

## Report on the IT Infrastructure Survey to inform PISA 2025

This report summarises the PISA IT Infrastructure Survey conducted in 2019 to inform the development of PISA 2025. The survey was responded by 17 countries/economies. It covers information about the devices and technology available in schools, the procedures used to currently administer PISA, as well as countries' requests and priorities for further development of PISA to better accommodate the countries' IT infrastructure.

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## Report on the PISA IT Infrastructure Survey

In 2019, the OECD Secretariat conducted a survey on countries' IT infrastructure to inform the implementation of the PISA 2025 cycle. This report, which summarises the survey findings, aims to help bidders for PISA 2025 understand the different kinds of IT situations in schools around the world, so they can include these considerations for the software set-up and respond to countries' priorities.

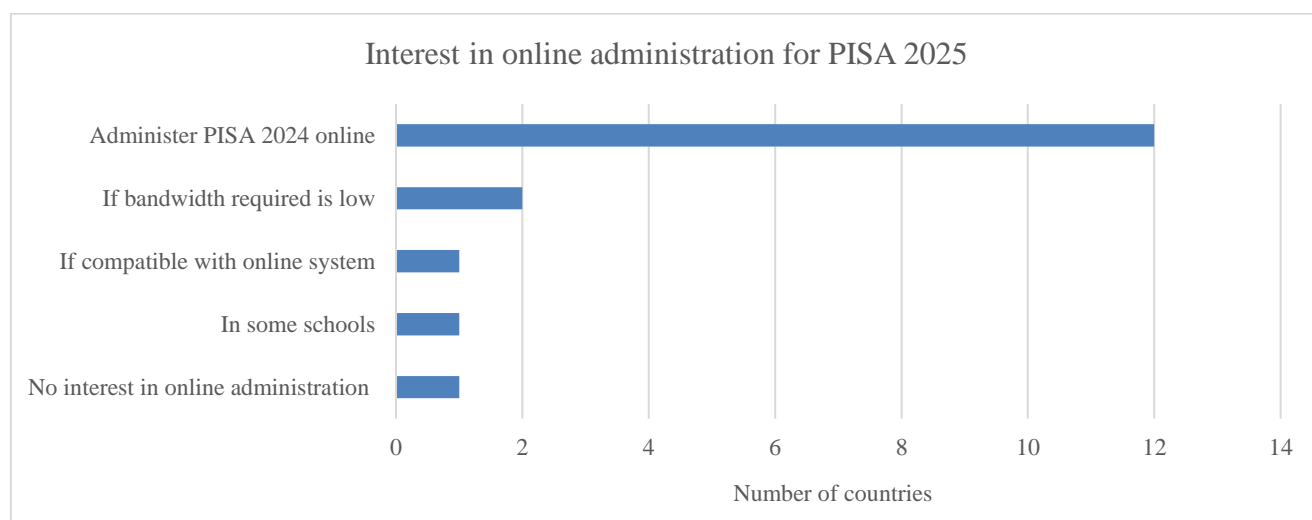
### Responses received

The OECD received responses from a total of 17 countries. The survey was responded by 10 National Project Managers, 4 PISA Governing Board Representatives, 1 Project Manager, 1 National Centre Staff and 1 National Data Manager. All countries, with the exception of one<sup>1</sup>, participated in the PISA 2022 cycle. Additionally, 15 countries were interested in a detailed trouble shooting guide for future versions of the delivery system.

### General IT infrastructure information

All 17 countries are currently administering PISA as a computer-based assessment (CBA) and all plan to administer the test in the same manner for the 2025 cycle. In principle, 12 countries would be interested in administering PISA 2025 online and 3 other countries expressed their potential interest if: the bandwidth required is sufficiently low (2 countries) and if it is compatible with their own online system (1 country). Additionally, 1 country intends to administer the test online in some schools and only 1 country has no interest in online administration.

**Figure 1. Interest in PISA 2025 online administration**



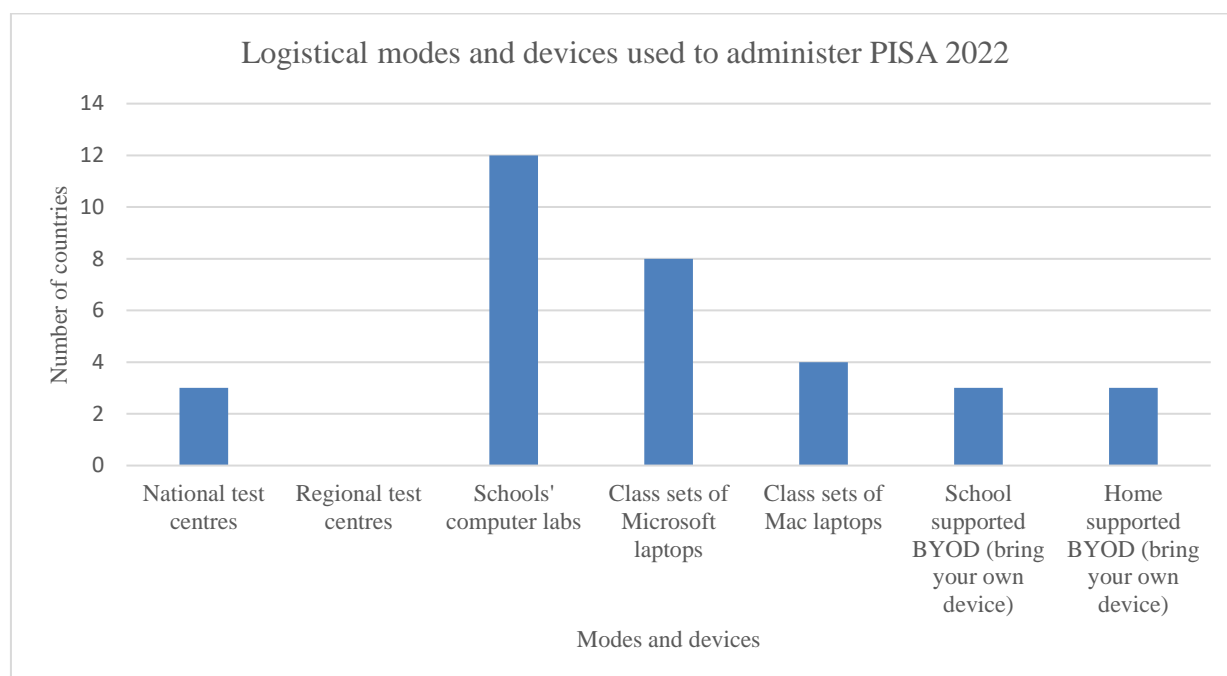
<sup>1</sup> Estonia's most recent participation was in PISA 2018.

Countries also provided information on the number of schools sampled for PISA each cycle, with an average of 280 schools sampled for the 17 countries. However, it is important to consider the number of schools may vary according to country size. The numbers provided ranged from 68 to 800 schools<sup>2</sup>.

### Logistical modes and devices used to administer PISA 2022 or the most recent cycle

Countries were asked about the different logistical modes and devices they used to administer PISA on the most recent cycle they participated. As can be observed in Figure 2, the most used mode and device of implementation is schools' computer labs (12 countries), followed by class sets of Microsoft laptops (8 countries) and class sets of Mac laptops (4 countries). Additionally, national test centres, school supported BYOD (bring your own device)<sup>3</sup> and home supported BYOD<sup>4</sup> were chosen 3 times each. No country reported using regional test centres for the administration of PISA 2022.

**Figure 2. Logistical modes and devices used to administer PISA 2022**



When asked about other logistical modes and devices, 10 countries reported the provision and management of laptops by different actors, such as national centres, the fieldwork agency and test administrators. One National Centre undergoes a procurement process in order to rent laptops for students and another one provides laptops leased by the Ministry of Education. Finally, one country relies on the use of a virtual desktop. For more information on other logistical modes and devices, see Annex 2.

### Logistical modes and devices planned for PISA 2025

Regarding the modes and devices planned for the administration of PISA 2025, a similar trend as in the past cycle was observed: 14 countries reported the use of school's computer labs and 10 mentioned the use

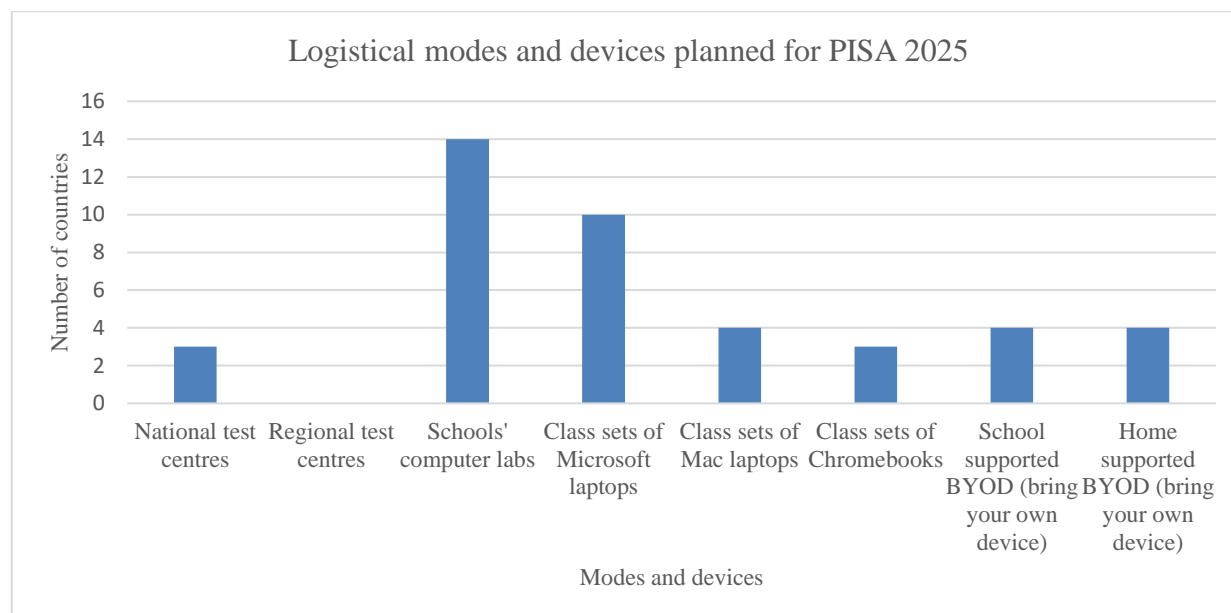
<sup>2</sup> For the complete list of number of schools sampled by countries see Annex 1

<sup>3</sup> Schools prescribe specifications and support purchase or purchasing decision.

<sup>4</sup> Decentralized device purchase supported through students' own households.

of class sets of Microsoft laptops. Class sets of Mac laptops, school supported BYOD and home supported BYOD, were chosen 4 times each, while 3 countries are planning to use national test centres and 3 other countries will use class sets of Chromebooks. No country is planning to use regional test centres.

**Figure 3. Logistical modes and devices planned for PISA 2025**



Additionally, 6 countries reported planning to include new modes and devices in their PISA 2025 setup, as shown in Table 1.

**Table 1. Countries including new modes and devices for PISA 2025**

Country	PISA 2022	PISA 2025
<b>Croatia</b>	National Centre provided Microsoft laptops for students in each school.	National Centre will provide Microsoft laptops only for schools with insufficient computers and <b>will introduce the use of school's computer labs.</b>
<b>Australia</b>	Use of school's computer labs, class sets of Microsoft laptops, class sets of Mac laptops, school supported BYOD and home supported BYOD. The National Centre also brought and managed Chromebooks and Mini-labs.	The country will use the same modes and devices and <b>will include the use of class sets of Chromebooks.</b>
<b>Belgium</b>	Use of school's computer labs. Test administrators brought Microsoft laptops.	The country will use the same modes and devices and <b>will add the use of class sets of Microsoft laptops.</b>
<b>Norway</b>	Use of school's computer labs, class sets of Microsoft laptops and class sets of Mac laptops. The country also brought laptops to a few schools.	Norway will use the same modes and devices and <b>will include the use of class sets of Chromebooks.</b>
<b>New Zealand</b>	Use of school's computer labs and class sets of Microsoft laptops. The Ministry also leased laptops to schools.	New Zealand will use the same modes and devices and <b>will include class sets of Chromebooks, school supported BYOD and home supported BYOD.</b>
<b>Dominican Republic</b>	National Centre provided Microsoft laptops to the schools.	Dominican Republic <b>will add the use of school's computer labs and class sets of Microsoft laptops.</b>

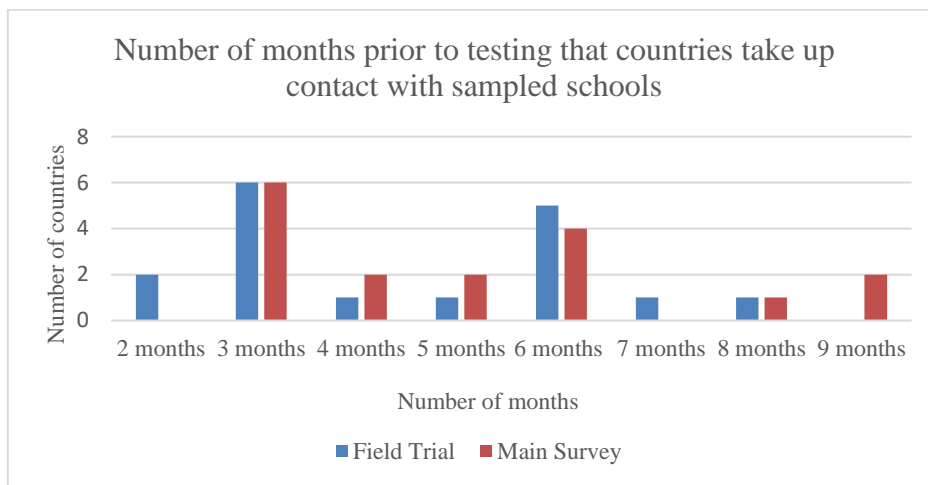
When asked about “*other logistical modes and devices*” for PISA 2025, 9 countries reported planning to rely on the provision of laptops by national centres, the fieldwork agency and test administrators, as they did for PISA 2022.

For more information on other logistical modes and devices for PISA 2025, see Annex 3.

### Countries contact with sampled schools before testing

Regarding the number of months that countries take up contact with sampled schools before testing, most countries (9) reported taking contact 4 to 8 months prior to the Field Trial. For the Main Survey, most countries (11) take up contact with 4 to 9 months of anticipation.

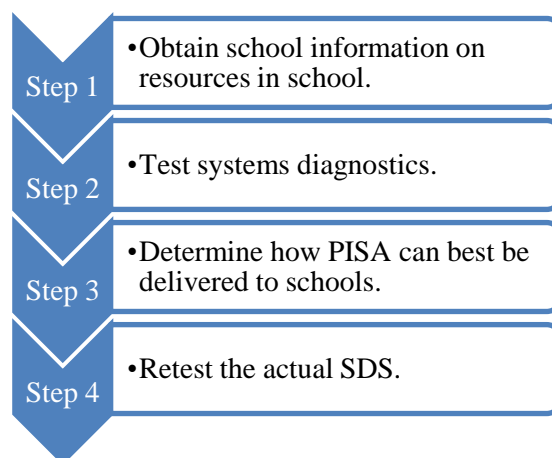
**Figure 4. Number of months prior to testing that countries take up contact with sampled schools**



### Process of planning with the schools until data collection

Countries described the process of planning with sampled schools until the data collection stage. For most countries (12), the planning process is organised in a similar order of steps as shown in Figure 5.

**Figure 5. Most common process of planning with schools**



Firstly, the National Centres obtain information from schools on the resources available for the test, such as devices, electricity, and space available. Afterwards, National Centres confirm schools' participation and proceed with the test of system diagnostics on selected machines with the help of school's IT coordinators. After obtaining the information on resources and testing systems diagnostics, National Centres determine how PISA can be best delivered to schools according to the resources available. This implies deciding on a schedule, number of assessment sessions, and providing devices to schools that have none. Finally, these countries retest the SDS on the devices a few weeks prior to the test with the help of the IT coordinator.

One of the 12 countries that follow this process, reported not sending schools the actual SDS for testing and instead, testing computers through the Diagnostics program. Another country mentioned having issues with the system diagnostic, because it does not reflect the compatibility of the SDS to run on a device and has asked PISA contactors for a mini-version of the SDS for PISA 2022.

On the other hand, 4 countries do not work with school devices and therefore their process of planning was different. In these cases, laptops are supplied to schools through two strategies: i) direct supply of laptops from National Centres (3 countries) and ii) public procurement process of rental of laptops and technical support (1 country). In these 4 cases, coordination with schools is limited to confirming schools' participation, determining the schedule, obtaining information on other relevant resources for the test implementation (electricity, space) and making arrangements for the delivery of laptops.

Finally, 1 country presented a simplified process, by relying on the use of a virtual environment that can be shared with school through a link. This virtual environment makes all school laptops compatible with SDS, thus not needing to rely on school's hardware and therefore skipping first steps related to information gathering and testing.

The detailed and complete responses on the process of planning with schools can be found in Annex 4.

## IT coordinators

Regarding the use of dedicated personnel, 10 countries mentioned working with IT coordinators in the sampled schools, 3 countries did not work with IT coordinators and 4 countries responded working with different personnel: i) a school technical assistant, ii) external technical support staff as part of a procurement process, iii) school coordinators, who are also in charge of IT coordination and iv) National Centre IT support staff from the Ministry of Education. Only 9 countries provide detailed descriptions to schools on the role of the IT coordinators.

**Table 2. Use of IT coordinators in schools**

Are you using IT coordinators in the schools you are testing in?	Number of responses
Yes	10
No	3
Other	4

Regarding the requirements for IT coordinators, most countries mentioned these were not specific, since this role is usually performed by school personnel. However, 4 countries mentioned the importance of working with IT coordinators who have full administration permissions to the school network so that settings can be changed as required. Countries also mentioned that a solid knowledge of the school's IT

equipment and the ability to modify their configuration were relevant requirements. Detailed information on the IT coordinators requirements for countries can be found in Annex 5.

### Other specialised IT personnel

When asked about the use of any other IT-specialized personnel on a local or national level, 8 countries responded affirmatively, 5 responded negatively and 4 selected “*other*”.

**Table 3. Use of specialised IT personnel**

<b>Are you using any other It-specialised personnel on a local or national level to support the testing and dissemination of the SDS or the IT support beyond what is described in the NPM Manual or the Technical Standards?</b>	<b>Number of responses</b>
Yes	8
No	5
Other	4

The 8 countries that use IT-specialised personnel, provided information on the roles, profiles and qualifications they consider. Most of these countries (5) worked with personnel from the National Centres’ IT divisions, while the others (3) work with IT staff from external organizations. The specialized IT personnel is required to run the diagnosis at schools, prepare the laptops and remove the data after the test. In terms of qualifications, countries look for personnel with relevant IT expertise, a basic knowledge of systems and Office package and one country works with university graduates from the Faculty of Electrical Engineering and Computing. More detailed information can be found in Annex 6.

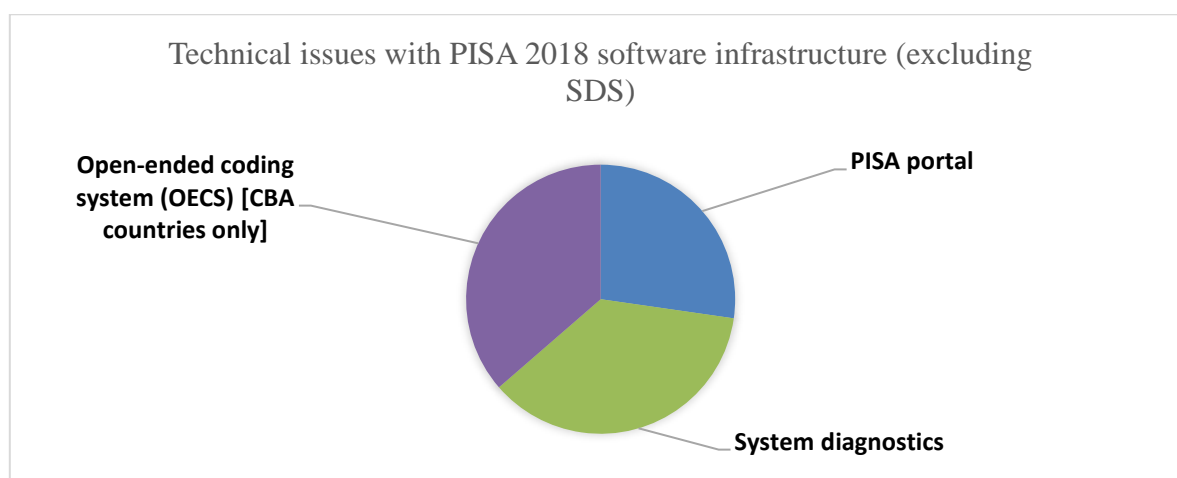
Within the group of countries that selected “*other*”, 3 mentioned that National Centres or IT personnel from the Ministry of Education provide support in the form of specialised technical advice, transportation of devices, national level helpdesk, etc., while the other country recruits specialised IT personnel as part of their procurement process.

### Technical issues with PISA 2018 software infrastructure (excluding SDS)

Regarding technical issues experienced with the PISA 2018 software infrastructure, 4 countries reported having problems with the system diagnostics, 4 countries had problems with the Open-ended coding system (OECS) and 3 countries reported issues with the PISA portal. No problems were mentioned with the Questionnaire authoring tool or the Open-ended reporting system (OERS).



**Figure 6. Technical issues with PISA 2018 software infrastructure (excluding SDS)**



The most common issues reported regarding these three components are summarised in Table 4<sup>5</sup>:

**Table 4. Additional comments on technical issues with PISA 2018 software infrastructure**

<b>System diagnostics</b>	<b>United Kingdom:</b> Problems of freezing, giving the impression that it had run satisfactorily, problems of compatibility of computers with SDS the day of the test administration. <b>Norway:</b> Does not test several factors relevant to ensure SDS will run on the computers.
<b>OECS</b>	<b>United Kingdom:</b> Did not experience technical issues, but could be more user friendly for markers and reviewers. <b>Ireland:</b> Slow OECS server speeds. <b>Switzerland and Italy:</b> Problems with files generation for the OECS. <b>New Zealand:</b> Failure in importing some zipped student batches, thus delaying coding.
<b>PISA portal</b>	<b>Ireland:</b> Organizational structure of the documents folders was not intuitive to our national center team. Difficulty in finding the correct location. <b>Denmark:</b> Need of a “Not relevant” option.

Additionally, 3 countries reported having 3 different problems: i) with the interaction between the OECS and DME<sup>6</sup>, ii) with the software infrastructure working on MAC and Linux and iii) with the SDS on USB keys.

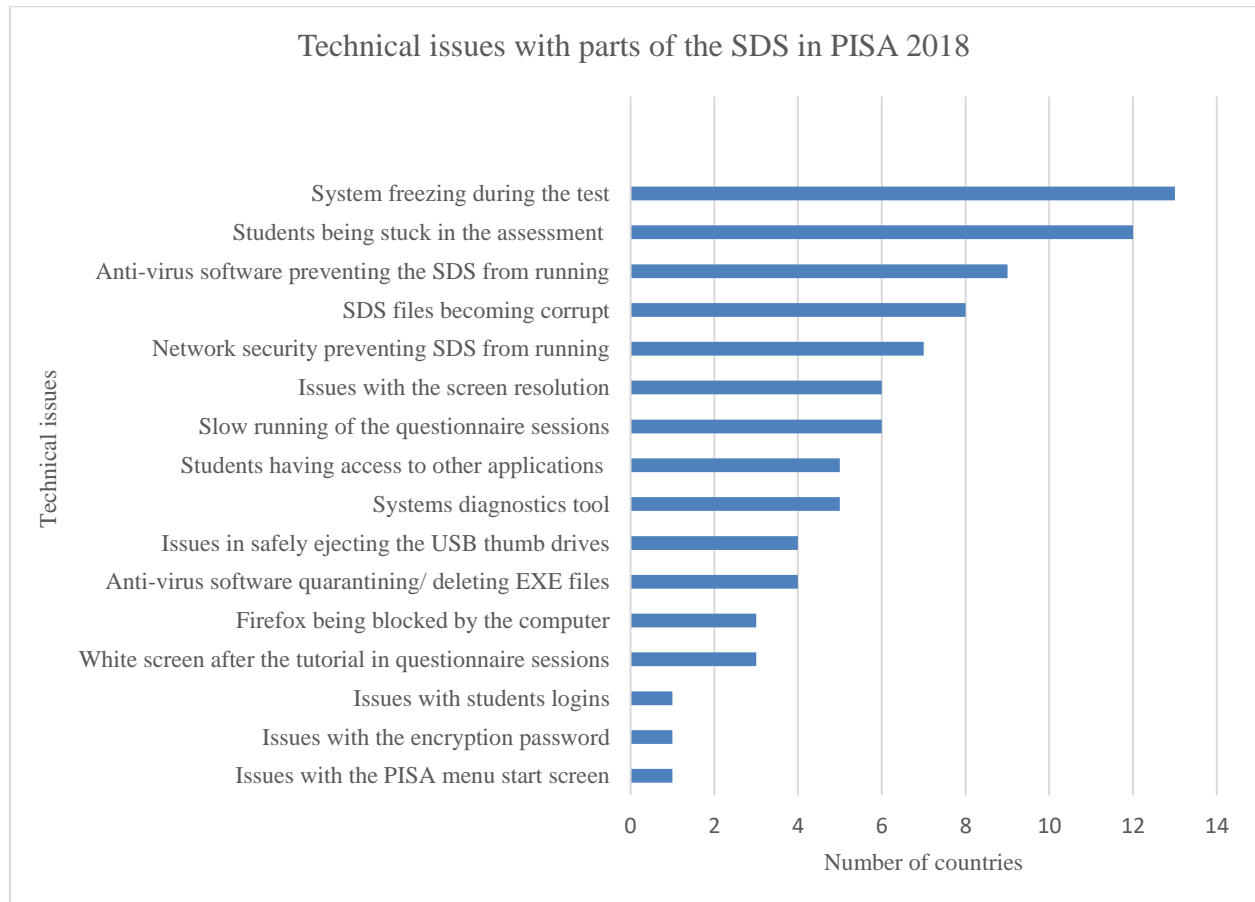
<sup>5</sup> A more detailed review of these problems and countries’ recommendations can be found in Annex 7.

<sup>6</sup> Ireland (complete response): With the interaction between the OECS and DME, there is no checking process for these softwares to interact with each other at the student level. For example, you need to wait until after coding is complete to import into DME, then you see students that have not been imported in the first place into the OECS. Despite tight upload, download procedures during and after testing, some data may not successfully upload into OECS and this is not necessarily by the system, until the end in the DME. A more integrated approach would be preferred. We note this is an issue, as we are limited to 3 uploads to the OECS, and therefore must keep 1 as a back-up for any missed student data when importing into DME.

## Technical issues with parts of the SDS in PISA 2018

Countries also reported experiencing different technical issues with parts of the student delivery system (SDS) in PISA 2018, as can be observed in Figure 7.

**Figure 7. Technical issues with parts of the SDS in PISA 2018**



The most pressing issues reported were: the system freezing during the test (13 countries) and students being stuck in the assessment unable to advance to the next screen (12 countries). This is followed by issues with the anti-virus software preventing the SDS from running (9 countries) and the SDS files being corrupt (8 countries). The least frequently mentioned issues were those related to students' logins, encryption passwords and the PISA menu start screen. It is worth mentioning that one of the countries that experienced problems with safely ejecting the USB thumb drives, also reported the loss of student data for the questionnaire<sup>7</sup>.

Countries provided additional information on some of the problems experienced. Regarding the system freezing, one country mentioned this issue could be due to the slow running of the SDS, while other commented that this problem led to administrators having to reboot the test. Other countries reported the SDS became corrupt midway through the test or after completion, with no warning during the system diagnostic. Some countries also believe problems with the SDS functioning is related to the local firewall

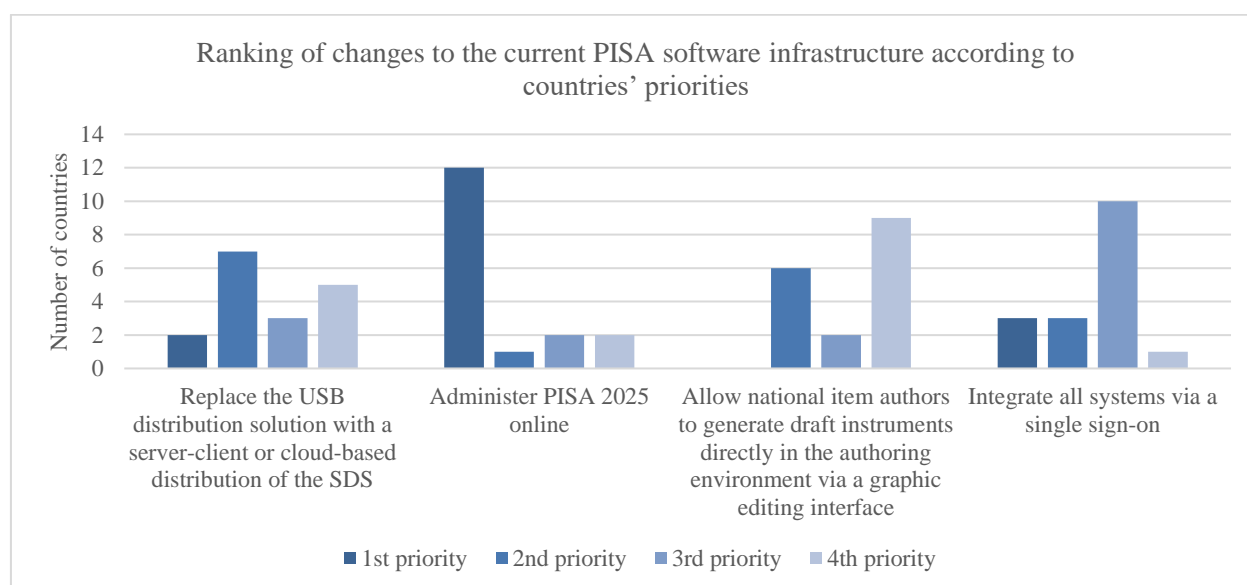
<sup>7</sup> Ireland (complete response): Some loss of data for students, where we know the student sat the test and questionnaire, but questionnaire session was never found on laptop or USB used to retrieve data from laptop.

or network security of schools. In one country, there is concern that schools will not further allow the use of USB drives on school computers due to ICT safety policies. Finally, countries also demanded additional guidance for solving issues with screen resolution. More detailed information can be found in Annex 8.

### Ranking of changes to the current PISA software infrastructure according to countries' priorities

As part of the survey, countries were asked to rank the changes to the current PISA software infrastructure from 1<sup>st</sup> to 4<sup>th</sup> priority. As can be observed in Figure 8, the most important priority for countries seems to be the online administration of PISA 2025, which was selected as number one priority by 12 countries. This is followed by the replacement of the USB thumb drive distribution solution with a server-client or cloud-based distribution of the SDS, which was selected as second priority by 7 countries. The integration of all systems via a single sign-on was ranked as third priority by 10 countries and allowing national item authors to generate draft instruments directly in the authoring environment via a graphic editing interface, was selected as fourth priority by 9 countries.

**Figure 8. Ranking of changes to current PISA software infrastructure**



## Additional comments

In the last section of the survey, 10 countries provided additional comments and recommendations on the PISA software infrastructure and the student delivery system (SDS), which should be considered for a better implementation in future cycles.

**Table 5. Additional comments**

<b>Singapore</b>	It would be very helpful to receive the technical specifications for the SDS by early October so that we can check that our schools IT infrastructure are able to meet the specifications before the schools close for the end-of-year long vacation. Furthermore, if there is any major deviation of the technical specifications from the most recent PISA cycle (e.g., from PISA 2015 to PISA 2018 there was a switch from USB 2.0 to USB 3.0; known conflicts of SDS with certain commonly used anti-virus software), it would be very helpful to inform countries as early as possible so that early provisions (such as budget) can be made to meet the SDS technical specifications.
<b>United Kingdom</b>	A comprehensive solution would incorporate online assessment and student data management functions.
<b>Ireland</b>	We are interested in further developments in the CBA delivery of the assessment, but we are mindful of how technological advancements will impact testing in a country where broadband availability is not evenly spread. Ideally, any move to an online testing system will run in parallel to the traditional SDS system, allowing us to accommodate testing in areas with poor or no broadband connectivity.
<b>Malta</b>	The OECS used in the PISA 2018 MS was a huge improvement over the FT version, and for that we are grateful. No extraordinary problems were encountered: indeed, we had a very smooth CBA administration of the MS.
<b>Switzerland</b>	We do miss the SDS for Linux We do have more problems with the SDS on Mac than on PC.
<b>Australia</b>	Thank you for undertaking this survey to better understand the needs of PISA participants, and to overcome the technical issues that countries, like ourselves continue to encounter.
<b>Belgium</b>	We will not be able to use the PISA online test on Chromebooks because neither the schools nor the organization that provides us with the laptops we bring to schools have them. The best solution for us would be to have both an online test, independent (incomplete response).
<b>Italy</b>	We would like the SDS to be compatible with the non-Windows operating systems, in particular, the LINUX operating system which in some of our regions is the standard operating system in use in school laboratories.
<b>Norway</b>	It is important that we have a version of the SDS that is compatible with Chromebooks in PISA 2022. An online solution that works on all or most types of computers would be preferable.
<b>New Zealand</b>	Broadly the SDS worked well and as expected.

## Annex: Alternative tables

### *Annex 1. General information on modes of assessment and General IT infrastructure information*

Country/ economy name	Is your country/ economy currently administering PISA as a computer-based assessment (CBA)?	Does your country/ economy plan on administering PISA 2025 on computer (CBA)?	Is your country/ economy in principle interested in administering PISA 2025 online (non- binding informal expression of interest)?	Please specify the number of schools sampled for PISA each cycle (until PISA 2022). Kindly provide the most recent figure.
<b>Singapore</b>	Yes	Yes	Yes	168
<b>United Kingdom</b>	Yes	Yes	Yes	430
<b>Colombia</b>	Yes	Yes	Yes	265
<b>Ireland</b>	Yes	Yes	Maybe <sup>8</sup>	158
<b>Malta</b>	Yes	Yes	Maybe <sup>9</sup>	68
<b>Croatia</b>	Yes	Yes	Yes	183
<b>Thailand</b>	Yes	Yes	Maybe <sup>10</sup>	291
<b>Switzerland</b>	Yes	Yes	Yes	220
<b>Poland</b>	Yes	Yes	Partially <sup>11</sup>	250
<b>Australia</b>	Yes	Yes	Yes	800
<b>Belgium</b>	Yes	Yes	Yes	120
<b>Italy</b>	Yes	Yes	Yes	550
<b>Denmark</b>	Yes	Yes	Yes	330
<b>Norway</b>	Yes	Yes	Yes	254
<b>New Zealand</b>	Yes	Yes	Yes	210
<b>Dominican Republic</b>	Yes	Yes	No	242
<b>Estonia</b>	Yes	Yes	Yes	231
<b>Total 'Yes' out of 17</b>	<b>17</b>	<b>17</b>	<b>12</b>	

<sup>8</sup> Our level of interest would really depend on the bandwidth required to complete the assessment. Broadband provision in Ireland is unevenly spread throughout the country. Ideally, a version of the test that does not use the internet would be available for use in schools where the broadband provision is unreliable.

<sup>9</sup> Online participation depends on whether large amounts of data are being uploaded simultaneously during the test.

<sup>10</sup> If it compatible with our online system.

<sup>11</sup> In some schools

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**Annex 2. Other logistical modes implemented in PISA 2022**


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<b>Singapore</b>	-
<b>United Kingdom</b>	-
<b>Colombia</b>	-
<b>Ireland</b>	The National Centre rented laptops and sent them to Technical Support personnel who brought them to schools on the day of testing. The SDS was uploaded onto the hard drive of the laptops, and technical support staff exported the data after testing.
<b>Malta</b>	Additional laptop computers are provided by the national center.
<b>Croatia</b>	National Centre provides Microsoft laptops for students in each school.
<b>Thailand</b>	-
<b>Switzerland</b>	Special case: virtual desktop
<b>Poland</b>	Laptops rented by fieldwork agency
<b>Australia</b>	Chrome books; Mini-labs (sets of laptops brought into the school and managed by the National Centre)
<b>Belgium</b>	Microsoft laptops brought by test administrators
<b>Italy</b>	laptops provided by the National Center
<b>Denmark</b>	-
<b>Norway</b>	We aim to use the schools' own machines, but we are ready to bring machines to a small number of schools that cannot implement the study on their own machines (in 2018 we provided machines for around 20 schools).
<b>New Zealand</b>	Taking Ministry-leased laptops into schools
<b>Dominican Republic</b>	Microsoft laptops are brought to the schools for the test.
<b>Estonia</b>	-

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***Annex 3. Other logistical modes to be implemented in PISA 2025***


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<b>Singapore</b>	-
<b>United Kingdom</b>	-
<b>Colombia</b>	-
<b>Ireland</b>	We will use the same model outlined above, unless PISA introduce changes.
<b>Malta</b>	It is envisaged that the national center will provide schools with additional laptop computers.
<b>Croatia</b>	National Centre provides Microsoft laptops for schools with insufficient number of school computers.
<b>Thailand</b>	-
<b>Switzerland</b>	Special case: virtual desktop
<b>Poland</b>	Laptops rented by fieldwork agency
<b>Australia</b>	-
<b>Belgium</b>	Microsoft laptops brought by test administrators
<b>Italy</b>	laptops provided by the National Center
<b>Denmark</b>	-
<b>Norway</b>	-
<b>New Zealand</b>	Taking Ministry-leased laptops into schools
<b>Dominican Republic</b>	As we have done, we would bring laptops to school for the administration of PISA tests.
<b>Estonia</b>	-

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#### *Annex 4. Process of planning with schools until data collection*

<b>Singapore</b>	<p><b>Context:</b> The Ministry of Education has an Information Technology Division (ITD) which manages the IT system and infrastructure in public schools (whose students comprise more than 90% of our 15-year-old student population). The National Centre (a division in the Ministry) works closely with ITD in ensuring that the IT infrastructure in public schools is able to support the PISA computer-based assessment.</p>
	<p><b>Step 1:</b> Obtain school information on the operating system of the laptops used and the types (e.g., touchscreen, tablets), as well as whether there are plans for the schools to upgrade the laptops during the data collection period.</p>
	<p><b>Step 2:</b> With the assistance of ITD, conduct systems diagnostics and test the actual SDS on all the commonly used laptops in public schools.</p>
	<p><b>Step 3:</b> School-based IT technical assistant (in all schools) to conduct systems diagnostics on all laptops that will be used in the assessment.</p>
	<p><b>Step 4:</b> PISA Test administrator to test all the USB drives with the SDS upon receiving the assessment material (about 2 weeks prior to the assessment date).</p>
<b>United Kingdom</b>	<p>We will send schools a link to test internet speed and latency, and accessibility of the Amazon Workspace platform. The virtual environment will contain the system resources required to run the SDS, and is therefore independent of the schools' own hardware.</p>
<b>Colombia</b>	<p><b>Step 1:</b> Socialize the study with all sampled schools.</p>
	<p><b>Step 2:</b> Confirm schools participation (phone call).</p>
	<p><b>Step 3:</b> Send information and formats to be completed by confirmed schools (e-mail).</p>
	<p><b>Step 4:</b> Confirmed schools send completed formats (e-mail).</p>
	<p><b>Step 5:</b> Test systems diagnostics on selected machines with help of schools' IT coordinators (run SDS test).</p>
	<p><b>Step 6:</b> Send to the schools the list of selected students.</p>
	<p><b>Step 6:</b> Send to the schools the list of selected students.</p>
	<p><b>Step 7:</b> Confirm to the schools the date and time of administration of the test. Modify this schedule if the school has a problem with the original date or time.</p>
	<p><b>Step 8:</b> Administration of the test.</p>
<b>Ireland</b>	<p><b>Step 1:</b> Procurement of laptop rental and technical support personnel via government public procurement process.</p>
	<p><b>Step 2:</b> Contracts awarded to a laptop rental company, and several technical support companies (in different testing regions).</p>
	<p><b>Step 3:</b> Laptop rental company loads the SDS onto the hard drive of each laptop.</p>
	<p><b>Step 4:</b> Laptops sent to regional technical support companies.</p>
	<p><b>Step 5:</b> Laptops are subject to testing by technical support companies (hardware and SDS are tested). Replacements are procured where necessary.</p>
	<p><b>Step 6:</b> Technical support staff bring a set of laptops to each school on the day of testing. They monitor the computer and software performance and intervene in cases of technical failure (both hardware and SDS).</p>
	<p><b>Step 7:</b> Post-testing, technical support staff harvest testing data from each laptop and upload the data at a later time to the cloud (usually that evening or the following morning).</p>
	<p><b>Step 8:</b> After the testing window has closed, technical support staff test the laptops again and log any faults. They also do a final sweep of the laptops for any data that may have been missed.</p>
	<p><b>Step 9:</b> Laptops are returned to the rental company. All data is purged from the systems.</p>
<b>Malta</b>	<p><b>Step 1:</b> Obtain school information on resources in school (types of resources, number of resources, specifications of resources) and develop initial resource plan for testing.</p>
	<p><b>Step 2:</b> Test systems diagnostics on selected machines with help of schools' IT coordinators.</p>
	<p><b>Step 3:</b> Determine how PISA can best be delivered to schools (choice of resources, take decisions on scheduling taking into account resource availabilities, determine number of assessment sessions, make alternative arrangements).</p>
	<p><b>Step 4:</b> Retest the actual SDS on the resources with the help of the IT coordinator (a few weeks prior to testing).</p>



<b>Croatia</b>	<b>Step 1:</b> National Centre develops plan for testing
	<b>Step 2:</b> National Centre informs schools that they have been selected for participation in PISA
	<b>Step 3:</b> IT personnel in National Centre test systems diagnostics on NC's laptops and retest the actual SDS on laptops
	<b>Step 4:</b> National Centre schedules PISA administration in each school, makes arrangements for the delivery of laptops in each school and sends test administrators to schools who conduct the assessment with the help of school coordinators
<b>Thailand</b>	<b>Step 1:</b> Obtain school information on resources in school (types of resources, number of resources, specifications of resources) and develop initial resource plan for testing.
	<b>Step 2:</b> Test systems diagnostics on selected machines with help of schools' IT coordinators.
	<b>Step 3:</b> Determine how PISA can best be delivered to schools (choice of resources, take decisions on scheduling taking into account resource availabilities, determine number of assessment sessions, make alternative arrangements).
	<b>Step 4:</b> Retest the actual SDS on the resources with the help of the IT coordinator (a few days prior to testing).
<b>Switzerland</b>	<b>Step 1:</b> Obtain school information on resources in school (types of resources, number of resources, specifications of resources) and develop initial resource plan for testing.
	<b>Step 2:</b> Determine how PISA can best be delivered to schools 2a) Organize laptops for schools that don't have any or not appropriate ones 2b) Test systems diagnostics on selected machines with help of schools' IT coordinators, if the school has own laptops
	<b>Step 3:</b> Sampling of students
	<b>Step 4:</b> Take decisions on scheduling taking into account resource availabilities, determine number of assessment sessions, and make alternative arrangements.
	<b>Step 5:</b> Test administrator calls the school coordinator to validate all the given information and asks for any problems with SDS in January and possible computer system changes since then.
<b>Poland</b>	We get information from schools on the size of rooms designed for testing and we decide if all students can participate in the study in one room (or in two or three rooms). We don't use school devices.
<b>Australia</b>	<b>Step 1:</b> National Centre requests nomination of an IT Coordinator in each sampled school.
	<b>Step 2:</b> National Centre asks the IT Coordinator to complete the Computer Resources Form. This form captures the details of the IT infrastructure in the school. IT asked questions about the type of computer (desktop, laptops, Chromebooks, tablets etc.; the operating system (Windows, Mac etc.); the location of the devices (computer lab, class set of laptop, BYOD); the number of devices; and restrictions on running an executable file.
	<b>Step 3:</b> The National Centre reviews the collected information from the Computer Resources Form and ascertain how best to administer PISA (For example, if a school has desktops and laptops, then the National Centre preference would be to use a desktop computer over a laptop).
	<b>Step 4:</b> The National Centre ask the IT Coordinator to assess the compatibility of running the SDS on the computers deemed most preferable. At this point the System Diagnostic has been used for this purpose, however our experience has shown that it is not fit-for purpose because it does not accurately reflect the compatibility of the SDS to run on a device. We have asked the PISA 2022 contractors to improve this by replacing the Systems Diagnostic with a mini-version of the SDS, which will then accurately determine if the SDS will run on schools' devices.
	<b>Step 5:</b> The National Centre liaises with IT experts in each of the education sectors to lift any restrictions centrally that may prevent the SDS from running.
	<b>Step 6:</b> For schools where the SDS cannot run on school devices, the National Centre then works individually with each school to determine how PISA can move forward.
	<b>Step 7:</b> The National Centers prepares the test schedule, taking into account the number of computers/laptops etc. available to determine the number of test sessions that need to be held in each school.
	<b>Step 8:</b> Approximately 4-6 weeks before the (first) test session, the National Centre contacts the IT Coordinator to retest computers that students will be sitting PISA.
	<b>Step 9:</b> The TA contacts the sampled approximately 1-2 weeks before the (first) test session and confirm that the computers have been retested, that the SDS will be able to run (this may include the IT Coordinator having to set up temporary accounts so executable files can run), and organize to be able to have access to the test room 1 hours before the assessment to launch the SDS, and have the SDS ready for students to start the test when they arrive.
	<b>Step 10:</b> On the day of the assessment, the IT Coordinator and TA can contact the National Centre if there are any technical issues (In PISA 2018, we encountered several different technical issues that could not be resolved and resulted in some students not being able to sit PISA.).

	<p><b>Step 11:</b> After the test, the IT Coordinator in the presence of the TA manages the student response data for return to the National Centre. (In PISA 2018, this process was time consuming and not the most efficient way to collect the files.)</p>
<b>Belgium</b>	<p><b>Step 1:</b> Sending of the manual and the necessary equipment for the diagnosis of school computers.</p> <p><b>Step 2:</b> If necessary, telephone support to the IT manager or, if there is none, to the school coordinator to carry out the diagnosis of the school computers and, if possible, adapt their configuration so that they are compatible with the SDS. If so, description on the diagnostics report of the configuration changes made so that the information is available on the day of the PISA test.</p> <p><b>Step 3:</b> Collection of the following information in the schools: the possible dates for the PISA test, the number of SDS compatible computers available in the school, the distribution of these in different classes, the availability of classes with power outlets for the installation of the NC laptops if necessary.</p> <p><b>Step 4:</b> Choice of PISA test date based on usable school computers and availability of NC laptops, which will be provided by test administrators.</p> <p><b>Step 5:</b> Launch of the diagnosis during the implementation of the SDS (USB keys) on the school computers by the TAs with the help of the IT manager, if the school has one, before the arrival of the students in the classes.</p>
<b>Italy</b>	<p><b>Step 1:</b> FIRST CONTACT. Obtain preliminary information about IT resources with school principals (number of schools labs, number of pc, how old is the equipment, location of the schools' labs).</p> <p><b>Step 2:</b> DEFINE A SCHOOL COORDINATOR. The school director appoints a school coordinator responsible for the project within the schools' teachers.</p> <p><b>Step 3:</b> SYSTEM DIAGNOSTIC AND LOGISTIC. Determine the IT schools' labs computer compatibility and if external IT resources are needed.</p> <p><b>Step 4:</b> NUMBER OF TEST SESSIONS AND DATES. Define the number of the test sessions, the dates of the test and the computer labs that will be used.</p> <p><b>Step 5:</b> ROUND UP BEFORE THE TEST. Test of final SDS before the beginning of the test sessions Bring and set up the external laptops for the period of testing and test it (external IT technicians).</p>
<b>Denmark</b>	<p><b>Step 1:</b> Obtain school information on resources in school (types of resources, number of resources, specifications of resources) and develop initial resource plan for testing.</p> <p><b>Step 2:</b> Test systems diagnostics on selected machines with help of schools' IT coordinators.</p> <p><b>Step 3:</b> Determine how PISA can best be delivered to schools (choice of resources, take decisions on scheduling taking into account resource availabilities, determine number of assessment sessions, make alternative arrangements).</p> <p><b>Step 4:</b> Retest the actual SDS on the resources with the help of the IT coordinator (a few weeks prior to testing).</p>
<b>Norway</b>	<p><b>Step 1:</b> Obtain school information on resources (types and number of computers).</p> <p><b>Step 2:</b> Determine whether schools' computers can be used, or if we need to find other solutions.</p> <p><b>Step 3:</b> Test SDS on school computers some weeks prior to the test window.</p> <p><b>Step 4:</b> Retest SDS on school computers a few days before the test date.</p>
<b>New Zealand</b>	<p>As per example with no Step 4 - it was never recommended to send schools the actual SDS for testing; we recollect that procedures required testing school computers via the Diagnostics program only. If school asks us to bring in (Ministry-leased) laptops, we go straight to Step 3 above.</p>
<b>Dominican Republic</b>	<p><b>Step 1:</b> Obtain school information about space, (classroom size and on what floor they at), electricity, outlets regularity power voltage, if they have power generators, (in our country electricity is unstable and there are power cuts often).</p> <p><b>Step 2:</b> If necessary an electrician and IT staff from the district will be sent to school to check.</p> <p><b>Step 3:</b> Inform schools about schedules and the process. We do not use computers or laptops of the schools (only a few have). All the laptops are brought and installed early the same day of the administration for the PISA test. Power generator and batteries are also brought in case there is no electricity or a power cut. These laptops are previously checked and tested by IT staff at the national center.</p>
<b>Estonia</b>	<p><b>Step 1:</b> Obtain school information on school computers (NC provides specifications).</p> <p><b>Step 2:</b> Schools test systems diagnostics with the USBs provided by NC. It is done by school's IT coordinator. They provide written feedback to the NC.</p> <p><b>Step 3:</b> Determine how PISA can best be delivered to schools (choice of resources, take decisions on scheduling, determine if school needs additional computer support, determine number of assessment sessions).</p> <p><b>Step 4:</b> Testing in schools.</p>

### *Annex 5. Requirements for the school IT Coordinators*

<b>Singapore</b>	We enlist the assistance of the school-based IT technical assistant to (1) check the laptops that will be used for PISA are able to fulfill the technical specifications, and (2) troubleshoot technical problems during the PISA session.
<b>United Kingdom</b>	No specific profile for the role, the person must have full administrator permissions to the school network, with the ability to open firewall ports.
<b>Colombia</b>	The IT coordinator of the school is usually the teacher in charge of the computer lab.
<b>Ireland</b>	We recruit external IT coordinators (we refer to them as Technical Support staff). They are recruited as part of the procurement process referred to in earlier responses to this survey. Generally, they are IT specialists working for an IT Support company.
<b>Malta</b>	The school IT coordinators are IT technicians employed by the schools and providing support to teachers and students during the school year. Public schools are employed following a call for applications listing the required qualifications and experience while private schools draw up the employment requirements themselves.
<b>Croatia</b>	N/A
<b>Thailand</b>	School staff who is responsible for IT and computer in school.
<b>Switzerland</b>	He needs to test all the computer with the SD and send back detailed information - he needs to be in the school in the morning, when the test administrator is arriving (at latest 1h before the test starts) - he needs to be available for questions all (incomplete answer).
<b>Poland</b>	Not applicable.
<b>Australia</b>	The IT Coordinator is a member of school staff that manage the IT infrastructure in the school and has extensive IT knowledge. They have to be able to have full authorization to change settings and admin rights as required. The responsibilities of the IT Coordinator are: Providing detailed information about the schools' computer resources. Testing the technical readiness of school computers to run the PISA software. Enabling the PISA software to run on computers. Meeting the Test Administrator on the day of the assessment. Providing technical assistance (if required) on the day of the assessment. Providing the Test Administrator with access to a school computer after the assessment (so that the student response data can be copied for return to ACER). Please note: The National Centre develops an IT Coordinator Manual to guide the IT Coordinator in completing their tasks for PISA.
<b>Belgium</b>	Knowledge of the school's IT equipment and ability to modify their configuration. Access as an administrator to computers. Ability to create a new user account, dedicated to the PISA test, to prevent parameters of an already used account from interfering with the SDS. Possibility when this is the case, to request the adaptation of the computer configuration to the external manager, in charge of the computers.
<b>Italy</b>	The school IT coordinator is part of the school's staff. They are usually teachers. Our requirement is that they are expert or familiar with IT devices, if possible.
<b>Denmark</b>	The school ordinary IT coordinator.
<b>Norway</b>	We do not have any particular requirement. We recommend to the school associate that someone from the schools' IT staff helps out with administering the test on the schools' computers.
<b>New Zealand</b>	That they know the school's ICT systems and have administrative rights to enable the SDS to run.
<b>Dominican Republic</b>	Profile: Systems engineering professional or student. Advanced management of Microsoft Windows, computer assembly and repair knowledge, basic database knowledge, technical English management ADDITIONAL COMPETENCES: Ability to work under pressure. Goal oriented and attention to details. Ability to dialogue and work with multidisciplinary teams. Good interpersonal relationships. Willingness to move to different parts of the country for several days, and willingness to work after hours if required.
<b>Estonia</b>	No specific requirements for the school IT coordinators.

### *Annex 6. Roles, profiles and qualifications of additional IT personnel*

<b>Country</b>	<b>If you are using additional IT personnel, please describe their roles, profiles and qualifications.</b>
<b>Singapore</b>	The National Centre works closely with officers from the Information Technology Division to ensure the school IT infrastructure is able to support the PISA assessment in the public schools. They are personnel with the relevant IT expertise.
<b>United Kingdom</b>	Pearson has internal cloud services development and support teams who will be leading on the set up and maintenance of the online SDS platform hosting the SDS. A separate customer service team will be trained to trouble shoot issues leading up to and during the assessment date.
<b>Colombia</b>	We have a contractor, who is in charge of the administration process in each school. This entity has IT personnel who run the diagnosis in the school. We only require them to have basic knowledge of systems and the Office Package.
<b>Ireland</b>	-
<b>Malta</b>	-
<b>Croatia</b>	Personnel from the IT department at the National Centre prepares the laptops for schools. The test administrators who conduct the assessments in schools are university graduates at the Faculty of Electrical Engineering and Computing.
<b>Thailand</b>	IT specialist of national center.
<b>Switzerland</b>	-
<b>Poland</b>	-
<b>Australia</b>	-
<b>Belgium</b>	-
<b>Italy</b>	1) internal school's IT technician, responsible for computer labs 2) external IT agency's technician appointed and trained by the National Center to provide IT resources and assistance to participating schools
<b>Denmark</b>	-
<b>Norway</b>	We receive some guidance from the IT staff at the department where the national center is located.
<b>New Zealand</b>	We contract an ICT organization to image the laptops and USBs with the SDS software, to manage ICT logistics and to securely remove all student data (and SDS) after testing.
<b>Dominican Republic</b>	-
<b>Estonia</b>	-

## Annex 7. Additional comments on technical issues with PISA 2018 software infrastructure

<b>Singapore</b>	No issues.
<b>United Kingdom</b>	In the 2018 MS, the <b>system diagnostics</b> was used in schools and it appears to have frozen. When schools saw that no errors were reported on screen they assumed it had run satisfactorily. When TAs came to schools to administer the tests, the computers were not suitable for the SDS. Only when we reported our problems to ETS were they able to explain that this was one of the problems affecting our administration. ETS then provided an additional file to run as part of the diagnostic test. On the <b>OECS</b> , we did not experience technical difficulties, but it could be made more user friendly for both markers and reviewers. It would be streamlined if it remembered your previous selections (e.g. if you select a language and a subject to then go into item marking/reviewing, if the language and subject were 'remembered' when you want to select the next item for marking or reviewing. Also, if markers/reviewers wanted to review the marking it would work better if you could type in the script number you want to jump to rather than having to click through them all. On the reliability tables, it would allow you to monitor reliability from the start if it only calculated reliability based on the marked scripts, rather than including the unmarked scripts in the calculation. The current system means that you can only get a true picture of the reliability rates once all (or nearly all) of the marking is complete, by which point, markers then have to go back to the beginning if there is an issue.
<b>Colombia</b>	No issues
<b>Ireland</b>	<b>Portal comment:</b> While the strict technical side of the portal was extremely functional, there are two things to point out. First, the organizational structure of the documents folders was not intuitive to our national center team. It can be very difficult to find the correct location. This mainly occurred when trying to find resources, rather than when related to a task that just went live (we would receive an email with file location). This organizational structure could be improved. Second, the task widget. This is a great idea, excellent for submitting and receiving files. However, tasks with national timelines were sometimes inputted incorrectly, this needs to be addressed. Otherwise a very efficient way to communicate between contractor and national center. <b>OECS comment:</b> As an early testing country, we encountered several issues related to the OECS. First, we had slow OECS server speeds in both our Main Study and autumn testing feasibility study, in the case of the MS, this was short-lived. In the autumn study, this lasted for longer, 1-2 days. A separate issue, deferrals were not marked as resolved in the system, despite being coded by the supervisor (we tried alternative browsers and cleared the cache and history no improvement) but we did receive assistance from OECS support in our attempt to resolve the issue. A separate recommendation, several of the team have noted that it would be useful to move the record code button to closer to the number code buttons. The current position requires a lot of moving across the screen, past the other navigation buttons. It may also be useful to repeat the number code radio buttons at the bottom of the screen, in a similar vein to the navigation buttons. This would help with longer items that require the coder to scroll.
<b>Malta</b>	Not applicable.
<b>Croatia</b>	There were no issues.
<b>Thailand</b>	No issues.
<b>Switzerland</b>	2015 & 2018: problems with generating the files for the <b>OECS</b> ; help by Mike, but some files had been generated twice and other weren't: we missed some answers while coding and had to code again 6 months later 2018: <i>firefoy</i> issues with the <b>SD</b>
<b>Poland</b>	No issues
<b>Australia</b>	In PISA 2018, the Australian National Centre provided ETS and also the OECD, a comprehensive overview of the technical issues encountered during PISA 2018. At this point, we are concerned about the <b>SDS</b> for PISA 2022. Please contact us if you require this document.
<b>Belgium</b>	We faced incomplete data extractions when using the Results Extractor. The program has been corrected during the MS2018.
<b>Italy</b>	Major Issues during 2015 cycle with <b>OECS</b> : PDF generation process.
<b>Denmark</b>	I needed a "Not relevant" option.
<b>Norway</b>	<b>System diagnostics</b> do not test several factors that are important to ensure that the SDS will run on the computers. One example is that the SDS must be used on a computer with administrator rights or similar to be able to run.
<b>New Zealand</b>	<b>OECS</b> failed to import some of the zipped student batches and we had to seek help from ETS. This delayed the start of coding by a couple of days.
<b>Dominican Republic</b>	None
<b>Estonia</b>	No

## Annex 8. Additional comments on technical issues with PISA 2018- SDS

<b>Singapore</b>	There were some minor technical issues that were either resolved by the IT technical assistants or after some troubleshooting between the National Centre and the test administrators/IT technical assistants during the actual assessment (via phone call or onsite support).
<b>United Kingdom</b>	All problems experienced with the SDS were reported to ETS and we worked with Mike Wagner and colleagues to resolve them. Every USB stick was tested before being sent out for administration, to ensure the SDS launched correctly. Despite this, many <b>USB sticks failed to launch</b> in schools on the day of testing so pupils were unable to participate. Even when using the same brand/make of USB sticks we experienced different issues (some working and some not with various problems) so it was unpredictable. The SDS ran very slowly for many students, resulting in screen freezing etc. Sometimes the SDS corrupted midway through the test, so students had begun but were unable to complete the test.
<b>Colombia</b>	No issues.
<b>Ireland</b>	<b>System freezing during the test</b> , comment: This was minimal but did occur. We believe this was minimized due to high standard of hired laptops with SDS pre-loaded onto each machine, removing any issues with USB delivery. Issues with <b>screen resolution</b> , comment: We had issues with screen resolution; we were able to rectify this on hired laptops in first 2 days of testing. More guidance could be provided on how to ensure this could be prevented. We had to quickly work out which settings worked best to ensure all students had the same size of test window on the screens.
<b>Malta</b>	The issues indicated above were encountered in only a small number of instances.
<b>Croatia</b>	There were no issues.
<b>Thailand</b>	Some students take the test without system problem but <b>USB drive</b> of those students were missing data files.
<b>Switzerland</b>	All the problems in both cycles 2015 & 2018, but more frequent in 2015.
<b>Poland</b>	<b>Screen resolution in SDS</b> app and Windows settings regarding size of elements (i.e. 100%, 125%, and 150%) are hard to bring them together. SDS shows test screens and questionnaires screens in different way (in different size). That's why we must change Windows settings so that test is shown on the whole screen and questionnaire is shown only on part of the screen (about 3/4). It would be helpful to change SDS so that questionnaire screens could be also set to whole screen. There was one or two cases when student performed "monkey test" (I think he was pressing shift key for several times) and he managed to get out from the SDS app. There were cases with <b>freezing SDS app</b> . On the screen one couldn't do anything. There were also cases when laptop (or Windows) was broken during the test. In these two types of issues we were giving student a new laptop but then merging results from two laptops is almost impossible. And when we had adaptive testing in Reading it is impossible for sure.
<b>Australia</b>	Please refer to our comments in the previous question.
<b>Belgium</b>	At the beginning of the MS2017, <b>USB keys</b> for which the diagnosis gave an OK result proved to be much too slow and therefore unusable. We had to replace them. - during the MS2017, on computers of a school, PISA test showed a white page after logging in to the students while all the points of the diagnosis performed just before and just after were OK. - During each FT or MS, sometimes the SDS does not work because of the configuration of the firewall or the antivirus. This situation is fortunately often corrected during the diagnosis.
<b>Italy</b>	For PISA 2015 the major technical issue has been <b>file corruption</b> after the test was completed, without incompatibility warning during the System Diagnostic which led to some cases of data loss. The other widespread procedural problem was <b>SDS freezing</b> during the test. It occurred in compatible PCs and it forced the administrator to reboot the test or the PC. In PISA 2018 the incompatibility with Skype for business caused a lot of System Diagnostic tests to fail at first instance because the program is running in background automatic execution in Office 2010. Several school coordinators needed assistance for deactivating Skype and going on with the test. In both cycles in some cases, it was difficult for <b>antivirus/firewall</b> software to detect the SDS as a safe software and it was necessary to deactivate security software for both diagnostic and test.
<b>Denmark</b>	I needed a "Not relevant" option.
<b>Norway</b>	Two major concerns for PISA 2022 is that: - there might be more schools that will not allow to use <b>USB drives</b> on the schools computers, due to ICT safety policies. - there might be more schools that are not willing to give administrator rights to students' computers, due to ICT safety - more schools will use Chromebooks and iPads, and thus not have computers that are compatible with the SDS
<b>New Zealand</b>	One or two schools reported that the Diagnostics program was OK but the <b>SDS</b> didn't run as expected. <b>SDS files becoming corrupt</b> - appears to mostly have been connected to laptops losing power or the <b>software freezing</b> . System freezing was infrequent but noticeable. A few 'unable to advance' - restarting the computer seemed to correct this. <b>Accessing other applications</b> - someone managed to take a photo of themselves and make it the screensaver.
<b>Dominican Republic</b>	In PISA 2018 we had an issue with the web server that runs as part of the SDS, it was related with the web service start up. It was fixed applying a patch.
<b>Estonia</b>	The biggest issue was as the add-on plugin that prevented from starting the test.