



# PISA 2018 Reading Literacy Framework

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# **PISA 2018 – DRAFT READING LITERACY FRAMEWORK**

## **INTRODUCTION**

### **Reading as the major domain**

PISA 2018 marks the third time reading is a major domain and the third time that the framework receives a major revision. Such a revision must reflect the changing definition of reading literacy as well as the contexts in which reading is used in citizens' lives. Thus, the present revision of the framework builds on contemporary and comprehensive theories of reading literacy as well as considers how students acquire and use information across broad contexts.

We live in a rapidly changing world, in which both the quantity and variety of written materials are increasing and where more and more people are expected to use these materials in new and increasingly complex ways. It is now generally accepted that our understanding of reading literacy evolves along with changes in society and culture. The reading literacy skills needed for individual growth, educational success, economic participation and citizenship 20 years ago were different from those of today; and it is likely that in 20 years' time they will change further still.

The goal of education has continued to shift its emphasis from the collection and memorisation of information only to the inclusion of a broader concept of knowledge: “whether a technician or a professional person, success lies in being able to communicate, share, and use information to solve complex problems, in being able to adapt and innovate in response to new demands and changing circumstances, in being able to marshal and expand the power of technology to create new knowledge and expand human capacity and productivity” (Binkley et al., 2010, p. 1). The ability to locate, access, understand and reflect on all kinds of information is essential if individuals are to be able to participate fully in our knowledge-based society. Achievement in reading literacy is not only a foundation for achievement in other subject areas within the educational system, but also a prerequisite for successful participation in most areas of adult life (Cunningham & Stanovich, 1998; OECD, 2013a; Smith, Mikulecky, Kibby, & Dreher, 2000). The PISA framework for assessing the reading literacy of students towards the end of compulsory education, therefore, must focus on reading literacy skills that include finding, selecting, interpreting, integrating and evaluating information from the full range of texts associated with situations that reach beyond the classroom.

### **Changes in the nature of reading literacy**

Evolving technologies have rapidly changed the ways in which people read and exchange information, both at home and in the workplace. Automation of routine jobs creates a demand for people who can adapt to quickly changing contexts and who can find and learn from diverse information sources. In 1997 when the first PISA framework for reading was starting to be discussed, just 1.7% of the world's population used the Internet. By 2014 the number had grown to a global penetration rate of 40.4%, representing almost three billion people (ITU, 2014a). Between 2007 and 2013, mobile phone subscriptions doubled: in 2013, there were almost as many active subscriptions as people on earth (95.5 subscriptions per 100 people) and mobile broadband has increased to almost two billion subscriptions worldwide (ITU, 2014b). The Internet increasingly pervades the life of all citizens, from

learning in and out of school, to working from real or virtual workplaces, to dealing with personal matters such as taxes, health care or holidays. As personal and professional development is becoming a lifelong undertaking, the students of tomorrow will need to be skilled with digital tools in order to succeed with the increased complexity and quantity of information available.

In the past, the primary and predominant interest in student reading literacy proficiency was the ability to understand, interpret and reflect upon single texts. While these skills remain important, greater emphasis on the integration of information technologies into citizens' social and work lives requires that the definition of reading literacy be updated and extended. It must reflect the broad range of newer skills associated with literacy tasks required in the 21st century (e.g. Ananiadou & Claro, 2009; Kirsch et al., 2002; Rouet, 2006; Spiro et al., 2015). This necessitates an expanded definition of reading literacy encompassing both the basic reading processes and higher-level digital reading skills while recognising that literacy will continue to change due to the influence of new technologies and changing social contexts (Leu et al., 2013, 2015).

As the medium through which we access textual information is moving from print to computer screens to smart phones, the structure and formats of texts have changed. This in turn requires readers to develop new cognitive strategies and clearer goals in purposeful reading. Therefore, success in reading literacy should no longer be defined by just being able to read and comprehend a single text. Although the ability to comprehend and interpret extended pieces of continuous texts - including literary texts - remains a valuable one, success will also come through deploying complex information-processing strategies, including analysing, synthesising, integrating and interpreting relevant information from multiple text (or information) sources. In addition, successful and productive citizens will need to use the information from across domains, such as science and mathematics, and employ technologies to effectively search, organise and filter a wealth of information. These will be the key skills, which are necessary for full participation in the labour market, in additional education as well as in social and civic life in the 21<sup>st</sup> Century (OECD, 2013b).

### **The continuity and change in the framework from 2000 to 2015**

With the changes in the nature of reading literacy, the framework also has changed. Reading literacy was the major domain assessed in 2000 for the first PISA cycle (PISA 2000). For the fourth PISA cycle (PISA 2009), it was the first to be revisited as a major domain, requiring a full review of its framework and new development of the instruments that represent it. For the seventh PISA cycle (2018), it is again being revised.

The original reading literacy framework for PISA was developed for the PISA 2000 cycle (from 1998 to 2001) through a consensus building process involving reading experts selected by the participating countries to form the PISA 2000 reading expert group (REG). The definition of reading literacy evolved in part from the IEA Reading Literacy Study (1992) and the International Adult Literacy Survey (IALS, 1994, 1997 and 1998). In particular, it reflected the IALS emphasis on the importance of reading skills for active participation in society. It was also influenced by contemporary – and still current – theories of reading, which emphasise the multiple linguistic-cognitive processes involved in reading and their interactive nature (Britt, Goldman, & Rouet, 2012; Kamil, Mosenthal, Pearson, & Barr, 2000; Perfetti, 1985, 2007; Rayner & Reichle, 2010; Snow, 2002), models of discourse comprehension (Kintsch, 1998; Zwaan & Singer, 2003) and theories of performance in solving information problems (Kirsch, 2001; Kirsch & Mosenthal, 1990; Rouet, 2006).

Much of the substance of the PISA 2000 framework was retained in the PISA 2009 framework, respecting one of the central purposes of PISA: to collect and report trend information about performance in reading, mathematics and science. However, the PISA domain frameworks are designed to be evolving documents that will adapt to and integrate new developments in theory and practice over time. Thus, there has been an evolution, reflecting both an expansion in our understanding of the nature of reading and changes in the world. This evolution is shown in greater detail in Appendix A, which provides an overview of the primary changes in the reading framework from 2000 to 2015.

Changes in our concept of reading since 2000 have led to an expanded definition of reading literacy, which recognises motivational and behavioural characteristics of reading alongside cognitive characteristics. Both reading engagement and metacognition – an awareness and understanding of how one develops an understanding of text and uses reading strategies – were referred to briefly at the end of the first PISA framework for reading under “Other issues” (OECD, 2000). In the light of recent research, reading engagement and metacognition were featured more prominently in the PISA 2009 and 2015 reading frameworks as elements that can be developed, shaped and fostered as components of reading literacy.

A second major modification of the framework for PISA 2009 involved the inclusion of electronic texts in recognition of the increasing role digital texts play in the literacy skills needed for individual growth and active participation in society (OECD, 2011). This modification was also specifically developed for presentation of items on a computer screen. PISA 2009 was the first large-scale international study to assess electronic reading. Due to the rapidly evolving technologies and related practices, this initiative, which is grounded in current theory and best practices from around the world, was inevitably a first step.

For the 2015 cycle, reading was a minor domain and continued the description and illustration of reading literacy developed for PISA 2009. However, the 2015 cycle involved important changes in the test administration procedures, some of which required adjustments in the wording of the reading framework. For example, the reading assessment in the 2015 cycle was administered primarily on computer. As a result, the “environment” and “medium” dimensions were revisited and further elaborated with the inclusion of the terms “fixed” and “dynamic”.

## Revising the framework for PISA 2018

The revisions to the reading literacy framework retain aspects of the 2009/2015 frameworks that are still relevant to PISA 2018. However, the framework is enhanced and revised in the following ways:

- The framework fully integrates reading in a traditional sense together with the new forms of reading that have emerged over the past decades and continue to emerge due to the spread of digital devices and digital texts.
- The framework incorporates constructs involved in basic reading processes. These constructs, such as fluent reading, literal interpretation, inter-sentence integration, extracting the central themes and inferencing, are critical skills for processing complex or multiple texts for specific purposes. If students fail at performing higher-level text processing functions, it is critical to know whether it was due to difficulties in these basic skills in order to provide targeted support to student populations within educational systems.

- The framework revisits the way in which the domain is organised to incorporate reading processes such as evaluating the veracity of texts, information seeking, reading from multiple sources and the integration/synthesis of information across sources. The revision rebalances the prominence of different reading processes to reflect the global importance of the different constructs, while ensuring there is a link to the prior frameworks in order to maintain trend.
- The revision considers how new technology options and the use of scenarios involving print and digital text can be harnessed to achieve a more authentic assessment of reading, consistent with the current use of texts around the world.

## The importance of digital reading literacy

Reading in today's world is very different from just 20 years ago. Up to the mid-1990s, reading was mostly performed with paper. Printed matter existed in many different forms, shapes and texture, from children books to lengthy novels, from leaflets to encyclopaedia, from newspapers and magazines to scholarly journals, from administrative forms to notes on billboards.

In the early 1990s, a small percentage of people owned computers and most of those owned were mainframes or desktop PCs. Very few people owned laptops for their personal use, whereas digital tablets and smartphones were still mostly fiction. Computer-based reading was limited to specific types of users and uses, typically a specialised worker dealing with technical or scientific information. In addition, due to mediocre display quality, computer-based reading was slower, more error-prone and more tiring than reading on paper (Dillon, 1994). Initially acclaimed as a means to "free" the reader from the printed text "straightjacket", the emerging hypertext technology [(i.e. the linking of digital information pages allowing each reader to dynamically construct their own route through information chunks (Conklin, 1988))] was also generating syndromes of disorientation and cognitive overhead, as design of the Web was still in its infancy (Foltz, 1996; Nielsen, 1999; Rouet & Levonen, 1996). But then, only a very small fraction of the world population had access to the newly-born World Wide Web.

In less than 20 years, the number of computers in use worldwide grew to an estimated 2 billion in 2015 (ITU, 2014b). In 2013, 40% of the world's population had access to the Internet at home, with sharp contrasts between developed countries, where access reached 80% of the population, and some less developed countries; where access lagged below 20% (ITU, 2014b). The last decade has witnessed a dramatic expansion of portable digital devices, with wireless Internet access overtaking fixed broadband subscriptions in 2009 (OECD, 2012). By 2015, computer sales were slowing, whereas digital pads, readers and cell phones still grew at two-digit rates (Gartner, 2015).

As a notable consequence of the spread of information and communication technology (ICT) in the general public, reading is massively shifting from print to digital texts. For example, computers have become the second source of news for American citizens, after TV and before radio and printed newspapers and magazines (American Press Institute, 2014). Similarly, British children and teenagers prefer to read digital than printed texts (Clark, 2014), and a recent UNESCO report showed that two thirds of users of a phone-based reader across five developing countries indicated that their interest in reading and time spent reading increased once it was possible to read on their phones (UNESCO, 2014). This shift has important consequences for the definition of reading as a skill. Firstly, the texts that people read on line are quite different from traditional printed texts. In order to enjoy the wealth of information, communication and other services offered through digital devices, online readers have to cope with smaller displays, cluttered screens and challenging networks of pages. In addition, new



genres of print-based communication have appeared, such as email, short messaging, forums and social networking applications. It is important to stress that the rise of digital technology means that people need to be selective in what they read while they must also read more, more often and for a broader range of purposes. Reading and writing are even replacing speech in some essential communication acts, such as telephoning and help desks. A consequence is that readers have to understand these new text-based genres and social-cultural practices.

Readers in the digital age also have to master several new skills. They have to be minimally ICT literate in order to understand and operate the devices and applications. They also have to search and access the texts they need to read through the use of search engines, menus, links, tabs and other paging and scrolling functions. Due to the uncontrolled profusion of information on the Internet, readers also have to be discerning in their choice of information sources and assessment of information quality and credibility. Finally, readers have to read across texts to corroborate information, to detect potential discrepancies and conflicts and to resolve them. The importance of these new skills was clearly illustrated in the OECD's PISA 2009 digital reading study, whose report noted the following:

Navigation is a key component of digital reading, as readers “construct” their text through navigation. Thus, navigational choices directly influence what kind of text is eventually processed. Stronger readers tend to choose strategies that are suited to the demands of the individual tasks. Better readers tend to minimise their visits to irrelevant pages and locate necessary pages efficiently. (OECD, 2011, p. 20)

In addition, a 2015 study of student use of computers in the classroom (OECD, 2015) shows for instance that “students’ average navigation behaviour explains a significant part of the differences in digital reading performance between countries/economies that is not accounted for by differences in print-reading performance” (p. 119), (see also Nauman, 2015).

Thus, in many parts of the world skilful digital reading literacy is now key to one’s ability to achieve one’s goals and participate in society. The 2018 PISA reading framework is revised and expanded so as to encompass those skills that are essential for reading and interacting with digital texts.

## Reading motivation, practices and metacognition

Individuals’ reading practices, motivation and attitudes towards reading, as well as an awareness of how effective reading strategies are, play a prominent role in reading. Students who read more frequently, be it with print or on-screen, who are interested in reading, who feel themselves confident in their reading abilities and who know well which strategies to use, for instance, to summarise a text or search information on Internet, tend to be more proficient in reading. Moreover, if practices, motivation, and metacognition deserve close attention, it is not only because they are potential predictors of reading achievement and growth, it is also because they can be considered important goals or outcomes of education, potentially driving life-long learning. Furthermore, they are malleable variables, amenable to change. For instance, there is strong evidence that reading engagement and metacognition (awareness of strategies) can be enhanced through teaching and supportive classroom practices (Brozo & Simpson, 2007; Guthrie, Wigfield, & You, 2012; Guthrie, Ho, & Klauda, 2013; Reeve, 2012). Reading motivation, practices and metacognition are briefly discussed in the reading literacy framework since they are critical factors of reading, although they are assessed in the questionnaire and are covered in more detail in the questionnaire framework.

## The structure of the reading literacy framework

Having addressed what is meant by the term “reading literacy” in PISA and introduced the importance of reading literacy in today’s society in this introduction, the remainder of the framework is organised as follows. The second section defines reading literacy and elaborates on various phrases that are used in the reading framework, along with the assumptions underlying the use of these words. The third section focuses on the organisation of the domain of reading literacy and discusses the characteristics that will be represented in the tasks included in the PISA 2018 assessment. The fourth section discusses some of the operational aspects of the assessment and how it will be measured as well as presenting sample items. Finally, the last section describes how the reading literacy data will be summarised and outlines plans for reporting.



## Defining Reading Literacy

Definitions of reading and reading literacy have changed over time to reflect changes in society, economy, culture and technology. Reading is no longer considered an ability acquired only in childhood during the early years of schooling. Instead it is viewed as an expanding set of knowledge, skills and strategies that individuals build on throughout life in various contexts, through interaction with their peers and the wider community. Thus, reading must be considered across the varied ways in which citizens interact with text-based artefacts and how reading is part of life-long learning.

Cognitively-based theories of reading emphasise the constructive nature of comprehension, the diversity of cognitive processes involved in reading and their interactive nature (Binkley, Rust, & Williams 1997; Kintsch, 1998; McNamara & Magliano, 2009; Oakhill, Cain, & Bryant, 2003; Snow and the RAND Reading Group, 2002; Zwaan & Singer, 2003). The reader generates meaning in response to text by using previous knowledge and a range of text and situational cues that are often socially and culturally derived. While constructing meaning, competent readers use various processes, skills and strategies to locate information, to monitor and maintain understanding (van den Broek, Risdien, & Husbye-Hartmann, 1995) and to critically assess the relevance and validity of the information (Richter & Rapp, 2014). These processes and strategies are expected to vary with context and purpose as readers interact with multiple continuous and non-continuous texts both in print and when using digital technologies (Britt & Rouet, 2012; Coiro, Knobel, Lankshear, & Leu, 2008).

### **Box 1: The definition of reading literacy in earlier PISA cycles**

The PISA 2000 definition of reading literacy was as follows:

*Reading literacy is understanding, using and reflecting on written texts, in order to achieve one's goals, to develop one's knowledge and potential, and to participate in society.*

The PISA 2009 definition of reading, continued for 2012 and 2015, added engagement in reading as part of reading literacy:

*Reading literacy is understanding, using, reflecting on and engaging with written texts, in order to achieve one's goals, to develop one's knowledge and potential, and to participate in society.*

For 2018 the definition of reading literacy adds in evaluation of texts as an integral part of reading literacy and removes the word "written".

### **The 2018 Definition of Reading Literacy**

Reading literacy is understanding, using, evaluating, reflecting on and engaging with texts in order to achieve one's goals, to develop one's knowledge and potential and to participate in society.

Each part of the definition is considered in turn below, taking into account the original elaboration and some important developments in the definition of the domain that uses evidence from PISA and other empirical studies, from theoretical advances and from the changing nature of the world.

*Reading literacy . . .*

The term “reading literacy” is used instead of the term “reading” because it is likely to convey to a non-expert audience more precisely what the survey is measuring. “Reading” is often understood as simply decoding, or even reading aloud, whereas the intention of this survey is to measure much broader and more encompassing constructs. Reading literacy includes a wide range of cognitive and linguistic competencies, from basic decoding to knowledge of words, grammar and larger linguistic and textual structures for comprehension, as well as integration of meaning with one’s knowledge about the world. It also includes metacognitive competencies: the awareness of and ability to use a variety of appropriate strategies when processing texts. Metacognitive competencies are activated when readers think about, monitor and adjust their reading activity for a particular goal.

The term “literacy” typically refers to an individual’s knowledge of a subject or field, although it has been most closely associated with an individual’s ability to learn, use and communicate written and printed information. This definition seems close to the notion that the term “reading literacy” is intended to express in this framework: the active, purposeful and functional application of reading in a range of situations and for various purposes. PISA assesses a wide range of students. Some of these students will go on to a university, possibly to pursue an academic or professional career; some will pursue further studies in preparation for joining the labour force; and some will enter the workforce directly upon completion of secondary schooling. Regardless of their academic or labour-force aspirations, reading literacy will be important to their active participation in their community and economic and personal life.

*. . . is understanding, using, evaluating, reflecting on . . .*

The word “understanding” is readily connected with the widely accepted concept of “reading comprehension”, that all reading involves some level of integrating information from the text with the reader’s knowledge structures. Even at the earliest stages, readers draw on symbolic knowledge to decode a text and require a knowledge of vocabulary to make meaning. However, this process of integration can also be much broader, such as developing mental models of how texts relate to the world. The word “using” refers to the notions of application and function – doing something with what we read. The term “evaluating” was added for PISA 2018 to incorporate the notion that reading is often goal-directed, and consequently the reader must weigh such factors as the veracity of the arguments in the text, the point of view of the author and the relevance of a text to the reader’s goals. “Reflecting on” is added to “understanding”, “using” and “evaluating” to emphasise the notion that reading is interactive: readers draw on their own thoughts and experiences when engaging with a text. Every act of reading requires some reflection, reviewing and relating of information within the text with information from outside the text. As readers develop their stores of information, experience and beliefs, they constantly test what they read against outside knowledge, thereby continually reviewing and revising their sense of the text. This evaluation can include determining the veracity of a text, checking the claims made by the author as well as inferring the author’s perspective. At the same time, incrementally and perhaps imperceptibly, readers’ reflections on texts may alter their sense of the world. Reflection might also require readers to consider the content of the text, apply their previous knowledge or understanding or think about the structure or form of the text. Each of these skills in the definition, “understanding”, “using”, “evaluating” and “reflecting on” are necessary, but none are sufficient for successful reading literacy.

*... and engaging with ...*

A reading literate person not only has the skills and knowledge to read well, but also values and uses reading for a variety of purposes. It is therefore a goal of education to cultivate not only proficiency but also engagement in reading. Engagement in this context implies the motivation to read and comprises a cluster of affective and behavioural characteristics that include an interest in and enjoyment of reading, a sense of control over what one reads, involvement in the social dimension of reading and diverse and frequent reading practices.

*... texts ...*

The phrase “texts” is meant to include all language as used in its graphic form: handwritten, printed or screen-based. In this definition, we exclude as texts those purely aural language artefacts such as voice recordings, as well as film, TV, animated visuals and pictures without words. Texts do include visual displays such as diagrams, pictures, maps, tables, graphs and comic strips, which include some written language (for example, captions). These visual texts can exist either independently or they can be embedded in larger texts.

Dynamic texts are distinguishable from fixed texts in a number of respects, including how they affect the ability to estimate the length and quantity of texts when physical cues (e.g. dimension of paper-based document) are hidden in virtual space); the way different parts of a text and different texts are connected with one another through hypertext links; whether multiple abstracted texts are shown as a result of a search; and consequent upon all these text characteristics, the way that readers typically engage with dynamic texts. To a much greater extent than with what is printed, readers need to construct their own pathways to complete any reading activity associated with dynamic texts.

The term “texts” was chosen instead of the term “information” because of its association with written language and because it more readily connotes literary as well as information-focused reading.

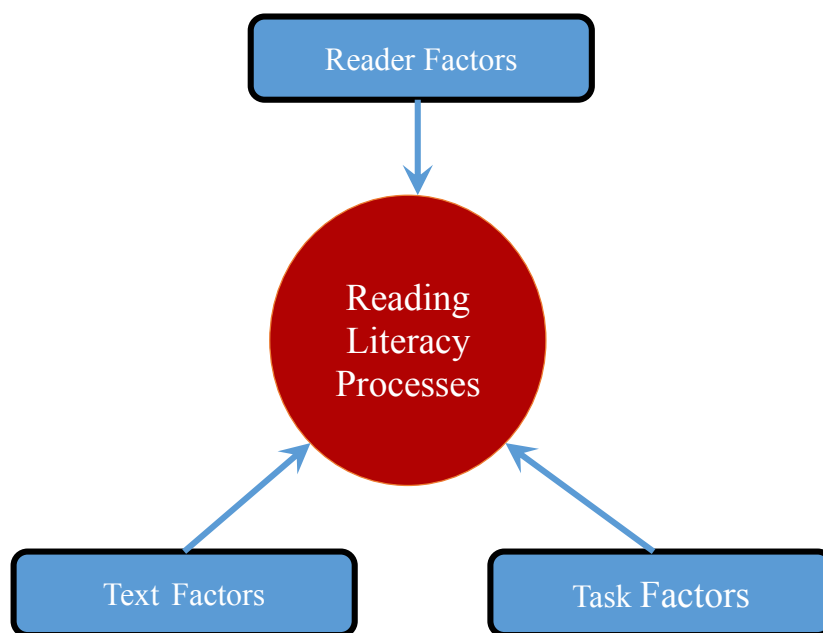
*... in order to achieve one’s goals, to develop one’s knowledge and potential and to participate in society.*

This phrase is meant to capture the full scope of situations in which reading literacy plays a role, from private to public, from school to work, from formal education to lifelong learning and active citizenship. “To achieve one’s goals and to develop one’s knowledge and potential” spells out the long-held idea that reading literacy enables the fulfilment of individual aspirations – both defined ones such as graduating or getting a job, and those less defined and less immediate that enrich and extend personal life and lifelong education (Gray & Rogers, 1956). The PISA concept of reading literacy also embraces the new challenges of reading in the 21st century. It conceives of reading literacy as the foundation for full participation in the economic, political, communal and cultural life of contemporary society. The word “participate” is used because it implies that reading literacy allows people to contribute to society as well as to meet their own needs: “participating” includes social, cultural and political engagement (Hofstetter, Sticht, & Hoffstetter, 1999). For instance, literate people have greater access to employment and more positive attitudes toward institutions (OECD, 2013). Higher levels of reading literacy have been found to be related to better health and reduced crime (Morrisroe, 2014). Participation may also include a critical stance, a step toward personal liberation, emancipation and empowerment (Lundberg, 1991).

## Organising the domain

Reading as it occurs in everyday life is a pervasive and highly diverse activity. In order to design an assessment that adequately represents the many facets of reading literacy, the domain is organized according to a set of dimensions. The dimensions will in turn determine the test design and, ultimately, the evidence about student proficiencies that can be collected and reported.

Snow and the RAND group's (2002) influential framework defined reading comprehension as the joint outcome of three combined sources of influence: the *reader*, the *text* and the activity, *task* or purpose for reading. Reader, text and task dimensions interact within a broad sociocultural context, which can be thought of as the diverse range of situations in which reading occurs. For the purpose of PISA, we adopt a similar view of the dimensions of reading literacy. Figure 1 illustrates these dimensions. A reader brings a number of *reader factors* to reading, which can include motivation, prior knowledge, and other cognitive abilities. The reading activity is a function of *text factors* (*i.e. the text or texts that are available to the reader at a given place and time*). These factors can include the format of the text, the complexity of the language used, the number of texts a reader encounters, as well as others. Reading activity is also a function of *task factors* (*i.e. the requirements or reasons that motivate the reader's engagement with text*). Task factors also include the potential time and other practical constraints, the goals of the task (e.g. read for pleasure, read for deep understanding or skim) and the complexity or number of tasks to be completed. Based on their individual characteristics and their perception of text and task dimensions, readers apply a set of *reading literacy processes* in order to locate, extract information and construct meaning from texts to achieve the tasks.



**Figure 1. Reading Literacy Sources of Influence**

For the purpose of PISA reading literacy, the goal of the cognitive instrument is to measure students' mastery of reading literacy processes through manipulating task and text factors. The questionnaire further serves to assay some of the reader factors, such as motivation, disposition and experience.

In designing the PISA reading literacy assessment, the two most important considerations are, first, to *ensure broad coverage* of what students read and for what purposes they read, both in and outside of school, and, second, to *represent a natural range of difficulty in texts and tasks*. The PISA reading literacy assessment is built on three major characteristics: *text* – the range of material that is read; *processes* – the cognitive approach that determines how readers engage with a text; and *scenarios* – the range of broad contexts or purposes for which reading takes place with one or more thematically related texts. Within scenarios are *tasks* – the assigned goals that readers must achieve in order to succeed. All three contribute to ensuring *broad coverage* of the domain. In PISA, *difficulty* of tasks can be varied by manipulating text features and task goals, which then require deployment of different cognitive processes. Thus, the PISA reading literacy assessment aims at measuring students' master of reading *processes* (the possible cognitive approaches of readers to a text) by varying the dimensions of *text* (the range of material that is read) and *scenarios* (the range of broad contexts or purposes for which reading takes place) with one or more thematically related texts. While there may be individual differences in *reader* factors based on the skills and background of each reader, these are not manipulated in the cognitive instrument, but are captured through the assessment in the questionnaire.

In order to use these three characteristics in designing the assessment, they must be operationalised. That is, the various values that each of these characteristics can take on must be specified. This allows test developers to categorise the materials they are working with and the tasks they construct so that they can then be used to organise the reporting of the data and to interpret results.

## Processes

The PISA typology of *cognitive aspects* involved in reading literacy was designed at the turn of the 21<sup>st</sup> Century (OECD, 2000). A revision of the “aspects” in the 2018 PISA reading literacy framework is needed for at least three reasons:

- a) A definition of reading literacy must reflect contemporary developments in school and societal literacy demands, namely, the increasing amount of text information available in print and digital forms and the increasing diversity and complexity of situations involving texts and reading. These evolutions are partly driven by the spread of digital information technology and in particular by increased access to the Internet worldwide.
- b) The PISA 2018 framework should also reflect recent developments in the scientific conceptualisation of reading and be as consistent as possible with the terminology used in current theories. There is a need to update the vocabulary that was used to designate the cognitive processes involved in reading, taking into account progress in the research literature.
- c) Finally a revision is needed to reassess the necessary trade-off between the precision of the aspects as described in the framework and the limited possibility to account for each of these individual aspects in a large-scale international assessment. Such a reassessment is particularly relevant in the context of PISA 2018 in which reading literacy is the main domain.

The 2018 framework replaces the phrase “cognitive aspects”, used in previous versions of the framework, with the phrase “cognitive processes”. The phrase “cognitive processes” aligns with the terminology used in reading psychology research and is more consistent with a description of reader skills and proficiencies. The term “aspects” tended to confound the reader's actual cognitive processes

with the requirements of various types of tasks (e.g. demands of specific types of questions). A description of proficient reading processes permits the 2018 framework to map these processes to a typology of tasks.

Recent theories of reading literacy emphasise the fact that "reading does not take place in a vacuum" (Snow and the RAND Reading Group, 2002; see also McCrudden & Schraw, 2007; Rouet & Britt, 2011). Indeed, most reading activities in people's daily lives are motivated by specific purposes and goals (White, Chen & Forsyth, 2010). Reading as a cognitive skill involves a set of specific reading processes that competent readers make use of when engaging with texts in order to achieve their goals. Goal setting and goal achievement drive not only readers' decisions to engage with texts, their selection of texts and passages of text, but also their decisions to disengage from a particular text, to reengage with a different text, to compare and to integrate information across multiple texts (Britt & Rouet, 2012; Goldman, 2004; Perfetti, Rouet, & Britt, 1999).

To achieve reading literacy as it is defined in this framework, an individual needs to be able to execute a wide range of processes. Effective execution of these processes, in turn, requires that the reader have the cognitive skills, strategies and motivation that support the processes.

The PISA 2018 reading framework acknowledges the goal-driven, critical and intertextual nature of reading literacy (McCrudden & Schraw, 2007; Rouet, 2006; Vidal-Abarca, Mañá, & Gil, 2010). Consequently, the former typology of reading aspects (OECD, 2000) is revised and extended so as to explicitly represent the fuller range of processes that skilled readers selectively draw from as a function of their particular task context and information environment.

More specifically, two broad categories of reading processes are defined for PISA 2018: text processing and task management (Figure 2). This distinction is consistent with current views of reading as a situated and purposeful activity (see e.g. Snow and the Rand Reading Group., 2002). The focus of the cognitive assessment is on processes identified in the text processing box.



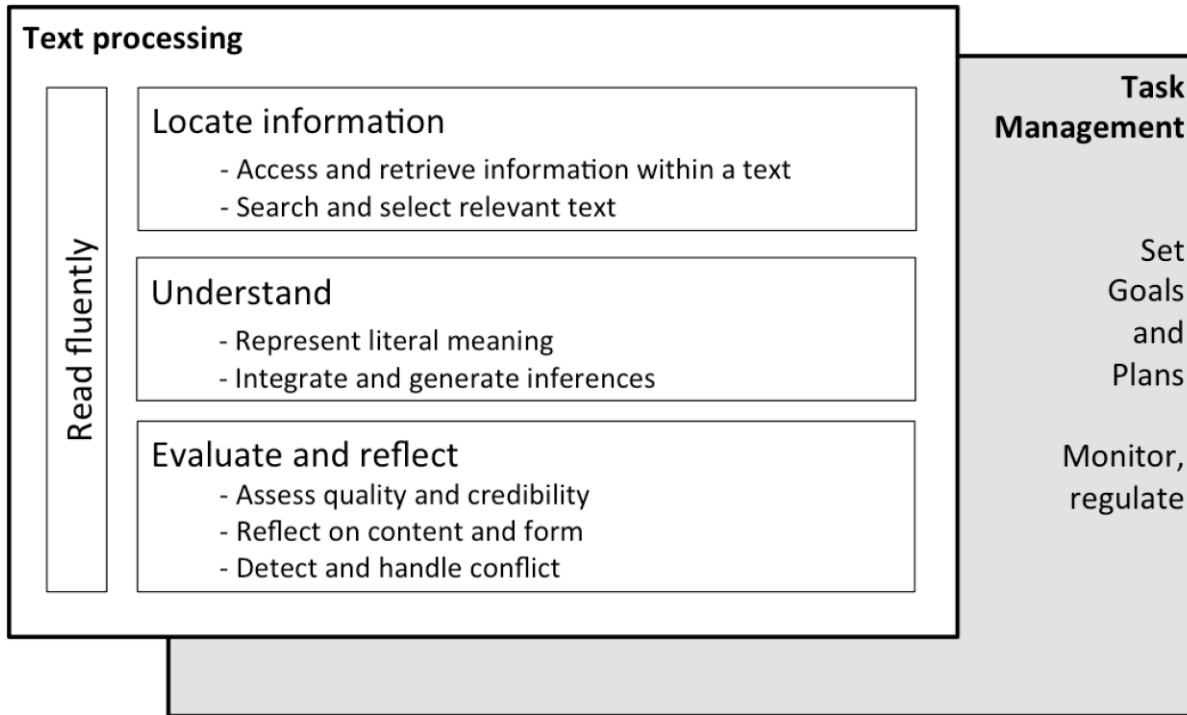


Figure 2. PISA 2018 Reading Framework Processes

### Text processing

The 2018 typology of reading process specifically identifies the process of reading fluently as distinct from other processes associated with text comprehension.

#### Read Fluently

Reading fluency can be defined as an individual's ability to read words and connected text accurately and automatically and to phrase and process these words and texts in order to comprehend the overall meaning of the text (e.g. Kuhn & Stahl, 2003). In other words, fluency is *the ease and efficiency of reading texts for understanding*. There is considerable empirical evidence demonstrating a link between reading ease/efficiency/fluency to reading comprehension (Chard, Pikulski, & McDonagh, 2006; Jenkins et al., 2003 b; Kuhn; Wagner et al; Wayman et al., 2007; Woodcock, Mather, & McGrew, 2001). The chief psychological mechanism proposed to explain this relationship is that the ease and efficiency of reading text is indicative of expertise in foundational reading skills of decoding, word recognition and syntactic parsing of texts.

Fluent reading frees up attention and memory resources, which can be allocated to higher-level comprehension processes. Conversely, weaknesses in reading fluency divert resources from comprehension towards lower level processes necessary to process the printed text, resulting in weaker performance in reading comprehension (e.g. Cain & Oakhill, 2007; Perfetti, Marron, & Foltz, 1996). Acknowledging this strong link between fluency and comprehension, the National Reading Panel (2000) in the United States recommended fostering fluency in reading to enhance students' comprehension skills.



## Locate information

Competent readers can read a text entirely and carefully in order to comprehend the main ideas and reflect on the text as a whole. On a daily basis, however, readers most often use texts for purposes that require the location of specific information, with little or no consideration for the rest of the text (White et al., 2010). Furthermore, locating information is becoming a mandatory aspect of reading when people interact with complex digital information systems such as search engines and websites (Brand-Gruwel, Wopereis, Vermetten, 2005; Leu et al., 2013). The 2018 framework defines two processes whereby readers perform the selection of information within and across texts:

**Access and retrieve information within a text.** Locating information from tables, text chapters or whole books is a skill in and by itself (Dreher & Guthrie, 1990; Moore, 1995; Rouet & Coutelet, 2008). Locating information draws on readers' understanding of the task demands, their knowledge of text organisers and their ability to assess the relevance of text. The ability to locate information is grounded on readers' strategic awareness of their information needs and their capacity to quickly disengage from irrelevant passages (McCrudden & Schraw, 2007). In addition, readers sometimes have to skim through a series of paragraph to retrieve specific pieces of information. This requires an ability to modulate one's reading speed, depth of processing and consideration versus dismissal of the information (Duggan & Payne, 2009). In the context of PISA 2018, access and retrieve tasks require the reader to scan a single text in order to retrieve target information made of a few words, phrases or numerical values. There is little or no need to comprehend the text beyond the phrase level. The identification of target information is achieved through literal or close to literal matching of elements in the question and in the text.

**Search and select relevant text.** Proficient readers are able to select information from not just one, but also from several texts. In electronic environments, the amount of available information often largely exceeds the amount readers are able to actually process. In these multiple-text reading situations, readers have to make decisions as to which of the available texts is the most important, relevant, accurate or truthful (Rouet & Britt, 2011). These decisions are based on readers' assessment of the texts' qualities from partial and sometimes opaque indicators, such as the information contained in a web link. (Gerjets, Kammerer, & Wermer, 2011; Mason, Boldrin, & Ariasi, 2010; Naumann, 2015; Rieh, 2002). Thus, one's ability to search and select a text within a set is an integral component of reading literacy. In PISA 2018, text search and selection tasks involve the use of text descriptors such as headers, source information (e.g. author, medium, date), and embedded or explicit links such as search engine result pages.

## Understand

A large number of reading activities involve the parsing and integration of extended passages of text in order to form an understanding of the meaning conveyed in the passage. Text understanding (also called comprehension) may be seen as the construction by the reader of a mental representation of what the text is about, or "situation model" (Kintsch, 1998). A situation model is based on two core processes: the construction of a memory representation of the literal meaning of the text; and the integration of literal text contents with one's prior knowledge through mapping and inference processes (McNamara & Magliano, 2009; Zwaan & Singer, 2003).

Acquiring a literal meaning representation requires readers to comprehend sentences or short passages. Literal comprehension tasks involve a direct or paraphrase type of match between the

question and target information within a passage. The reader may need to hierarchise or condense information at a local level (Note: tasks requiring integration at the level of an entire passage, such as identifying the main idea, summarizing, or giving a title, are considered integration; see below).

Constructing an integrated text representation involves materials ranging from a sentence to an entire passage. The reader needs to generate various types of inferences, ranging from simple connecting inferences (such as the resolution of anaphora) to more complex coherence relationships (e.g. spatial, temporal, causal or claim-argument links). Sometimes the inference involves several portions of the text; in other cases the inference is needed to connect the question and the passage. Finally, the production of inferences is also needed in tasks requesting the reader to identify an implicit main idea, in order to produce a summary or title for a given passage.

When readers are faced with more than one text, integration and inference generation may be performed based on pieces of information located in different texts (Perfetti, Rouet, & Britt, 1999). Integration of information across texts poses a specific problem when the texts provide inconsistent or conflicting information. In those cases readers must engage in evaluation processes in order to acknowledge and handle the conflict (Bråten, Strømsø, & Britt, 2009; Stadtler & Bromme, 2014; see below).

### Evaluate and reflect

Competent readers can reason beyond the literal or inferential meaning of the text. They can reflect on the content and form of the text and critically assess the quality and validity of information.

Assess quality and credibility. Competent readers can evaluate the quality and credibility of the text (e.g. whether the information is valid, up to date, accurate, unbiased). Proficient evaluation sometimes requires the reader to identify and assess the source of the information: whether the author is competent, well-informed and benevolent, the reader must be able to reflect critically on the content and form of the text. Evaluation and reflection were arguably always part of reading literacy, but their importance has increased with the increased amount and heterogeneity of information readers are faced with today.

Reflect on content and form. Competent readers must also be able to reflect on the quality and style of the writing. This reflection involves being able to evaluate the form of the writing and how the content and form together relate to, and effectively express, the author's purposes and point of view. Reflecting also involves drawing upon one's knowledge, opinions or attitudes beyond the text in order to relate the information provided within the text to one's own conceptual and experiential frames of reference. Reflect items may be thought of as those that require readers to consult their own experience or knowledge to compare, contrast or hypothesise different perspectives or viewpoints.

Detect and handle conflict. When facing multiple texts that contradict each other, readers need to become aware of the conflict and to find ways to deal with it (Britt & Rouet, 2012; Stadtler & Bromme, 2013; 2014). Handling conflict typically requires readers to assign discrepant claims to their respective sources and to assess the soundness of the claims and/or the credibility of the sources. As these skills underlie much of contemporary reading, it is an issue of critical importance to measure the extent 15-year-olds can meet the new challenges of comprehending, comparing and integrating multiple texts (Bråten et al., 2011; Coiro et al., 2008; Goldman, 2004; Leu et al., 2015; Mason et al., 2010; Rouet & Britt, 2014).

## Task management processes

In the context of any assessment, but also in many everyday reading situations (White et al., 2010), readers engage with texts because they receive some kind of assignment or external prompt to do so. Reading literacy involves one's ability to accurately represent the reading demands of a situation, to set up task-relevant reading goals and to monitor progress toward these goals throughout the activity. Task management processes to accomplish a reader's goals include the setting, self-monitoring and self-regulation of goals and strategies (see e.g. Hacker, 1998; Winne & Hadwin, 1998, for discussions of self-regulated reading).

Task-oriented goals fuel the reader's search for task-relevant texts and/or passages within a text (e.g. McCrudden & Schraw, 2007; Rouet & Britt, 2011; Vidal-Abarca, Mañá, & Gil, 2010). Finally, monitoring (metacognitive) processes enable the dynamic update of goals throughout the reading activity. Task management is represented in the background of text processing to emphasise the fact that it constitutes a different, metacognitive level of processing.

While readers' interpretation of task requirements are an important part of task management processes, it is important to stress that the construction of reading goals extends beyond the context of explicit task instructions, as goals may be self-generated based on one's own interests and initiative. However, the PISA reading literacy assessment only considers those goals that readers form upon receiving external prompts to accomplish a given task. In addition, due to implementation constraints, task management processes are represented but not directly and independently assessed as part of PISA 2018. However, portions of the background questionnaire will estimate readers' awareness of reading strategies. Future cycles may consider the use of computer-generated process indicators (such as visiting a particular page, number of question lookbacks) as part of the assessment of task management skills.

## Summary of reading processes

To summarise, the 2018 framework features a comprehensive and detailed typology of the cognitive processes involved in purposeful reading activities as they unfold in single or multiple text environments. Due to design constraints, it is not possible to distinguish each of these processes in a separate proficiency scale. Instead, the framework also defines a smaller list of processes that will form the basis for scaling and reporting (Table 1).

It is worth noting that the 2018 process typology also permits an analysis of changes in students' proficiency at the level of broad reading processes, as the former "cognitive aspects" featured in previous frameworks can be mapped onto specific categories within the new typology. Table 1 shows the correspondence between the 2018 typology and the former 2009 typology (which was also used in 2012 and 2015). The distinction between single and multiple text processes is discussed in greater detail below.

**Table 1. Mapping of 2018 process typology to 2018 reporting scales and to former 2009-2015 cognitive aspects.**

2018 Cognitive processes	Superordinate Category Used for Scaling in 2018	2009-2015 Aspects
Read fluently	Reported but not on PISA scale	Not assessed
Access and retrieve information within a text	Locate information	Access and retrieve
Search and select relevant text		
Represent literal meaning	Understand	Integrate and interpret
Integrate and generate inferences		
Assess quality and credibility	Evaluate and reflect	Reflect and evaluate
Reflect on content and form		
Detect and handle conflict		Complex

## Texts

Reading requires material for the reader to read. In an assessment, that material – a text (or a set of texts) related to a particular task – must include sufficient information for the proficient reader to engage in meaningful comprehension and resolve the problem posed by the task. Although it is obvious that there are many different kinds of texts and that any assessment should include a broad range, there was never a single agreed-upon ideal categorisation of the many different kinds of text that readers encounter. With the advent of digital media and the profusion of new text genres and text-based communication services – some of which may not survive the next decade, some of which may be newly created in the same time span – this issue becomes even more complex.

### Box 2: Characteristics used to classify texts in the PISA 2009 reading framework

The previous reference framework (2009) included four major dimensions to characterise texts:

**Medium:** print and electronic

**Environment:** authored and message-based

**Text format:** continuous, non-continuous, mixed and multiple

**Text type:** description, narration, exposition, argumentation, instruction and transaction

A Digital Reading Assessment was offered as an optional component in 2009 and 2012.

For the 2015 reading literacy assessment, only texts that had their origin as paper-based print documents were used, albeit presented on computer. For clarity, these were referred to as fixed and dynamic texts under the heading “text display space” instead of medium (clarifying that while their origin was paper-based print, students were in fact reading them on a computer screen, hence on an

electronic medium). Because reading literacy was a minor domain in 2015, no new tasks were designed and implemented. Consequently, dynamic texts, i.e. texts such as websites designed to take advantage of hyperlinks, menus, and other navigational features of an electronic medium, were not part of PISA 2015<sup>1</sup>.

For 2018, reading is the major domain and a broader range of texts can be represented in the assessment. These will include texts that are typical of the print medium, and also the ever-expanding category of digital-native text genres. Just like printed texts, some digital texts are "static" in that they come with a minimal set of tools for interaction (scrolling, paging, and a find function). For instance, this is the case of documents intended for printing but displayed on a computer screen (e.g. word processing documents or pdf files). However, many digital texts come with innovative features that increase the possibilities for the reader to interact with the materials, hence the phrase "dynamic text", which is sometimes used to characterize these texts. Dynamic text features include embedded hyperlinks that take the reader to other sections, pages or web sites; advanced search functions that provide ad hoc indexes of the searched keyword and/or the highlighting of these words in the text; and social interaction like in interactive text-based communication media such as email, forums and instant messaging services.

The 2018 framework defines four dimensions of texts: source (single, multiple); organisation and navigation (static, dynamic); format (continuous, non-continuous, mixed); and type (description, narration, exposition, argument, instruction, interaction, transaction). The first three dimensions are typical of specific situations and tasks and may trigger the use of specific processes. In contrast, the fourth dimension is included mainly for purposes of domain coverage.

### Source

In the PISA 2018 framework, a source is a unit of text. *Single texts* are defined by having a definite author (or group of authors), time of writing or publication date, and reference title or number. Authors may be defined precisely, like in most traditional printed books, or more vaguely like the pseudonyms in a blog post or the sponsors of a website. A single text may also be construed as such because it is presented to the reader in isolation from other texts, even if it does not explicitly bear any source indication. *Multiple texts* are defined by having different authors, or being published at different times, or bearing different titles or reference numbers. Note that in the PISA framework, "title" is meant in the sense of a bibliographical catalogue unit. Lengthy texts that feature several sections with titles and subtitles are still single texts, to the extent that they were written by a definite author (or group of authors) at a given date. Likewise, multi-page websites are single texts as long as there is no explicit mention of a different author or date. It is useful to point out that multiple texts may be represented on a single page. This is the case in printed newspapers and in many textbooks, but also in forums, customer reviews or question-and-answer websites. Finally, a single text may contain embedded sources, that is, references to various authors or texts (Rouet & Britt, 2014; Strømsø et al., 2013).

The source dimension in PISA 2018 replaces the distinction between "multiple" and the other types of "text formats" in the previous versions of the framework.

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<sup>1</sup> Some dynamic navigation features were incidentally included in the 2015 assessment. This was a result of the adaptation of the trend of print documents to the electronic screen. Many of these so-called fixed texts used in previous cycles, although adapted to mimic as closely as possible the presentation of printed texts, had to be reformatted to cope with the smaller screen size typical of computer displays. Therefore, tabs and other very simple navigation tools were included to let the reader navigate from one page to another.

## Organisation and navigation

Screen sizes vary dramatically in digital environments, from cell phone displays, which are smaller than a traditional index card, to large, multiple screen displays for simultaneously showing multiple screen windows of information. At the time of the drafting of this framework, however, the typical computer screen (such as the 15" or 17" that come with ordinary desktop and laptop computers) features a display resolution of 1024x768 pixels. Assuming a typical font size, this is enough to display about a half-page of A4 or US-Letter page; that is, a very short piece of text. Given the wide variation in the "landscape" available on screens to display text, digital texts come with a number of tools meant to let the user access and display specific passages. These tools range from generic tools, such as the scroll bar and tabs (also found in a number of other software applications like spreadsheets and word processors) and tools to resize or position the text on the screen, to more specific devices such as menus, tables of contents and embedded hyperlinks to move between text segments. There is growing evidence that navigation in digital text requires specific skills (OECD, 2011; Rouet, Vörös, & Pléh, 2012). Therefore, it is important to assess readers' ability to deal with texts featuring a high density of navigation tools. For reasons of simplicity, the PISA 2018 framework distinguishes "static" texts, with a simple organisation and low density of navigation tools (typically, one or several screen pages arranged in a linear way), from "dynamic" texts, which feature a more complex, non-linear organisation and a higher density of navigation devices. Note that the term "density" is preferred to "number" to mark the fact that dynamic texts do not have to be longer than static texts.

For purposes of coverage, the 2018 framework also retains two former dimensions of texts, "format" and "type", that remain for the most part unchanged from the previous framework.

## Text format

An important classification of texts, and one at the heart of the organisation of the PISA 2000 framework and assessment, is the distinction between continuous and non-continuous texts. Continuous texts are typically composed of sentences that are, in turn, organised into paragraphs. These may fit into even larger structures such as sections, chapters and books. Non-continuous texts are most frequently organised in matrix format, based on combinations of lists.

Texts in continuous and non-continuous formats appear in both fixed and dynamic texts. Mixed and multiple format texts are also prevalent in both, particularly so in dynamic texts. Each of these four formats is elaborated below.

Other non-text-formatted objects are also commonly used in conjunction with fixed texts and particularly with dynamic texts. Pictures and graphic images occur frequently in fixed texts and can legitimately be regarded as integral to such texts. Static images as well as videos, animations and audio files regularly accompany dynamic texts and can, also, be regarded as integral to those texts. As a reading literacy assessment, PISA does not focus on non-text formatted objects independently, but any such objects may, in principle, appear in PISA as part of a (verbal) text. However, in practice the use of video and animation is very limited in the current assessment. Audio is not used at all because of practical limitations such as the need for headphones and audio translation.

*Continuous texts.* Continuous texts are formed by sentences organised into paragraphs. Examples of text objects in continuous text format include newspaper reports, essays, novels, short stories, reviews and letters, including on e-book readers.



Graphically or visually, organisation occurs by the separation of parts of the text into sentences and paragraphs with spacing (e.g. indentation) and punctuation conventions. Texts also follow a hierarchical structure signalled by headings and content that help readers to recognise the organisation of the text. These markers also provide clues to text boundaries (showing section completion, for example). The location of information is often facilitated by the use of different font sizes, font types such as italic and boldface or borders and patterns. The use of typographical and format clues is an essential subskill of effective reading.

Discourse markers also provide organisational information. Sequence markers (first, second, third, etc.), for example, signal the relation of each of the units introduced to each other and indicate how the units relate to the larger surrounding text. Causal connectors (therefore, for this reason, since, etc.) signify cause-effect relationships between parts of a text.

*Non-continuous texts.* Non-continuous texts are organised differently to continuous texts, and therefore require a different kind of reading approach. Most non-continuous texts are composed of a number of lists (Kirsch & Mosenthal, 1990). Some are single, simple lists, but most consist of several simple lists combined.

Examples of non-continuous text objects are lists, tables, graphs, diagrams, advertisements, schedules, catalogues, indexes and forms. These text objects occur in both fixed and dynamic texts.

*Mixed texts.* Many fixed and dynamic texts are single, coherent objects consisting of a set of elements in both a continuous and non-continuous format. In well-constructed mixed texts the components (for example, a prose explanation including a graph or table) are mutually supportive through coherence and cohesion links at the local and global level.

Mixed text is a common format in magazines, reference books and reports, where authors employ a variety of presentations to communicate information. In dynamic texts, authored web pages are typically mixed texts, with combinations of lists, paragraphs of prose and often graphics. Message-based texts, such as online forms, e-mail messages and forums, also combine texts that are continuous and non-continuous in format.

The “multiple” format defined in the previous versions of the framework is now represented as one modality of the new “source” dimension defined above.



## Assessing Reading Literacy

The previous section outlined the conceptual framework for reading literacy. The concepts in the framework must in turn be represented in tasks and questions in order to collect evidence of students' proficiencies in reading literacy.

In this section, we consider the use of scenarios, factors affecting item difficulty, dimensions ensuring coverage and some of the other major issues in constructing and operationalising the assessment.

### Scenarios

Reading is a purposeful act that occurs within the context of particular reader goals. In many traditional reading assessments, test takers are presented with a series of unrelated passages on a range of general topics. Students answer a set of discrete items on each passage and then move on to the next unrelated passage. In this traditional design, students are effectively expected to “forget” what they read previously when answering questions on later passages. Consequently, there is no overarching purpose for reading other than to answer discrete questions (Rupp et al., 2006). In contrast to this approach, a scenario-based assessment approach can influence the ways in which students use the texts in order to assess specific processes (e.g. Sabatini et al., 2014, 2015).

The PISA 2018 assessment will include scenarios in which students are provided an overarching purpose for reading a collection of thematically related texts in order to complete a higher-level task (e.g. respond to some larger integrative question, write a recommendation based on a set of texts), along with traditional PISA reading units. The reading purpose sets up a collection of goals, or criteria, that students use to search for information, evaluate sources, read for comprehension and/or integrate across texts. The collection of sources can be diverse and may include a selection from literature, textbooks, e-mails, blogs, websites, policy documents, primary historical documents and so forth. Although the prompts and tasks that will evolve from this framework may not grant student test-takers freedom to choose their own purposes for reading and the texts related to those individual purposes, the goal of this assessment is to offer test-takers some freedom in choosing certain textual sources and paths after attending to initial prompts. In this way, within the constraints of a large-scale assessment, goal-driven reading can be assessed.

### Tasks

Each scenario is made up of one or more tasks. For each task, students may be asked questions about the texts ranging from traditional comprehension items (locate information, perform an inference) to more complex tasks such as the synthesis and integration of multiple texts, evaluating web search results or corroborating information across multiple texts. Each task is designed to assess one or more processes identified in the framework. Tasks in a scenario can be sequenced starting with less difficult to more complex to provide information about different student abilities. For instance, a student might encounter an initial task in which the student must locate a particular document based on a search result. As a second task, the student might have to answer a question about information that is specifically stated in the text. As a third task, the student might need to determine if the author's point of view in the first text is the same as a second text. In each case, these tasks can be scaffolded so that if a student fails to find the correct document in the first task, the student is then provided with the correct document in order to complete the second task. In this way, complex multipart scenarios do not become an “all or none activity”, but rather a way to help triangulate the level of different student skills

within the context of realistic tasks. Thus, scenarios can be thought of as corresponding to units and tasks as items within units from previous PISA reading literacy assessments.

A scenario-based assessment mimics the way an individual interacts and uses literacy source material in a more authentic way than in traditional, decontextualised assessments. It presents students with realistic problems and issues to solve, and it involves the use of both basic and higher-level reading and reasoning skills (O'Reilly & Sabatini, 2013).

Scenarios make use of the affordances of computer-based assessments, such as the possibility of introducing stimulus material in a paced sequence, providing feedback to students and delivering items in a lockstep fashion, in order to provide scaffolding and manipulate difficulty. Scenarios represent a natural extension of the traditional, unit-based approach in PISA. A scenario-based approach was used in the PISA 2012 assessment of problem solving and the PISA 2015 assessment of collaborative problem solving. Tasks 2-4 in Appendix B illustrate a sample scenario with multiple items.

### Distribution of tasks

Tasks are designed to assess the specific skills as were defined in the section on processes. Each task will primarily assess one process. As such, they can be thought of as individual assessment items. The approximate distribution of tasks for the 2018 reading literacy assessment are shown below in Table 2 and are contrasted with the distribution of tasks for the 2015 assessment.

**Table 2. Approximate distribution of tasks per targeted process and text availability.**

2015 FRAMEWORK	2018 FRAMEWORK	
	SINGLE Text	MULTIPLE Text
Access and Retrieve 25%	Scan and Locate 15%	Search and select relevant text 10%
Integrate and Interpret 50%	Literal Comprehension 15% Inference Comprehension 15%	Inference Comprehension 15%
Reflect and Evaluate 25%	Assess quality and credibility 20% Reflect on content and form	Corroborate/Handle conflict 10%

Items will be reused from previous PISA reading literacy assessments in order to maintain trends. In order to achieve the desired representation of multiple text tasks, and because prior PISA assessments focused on single text tasks, the development of new items will mostly require the creation of tasks involving multiple texts (e.g. search, inference and corroborate/conflict). At the same time, a sufficient number of single-text items within the newly developed scenarios need to be present to ensure that future trend items cover the entire framework.

## Factors affecting item difficulty

The purpose of the PISA reading literacy assessment is to monitor and report on the reading proficiency of 15-year-olds as they approach the end of compulsory education. Each task in the assessment is designed to gather a specific piece of evidence about that proficiency by simulating a reading activity that a reader might carry out either inside or outside school, as an adolescent or as an adult.

The PISA reading literacy tasks range from very straightforward locating and comprehension activities to quite sophisticated activities requiring integrating information across multiple texts. The difficulty of any reading literacy task depends on an interaction amongst several variables. Drawing on Kirsch and Mosenthal's work (see for example Kirsch, 2001; Kirsch & Mosenthal, 1990), the difficulty of items can be manipulated by applying knowledge of the process and text format variables. In Table 3 below we outline how the difficulty can be manipulated across the different types of tasks.

Table 3. Item difficulty for tasks.

Single	Multiple
<p>In <b>scan and locate</b> tasks, difficulty is conditioned by the number of pieces of information that the reader needs to locate, by the amount of inferencing required, by the amount and prominence of competing information and by the length and complexity of the text.</p>	<p>Multiple document <b>search</b> difficulty is conditioned by the number of texts, the complexity of the document hierarchy (depth and breadth), familiarity of the structure, the amount of non-hierarchical linking, the distance to the goal, the salience and relevance of the headers and the dissimilarity of each of the physical presentation/structure of the sources (lack of parallelism in different source texts)</p>
<p>In <b>literal and explicit meaning</b> and <b>integrate and generate inferences</b> tasks, difficulty is affected by the type of interpretation required (for example, making a comparison is easier than finding a contrast); by the number of pieces of information to be considered; by the degree and prominence of competing information in the text; and by the nature of the text: the less familiar and the more abstract the content and the longer and more complex the text, and the lower the coherence of the structure, the more difficult the task is likely to be.</p>	<p>In multiple documents, <b>inference</b> difficulty is conditioned on the number of texts, the salience of the headers, the similarity of content (e.g. discrepancy in text content/arguments, variability in point of view), the dissimilarity of the physical presentation/structure of the sources (lack of parallelism in different source texts) and the explicitness of source information.</p>
<p>In <b>reflect on content and form</b> tasks, difficulty is affected by the type of reflection or evaluation required (from least to most difficult with types of reflection being: connecting; explaining and comparing; hypothesising and evaluating); by the nature of the knowledge that the reader needs to bring to the text (a task is more difficult if the reader needs to draw on narrow, specialised knowledge rather than broad and common knowledge); by the relative abstraction and length of the text; and by the depth of understanding of the text required to complete the task.</p> <p>For <b>assess quality and credibility</b> tasks credibility and quality of a source can be conditioned by using text signals such as the explicitness of the source and the degree to which a text appears to be advertising or comes from a reputable source.</p>	<p>In multiple documents, <b>corroborate/conflict/synthesize</b> difficulty is conditioned on the number of texts, the dissimilarity of content (discrepancy in texts content/arguments), the dissimilarity of each of the physical presentation/structure of the sources (lack of parallelism in different source texts), the explicitness of the source information, and the degree of credibility of the source.</p>

**Box 3: Text availability and its impact on comprehension in the design of tasks**

In the last decade, there has been some debate whether memory-based measures of reading comprehension, i.e. answering comprehension question while the text is not available to students after initial reading, might be a better indicator of students' reading comprehension skills than questions with text availability. From a theoretical point of view, arguments can be made for both, with- and without-text availability questions. Answering comprehension questions with a text might be more ecologically valid because many reading settings (especially in the digital age) potentially allow the reader to refer back to the text. In addition, if the text is not available to students, their performance on the comprehension questions might be confounded with their memory skills, i.e. their ability to remember the content of the text. On the other hand, answering comprehension questions without text availability is also a common reading situation (e.g. commenting on a newspaper article over lunch that has been read in the morning) and might be less confounded by students' motivational and test taking strategies. Empirically, recent studies (Ozuru et al., 2007; Schroeder, 2011) do provide some evidence that comprehension questions without text availability might indeed be more sensitive to the quality of the processes that are executed while students are reading a text and the strength of the resulting memory representation. At the same time, however, both kinds of measures are highly correlated and are thus difficult to dissociate empirically. At present, therefore, there is not enough evidence that justifies any major changes in the way PISA is administered. However, it is encouraged to include further measures in the analysis, e.g. time on task, time of initial reading of a text, etc., in order to further explore this issue.

## Factors improving the coverage of the domain

### Situations

Scenarios can be developed across a wide range of potential situations. *Situation* is used to define the contexts and uses for which the author constructed the text. The manner in which the situation variable is specified is therefore about supposed audience and purpose, and is not simply based on the place where, or the purpose for which, the reading activity is carried out.

The framework categorises situations using a typology adapted from the Common European Framework of Reference (CEFR) developed for the Council of Europe (Council of Europe, 1996). The situations are personal, public, occupational and educational contexts and are defined in Box 4. In contrast to previous PISA reading literacy assessments, texts from the different situations may be mixed within a scenario. For example, a student may perform a set of tasks that require relating an *educational* text that provides historical content to *personal* texts that provide first person accounts of the events.

#### Box 4. Categorisation of situations

A *personal* situation relates to texts that are intended to satisfy an individual's personal interests, both practical and intellectual. This category also includes texts that are intended to maintain or develop personal connections with other people. It includes personal letters, fiction, biography and informational texts that are intended to be read to satisfy curiosity, as a part of leisure or recreational activities. In the electronic medium, it includes personal e-mails, instant messages and diary-style blogs.

A *public* situation describes the reading of texts that relate to activities and concerns of the larger society. The category includes official documents as well as information about public events. In general, the texts associated with this category assume a more or less anonymous contact with others;

therefore they also include message boards, news websites and public notices that are encountered both on line and in print.

The content of *educational* situations makes use of texts designed specifically for the purpose of instruction. Printed textbooks, electronic textbooks and interactive learning software are typical examples of material generated for this kind of reading. Educational reading normally involves acquiring information as part of a larger learning task. The materials are often not chosen by the reader, but instead assigned by an instructor.

Many 15-year-olds will move from school into the labour force within one to two years. A typical *occupational* reading situation is one that involves the accomplishment of some immediate task. It might include searching for a job, either in a print newspaper's classified advertisement section or online; or following workplace directions. Texts written for these purposes, and the tasks based on them, are classified as occupational in PISA. While only some of the 15-year-olds who are assessed will currently have to read at work, it is important to include tasks based on texts that are related to work since the assessment of young people's readiness for life beyond compulsory schooling and their ability to use their knowledge and skills to meet real-life challenges is a fundamental goal of PISA.

Many texts used in classrooms are not specifically designed for classroom use. For example, a piece of literary text may typically be read by a 15-year-old in a mother-tongue language or literature class, yet the text was written (presumably) for readers' personal enjoyment and appreciation. Given its original purpose, such a text is classified as being used in a *personal situation* in PISA. As Hubbard (1989) has shown, some kinds of reading usually associated with out-of-school settings for children, such as rules for clubs and records of games, often take place informally at school as well. These are classified as *public* situations in PISA. Conversely, textbooks are read both in schools and in homes, and the process and purpose probably differ little from one setting to another. These are classified as *educational* situations in PISA.

It should be noted that many texts can be cross-classified to different situations. In practice, for example, a text may be intended both to delight and to instruct (personal and educational); or to provide professional advice, which is also general information (occupational and public). While content is not a variable that is specifically manipulated in this study, by sampling texts across a variety of situations the intent is to maximise the diversity of content that will be included in the PISA reading literacy test.

### Text types

Text types further describe the diversity of texts in a way to cover a wide range of types of reading that students would encounter: description, narration, exposition, argumentation, instruction and transaction<sup>2</sup>. Texts as they are found in the world typically resist categorisation, as they are usually not written with text type rules in mind, and tend to cut across categories. For example, a chapter in a textbook might include some definitions (exposition), some directions on how to solve particular problems (instruction), a brief historical account of the discovery of the solution (narration) and descriptions of some typical objects involved in the solution (description). Nevertheless, in an assessment like PISA it is useful to categorise texts according to the text type, based on the

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<sup>2</sup> In the first version of the reading framework, these text types were located as subcategories of the continuous text format. In the PISA 2009 cycle it was acknowledged that non-continuous texts (and the elements of mixed and multiple texts) also have a descriptive, narrative, expository, argumentative or instructional purpose.



predominant characteristics of the text, in order to ensure that the instrument samples across a range of texts that represent different types of reading.

The classification of texts used in PISA is adapted from the work of Werlich (1976) and are shown in Box 5.

### **Box 5. Classification of texts**

*Description* is the type of text where the information refers to properties of objects in space. The typical questions that descriptive texts provide an answer to are *what* questions. Descriptions can take several forms. Impressionistic descriptions present information from the point of view of subjective impressions of relations, qualities and directions in space. Technical descriptions present information from the point of view of objective observation in space. Frequently, technical descriptions use non-continuous text formats such as diagrams and illustrations. Examples of text objects in the text type category description are a depiction of a particular place in a travelogue or diary, a catalogue, a geographical map, an online flight schedule or a description of a feature, function or process in a technical manual.

*Narration* is the type of text where the information refers to properties of objects in time. Narration typically answers questions relating to *when*, or *in what sequence*. Why characters in stories behave as they do is another important question that narration typically answers. Narration can take different forms. *Narratives* present change from the point of view of subjective selection and emphasis, recording actions and events from the point of view of subjective impressions in time. *Reports* present change from the point of view of an objective situational frame, recording actions and events which can be verified by others. *News stories* intend to enable the readers to form their own independent opinion of facts and events without being influenced by the reporter's references to his own views. Examples of text objects in the text type category *narration* are a novel, a short story, a play, a biography, a comic strip and a newspaper report of an event.

*Exposition* is the type of text in which the information is presented as composite concepts or mental constructs, or those elements into which concepts or mental constructs can be analysed. The text provides an explanation of how the different elements interrelate in a meaningful whole and often answers questions about *how*. Expositions can take various forms. *Expository essays* provide a simple explanation of concepts, mental constructs or conceptions from a subjective point of view. *Definitions* explain how terms or names are interrelated with mental concepts. In showing these interrelations, the definition explains the meaning of words. *Explications* are a form of analytic exposition used to explain how a mental concept can be linked with words or terms. The concept is treated as a composite whole that can be understood by breaking it down into its constituent elements and then naming the interrelations of those elements. *Summaries* are a form of synthetic exposition used to explain and communicate texts in a shorter form than the original text requires. *Minutes* are a record of the results of meetings or presentations. *Text interpretations* are a form of both analytic and synthetic exposition used to explain the abstract concepts that are realised in a particular (fictional or non-fictional) text or group of texts. Examples of text objects in the text type category *exposition* are a scholarly essay, a diagram showing a model of memory, a graph of population trends, a concept map and an entry in an online encyclopaedia.

*Argumentation* is the type of text that presents the relationship among concepts or propositions. Argumentative texts often answer *why* questions. An important subclassification of argumentative texts is persuasive and opinionative texts, referring to opinions and points of view. *Comment* relates the



concepts of events, objects and ideas to a private system of thoughts, values and beliefs. *Scientific argumentation* relates concepts of events, objects and ideas to systems of thought and knowledge so that the resulting propositions can be verified as valid or non-valid. Examples of text objects in the text type category *argumentation* are a letter to the editor, a poster advertisement, the posts in an online forum and a web-based review of a book or film.

*Instruction* (sometimes called injunction) is the type of text that provides directions on what to do. *Instructions* present directions for certain behaviours in order to complete a task. *Rules, regulations* and *statutes* specify requirements for certain behaviours based on impersonal authority, such as practical validity or public authority. Examples of text objects in the text type category *instruction* are a recipe, a series of diagrams showing a procedure for giving first aid and guidelines for operating digital software.

*Transaction* represents the kind of text that aims to achieve a specific purpose outlined in the text, such as requesting that something is done, organising a meeting or making a social engagement with a friend. Before the spread of electronic communication, this kind of text was a significant component of some kinds of letters and, as an oral exchange, the principal purpose of many phone calls. This text type was not included in Werlich's (1976) categorisation, used until now for the PISA framework.

The term transactional is used in PISA not to describe the general process of extracting meaning from texts (as in reader-response theory), but the type of text written for the kinds of purposes described here. Transactional texts are often personal in nature, rather than public, and this may help to explain why they do not appear to be represented in some of the corpora used to develop many text typologies. For example, this kind of text is not commonly found on websites, which are frequently the subject of corpus linguistics studies (for example, Santini, 2006). With the extreme ease of personal communication using e-mail, text messages, blogs and social networking websites, this kind of text has become much more significant as a reading text type in recent years. Transactional texts often build on common and possibly private understandings between communicators – though clearly, this feature is difficult to explore in a large-scale assessment. Examples of text objects in the text type transaction are everyday e-mail and text message exchanges between colleagues or friends that request and confirm arrangements.

*Narration* occupies a prominent position in many national and international assessments. Some texts are presented as being accounts of the world as it is (or was) and therefore claim to be factual or non-fictional. Fictional accounts bear a more metaphorical relation to the world as it is, appearing either as accounts of how it might be or of how it seems to be. In other large-scale reading studies, particularly those for school students: the National Assessment of Educational Progress (NAEP); the IEA Reading Literacy Study (IEARLS); and the IEA Programme in International Reading Literacy Study (PIRLS), the major classification of texts is between fictional or literary texts and non-fictional texts (*reading for literary experience* and *reading for information or to perform a task* in NAEP; *literary experience* and *acquire and use information* in PIRLS). This distinction is increasingly blurred as authors use formats and structures typical of factual texts in creating their fictions. The PISA reading literacy assessment includes both factual and fictional texts, and texts that may not be clearly one or the other. PISA, however, does not attempt to measure differences in reading proficiency between one type and the other. In PISA, fictional texts are classified as narration.

## Response formats

The form in which the evidence is collected – the *response format* – varies according to what is considered appropriate given the kind of evidence that is being collected, and also according to the pragmatic constraints of a large-scale assessment. As in any large-scale assessments the range of feasible item formats is limited. However, with computers for assessment, the types of response formats can include interactions with text, such as highlighting and drag-and-drop, as well as multiple choice and short constructed response items (to which students write their own answer).

Response formats can be differentially sensitive to individual differences. For example, cloze and sometimes multiple choice are typically more dependent on decoding skills, because readers have to decode distractors or items, when compared to open constructed response items (Cain & Oakhill, 2006). Several studies based on PISA data suggest that the response format has a significant effect on the performance of different groups: for example, students at different levels of proficiency (Routitsky & Turner, 2003); students in different countries (Grisay & Monseur, 2007); students with different levels of intrinsic reading motivation (Schwabe, McElvany & Trendtel, 2015), and boys and girls (Lafontaine & Monseur, 2006, 2006b; Schwabe, et al., 2015). Given this variation, in measuring trends over time, it is important to maintain a similar proportion of tasks in multiple choice and constructed response formats from one administration to the next. A further significant consideration in the context of reading literacy is that open constructed response items are particularly important for the reflection and evaluation aspect, where the intent is often to assess the quality of thinking rather than the conclusion itself. Nevertheless, because the focus of the assessment is on reading and not on *writing*, constructed response items should not be designed to put great emphasis on assessing writing skills, such as spelling, grammar, etc. Finally, students in different countries are more or less familiar with various response formats. Including items in a variety of formats is likely to provide some balance between more and less familiar formats for all students, regardless of nationality.

In summary, to ensure proper coverage of the ability ranges in different countries, to ensure fairness given the inter-country and gender differences observed and to ensure a valid assessment of the *reflect and evaluate* aspect, both multiple choice and open constructed response items continue to be used in PISA reading literacy assessments regardless of the change in delivery mode. Any major change in the distribution of item types in print reading might also impact the measurement of trends.

### **Box 6: The status of writing skills in PISA 2018 reading literacy assessment.**

Skilled readers are often required to write comments, essays or explanations in response to questions, or choose to make notes, outlines and summaries, or simply write down their thoughts and reflections about texts, towards achieving their reading goals. They also routinely engage in written communication with others (e.g. teachers, student peers, acquaintances) in learning (e.g. an email assignment from a teacher) or social (e.g. a chat with peers about text or school literacy contexts). The PISA 2018 reading framework considers writing to be an important correlate of reading literacy. Test design and administration constraints prohibit the inclusion of the assessment of writing skills, where writing is in part defined as the quality and organization of the production. However, a significant proportion of test items requires readers to articulate their thinking into written answers. Thus, the assessment of reading skills also draws on readers' ability to communicate their understanding in writing, although such aspects as spelling, quality of writing and organization are not measured in PISA.

## Assessing the ease and efficiency of reading simple texts for understanding

The PISA 2018 reading literacy assessment will include the assessment of reading fluency, defined as the ease and efficiency with which students can read simple texts for understanding. This will provide a valuable indicator for use in describing or understanding differences between students, especially for individuals in the lower reading proficiency levels. Students with low levels of foundational reading skills may be exerting so much attention and cognitive effort on lower level skills of decoding, word recognition and sentence parsing that they have diminished resources to perform higher-level comprehension tasks with single or multiple texts. This finding applies to developing as well as teenage readers (Rasinski et al., 2005; Scamacca et al., 2006).

The computerized administration and scoring in PISA 2018 allows the measurement of the ease and efficiency with which 15-year-olds can read simple texts for understanding. While not all slow reading is poor reading, as noted above, a large body of evidence documents how and why a lack of automaticity in one's basic reading processes can be a bottleneck to higher-level reading proficiency and is associated with poor comprehension (e.g. Rayner et al., 2001). Thus, it is valuable to have an indicator of the ease and efficiency with which 15-year-olds can read simple texts accurately for understanding to better describe and interpret very low-level performance on PISA comprehension tasks.

It is further worth noting that with the exponential expansion of text content available on the Internet, there is an ever greater need for 21<sup>st</sup> century students to not only be proficient readers, but also efficient readers (OECD, 2011). Thus, a basic indicator of reading rate under low demand conditions can also be used descriptively for other purposes, such as investigating how much students regulate their rate or strategic processes in the face of more complex tasks or larger volumes of text.

While there are many variations in how to define, operationalize and measure reading ease, efficiency or fluency, the most common evidence collected when using silent reading tasks are indicators of accuracy and rate. Oral reading fluency measures can also be used to estimate prosody and expressiveness of the reader, but these attributes are more challenging to measure in silent reading tasks and there is less agreement concerning their added value over and above strong indicators of accuracy and rate (Eason et al., 2013; Kuhn, Schwanenflugel, & Meisinger, 2010). In addition, it is not currently feasible to implement and score oral reading tasks in all the languages in which PISA is available. Thus, a silent reading task design is recommended.

In order to better understand the challenges facing 15-year-olds scoring at lower levels on the PISA reading literacy task, a specific task can be administered near the start of the assessment to measure reading ease and efficiency. Performance on this task can be scaled and reported independently from the main proficiency scales. As noted, inefficient reading can be a symptom of low foundational skills. However, there may be individuals who are relatively slow readers, yet possess compensatory or strategic processes that permit them to be higher-level readers when given sufficient time to complete complex tasks. This may be especially the case for non-native speakers of a language, who may be relatively slower than native speakers, but score comparably to more proficient students on untimed tasks. Thus, it seems most prudent to use the ease of reading indicator as a descriptive variable to help differentiate students who may have foundational skill deficits from those who are slow, but nonetheless proficient readers.

In addition, an index of ease and efficiency of reading could be, as one of several indicators, used for placing students in a level for adaptive testing (see section below on "Considerations for adaptive

testing”). For the reasons cited in the previous paragraph, the index may not be suitable as a sole indicator of reading level, however, when combined with other evidence, inefficiency in basic processing may be helpful in placing students in appropriate levels.

A task design that has been used effectively as an indicator of reading ease and efficiency in other empirical research requires students to read a sentence and make a judgment of the plausibility of the sentence in relation to world knowledge or internal logical consistency of the sentence. The measure takes into account both accuracy of understanding the text and the time it takes to read and respond. This sentence task structure has been used in the Woodcock Johnson Subtest of Reading Fluency (Woodcock, McGrew, & Mather, 2001) and the Tests of Silent Reading Efficiency and Comprehension (TOSREC) (Wagner, Torgesen, Rashotte, & Pearson, 2010). It is also the task type used in the PIAAC Reading Components task set (OECD, 2013a; Sabatini & Bruce, 2009), and in two PISA countries (Bruce & Sabatini, 2013) with success. A similar task has been used in the Austrian PISA 2000 assessment and showed high correlations ( $r = .64$ ) with students’ final test score (Landerl & Reiter, 2002). This task design thus has a proven empirical foundation as an index of reading ease and efficiency in international study contexts. Task 1 in Appendix B shows a sample item taken from the PIAAC Reading Components task.

While it may be possible in future cycles of PISA to use log-file data based on complex reading literacy tasks as the sole source for measuring ease and efficiency, this option is not recommended for the current cycle. In order to ensure that students complete tasks under conditions that yield a valid indicator of efficiency, the design and instructions accompanying the task should target the desired construct. The texts need to be simple and short in order to maximize reading efficiency versus strategic or compensatory processes. In addition, the task demands should take minimal reasoning so as to not confound individual differences in decision time with basic reading rate information. It will therefore be difficult to ensure that the reading rates and accuracy observed in tasks that were designed for different measurement purposes that are executed by students under these constraints. The more complex the task, the more likely that students will deploy strategic or compensatory processes that interfere with measuring ease and efficiency of basic understanding.

Thus, it is recommended that the log files from this cycle be analysed to evaluate whether there are indicators within the new PISA Reading Literacy task set that are strongly correlated with the sentence level efficiency task proposed. The probability is low that there is sufficient valid evidence in the field test log files – essentially psychometric equivalence with the sentence task – from initial item trials of the new reading literacy tasks. On the other hand, such log file correlational evidence would serve as cross-validation evidence for the ease and efficiency task.

### **Assessing students' reading motivation, reading practices and awareness of reading strategies**

Since PISA 2000, the importance of motivational attributes of the reader (such as their attitude toward reading) and of their reading practices (e.g. the readers’ factors in Figure 1) has been highlighted in the reading literacy framework; accordingly, items and scales have been developed to measure these important constructs in the student questionnaire. It is important to note that reading motivation and reading strategies may vary as a function of the contexts and types of texts considered. Therefore, questionnaire items assessing motivation and strategies should refer to a range of situations that represent students' practices. In addition to increased theoretical relevance, items referring to more

specific and concrete situations are known to decrease the risk of response bias that may come with ratings and self-reports.

### **Intrinsic motivation and interest in reading**

“While *motivation* refers to goals, values, beliefs in a given area, such as reading, *engagement* refers to behavioural displays of effort, time, and persistence in attaining desired outcomes” (Klauda & Guthrie, 2015, p. 240). Reading engagement, motivation and practices have been shown in a number of studies to be strongly linked with reading proficiency (Becker, McElvany, & Kortenbruck, 2010; Guthrie, Wigfield, Metsala, & Cox, 2004; Klauda & Guthrie, 2014; Mol & Bus, 2011; Morgan & Fuchs, 2007; Pfof, Dörfler, & Artelt, 2013; Schaffner, Philipp, & Schiefele, 2014; Schiefele, Schaffner, Möller, & Wiegfield, 2012). In PISA 2000, engagement in reading (comprising interest, intrinsic motivation, avoidance and practices) were strongly correlated with reading proficiency, stronger even than the association between reading literacy and socio-economic status (OECD, 2002; 2010a). In other studies, reading engagement has been shown to explain reading achievement more than any other variable besides previous reading achievement (Guthrie & Wigfield, 2000). Critically, perseverance as a characteristic of engagement has also been linked to successful learning and achievement outside of school (Heckman & Kautz, 2012). Thus, motivation and engagement are powerful variables and levers on which one can act in order to enhance reading proficiency and reduce gaps between groups of students.

In previous PISA cycles in which reading literacy was the major domain (PISA 2000 and PISA 2009), the main motivational construct investigated was *interest in reading and intrinsic motivation*. The scale measuring interest and intrinsic motivation also captured *reading avoidance*, which is lack of interest or motivation and has shown strong associations with achievement especially among struggling readers (Klauda & Guthrie, 2015; Legault, & al., 2006). For PISA 2018, in accordance with what was done in other domains, two other prominent motivational constructs will be investigated as part of the PISA questionnaire, namely *self-efficacy*, the individual’s perceived capacity of doing specific tasks, and *self-concept*, the individual’s own perceived abilities related to a domain.

### **Reading practices**

Beside motivation, *reading practices* have previously been measured as *the self-reported frequencies of reading different types of texts in various media, including online reading*. In PISA 2018, the list of online reading practices scales will be updated and extended in order to take into account emerging practices (e.g. e-books, online search, short messaging and social networking).

### **Awareness of reading strategies**

*Metacognition*, an individual’s ability to think about and control his or her reading and comprehension strategies, has both a significant correlation with reading proficiency and is responsive to teaching and learning. A number of studies have found an association between reading proficiency and metacognitive strategies (Artelt, Schiefele, & Schneider, 2001; Brown, Palincsar, & Armbruster, 1984). Explicit or formal instruction of reading strategies leads to an improvement in text understanding and information use (Cantrell et al., 2010). More specifically, it is assumed that the reader becomes independent of the teacher after these strategies have been acquired and are applied without much effort. By using these strategies, the reader can effectively interact with the text by conceiving reading as a problem-solving task that requires the use of strategic thinking and by thinking strategically about solving reading comprehension problems. In previous PISA cycles, engagement and metacognition proved to be robust predictors of reading achievement, mediators of gender or socioeconomic status (OECD, 2010, b vol. III) and also potential levers to reduce achievement gaps. In the questionnaire



framework, the measures of these motivational, metacognition and reader practices are updated and extended in order to take into account the recent and emerging practices (e.g. e-books, online search, social networking) as well as to better cover measurement of teaching practices and classroom support that support reading growth.

Skilled reading requires students to know and employ strategies in order to make the best use of text given their purposes and goals. For instance, students must know when it is appropriate to scan a passage or when the task requires the sustained and complete reading of the passage. In PISA 2009, information about reading strategies was collected. Two reading scenarios were presented to students. In the first scenario, students were asked to evaluate the effectiveness of different reading and text comprehension strategies to reach the goal of *summarising information*; in the second, students had to evaluate the effectiveness of other strategies for *understanding and remembering a text*). For PISA 2018, in accordance with the new frame of reading processes (see Figure 2), information will also be collected about knowledge of reading strategies specifically linked to the goal of “*assessing the quality and credibility of sources*”, which is particularly prominent in digital reading and when confronted with multiple texts.

### **Teaching practices and classroom support for reading growth and engagement**

There is strong research evidence showing that classroom practices, such as the direct teaching of reading strategies, contribute to growth in reading skill (Pressley, 2000; Rosenshine & Meister, 1997; Waters & Schneider, 2010). In addition, teachers’ scaffolding and support for autonomy, competence and ownership improve students’ reading proficiency, awareness of strategies, and engagement in reading (Guthrie, Ho, & Klauda, 2013; Guthrie, Wigfield, & You, 2012). While in most educational systems, reading is no longer taught as a subject matter to 15-year-old students in the same way as are mathematics and science, some reading instruction may be explicitly or incidentally given in language lessons and in other disciplines (e.g. social science, science, foreign languages, civic education, ICT). Yet the dispersed nature of reading instruction represents a challenge for articulating questions that capture the classroom practices and opportunities to learn to which students may be exposed. Despite these challenges, it is thought extremely important to capture through the student questionnaire the relevant instructional processes – opportunity-to-learn and teaching practices – that might support the development of students’ reading skills, practices and motivation.

### **Considerations for adaptive testing**

The deployment of computer-based assessment in PISA creates the opportunity to implement adaptive testing. Adaptive testing enables higher levels of measurement precision using fewer items per individual student. This is accomplished by targeting more items that are aligned to the ability range of students at different points in the ability distribution.

Adaptive testing has the potential to increase the resolution and sensitivity of the assessment, most particularly at the lower end of the distribution of student performance. For example, students who perform low on items that assess their ease and efficiency of reading (e.g. reading fluency) will likely struggle on highly complex multiple text items. Thus, there would be benefit in providing additional lower-level texts for those students to better assess specific aspects of their comprehension.



## Reporting Proficiency in reading

### Reporting scales

PISA reports students' results in terms of proficiency scales that are interpretable in educational policy terms. In PISA 2000, when reading was the major domain, the results of the reading literacy assessment were first summarised on a single composite reading literacy scale having a mean of 500 and a standard deviation of 100. In addition to the composite scale, student performance was also represented on five subscales: three process (aspect) subscales (retrieving information, interpreting texts, and reflection and evaluation) and two text format subscales (continuous and non-continuous) (OECD, 2002). These five subscales made it possible to compare mean scores and distributions among subgroups and countries by various components of the reading literacy construct. Although there is a high correlation between these subscales, reporting results on each subscale revealed interesting deviations among the participating countries. Where such deviations occur, they can be examined and linked to the curriculum and teaching methodology used. In some countries, the important question may be how to teach the current curriculum better. In others, the question may be not only how to teach but also what to teach. In PISA 2009, reading was again the major domain. A reporting scheme including subscales as well as a composite scale was used.

In both PISA 2003 and 2006, and 2012 when reading was a minor domain, and fewer reading items were administered to participating students, a single reading literacy trend scale was reported based upon the overall composite scale (OECD, 2004, 2007, 2014). In 2018 reading is the major domain, and reporting on subscales is again possible.

For PISA 2018, the reporting subscales will be (see also Table 1):

- 1) Locate information, which is composed of tasks that require students to search and select relevant texts, and access relevant information within texts.
- 2) Understand, which is composed of tasks that require students to represent the explicit meaning of texts as well as integrate information and generate inferences.
- 3) Evaluate and reflect, which is composed of tasks that require the student to assess the quality and credibility of information, reflect on the content and form of a text and detect and handle conflict within and across texts.

As described above, a separate subscore for reading fluency can also be provided as a measure of students' ease and efficiency of reading. This subscore will not be reported on the PISA scale, but can be used to help interpreting student's performance.

### Interpreting and using the scales

Just as students can be ordered from the least proficient to the highly skilled on a single scale, reading literacy tasks are arranged along a scale that indicates progressively the level of difficulty for students and the level of skill required to answer each item correctly. By comparing the position of students and items on these scales, we can summarise both the proficiency of a person in terms of his or her ability and the complexity of an item in terms of its difficulty.

Reading literacy tasks used in PISA vary widely in situation, text format and task requirements, and they also vary in difficulty. This range is captured through what is known as an item map. The item map provides a visual representation of the reading literacy skills demonstrated by students at different points along the scale.

Tasks at the lower end of the reading scale and subscales differ from those at the higher end. Difficulty is in part determined by the length, structure and complexity of the text itself. However, while the structure of a text contributes to the difficulty of an item, what the reader has to do with that text, as defined by the question or instruction, interacts with the text and affects the overall difficulty. A number of variables that can influence the difficulty of any reading literacy task have been identified, including the complexity and sophistication of the mental processes integral to the aspect of the task (retrieving, interpreting or reflecting), the amount of information to be assimilated by the reader and the familiarity or specificity of the knowledge that the reader must draw on both from within and from outside the text.

### Defining levels of reading literacy proficiency

In an attempt to capture this progression of complexity and difficulty in PISA 2000, the composite reading literacy scale and each of the subscales were divided into six levels (Below level 1, 1, 2, 3, 4, 5). These levels as they were defined for PISA 2000 were kept for the composite scale used to measure trends in PISA 2009 and 2015. However, newly constructed items helped to improve descriptions of the existing levels of performance and to furnish descriptions of levels of performance above and below those established in PISA 2000. Thus, the scales were extended to level 6, and level 1b was introduced at the bottom of the scale (OECD, 2012).

The levels provide a useful way to explore the progression of reading literacy demands within the composite scale and each subscale. The scale summarises both the proficiency of a person in terms of his or her ability and the complexity of an item in terms of its difficulty. The mapping of students and items on one scale represents the idea that students are more likely to be able to successfully complete tasks mapped at the same level on the scale (or lower), and less likely to be able to successfully complete tasks mapped at a higher level on the scale.

As an example, the reading proficiency scale for the PISA 2012 study is represented in Table 4. The left-hand column shows the level number, the lower score limit, and the percentage of students who are able to perform tasks at each level or above (OECD average). The right-hand column describes what students can do at each level (adapted from OECD, 2013).

Table 4. An overview of reading proficiency levels as they were described in the PISA 2012 study.

Level	What Students Can Do
6 698 1.1%	Readers at level 6 typically can make multiple inferences, comparisons and contrasts that are both detailed and precise. They demonstrate a full and detailed understanding of one or more texts and may integrate information from more than one text. Tasks may require the reader to deal with unfamiliar ideas, in the presence of prominent competing information, and to generate abstract categories for interpretations. Students can hypothesise about or critically evaluate a complex text on an unfamiliar topic, taking into account multiple criteria or perspectives, and applying sophisticated understandings from beyond the text. A salient condition for access and retrieve tasks at this level is precision of analysis and fine attention to detail that is inconspicuous in the texts.
5 626 8.4%	At level 5, readers can locate and organise several pieces of deeply embedded information, inferring which information in the text is relevant. Reflective tasks require critical evaluation or hypothesis, drawing on specialised knowledge. Both interpretative and reflective tasks require a full and detailed understanding of a text whose content or form is unfamiliar. For all aspects of reading, tasks at this level typically involve dealing with concepts that are contrary to expectations.
4 553 29.5%	At level 4, readers can locate and organise several pieces of embedded information. They can also interpret the meaning of nuances of language in a section of text by taking into account the text as a whole. In other interpretative tasks, students demonstrate understanding and application of categories in an unfamiliar context. In addition, students at this level can use formal or public knowledge to hypothesise about or critically evaluate a text. Readers must demonstrate an accurate understanding of long or complex texts whose content or form may be unfamiliar.
3 480 58.6%	Readers at level 3 can locate, and in some cases recognise the relationship between, several pieces of information that must meet multiple conditions. They can also integrate several parts of a text in order to identify a main idea, understand a relationship or construe the meaning of a word or phrase. They need to take into account many features in comparing, contrasting or categorising. Often the required information is not prominent or there is much competing information; or there are other text obstacles, such as ideas that are contrary to expectation or negatively worded. Reflective tasks at this level may require connections, comparisons, and explanations, or they may require the reader to evaluate a feature of the text. Some reflective tasks require readers to demonstrate a fine understanding of the text in relation to familiar, everyday knowledge. Other tasks do not require detailed text comprehension but require the reader to draw on less common knowledge.
2 407 82.0%	Readers at level 2 can locate one or more pieces of information, which may need to be inferred and may need to meet several conditions. They can recognize the main idea in a text, understand relationships, or construe meaning within a limited part of the text when the information is not prominent and the reader must make low-level inferences. Tasks at this level may involve comparisons or contrasts based on a single feature in the text. Typical reflective tasks at this level require readers to make a comparison or several connections between the text and outside knowledge, by drawing on personal experience and attitudes.
1a 335 94.3%	Readers at level 1a can locate one or more independent pieces of explicitly stated information; they can recognise the main theme or author's purpose in a text about a familiar topic, or to make a simple connection between information in the text and common, everyday knowledge. Typically the required information in the text is prominent and there is little, if any, competing information. The student is explicitly directed to consider relevant factors in the task and in the text.
1b 262 98.7%	Readers at level 1b can locate a single piece of explicitly stated information in a prominent position in a short, syntactically simple text with a familiar context and text type, such as a narrative or a simple list. Texts in level 1b tasks typically provide support to the reader, such as repetition of information, pictures or familiar symbols. There is minimal competing information. Level 1b readers can interpret texts by making simple connections between adjacent pieces of information.

Given that the top of the reading literacy scale currently has no bounds, there is arguably some uncertainty about the upper limits of proficiency of extremely high performing students. However such students are likely to be capable of performing tasks characterised by the highest level of proficiency. For students who are at the bottom end of the reading literacy scale, there is a greater issue. Although it is possible to measure the reading proficiency of students performing below Level 1, at this stage their proficiency cannot be described. The independent measure of reading ease and efficiency, however, may provide additional information about those students performing below Level 1. In developing new material for PISA 2018, an effort should be made to design items that measure reading skills and understandings located at or below the current Level 1.

## Appendix A. Main changes in the reading framework, 2000-2015.

	2000	2009	2015
TEXT			
Format	Continuous, Non-continuous, Mixed	Same as 2000, plus Multiple	Same as 2009
Type	Argumentation, Description, Exposition, Narration, Instruction	Same as 2000, plus “Transactional”	Same as 2009
Environment	N/A	Authored, Message-based	N/A
Medium	N/A	Print, Electronic	N/A
Space	N/A	N/A	Fixed, Dynamic
SITUATIONS	Educational, Personal, Professional, Public	Same as 2000	Same as 2000
ASPECT	Access and retrieve Integrate and interpret Reflect and evaluate	Same as 2000, plus “complex”	Same as 2000

## Appendix B. Sample Tasks

Task 1. Sample of reading ease and efficiency task. The sentence-processing items are timed tasks that require the respondent to assess whether a sentence makes sense in terms of the properties of the real world or the internal logic of the sentence. The respondent reads the sentence and circles YES if the sentence makes sense or NO if the sentence does not make sense. This task is adapted from PISA 2012 and PIAAC's Reading Components sentence processing items.

Directions: Circle **YES** if the sentence makes sense. Circle **NO** if the sentence does not make sense.

The red car had a flat tire.	<b>YES</b>	<b>NO</b>
Airplanes are made of dogs.	<b>YES</b>	<b>NO</b>
The happy student read the book last night.	<b>YES</b>	<b>NO</b>
If the cat had stayed out all night, it would not have been in the house at 2 a.m.	<b>YES</b>	<b>NO</b>
The man who is taller than the woman and the boy is shorter than both of them.	<b>YES</b>	<b>NO</b>



Tasks 2-4. Sample scenario with three embedded tasks.

In this scenario, students are asked to read three sources: a blog post, the comments section that follows and an article that is referenced by one of the commenters. The articles and comments all discuss space exploration now and in the future. Students are asked to answer several questions that assess different reading processes.

Task 2. Scan and locate (single text).

**PISA 2018**

**Unit Title: Space Exploration**  
Question 1/5

Refer to Scott Huffington's Blog on the right. Select a choice to answer the question.

According to Scott Huffington in the article "Is the Golden Era of Space Exploration Over?" what effect have private companies had on space exploration?

- o Private companies have shown that they can better manage space exploration projects.
- o People are questioning whether government space programs are necessary.
- o Government agencies are losing funding to private companies offering the same service.
- o Government agencies and private companies are collaborating effectively.

**Text 1**  
**Is the Golden Era of Space Exploration Over?**  
by Scott Huffington 🍏 May 16, 2011

Beginning with the launch of Sputnik in 1957 the focus of space exploration had one aim: be the first to go where no human had gone before. In 1961 Yuri Gagarin became the first man in space sparking an intense competition where astronauts and cosmonauts battled to break records, expand frontiers, and bring notoriety to their countries of origin. However, since July 22<sup>nd</sup> 1969 and Neil Armstrong's historic leap for mankind, space exploration has slowed.

Since then, space programs have focused on creating a sustainable presence in low-Earth Orbit through the development and maintenance of space craft, space stations, and satellites. The Russian space station Mir and the US Skylab were the first space stations but proved too expensive to operate independently. We now have the International Space Station (ISS), an impressive international collaborative effort led by the United States, Russia, Canada, and Japan. Yet, the station was meant to be a stepping stone to bolder projects including a manned mission to Mars. Thirty years later, we are still maintaining the space station but we are no closer to achieving a manned mission to Mars.

For decades, the idea of human space exploration has widely been seen as the exclusive domain of government agencies like the Russian Federal Space Agency (RKA), the National Aeronautics and Space Administration (NASA) in the United States, and the European Space Agency (ESA) with 22 member countries. However, the rise of private companies making serious steps toward successful commercial space flights has many people questioning the relevance and necessity of government run and publicly funded space exploration programs. Add the highly publicized U.S. space shuttle disasters in 1986 and 2003 and the enthusiasm and commitment for space exploration has further eroded.

All of this leads me to conclude that the world has lost the focus and drive to explore new frontiers. I fear that the golden age of space exploration has passed, and we are rapidly progressing toward a decidedly Earth bound future.

## Task 3: Multiple text inference

PISA 2018

Unit Title: Space Exploration  
Question 2/5

Refer to both Scott Huffington's article and the comment section that followed it to answer the next question. Select all the choices that apply.

The author Scott Huffington and commenters Yoshi Kubota and Claude Messier disagree on some issues while agreeing on others.

Based on what you have learned, select the radio button for each person that would agree with the issue statement.

Issue Statement	Scott Huffington	Yoshi Kubota	Claude Messier
Enthusiasm for space exploration has decreased	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advances resulting from space exploration have slowed in recent years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Both human and robotic missions are vital to space exploration programs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Text 1      Text 2

**COMMENTS:**

**Yoshi Kubota: 05/17/2015 09:42 CDT**

The perception that enthusiasm and commitment for space exploration has eroded is simply false. While funding for governmental agencies has been challenging due to a sluggish worldwide economy, enthusiasm for exploration on an international level is still high. Please note that 14 space agencies from around the world came together in 2007 to draft *The Global Exploration Strategy: the Framework for Coordination*. The purpose of the framework is to create a globally coordinated vision for human and robotic space exploration. Together, our space agencies have a very clear plan for space exploration. In fact, the framework was updated in 2014. Please read the attached copy of the global exploration strategy.

**Randall M. Kay: 05/18/2015 08:31 CDT**

Scott, like Yoshi Kubota, I think you have misunderstood the current state of global space exploration. The ISS is allowing us to develop the skills and technology needed for deep space exploration. NASA, one of the members of the International Space Exploration Coordination Group that drafted *The Global Exploration Strategy* that Yoshi shared, has published a detailed plan for developing the technologies needed to send a manned mission to Mars. Low Earth orbit is the initial step, not the final goal.

**Claude Messier: 05/19/2015 12:42 CDT**

This discussion is fascinating, but I do feel the need to point out a few corrections. It is precisely through space exploration that we will solve the problems of the world. With that said, Scott does have a point that advances in the Global Exploration Strategy are slow to materialize. Part of the reason is cost, but also a flexibility built into the Global Exploration Strategy. The article referenced by Yoshi presents a strategy that the moon is our next stop. However, the organization is currently exploring two strategies: moon next and asteroid next.

Task 4. Evaluate and reflect.

PISA 2018

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**Unit Title: Space Exploration**  
 Question 5/5

*Refer to the articles on the right. Type your answer to the questions in the space provided.*

Think about how Scott Huffington wrote his article and the commenters responded. Based on this information, write a comment that explains two primary benefits of space exploration? Support your answer with details from the articles.

Text 1
Text 2
Text 3

**Is the Golden Era of Space Exploration Over?**  
 by Scott Huffington 🍷 May 16, 201

Beginning with the launch of Sputnik in 1957 the focus of space exploration had one aim: be the first to go where no human had gone before. In 1961 Yuri Gagarin became the first man in space sparking an intense competition where astronauts and cosmonauts battled to break records, expand frontiers, and bring notoriety to their countries of origin. However, since July 22<sup>nd</sup> 1969 and Neil Armstrong's historic leap for mankind, space exploration has slowed.

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