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Output 3

Guidance to develop a tool for systematically monitoring and evaluating the implementation of the relevant RRP investment

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Note by Türkiye

The information in the documents with reference to “Cyprus” relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Türkiye recognizes the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Türkiye shall preserve its position concerning the “Cyprus issue”.

Note by all the European Union Member States of the OECD and the European Union

The Republic of Cyprus is recognised by all members of the United Nations with the exception of Türkiye. The information in the documents relates to the area under the effective control of the Government of the Republic of Cyprus.

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1 Key takeaways

Identified areas for measurement by the monitoring and evaluation tool

Digital skills should be at the core of the monitoring and evaluation tool since the enhancement of seniors' digital proficiency is the primary indicator of the RRP investment's success. These skills can be measured through a combination of task-based assessments and self-assessment tests. Moreover, conducting entry, exit, and follow-up tests can capture the immediate and long-term evolution of older individuals' digital skills after the training. In addition to assessing digital skills proficiency, the monitoring scope extends to include seniors' digital security and their attitudes toward technology.

A holistic evaluation of the RRP investment's real-world impact involves assessing the practical application of acquired digital skills among older individuals. The focus should be on two key areas: active ageing and engagement with government. The use of online services by older people should be measured in areas such as eHealth, enhanced communication, online banking, lifelong learning, eGovernment, and exposure to disinformation.

It is also crucial to consider the barriers and enablers that serve as primary catalysts for the successful advancement of digital skills among seniors. Key elements include guaranteeing sufficient access to ICT, tackling affordability concerns, and optimising ICT utilisation.

Data collection & analysis

The evaluation of the RRP investment must be data-driven. Some indicators can be directly compiled from already existing data. Administrative data, such as records from public agencies, are continuously collected by governments at no additional cost and cover the entire population. However, their use faces challenges in the Slovak Republic. Technical limitations and the absence of a legal framework for data exchange among various owners currently hinder their seamless usability. In this context, the logistical information system, ELIS (Evidenčno-logistický informačný systém), emerges as a valuable data source. ELIS directly collects data related to the senior-tablet policy under the RRP investment, ensuring the collection, processing, control, and evaluation of obtained data while also monitoring project milestones.

Additionally, survey data serve as another valuable and easily accessible source for the monitoring and evaluation tool. Several surveys align well with the identified areas of interest, such as the OECD ICT Access and Usage by Households and Individuals database, EU statistics on income and living conditions (EU-SILC), Programme for the International Assessment of Adult Competencies (PIAAC), and the Digital Economy and Society Index (DESI).

Finally, new data collection should be considered. Enhancing existing surveys, especially expanding coverage to include the age group 65+, would provide valuable insights. Existing results are frequently analyzed only at an aggregate level. Breaking down the data to account for vertical inequalities or regional disparities would unveil groups requiring more targeted support. Additionally, some relevant indicators can be relatively easily measured by adding questions to the existing project questionnaires.

Once the data is identified and accessible, a thorough analysis must be ensured. One way to achieve this is by fostering data exchange across stakeholders for a more holistic view of the policy's impact. However, this requires robust data-sharing protocols to ensure privacy and data integrity, which are currently lacking in the Slovak Republic. Good practices can be seen in countries such as Estonia or Luxembourg, where mechanisms have been put in place to allow secure and efficient data sharing between private and public sector organisations while ensuring data privacy and protection.

Another way to enhance in-depth analysis involves establishing connections between different registries. The most effective solution is to use a personal identifier common to all registers (such as a social security number or personal ID) since this allows for exact matching between registers. This approach would improve the overall quality of data collection and analysis in the Slovak Republic. However, since the Slovak Republic does not use a unique identifier for all registers, alternative methodologies such as deterministic matching and probabilistic matching can be employed.

Key stakeholders

Early involvement of data owners, including the Statistical Office, MIRRI, and relevant ministries, ensures valuable expertise and support for effective tool setup and operation. A more expansive and inclusive strategy involves the establishment of a government-led task force group, bringing together a diverse array of stakeholders such as public institutions, senior organisations, and digital literacy groups.

Clearly delineating roles and responsibilities for data collection, analysis, and reporting serves to streamline the overall process. Building robust analytical capabilities, either through training existing staff or hiring specialists in policy analysis, statistics, or data science, may be essential. In this regard, the Slovak Statistical Office is well-positioned to spearhead data collection and analysis, leveraging its expertise and technical tools. Taking inspiration from the Slovenian Statistical Office, which plays a central role in evaluating and monitoring the national strategy Digital Slovenia 2030 in collaboration with the Ministry of Digital Transformation, the Slovak Republic could follow a similar trajectory. An alternative approach would involve outsourcing data-related tasks. For instance, Austria is presently developing a reporting platform with an external provider to enhance data linkage and accessibility. This reporting platform is designed to empower the administration to capture, analyse, and transparently display data, functioning as a comprehensive data catalogue.

Implementation process

The deployment of this tool should follow a Plan-Do-Check-Act methodology.

Plan: Engage key stakeholders, including public institutions, senior organisations, and digital literacy groups, in defining Specific, Measurable, Achievable, Relevant, and Time-bound (SMART) objectives for the RRP investment. Clearly assign responsibilities for monitoring and evaluation elements, such as data collection, analysis, and reporting.

Do: Collect information on seniors' digital skills proficiency. Establish secure mechanisms for sharing data among stakeholders, potentially involving databases or data exchange platforms in compliance with privacy laws. Enhance understanding by linking data across diverse sources or registers.

Check: Evaluate policy impact by selecting and creating data visualisation tools for result interpretation. Disseminate monitoring and evaluation results clearly and comprehensibly to stakeholders.

Act: Institute a robust governance structure overseeing the project, encompassing periodic objective reviews, oversight committees, and steering groups to guide policy adaptation. Transparently communicate findings and subsequent actions to the public through various communication channels.

2 Objectives and scope of the monitoring and evaluation tool

This draft guidance is the third output from the technical assistance project "Enhancing the digital skills of seniors", a cooperation between the OECD, the Directorate-General for Structural Reform Support (DG REFORM) of the European Commission and the Ministry for Investment Regional Development and Informatization of the Slovak Republic (MIRRI). The project aims at supporting MIRRI in assessing the results of a digital training pilot scheme for seniors, develop upscaling recommendations to train 173 000 seniors in 4 years as foreseen in the Resilience and Recovery Plan (RRP), investment no.7, and provide inputs for enhancing the digital skills of seniors beyond the RRP implementation timelines.

The objective of this draft is to provide guidance for developing a data-driven tool to monitor and evaluate the Slovak Republic's RRP investment no.7. It can also help to assess the progress in closing the digital gap between younger and older generations, as well as the benefits for older generations from improving their digital skills to stay active in society and the economy.

This guidance outlines the elements of a monitoring and evaluation tool (M&E tool) that would allow:

- Monitoring the **effective implementation** of the RRP investment, such as the measuring the uptake of the benefits and services delivered.
- Evaluating the **direct and indirect impacts** that the RRP investment has on the target population in line with the overall objectives of the policy and beyond the RRP implementation timelines.
- Identifying the **barriers and enablers** to the realisation of the RRP investment, focusing particularly on these necessary factors that, if not present, may prevent the policy from achieving its objectives.
- Supporting with the **recalibration of the policy,** by providing valuable information on the policy impacts and on the role that barriers and enablers may have played.

The current guidance begins with a discussion of the framework of the M&E tool, determining the areas of monitoring it will cover. It then proceeds to discuss the different outcomes and indicators for conducting the monitoring and evaluation. Subsequently, it addresses data availability, a crucial aspect when designing such a tool. Finally, this guidance provides a broad roadmap for the implementation of an M&E tool.

3 Framework

This draft guidance focuses on four outcomes to monitor and evaluate the direct and indirect impact of the RRP investment and the barriers and enablers to the policy. These outcomes have been selected in consultation with MIRRI. They have also been presented for comments to other key stakeholders in the design of the RRP investment, such as the Statistical Office, the Ministry of Labour, the Ministry of Education, and members of the Digital Coalition, during a workshop on the 25 May 2023 as part of activity 3.2 of the current technical assistance project. The outcomes presented in this guidance therefore are closely aligned to the objectives of the RRP investment.

Direct impact

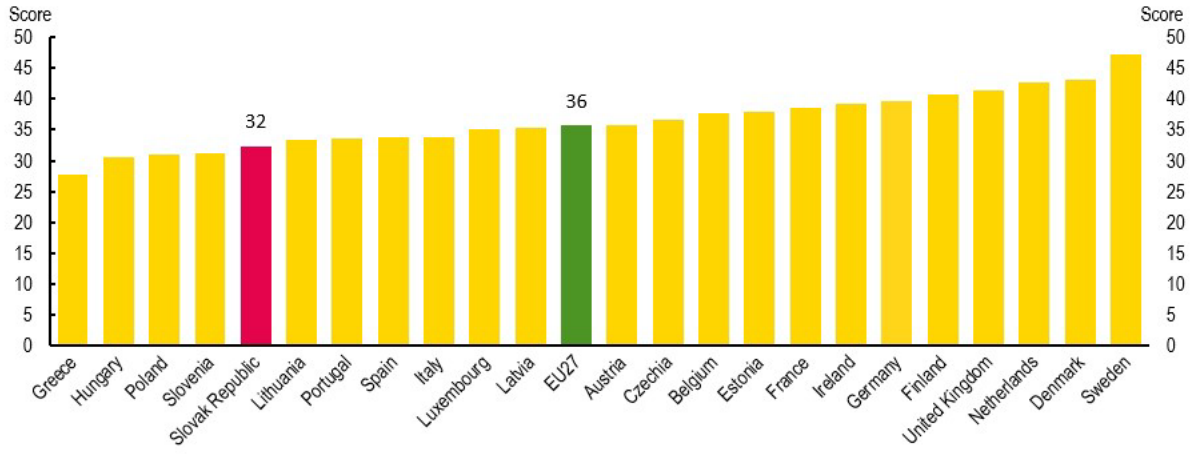
The most direct impact of the RRP investment is on the digital skills among seniors. The measurement of skills, and in this case digital skills, can take several forms, including self-reported skills and task-based measurement of skills. Either of these approaches have benefits and limitations, which will be discussed in the following section. In addition to improving digital skills, another direct impact of the RRP investment should be that of changing seniors' attitudes towards technology, and to improve how secure seniors feel and act online.

Indirect impact

Since the Slovak Government and the RRP investment have the overall objective of promoting better active ageing of the population, the focus of the M&E tool is also to evaluate how improved digital skills (direct impact) can contribute to better active ageing (indirect impact). The European Commission defines active ageing as "helping people stay in charge of their own lives for as long as possible as they age and, where possible, to contribute to the economy and society" (Publications Office of the European Union, 2020[1]). The Active Ageing Index (AAI) developed by the European Commission (DG EMPL) and UNECE assesses older people's ability to control their own lives and (capacities for) participation in society and the economy (UNECE, 2019[2]). By covering various areas of the lives of older people, including healthy living, participation in society, and lifelong learning, the AAI aims to capture this complexity. Based on the overall AAI score, the Slovak Republic ranks well below the average in the European Union (Figure 1). This justifies selecting active ageing as a key monitoring and evaluation area in the tool.

Figure 1. The Slovak Republic scores below average on the Active Ageing Index

Overall score on the 2018 Active Ageing Index

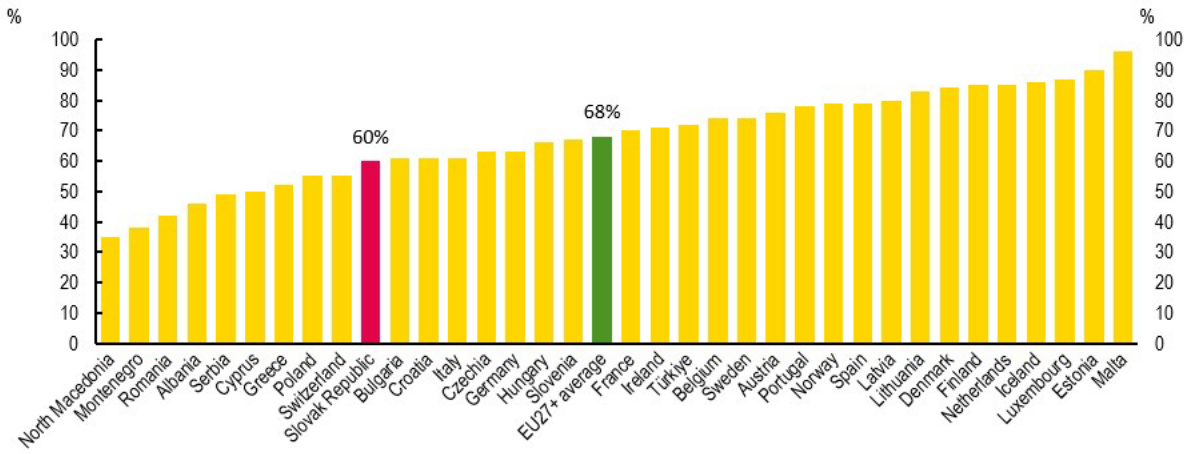


Note: EU27 is an unweighted average. The AAI contains four domains that have an equal weight: employment; social participation; independent, healthy and secure living; and capacity and enabling environment for active ageing. The first two domains cover various aspect of participation directly, the latter two domains assess the preconditions that need to be fulfilled for older people to realise participation.
Source: UNECE (2019[2]), Active Ageing Index: Analytical Report, https://unece.org/population/publications/activeageing-index-analytical-report.

Another area of interest for the government in implementing the RRP investment is the impact it can have on engagement with government. E-governance is an essential component of a digital society, facilitating efficient and accessible public services for all citizens. Seniors, often marginalised in digital world, should have equal opportunity to reap the benefits of using government services through digital platforms. The eGovernment Benchmark, 2022 Europe's Comparative Study into Digital Governments assessed key dimensions of online public services, such as User centricity, Transparency, Key Enablers and Cross-Border Services. The study found that Slovakia underperforms in all four areas and is thus overall situated below the average (Figure 2) (European Commision, 2021[3]). The engagement of seniors with government through e-government services can be positively influenced by increased internet usage, which is in the interest of every government. On the other hand, understanding potentially negative spillovers, such as exposure to disinformation, provides useful information to recalibrate training and services delivered under the RRP investment.

To capture the multidimensionality of active ageing and e-governance, this framework proposes monitoring and evaluating the channels through which improved digital skills would impact both active ageing and e-governance. The reason for this approach is that changes in either phenomenon can be the consequence of a myriad of factors unrelated to the RRP investment. There is thus a risk to make erroneous inferences about the impact of the RRP investment. To establish with more confidence that the RRP investment is having the desired impact, it is more effective to monitor and evaluate its impact on channels that are well established to influence active ageing or e-governance.

Figure 2. Overall eGovernment maturity index

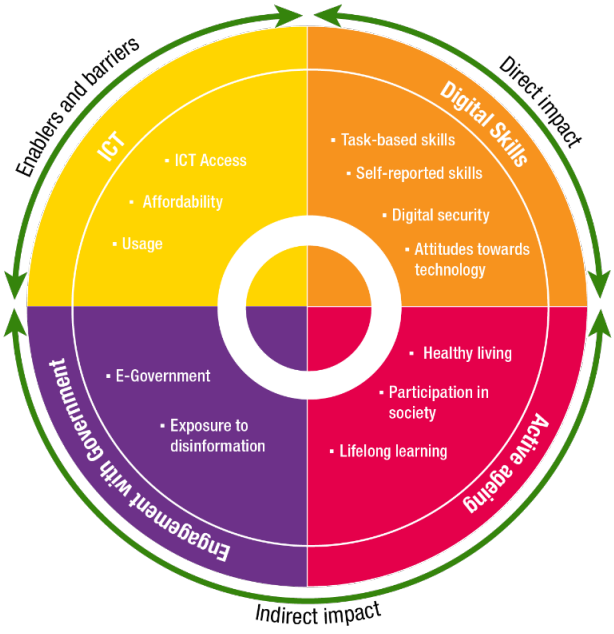


Note: EU27 Member states + Iceland, Norway, Switzerland, Albania, Montenegro, North Macedonia, Serbia and Türkiye.
Source: European Commission (2021[3]), eGovernment Benchmark 2022, https://digital-strategy.ec.europa.eu/en/library/egovernment-benchmark-2021.

Enablers and barriers

There are certain aspects of information and communication technology (ICT) that, if not achieved, can impose barriers to the success of the RRP investment. These can be categorised into ICT access, affordability, and usage. Put simply, if ICT access is lacking or is overly expensive, the digital training for seniors will have a short-lived impact as seniors will not be able to reap off the benefits from increased digital skills due to limited access to the internet or lack of digital devices. Assessing whether these minimum conditions are met is essential to identify potential bottlenecks of the policy.

Figure 3.3. Summary of the framework for the monitoring and evaluation of the RRP investment



4 Main indicators

This section describes in detail the different outcomes of the framework for the monitoring and evaluation tool. It provides a rationale and motivation for the choice of indicators for each outcome and summarises potential data sources.

Direct impact: Digital skills, digital security and attitudes towards technology

Digital skills should be at the core of the monitoring and evaluation tool, as assessing whether digital skills of seniors have improved should be the main pointer for the success of the RRP investment. The main challenge lies in defining digital skills and determining how to measure them. The European Commission's Digital Competence (DigComp) Framework details the various aspects of digital competence for all citizens by listing 21 competences and describing them in terms of knowledge, skills, and attitudes (Ferrari and Punie, 2013[4]). The 5 identified areas of competence when it comes to digital skills are information, communication, content-creation, safety, problem-solving. Therefore, tests to assess the digital skills of seniors should cover the five categories detailed in Table 1.

Table 1. The European Commission's Digital Competence (DigComp) Framework for Citizens

Areas of digital competence	Scope of the area	Digital competences
Information and data literacy	Identify, locate, retrieve, store, organise and analyze digital information, judging its relevance and purpose	1) Browsing, searching and filtering data, information and digital content 2) Evaluating data, information and digital content 3) Managing data, information and digital content
Communication and collaboration	Communicate in digital environments, share resources through online tools, link with others and collaborate through digital tools, interact with and participate in communities and networks, cross-cultural awareness.	1) Interacting through digital technologies 2) Sharing information and content through digital technologies 3) Engaging in citizenship through digital technologies 4) Collaborating through digital technologies 5) Netiquette 6) Managing digital identity
Digital content creation	Create and edit new content (from word processing to images and video); integrate and re-elaborate previous knowledge and content; produce creative expressions, media outputs and programming; deal with and apply intellectual property rights and licenses.	1) Developing digital content 2) Integrating and re-elaborating digital content 3) Copyright and licenses 4) Programming
Safety	Personal protection, data protection, digital identity protection, security measures, safe and sustainable use.	1) Protecting devices 2) Protecting personal data and privacy 3) Protecting health and well-being 4) Protecting the environment
Problem solving	Identify digital needs and resources, make informed decisions as to which are the most appropriate digital tools according to the purpose or need, solve conceptual problems through digital means, creatively use technologies, solve technical problems, update one's own and others' competences.	1) Solving technical problems 2) Identifying needs and technological responses 3) Creatively using digital technologies 4) Identifying digital competence gaps

Source: (Ferrari and Punie, 2013[4]) (Vuorikari et al., 2022[5]).

Digital skills

Task-based tests are the most accurate way to assess seniors' digital skills. One approach is to measure digital skills through the problem-solving capacity in technology-rich environments, captured by having respondents resolve problems that would illustrate their real digital skills. This approach could rely on the OECD's Programme for the International Assessment of Adult Competencies (PIAAC) survey, and the IT Fitness test.

- The **PIAAC survey** is the first international survey to implement problem solving in technology-rich environments. This key skill is defined as the ability to successfully use digital technologies, communication tools and networks to search for, communicate and interpret information. Items include sorting and sending e-mails, filling out digital forms, and evaluating the informational content and credibility of different websites. The survey was carried out as a personal interview comprising a questionnaire followed by a skills assessment. Although the target population consisted of people aged 16-65 years, it should be suitable also for elderly population. Subsequent rounds of testing allow monitoring and analysing changes in respondent's skills and thus provide first indications of where improvements have been achieved and deficits persist.
- The **IT Fitness test**, developed by the IT Association of Slovakia within the framework of the Slovakian Digital National Coalition, provides a realistic picture of the tested respondent's IT skills level. The test also identifies areas for improvement and the comparison of respondent's score with the national average. The 5 tested areas of digital skills are: Internet, Security and computer systems, Complex tasks, Office tools and Collaborative tools and social networks. The test has two difficulty levels: one testing primary school pupils and another more advanced which is meant for high school and university students but may also be of interest to any citizen curious to assess their digital skills level. In 2022, the oldest respondent was 82 years old. The IT Fitness Test also publishes yearly results of the participation rates and level of digital skills which can be used to analyse the overall progress. Developing a third difficulty level, more suitable for assessing seniors' digital skills, might be considered.

Some of the activities of the RRP investment include a specific measurement of digital skills, namely through an **exit test**, which is a short task-based test. The length of these tests means that they are not very time consuming for seniors, however, it can also be a challenge to fully capture digital skills in only a few questions. Striking the right balance in length is complex and possibly requires comparing the outcomes from entry and exit tests with the outcomes of longer tests to assess their validity. Entry and exit tests allow to measure an immediate impact after training and thus the effectiveness of the training on seniors' digital skills. While useful, this type of one-off test does not allow evaluating how digital skills fare in the longer-term, unless these tests are repeated more frequently after participating in training.

Although the task-based tests provide an objective measure of ICT proficiency among tested individuals, they come with a higher cost and are more difficult to put in place regularly. Therefore, it is suitable to complement the monitoring of digital skills with **self-assessment tests**. This approach consists of collecting self-assessed responses to digital skills questions. The main advantage is that the self-assessing tests allow to ask a large number of questions on a wide range of skills in a short time and are cost effective. There is a substantial risk of misalignment between perceived and actual skills, however, that needs to be taken into account. The tests can still provide useful information on changes in perceived proficiency, particularly useful for **follow up** tests of seniors over time.

An effective tool to monitor seniors' digital skills, whether task-based or self-assessment, has to account for the elements of age-appropriate digital literacy. Some questionnaires and tools to self-assess older people's proficiency in using ICT have been recently developed (Box 1). For instance, experience from the senior-tablets pilot showed that many seniors felt uncomfortable being tested before and after training, which could not only affect the way they responded, but also result in low take up and the impossibility to

regularly track digital skills. It could be useful to find alternatives that impose less of a burden – psychological and of time – to seniors.

A potentially valuable approach is to regularly test the digital skills participants in training by **gamifying the tests** and make them attractive for individuals to participate voluntarily. Gamified assessment refers to modifying the original form of traditional assessment by adding game elements to increase motivation. For example, a gamified assessment can be letting an avatar ask the items within a personality test or adding other animation and/or sound effects (Armstrong, Landers and Collmus, 2015[6]). Examples of these approaches include initiatives as developed in the December 2022 hackathon in the Slovak Republic.

Another example of a gamification in digital skills tests comes from an online game designed to test teachers' and trainers' Essential Digital Skills released by the Education and Training Foundation (ETF) released (Education & Training Foundation, 2021[7]). The game, called DigiVille, is designed as a follow up for those who have undertaken Essential Digital Skills (EDS) training. In the game, the player works through a range of different scenarios talking with colleagues and learners, picking different options along the way which build up a knowledge and confidence score. At the same time, the player is signposted to relevant training resources where skills gaps are identified. It is a fun means for EDS participants to review their knowledge after the training is completed. At the end, the player gets feedback (score of confidence, and knowledge and understanding) and suggested resources he or she might want to visit, or revisit, based on the chosen answers in the game.

Digital security

Engaging in digital activities in everyday life can create risks to personal security for users who are not well equipped to protecting themselves. Giving access to digital tools may thus backfire when personal security training does not prepare seniors sufficiently against these risks. Although older adults are more afraid about online security, they perform fewer protection behaviors, have less confidence in their abilities and are uncertain about the effectiveness of protection resources (Jiang et al., 2016[8]).

As emphasised in Output 2 of the Enhancing the Digital Skills of Seniors (22SK04) initiative (OECD, 2023[9]), it is imperative to address online security concerns of older individuals during the training sessions. To evaluate the effectiveness of this aspect, the monitoring and evaluation tool should include tracking attempts against the digital security of seniors. Therefore, the share of individuals who report having experienced an **online security incident** and **personal experiences of abuse of private information** should be monitored.

Attitudes towards technology

The attitudes towards technology may be influenced by improving the digital skills of seniors. In fact, the Technology Acceptance Model (Davis, 1989[10]) emphasises that the usage of technology is based on **perceived ease of use** and **perceived usefulness**. Perceived ease refers to the degree to which an individual believes that using a particular technology would be free from effort. The easier the use of a technology is, the more likely is its adoption. Perceived usefulness is defined as the degree to which a person believes that using a particular system would enhance his/her job performance.

The more it is needed, the more probable is that the individual will embrace the technology and put effort into mastering it. This is also why Output 2 of the Enhancing the Digital Skills of Seniors (22SK04) initiative (OECD, 2023[9]) insisted on the practicality of the digital skills covered by the training.

Box 1. Self-assessing tests: Computer Proficiency Questionnaire (CPQ), Mobile Device Proficiency Questionnaire (MDPQ) and Europass digital self-assessment test

Computer Proficiency Questionnaire (CPQ)

Computer Proficiency Questionnaire (CPQ) assesses the computer proficiency of seniors with a range of abilities, from noncomputer users to frequent computer and Internet users (Boot et al., 2015[11]). The CPQ asked seniors to rate their ability to perform several computer-related tasks on a 5-point scale, ranging from Never tried, to Very easily. The CPQ focused on areas of computer use predicted to be important to support well-being and independence in older adults' population. For instance, it assessed seniors' proficiency in using computers to communicate, accessing information through the Internet, and using calendaring and reminding software. This tool can serve to gauge computer proficiency for training and research purposes, but also as an outcome measure to assess the effectiveness of such training.

Mobile Device Proficiency Questionnaire (MDPQ)

A similar tool has been developed to assess older adults' proficiency when it comes to mobile devices, such as tablet or smartphone. Mobile Device Proficiency Questionnaire (MDPQ) studies both basic and advanced proficiencies related to smartphone and tablet use across eight subscales: Mobile Device Basics, Communication, Data and File Storage, Internet, Calendar, Entertainment, Privacy, and Troubleshooting and Software Management (Roque and Boot, 2018). As pointed out in Output 2 of the Enhancing the Digital Skills of Seniors (22SK04) initiative (OECD, 2023[9]), this instrument can provide a useful benchmark and starting point for developing a new test for the programme.

In fact, these questionnaires can be easily adapted to cross-cultural differences, as demonstrated in Spain, where a culturally adapted questionnaire was used and proved to be relevant (Moret-Tatay et al., 2019[12]). The participants should be re-assessed on proficiency after the completion of the training and ideally later on to observe the changes in the skills trained.

Europass digital self-assessment test

The European Commission launched a digital skills self-assessment tool to help learners and professionals understand their level of digital skills based on the digital competence framework. The self-assessment tool is available in 29 languages, including Slovak, on the EU Digital Skills and Jobs platform and Europass. It is accessible from mobile or landline devices such as mobile phones, tablets and computers. The self-assessment test takes about 20 minutes and contains confidence-assessing questions as well as knowledge-based questions. The test questions are based on the EU Digital Competence Framework (DigComp). At the end of the test, participants receive a detailed description of the result obtained and useful advice on how to improve their existing knowledge and acquire new digital skills.

Source: (Roque and Boot, 2018[13]), (Moret-Tatay et al., 2019[12]), (Europass, n.d.[14]), (Boot et al., 2015[15])

Table 2. Direct impact: Digital skills, digital security, and attitudes towards technology

Outcome	Indicator	Rationale	Data sources
Digital skills	Task-based tests (entry/exit/follow up)	Task-based assessment (entry/exit/follow up tests) measure the objective level of performance.	IT Fitness test Problem solving in technology-rich environments section from PIAAC test
	Self-reported tests (entry/exit/follow up)	It is a time and cost-effective assessment of an individual's belief in his or her capacity to perform certain Internet actions.	Adapted version of online questionnaire on digital competencies inspired by the EC DigComp framework, CPQ and MDPQ.
	Gamification of tests	This type of test allows tracking of digital skills over time. It may also lead to a further improvement of seniors' digital skills.	Creation of a platform for testing and improvement of digital skills. Possible inspiration from 2022 hackathon initiatives or DigiVille game.
Digital security	Reporting online security incidents	Giving access to ICT must be complemented by ensuring personal security of its users.	ICT surveys New data collection
	Abuse of private information	Downsides of increasing Internet use must be also monitored to fully assess the success of the reform.	
Attitudes towards technology	Perceived ease of use	Perceived ease of use, directly influenced by improved digital skills, impacts how positive people are towards technology.	ICT surveys as the baseline New data collection
	Perceived usefulness	Perceived usefulness, directly influenced by improved digital skills, impacts how positive people are towards technology.	ICT surveys as the baseline New data collection

Indirect impact: Active ageing and engagement with government

To measure the full reach of the RRP investment, the monitoring and evaluation tool should go beyond the outcomes directly impacted by the ICT access and digital skills to assess indirect consequences of improving the digital skills of seniors. Together with key stakeholders and MIRRI in consultations, it has been identified that the ultimate policy goal for improving digital skills for seniors is to promote active ageing and improve e-governance. The following section identifies the relevant indicators for both categories.

Active ageing

One first aspect in which better digital skills for seniors could have a positive effect is on their ability to control their own lives and (capacities for) participation in both society and the economy, referred to as active ageing. The monitoring tool focuses on three main outcomes to measure their capacity to engage in active ageing: healthy living, participation in society and lifelong learning. These areas are interlinked, since loneliness and social isolation have both been linked with poor health outcomes including falls, re-hospitalisations, dementia, and all-cause mortality (Derynda et al., 2022[16]).

Healthy living

Improving seniors' digital skills is becoming increasingly important for the promotion of their health. ICT technologies provide access to important information and resources related to health, help individuals track and understand their own health status and improve their healthcare decision making. Moreover, e-health, defined by the World Health Organization (WHO) as "the use of information and communications technology in support of health and health-related fields", has become an integral part of the healthcare system as it addresses a range of difficulties in medicine, including reducing errors and providing more efficient services with more accurate results without the need of a direct contact between the health care

provider and patient. Electronic health resources are helpful only when people are able to use them and bring more advantages to elderly people who need more frequent consultations with health care providers while suffering from reduced mobility. Therefore, the ability to benefit from e-health should be monitored. The choice of indicators to measure the use of ICT related to health is a complex one due to data limitations. This guidance proposes to focus on four indicators that are either already being collected through surveys, or that can be relatively easy to collect through new data collection. Namely these are the number of **medical appointments online, seeking health information online, communication with health care provider online and use of e-medicine**.

Participation in society

ICT technology significantly improves social connection**,** a key component to a full participation in society. While seniors are susceptible to face high levels of loneliness and social exclusion,, the ICT use enhances communication and access to entertainment, leading to higher levels of mental well-being (Heo et al., 2015[17]). A study showed that Internet use by elderly Americans leads to about a 20% reduction in depression (Ford and Ford, 2009[18]). In fact, digital proficiency directly supports communication with family and friends (email, Facebook, Skype) (Roque and Boot, 2018[19]). Individuals can complement their face-to-face interactions with their family and friends with computer mediated interactions or interact online with people they have never met physically, making new "virtual friends" (Pénard, Poussing and Suire, 2013[20]). **Using social network sites** is another indicator to measure. Especially during Covid-19 pandemics, the role of ICT in reducing loneliness has been reinforced as it was de facto the only way to stay connected with other people and society (Dong, Meng and Chen, 2022[21]). Almost 38% of people aged 65-74 used social media in 2022, vs. 82% of 16-24 years old (Statistical Office of the Slovak Republic, 2022[22]).

Similarly, **the frequency of use of social networks** is associated with lower levels of loneliness and a positive effect on seniors' social relationships as it increases both the quantity and quality of their communication with others (Cotten, Anderson and McCullough, 2013[23]).

Lastly, participation in society also means that seniors can have an improved autonomy over their finances. Enhanced digital skills may promote senior's ability to access **financial services online**, such as the adoption of online banking services. While online banking represents a time and distance flexible way of managing personal finances with lower fees, older adults are lagging behind in the adoption of online banking (Jiang et al., 2022[24]) – only around 1/3 of senior Internet users used online banking vs. 56% of 16-24 years old (Statistical Office of the Slovak Republic, 2022[22]). In fact, many fear that they have neither the skills nor the knowledge to protect themselves from malfeasance while banking (Jiang et al., 2016[25]). Therefore, better digital skills should enhance seniors' inclusion into online banking services.

Lifelong learning

Older adults are able to acquire and develop a wide range of knowledge and skills that make them feel more prepared to participate in current innovative processes. Overall, research evidence indicates that regular participation in non-formal lifelong learning can be beneficial for the psychological well-being and life satisfaction of older adults (Yamashita et al., 2017[26]), (Narushima, Liu and Diestelkamp, 2018[27]).

ICT proficiency also provides seniors with enhanced learning opportunities (online courses on various topics, enhancing life-long learning), targeted information gathering (Internet search engines, news) and access to enrichment opportunities provided by games, music, and movies (Roque and Boot, 2018[19]). This contributes to better conditions and opportunities for lifelong learning. World Health Organization's 'active ageing' framework stresses the importance of both formal and informal learning in maintaining and promoting social participation and good health during later life. Lifelong learning includes continuous learning of digital skills, eventually ensuring higher levels of ICT proficiency among seniors, even after the end of the project. It is thus beneficial to monitor the **participation of older adults in lifelong learning** as well as the share of **older people learning on line**.

Engagement with government

E-government

Seniors acquiring digital skills can have a direct impact on their capacity to interact with the government, by accessing e-government and digital government services. Also, seniors are often not given the opportunity to meaningfully contribute to the development of services, policies and programmes built for them and are frequently excluded from mainstream policy processes (UNECE, 2021[28]). While the e-governance considerably improves flow of information from citizens to government, and government to citizens, older people are often not able to use the proposed public services online due to lack of digital skills (Ručinská and Fečko, 2022[29]). Therefore, the monitoring and evaluation tool should monitor **the use of e-government services**, as well as **the number of people excluded from e-government services** because of lack of skills (both measured in the OECD ICT database).

Exposure to disinformation

However, such set of outcomes could also be expanded to account for the risks of being **exposed to disinformation**. In fact, as seniors tend to be less proficient in digital skills and social media, they may struggle to spot sponsored content or manipulated images. Late adulthood also involves social changes, including general trust, difficulty detecting lies, and less emphasis on accuracy when communicating (Brashier and Schacter, 2020[30]).

Table 3. Indirect impact: Active ageing and engagement with government

Outcome	Indicator	Rationale	Data sources
Active Ageing			
Healthy living	Medical appointment online	Making medical appointments online is time efficient way of planning the appointment.	Eurostat, Digital Economy and Society
	Seeking health information online	Internet provides a lot of information on all aspects of personal health. It is a great asset in monitoring, planning, and improving seniors' health if they can derive full benefit from ICT.	OECD ICT Access and Usage
	Communication with health care provider online	Especially in rural areas where the health centers are not easily accessible, or for seniors with limited mobility, online consultations with healthcare providers are very useful.	New data collection
	Use of e-medicine	Sharing medical information among different health practitioners improves the delivery of care.	New data collection
Participation in society	Use of social network sites	ICT technologies allows Internet users to communicate and stay connected despite being physically distant.	Household surveys/ ICT surveys (SHARE, EHIS)
	Frequency of use of social network sites	ICT technologies allows Internet users to communicate more and better.	ICT surveys/New data collection
	Use of financial services online	Online banking represents an important aspect of using digital skills in practice, as it is a significant improvement in older people everyday lives.	Household surveys/ ICT surveys (SHARE, EHIS)
Lifelong learning	Lifelong learning rate	Lifelong learning is significantly enhanced by access and proper use of ICT technologies. Moreover, lifelong learning promotes long-term acquisition and improvement of digital skills.	Eurostat
	Learning online	Digital learning makes imply effective use of digital technology.	Eurostat, ICT surveys
Engagement with government			
E-government	Use of e-government services	E-Government increases initiatives and instruments for older persons participation and interaction with society. It makes communication with authorities more efficient.	ICT surveys as the baseline New data collection
	Exclusion from e-government services because of lack of skills	Many seniors are still excluded from the online public services because they are not aware or capable of using them properly.	
Exposure to disinformation	Exposure to disinformation	Increased Internet use also brings disinformation risk for governance.	

Barriers and enabling factors: ICT access, affordability, and usage

A proper access to ICT, its affordability and effective usage represent the main enabler to a successful improvement of digital skills for seniors. Without generalised, affordable and good quality internet combined with available digital devices, it will be difficult to attain the objective of higher digital literacy of seniors. In fact, the absence of digital devices, lack of internet connection and inadequacies in necessary skills are the most common reasons for non-use of ICT by elderly (Nayak, Priest and White, 2010[31]). Some of the policies of the RRP investment directly tackle ICT access (e.g., by giving tablets to seniors and creating internet hubs) and affordability (by giving free data plans), and indirectly tackle ICT use (through digital training). Measuring the impact of these policies on overall ICT access, affordability and usage is essential to assess the effectiveness of the policy.

ICT access

Measuring **broadband internet coverage** is the first step when assessing ICT access. A full broadband coverage is not yet a reality in the Slovak Republic, despite having increased significantly in the past decade. In 2022, around 10% of the Slovak population (compared to EU average 7.5%) still didn't have access to the Internet (Trading Economics, 2023[32]). The proportion is higher among senior citizens (OECD Broadband statistics), and 28% of Slovak people aged 65-74 (vs. 2% of 16-24 years old) claimed they never used the Internet (Statistical Office of the Slovak Republic, 2022[22]). Therefore, it is crucial to ensure an easy access to internet to elderly people.

Ownership of digital devices, such as laptops, smartphones or tablets, is another indicator to measure. Seniors are also more likely to face barriers with regard to the availability of technologies not only for the development of digital skills, but for the overall use of digital tools. Having a direct access to Internet from home or through mobile devices is the most suitable option, especially for elderly people with worsened health conditions. However, there can be financial barriers to owning a computer, and difficulties in working with touchscreen and smaller screens (No Isolation, 2021[33]). In fact, according to the Indicators of Poverty and Social Exclusion ("The European Union Statistics on Income and Living Conditions", EU-SILC), up to every tenth household made up of a person over 65 years old cannot afford a computer in Slovakia, which is twice the share of the EU average. This is tackled by the policy of the RRP investment, which aims to give free tablets to seniors after completing the training. Equipping seniors with devices will enhance ICT access since the devices will be available for immediate and convenient use in the long term from home.

Providing seniors with digital devices is not enough if they are not connected to Internet. Following the completion of the training, seniors received from MIRRI not only tablets, but also data packages. Therefore, **number and size of data packages delivered and used** under the national policies will complement the indicator on digital devices ownership.

Number of public Internet access points reflects the accessibility of ICT even without owning adequate equipment at home. **Libraries**, for instance, provide a vital access option for those more likely to be digitally excluded (IFLA & EIFL, 2021[34]), which is why it is accurate to measure the share of people using internet as well as the presence, the use and awareness of public access points such as libraries, and cybercafes.

Moreover, people continue using libraries even when having alternative options to access internet, mainly because of numerous positive externalities, such as library staff support, access to other devices, convenient and free access, quality of connectivity, being in shared public space. Enabling libraries as digital hubs is one of the policies that are being implemented in the RRP investment plan. Since regional, socio-economic and gender disparities amplify the digital divide (Warf, 2018[35]), the collected data should go under the aggregate level, to uncover gender, socio-economic background, and regional differences.

ICT affordability

The **affordability of internet** access should be monitored, as high costs could create barriers for seniors to accessing it. This can be simply measured by monitoring the price of data plans at home and in mobile devices. Since one of the policies of RRP investment plan includes giving away data packages to seniors participating in the digital skills training, monitoring the price of data plans, together with changes in internet use during and after free data plans are given away, can be indicative of how much of a barrier the affordability of data can be.

ICT usage

ICT usage is also essential, to the extent that not only access matters, but effective use of the Internet and personal digital devices matters. Internet usage can be monitored in terms of the amount of use, variety of different uses, and types of use (Blank and Groselj, 2014[36]).

Internet use of older people indicates the level of usefulness of ICT and possessing digital skills. The amount can be measured by frequency of use in day-to-day life and by Internet traffic, which indicates the use in practice since it measures how long users are spending on the Internet.

The **variety of online activities,** such as entertainment, online banking, social inclusion, information seeking, etc., that individuals undertake online shows their proficiency in ICT. Use of online training and applications indicates an increased interest in digital skills.

Finally, monitoring **vertical inequalities in usage** helps to study the gaps and vulnerable groups/regions. In fact, it would show how the Internet use vary according to socio-economic, educational, gender and regional disparities. For instance, studies tend to show that rates of internet use are consistently lower for older women compared to men, and this gender difference can be accentuated when older women become widowed and live alone (Matthews, Nazroo and Marshall, 2019[37]). Once the patterns of gaps are identified, the focus can be strengthened on the digitally less advanced groups so that they Internet access and usage significantly vary according to socio-economic, educational, gender and regional disparities. Assessing the gaps would enable targeted measures to ensure that no one is left behind.

Table 4. Barriers and enabling factors: ICT access, affordability and usage

Outcome	Indicator	Rationale	Data sources
ICT access	Broadband penetration	Subscription suggests a certain intensity of use since it is unlikely one would be paying for Internet access unless it is being used regularly.	New data collection • MIRRI • IT Fitness test Digital Economy and Society Index (DESI) ICT surveys
	Ownership of tablets/ laptops/smart phones	Owning a digital device directly enhances access and use of Internet.	
	Number and size of data packages delivered and used	Provided data packages can substitute and/or complement the missing Internet connection. Hence, it increases the Internet access.	
	Number of public Internet access points (including libraries)	Public places, where people can access ICT technologies, such as libraries, provide access and guidance to all interested seniors.	
Affordability	Cost of Internet connection	Higher price of Internet can negatively affect the number of subscribers.	
Usage	Internet use	Frequency of use in day-to-day life and time spent on Internet indicates the familiarity of use of internet.	
	Variety of online activities	Ability to use Internet for various purposes witnesses the proficiency of use.	
	Vertical inequalities in usage	Internet access and usage significantly vary according to age. Assessing the gaps would enable targeted measures to ensure that no one is left behind.	

5 Data sources

Without data, there is no monitoring and evaluation. This section provides guidance on necessary data to construct the above-mentioned indicators, identifying sources of data registered through administrative records and already being collected through surveys or, and revealing gaps in data which need to be complemented by collecting new data.

Monitoring and evaluating policies and programmes to assess their impacts necessitates access to information about the outcomes of participants. This requirement underscores the need for investments in data collection (OECD, 2020[38]). There are many potential data sources for this purpose, as summarised in Table 5 below. Survey data are data directly asked to interviewed people, either through social surveys or ICT surveys, or through data collected specifically for the purpose of evaluating a policy. These data have the advantage of being well targeted to allow monitoring and evaluating a policy, particularly when the data are specifically collected for this purpose. The disadvantage is that the cost of collecting such data is large, and as a result sample sizes are usually small. Increasingly, governments aiming at evaluating their policies are relying on more cost-effective approaches to obtaining data, in particular, administrative data. Administrative data are not data collected for research purposes, but rather to ensure the functioning of the services and programmes delivered by public agencies. The following sections discuss in detail the advantages and disadvantages of the different sources of data and provide examples for the specific case of this monitoring and evaluation tool.

Table 5. Potential data sources

Survey data		Other data	
Experimental data *e.g. follow-up surveys*	**Observational data** *e.g. social surveys*	**Administrative data** *e.g. records from public agencies*	**Other types of Big Data** *e.g. social media, supermarket transactions*
• Data are collected to investigate a fixed hypothesis • Usually relatively small in size • Known sample / population • Usually not complex to use for research.	• Data specifically designed for research, may be used to address multiple research questions. • Data may be large • Known sample / population • Usually not very complex to use for research.	• Data are not collected for research purposes. • Data may be very large • Usually a known sample / population • Can be complex to use for research and require extensive data management to clean and organise the data • Multidimensional (i.e., may involve multiple fragments of data that have to be linked together).	• Data are not collected for research purposes. • Data may be very large • Sample / population unknown • Complex to use for research and requires advanced techniques to make it usable • Multidimensional (i.e., may involve multiple fragments of data that have to be linked together).

Source: OECD (2020[38]), Impact evaluation of labour market policies through the use of linked administrative data, Final report, www.oecd.org/els/emp/Impact_evaluation_of_LMP.pdf.

Compilation of already existing data

Administrative data

Administrative data, such as records from public agencies, are collected by governments as part of their ongoing operations. Administrative data are especially helpful to obtain data pertaining to populations or topics that may be difficult or costly to obtain by survey. They should be used to complement survey data and support statistical operations.

Using administrative data comes with multiple advantages. Firstly, their use does not impose an additional data collection cost and it reduces respondent burden. Moreover, it improves the quality of the data thanks to a greater population coverage – ideally, they cover the entire relevant population. Furthermore, since administrative data are continuously recorded, they make it possible to identify cohorts, who experienced a particular policy change, and study the effects of this change over time. They also enhance the timeliness of data. Finally, the legal obligation to participate in administrative data programmes is a key advantage compared to the voluntary nature of responses to surveys, which limits the problem of non-response, as well as potential issues of sample selection and non-random attrition (OECD, 2020[38]).

In the Slovak Republic, administrative data are not yet easily usable for monitoring and evaluation purposes.

- First, there is a **lack of legal framework** that would allow exchanging data between data owners. Currently, each public administration is the owner of the own data they produce. While this is the case in many other OECD countries, what is lacking in the Slovak Republic is a legal framework to exchange and link data across public administrations, and a **responsible authority** for doing so. In many countries, this responsible authority is the national Statistical Office, which guarantees the privacy, security, confidentiality and transparency of the data. However, this is not a necessary condition for the set-up of a monitoring and evaluation tool using administrative data. For example, in Austria, digital skills policies are monitored and evaluated through an online platform that securely allows public institutions to exchange and display data across them (Box 2). To use administrative data for research, the first step is to establish legal frameworks that safeguard personal data and develop robust guidelines for its use and sharing.
- Second, there are **technical limitations** to exchanging and linking data across public administrations. One major limitation is that there is not a single individual identifier consistent across different sources of data. This makes it impossible to link data at the individual level across different records. A good practice used by some countries is for instance the use of social security number as an identification allowing for linking answers of the same person from various sources, and over time.

Box 2. International example: Austrian Reporting Platform

Some countries have started taking initiatives to improve the public sector's capacity for storing, analysing, and exchanging administrative data. For instance, Austria is currently developing a reporting platform, to enhance linkage and accessibility of data.

While there used to be multiple isolated systems with independent reporting structures, and report recipients received information in a previously established process in various forms (mostly paper-driven or in filing directories and e-mail), the new reporting platform provides a centralised access point to data.

The Reporting Platform allows the administration to capture, analyse and display data. The main goal is to visualise data and create dashboards and reports. These are available for managers as well as for operational employees in order to deliver all relevant information for decision making, accessible instantly via every (mobile) device.

Ministry of Finance of Austria is taking the lead over the implementation since it is responsible for IT system in the country. The platform is for now used mostly by the Ministry of digitalization, which needs to store large amounts of data. Smaller entities that are linked to public sector can use the reporting platform as well.

For now, institutions bring their own data to the system and securely store it there. However, the platform should serve as a data catalogue in the future. The platform is currently tackling the problem of sharing the data across institutions. The ownership of data by individual entities hinders combining and sharing of data. In the longer term, data will be processed and transformed into a user-friendly format, to increase dissemination and comprehensibility of data. For this, the platform will provide data in a graphically representative form. By the end of 2023, data should become publicly available to citizens, supporting open-source information and research.

The monitoring and evaluation tool should be using administrative data directly collected for the RRP investment. The logistical information system, ELIS (Evidenčno-logistický informačný system), is a new system put in place for the management of the senior-tablet policy. It gathers data on participants and provides information about seniors interested in undertaking ICT training. It gives access to all information needed to project leaders, including the Project team MIRRI SR, operators from Call-centre (responsible for registration and checking the data accuracy in the system), suppliers of digital equipment, mobile data suppliers and education providers. ELIS will be responsible for the collection, processing, control and evaluation of the obtained data, and will monitor the project's main milestone – the number of seniors participating in the tablet and training policy, information on the ownership of tablets/ laptops/smartphones and the number and size of data packages delivered and used is essential to the monitoring and evaluation tool (Box 3).

At the same time, the current set up of ELIS represents a missed opportunity to conduct an impact evaluation of the policy. Because of the technical and legal limitations to use administrative data for research purposes in the Slovak Republic, it is not possible to link data collected through ELIS on the participants to the policies to other administrative records (social security, public employment services, education, e-government etc.) and survey data. Therefore, it is not possible to identify at the individual level whether someone participated in the policy and then contrast it with other outcomes. This is a missed opportunity to conduct an evaluation of the direct impact of the policy. Rather, the monitoring and evaluation tool will have to rely on averages (contrasting the number of participants with to average digital skills levels among seniors, for example), with the risk that either no impact from the policy can be captured, or that a wrong impact will be attributed to the policy if other factors are affecting the outcome of interest.

Box 3. Relevant indicators covered by ELIS

In addition to its monitoring purpose, the ELIS system facilitates the participation of the interested seniors in the project. In fact, it gives information about the education system and lists available and free courses. Since it is designed to be user-friendly, the information system requires no intervention of applicants once they fill out their application. The ELIS system automatically takes care of:

- Registration of applicants with their personal data in the database
- Selection of applicants based on established criteria in the database from three levels
  - Registered
  - Trained
  - Expelled
- Checking duplicates in registered applicants
- Overview of available training and their dates
- Overview of entities providing educational training in digital skills
- Records of important accompanying documents proving the fulfilment of project conditions and training of seniors (Attendance lists, GDPR...)
- Time and address instructions for the purpose of delivery of digital devices to training providers
- Records of digital devices handed over to each training provider with the possibility of recording the device that was handed over to the trained senior
- Names and addresses of trained seniors for the purpose of delivery of data packages
- Records of transferred data packages based on the list of trained seniors.

Survey data

In contrast with administrative data, survey data are gathered from a target audience about a specific topic to conduct research. They include data from long-running surveys, series and longitudinal studies, and are a major part of social science research. For monitoring and evaluation tool of this RRP investment, several surveys will be of particular importance. Not only do they already encompass the Slovak Republic, but their indicators align precisely with the requirements of this monitoring and evaluation tool.

ICT usage in households and by individuals survey

The OECD ICT Access and Usage by Households and Individuals database provides a selection of 78 indicators. The selected indicators originate from two sources:

- An OECD data collection on the following OECD and accession countries: Australia, Canada, Chile, Colombia, Israel, Japan, Korea, Mexico, New Zealand, and the United States.
- Eurostat Statistics on Households and Individuals for the OECD countries that are part of the European Statistical system.

The EU survey on the use of ICT in households and by individuals (aged 16 to 74) is an annual survey conducted since 2002 aiming at collecting and disseminating harmonised and comparable information on the use of ICT in households and by individuals.

Indicators from this survey are not only used for benchmarking purposes, but they also support measuring the implementation of the priorities of the European Commission on digitalisation.

Furthermore, this survey facilitates monitoring of the EU's digital targets for 2030 set by the Digital Compass for the EU's Digital Decade, whose implementation is directly supported by this project (aiming to ensure that 80% of adults have basic digital skills by 2030).

Data are collected on a yearly basis by the National Statistical Institutes and are based on Eurostat's annual model questionnaire. This questionnaire is not fixed - the questions are updated each year to reflect the evolving situation of information and communication technologies.

In 2022, the survey collected data on the access to ICT, on the use of the Internet, e-government, e-commerce, internet of things and green ICT. Concretely, the relevant indicators that the Slovak Statistical Office gathered information for the purpose of the survey are listed in the Box 4.

Box 4. Relevant indicators covered by the OECD ICT Access and Usage by Households and Individuals database

- Internet connection from home
- Last Internet use
- Frequency of Internet use
- Variety of online activities
- Access to e-health services (part of the variety of online activities):
- Seeking health-related information (e.g. injuries, diseases, nutrition, improving health, etc.),
- Making an appointment with a practitioner via a website or app (e.g. of a hospital or a health care centre),
- Accessing personal health records online,
- Using other health services via a website or app instead of having to go to the hospital or visit a doctor (e.g. by getting a prescription or a consultation online)
- Self-assessed digital skills (assessed every 2 years)
- Use of social network sites
- Frequency of using social network sites
- Use of e-government services
- Exposure to disinformation
- Online security incidents.

Source: OECD (2024[39]), "ICT Access and Usage by Households and Individuals", *OECD Telecommunications and Internet Statistics* (database), https://doi.org/10.1787/b9823565-en.

The aggregated data relating to individuals can be requested from the Statistical Office of the Slovak Republic through the Information Service. It is possible to break down the data by demographic characteristics, region, and employment outcomes.

EU statistics on income and living conditions (EU SILC, yearly, age group 16+)

The EU statistics on income and living conditions (EU-SILC) aim to collect timely and comparable cross-sectional and longitudinal data on **i**ncome, poverty, social exclusion, and living conditions.

The regulation provides for "primary" domains to be covered each year (socio-demographic characteristics of persons belonging to the households surveyed, details of income, financial situation, living conditions, work, housing, education, health, etc.) and "secondary" domains on specific topics that vary each year

(housing conditions, children's health and living conditions, indebtedness, well-being, etc.), and are determined at European level. Co-ordinated by Eurostat, data are obtained from individuals aged 16 and plus by National Statistical Institutes.

As for the Slovak Republic, data can be requested from the Statistical Office of the Slovak Republic through the Information Service.

Box 5. Relevant indicators covered by EU SILC

- Measure of loneliness
- Voluntary work (assessed every 5 years)
- Participation in political life
- Life satisfaction.

Source: EU SILC (2022[40]), EU Statistics on Income and Living Conditions, www.eui.eu/research/library/researchguides/economics/statistics/dataportal/eu-silc

Programme for the International Assessment of Adult Competencies (PIAAC)

Developed by the OECD, the Programme for the International Assessment of Adult Competencies (PIAAC) is an international survey conducted in over 40 countries to assess the cognitive and workplace skills of adults aged 16 to 65. The survey is designed for repeated decennially administration to facilitate monitoring key aspects of human capital development. Notably, PIAAC was first conducted in 2011, followed by two subsequent rounds. It's important to consider that these rounds have relatively lengthy intervals between them, which can impact the data's relevance. Currently, the 2nd Cycle of PIAAC is underway, spanning from 2018 to 2024, with the active participation of over 30 countries/economies.

The survey measures adults' proficiency in key information-processing skills - literacy, numeracy and problem solving in technology rich environments. In fact, PIAAC is the first adult skills assessment to measure adults' digital problem-solving skills in an online environment (e.g., e-mail, web pages, and spreadsheets), which is defined as the ability to use digital technology, communication tools and networks to acquire and evaluate information, communicate with others and perform practical tasks (OECD, 2013[41]).

Moreover, it collects comprehensive data on skill utilisation in various contexts, including work, home, and the wider community. The task-based assessment focuses on adults' abilities to use digital technology, communication tools, and networks for acquiring information, problem-solving, and practical tasks. In fact, PIAAC survey is the first large-scale international assessment to be administered online, making it a valuable tool for policy makers to track and enhance human capital development every decade. However, a paper-and-pencil version is prepared for those who cannot take the assessment on a computer.

Although the survey doesn't cover seniors as the maximum age limit is set to 65 years, this comprehensive survey could however serve as a stepping stone for assessment of older adults. Besides the possibility of upscaling the survey to include older persons, it brings value to this monitoring and evaluation tool by establishing a precise benchmark: the level of digital skills of 65 years old adults. It can therefore serve as a starting point measuring older adults' improvement.

Box 5. Relevant indicators covered by PIAAC

- Frequency of Internet use
- Task-based digital skills assessments
- Self-reported digital skills assessments
- Mental wellbeing
- Voluntary work
- Participation in political life
- Participation in online training
- Self-reported life satisfaction
- Trust towards other people.

Source: OECD (2013[41]), "What the Survey of Adult Skills (PIAAC) measures", in The Survey of Adult Skills: Reader's Companion, https://doi.org/10.1787/9789264204027-4-en.

Digital Economy and Society Index (DESI)

The Digital Economy and Society Index (DESI) is a tool released annually by the European Commission to assess the digital progress of member states within the European Union. It includes individual country profiles that provide a detailed analysis of each nation's advancement in key indicators as well as areas that require priority action.

The key indicators of DESI encompass human capital, connectivity, integration of digital technology, and the provision of digital public services. Human capital focuses on internet usage and digital skills, essential for participating in the digital society and driving economic growth. Connectivity evaluates fixed and mobile broadband accessibility, pricing, and the adoption of advanced networks like 5G. The integration of digital technology measures the digitalisation of businesses and e-commerce activities, while digital public services assess the availability and user-friendliness of e-government services. DESI thus serves as a valuable instrument in monitoring and benchmarking digital development in the EU.

Box 6. Relevant indicators covered by DESI

- Internet use frequency and variety
- Internet user skills
- Household internet coverage
- Fixed broadband coverage
- Broadband price index
- E-government users
- Individuals using a laptop/tablet to access the internet, away from home or work
- Participating in social networks online
- Doing an online course
- Making an appointment with a practitioner via a website
- Seeking online information about health
- Individuals experienced abuse of personal information and/or other privacy violations.

Source: European Commission (2023[42]), Digital Economy and Society Index, https://digital-strategy.ec.europa.eu/en/policies/desi.

New data collection

Although there are high quality data available thanks to national and international surveys and databases, they do not necessarily account for detailed variables or cover the age group of interest.

Firstly, the **age group of 65+** is often omitted. As the focus is often put on active persons, retired people tend to be excluded from mainstream surveys. It is crucial to enlarge the current data collection for older people.

Secondly, some indicators - **perceived ease of use** and **perceived usefulness** - can be relatively easily measured by simply adding questions in the entry and exit questionnaires that are part of the project and comes before and after the provided training. Data should also be collected on the **number of public Internet access points (including libraries).**

Thirdly, the data is often collected on aggregate level, without the possibility to break down the results. For instance, it would be beneficial to account for regional disparities and other **vertical inequalities**. This would be enabled by additional questions on the respondents' background as well as linking information from different sources in order to create a more valuable and helpful data set. However, when linking administrative records, technical and data protection considerations must be taken into account.

From a technical point of view, the most effective solution is to use a personal identifier common to all registers (social security number, personal ID, etc.) since this allows for exact matching between registers. However, Slovakia does not use a unique identifier for all registers. Alternative methodologies, such as deterministic matching (using identifying characteristics, such as name, address, date of birth, gender etc. to match the persons between two registers) and probabilistic matching (using a statistical approach to determine whether an entry in two records represents the same individual) should be considered.

From the data protection point of view, the linking process must ensure the privacy of personal information. Linking data from registers should by executed by a trusted third-party approach, either using a unique person identifier (common to all administrative records) or assigning a project-specific person identifiers. In the latter case, the algorithm used to create the person number - "Linking Key" - should be stored to ensure that it can be reused, rather than being a one-off process.

The Slovak Statistical Office is well-positioned to take responsibility for a new data collection project, leveraging its expertise and capabilities in building the capacity to use and link data. Statistical offices generally have technical tools and experience with anonymisation and data collection that are useful for this exercise. It is important to ensure that this institution is included from the beginning in the setting up of a monitoring and evaluation tool (Box 8).

Box 7. International example: central role of the Slovenian Statistical Office in Digital Slovenia 2030

In the context of Digital Slovenia 2030, the Slovenian Statistical Office (SORS) assumes a central role in the comprehensive collection and analysis of data. Drawing upon its expertise in monitoring the previous national strategy, Digital Slovenia 2020, SORS now collaborates closely with the Ministry of Digital Transformation of Slovenia to oversee the implementation of the subsequent strategy, Digital Slovenia 2030.

SORS takes charge of gathering core indicators through unified surveys that assess the extent of ICT usage in households, among individuals, and within enterprises. In addition to its core efforts, SORS conducts further specialised statistical surveys, targeting indicators specific to the information society. These surveys are designed to capture emerging trends and evolving needs, playing a vital role in ongoing monitoring and potential updates to the Plan Digital Slovenia 2030. By staying at the forefront of data collection methodologies and leveraging its expertise, the Slovenian Statistical Office continues to be a pillar of support in steering Slovenia toward a digitally progressive and inclusive future.

Overall, the systematic approach taken by the Slovenian Statistical Office, in collaboration with relevant authorities, fosters an environment of data-driven decision-making and enables Slovenia to effectively navigate its path toward a thriving and digitally empowered future.

6 Implementation of the monitoring and evaluation tool

This section gives pointers on how to implement the monitoring and evaluation tool (M&E tool). The implementation of such a tool should follow a Plan-Do-Check-Act process. The first step, that of planning the objectives and set up of the monitoring tool, is crucial to ensure the good functioning of the tool. The second step, to implement the monitoring tool, has to do with data, its collection and combination of different sources. The third step, to verify the impact of the policy, is the chore objective and goal of the monitoring tool. Lastly, the step of acting to adapt the policy to meet its ultimate objectives, requires strong governance and communication with the public.

Plan: Identifying objectives for the M&E tool

Defining objectives consultatively

It is crucial to start with a consultative process involving key stakeholders such as relevant public institutions, senior organisations, and digital literacy organisations, to reflect on what are the objectives of the RRP investment and how they should be monitored.

Ensuring that objectives are measurable

The objectives of the RRP investment and of the tool should be Specific, Measurable, Achievable, Relevant, and Time-bound (SMART). For instance, instead of having a vague goal like "increase digital literacy among seniors," stakeholders should aim for something more measurable, such as "close the gap between seniors and non-seniors in the use basic internet functions by 20% within a year."

SMART objectives are more easily measurable, but to be measured it requires thinking about data from the very beginning. It is crucial to include data owners like the Statistical Office, MIRRI, and other relevant ministries from the beginning. These stakeholders can provide invaluable expertise, data, and support in setting up and running the monitoring and evaluation tool and ensure that all resources available and useful are being used.

If existing data sources such as national statistics, surveys, or databases can provide the necessary data, then these should be leveraged. This not only saves time but also allows for a quicker rollout of the M&E tool. If existing data are insufficient or outdated, new data collection methods such as surveys, focus groups, and interviews targeted at seniors may be necessary. The need for new data should be ascertained during the planning phase.

Defining responsibilities

Clearly delineate who will be responsible for various elements of the monitoring and evaluation process, including data collection, analysis, and reporting.

This requires answering the question who will conduct the analysis after data has been collected. Depending on the answer, it may be essential to invest in building strong analytical capacity to manage and interpret the data. Training existing staff or hiring specialists in policy analysis, statistics, or data science may be necessary. A dedicated team comprising members from involved departments and stakeholder groups should be set up. This team will focus on conducting the analysis and generating actionable insights from the collected data.

The frequency of the monitoring cycle will depend on the type of data being collected and its availability. For example, if relying on existing yearly surveys or national statistics, an annual review may be sufficient. For more real-time data, such as monthly reports or continuous online surveys, quarterly or even monthly monitoring may be feasible. Determining the right frequency is essential for timely evaluations and for allowing enough time to implement changes based on the evaluations.

Do: Monitoring the objectives

Collecting data (existing and new)

Designing surveys, interviews, or other data collection tools to gather information on digital skills proficiency among seniors. Also, identifying existing sources of data, such as census records or previous studies, which could offer baseline statistics for comparison.

Exchanging data across stakeholders

Setting up mechanisms for easy and secure sharing of collected data among involved stakeholders. This may include securing databases or data exchange platforms compliant with privacy laws.

Modern tools and platforms can significantly aid in centralizing the M&E activities. Google Cloud offers robust data storage, analytics, and machine learning services that can automate many M&E tasks. Salesforce can facilitate the tracking of stakeholder interactions and outcomes, while Stacker can allow non-technical staff to interact with stored data.

Selecting a tool or a combination of tools should be done based on scalability needs, ease-of-use, and compatibility with existing systems. Making sure to abide by all data privacy regulations is essential when choosing these platforms.

Linking data across registers

To gain a more comprehensive understanding, it may be useful to link data across different sources or registers. This requires a robust data architecture and a comprehensive data governance model. There are two approaches to this. The first one is to keep separate monitoring processes and linking or combining the data at the end, which may be beneficial if different departments or stakeholder groups have specialised metrics or methodologies. However, this approach can result in siloed data, making it challenging to get an integrated view of the policy's impact. To prevent that, it is necessary to establish a protocol to link the disparate data sets at the end of each monitoring cycle. If analysis is to be conducted separately by each stakeholder (e.g., individual departments, external organisations), it is also necessary to establish standardised methods and protocols to ensure data comparability and quality.

The second approach consists in exchanging data between stakeholders. This allows for a more cohesive and integrated analysis, providing a holistic view of the policy's impact (Box 9). However, this requires robust data sharing protocols to ensure privacy and data integrity.

Box 8. International Case Studies: Data Exchange Platforms

Estonia's X-Road

Estonia's X-Road is an open-source software and ecosystem solution that provides unified and secure data exchange between private and public sector organisations. This platform facilitates comprehensive analysis for policy impact assessment by linking data from different sources. For instance, it connects healthcare data with education records and taxation information, allowing the government to assess the effectiveness of public health initiatives on educational outcomes and tax revenues. To ensure secure transfers, all outgoing data is digitally signed and encrypted, and all incoming data is authenticated and logged.

Luxembourg's National Interoperability Framework

Luxembourg has taken significant strides in fostering data exchange and interoperability through its National Interoperability Framework (NIF). Launched in 2019, this framework serves as a cornerstone for enhancing data collaboration and innovation within the country.

The NIF encompasses a comprehensive strategy for enabling secure and efficient data sharing among government agencies, businesses, and citizens. It provides guidelines, standards, and protocols that facilitate the seamless flow of data across different domains, promoting a holistic approach to policymaking and public service enhancement.

One key aspect of the NIF is its commitment to data privacy and protection, aligning with the GDPR and Luxembourg's strong emphasis on safeguarding individual rights and information security. Through the NIF, Luxembourg is creating an environment where data can be harnessed to drive innovation, improve public services, and support the nation's socio-economic development.

Source: Interoperability services (n.d.[43]), www.eui.eu/research/library/researchguides/economics/statistics/dataportal/eu-silc; Luxembourg Government (n.d.[44]), https://digital.gouvernement.lu/en/dossiers/2019/NIF-2019.html/.

Check: Verifying impact of policies

Deciding on reporting and visualisation tools

Choosing or creating data visualisation tools that allow for easy interpretation of the results. Graphs, dashboards, and heat maps are often helpful in this regard.

Traditional reports are effective for annual reviews and for stakeholders who prefer textual and static visual data. They offer a permanent record that can be easily archived and shared.

Dynamic tools allow real-time analysis and can be more engaging for stakeholders. These tools are ideal for more frequent monitoring cycles and offer the ability to drill down into the data for more detailed insights.

The complexity of the reporting or visualisation tool will depend on the frequency of your monitoring cycle. For frequent monitoring, dynamic tools may offer more flexibility, while traditional reports may be more practical for less frequent, perhaps annual, evaluations.

Disseminating results

Ensuring that the results of the monitoring and evaluation are distributed to stakeholders in a clear and understandable manner. Summary reports and policy briefs can be effective methods of dissemination.

Act: Adapting objectives and policies based on the M&E

Ensuring strong governance

Maintaining a robust governance structure is crucial to oversee the implementation of action items stemming from the M&E process. This includes the periodic review of objectives, oversight committees, and steering groups to guide the adaptation of policies.

Communicating with the public

Transparently sharing the findings and any consequent actions with the public through various communication channels is important. This could include press releases, social media updates, and public forums.

References

Armstrong, M., R. Landers and A. Collmus (2015), "Gamifying recruitment, selection, training, and performance management: Game-thinking in human resource management", *Emerging Research and Trends in Gamification*, pp. 140-165, https://doi.org/10.4018/978-1-4666-8651-9.CH007. [6]

Blank, G. and D. Groselj (2014), "Dimensions of Internet use: amount, variety, and types", *Information, Communication & Society*, Vol. 17/4, pp. 417-435, https://doi.org/10.1080/1369118X.2014.889189. [36]

Boot, W. et al. (2015), "Computer Proficiency Questionnaire: Assessing Low and High Computer Proficient Seniors", *The Gerontologist*, Vol. 55/3, pp. 404-411, https://doi.org/10.1093/geront/gnt117. [11]

Boot, W. et al. (2015), "Computer Proficiency Questionnaire: Assessing Low and High Computer Proficient Seniors", *The Gerontologist*, Vol. 55/3, pp. 404-411, https://doi.org/10.1093/geront/gnt117. [15]

Brashier, N. and D. Schacter (2020), "Aging in an Era of Fake News", *Current Directions in Psychological Science*, Vol. 29/3, pp. 316-323, https://doi.org/10.1177/0963721420915872. [30]

Cotten, S., W. Anderson and B. McCullough (2013), "Impact of Internet Use on Loneliness and Contact with Others Among Older Adults: Cross-Sectional Analysis", *Journal of Medical Internet Research*, Vol. 15/2, p. e39, https://doi.org/10.2196/jmir.2306. [23]

Davis, F. (1989), "Perceived usefulness, perceived ease of use, and user acceptance of information technology", *MIS Quarterly: Management Information Systems*, Vol. 13/3, pp. 319-339, https://doi.org/10.2307/249008. [10]

Derynda, B. et al. (2022), "Virtual Lifelong Learning Among Older Adults: Usage and Impact During the COVID-19 Pandemic", *Cureus*, https://doi.org/10.7759/cureus.24525. [16]

Dong, X., S. Meng and D. Chen (2022), "How does the Internet enhance the subjective well-being of elderly individuals in China?", *Frontiers in Psychology*, Vol. 13, https://doi.org/10.3389/fpsyg.2022.1036169. [21]

Education & Training Foundation (2021), *ETF pilots new Essential Digital Skills game - The Education and Training Foundation*, https://www.et-foundation.co.uk/news/etf-pilots-new-essential-digital-skills-game/ (accessed on 6 April 2023). [7]

EU SILC (2022), *EU Statistics on Income and Living Conditions*. [40]

Europass (n.d.), *Test your digital skills*, https://europa.eu/europass/en/europass-tools/test-your-digital-skills (accessed on 19 September 2023). [14]

European Commision (2021), *eGovernment Benchmark*, https://digital-strategy.ec.europa.eu/en/library/egovernment-benchmark-2021. [3]

European Commission (2023), *Digital Economy and Society Index*, https://digital-strategy.ec.europa.eu/en/policies/desi. [42]

Ferrari, A. and Y. Punie (2013), "DIGCOMP: A Framework for Developing and Understanding Digital Competence in Europe", https://doi.org/10.2788/52966. [4]

Ford, G. and S. Ford (2009), "Internet Use and Depression Among the Elderly", *SSRN Electronic Journal*, https://doi.org/10.2139/SSRN.1494430. [18]

Heo, J. et al. (2015), "Internet Use and Well-Being in Older Adults", *Cyberpsychology, Behavior, and Social Networking*, Vol. 18/5, pp. 268-272, https://doi.org/10.1089/CYBER.2014.0549. [17]

IFLA & EIFL (2021), *Report by the International Federation of Library Associations and Institutions (IFLA) and Electronic Information for Libraries (Impacts of Public Access to Computers and the Internet in Libraries*, http://lists.apc.org/mailman/listinfo/pal-dc. [34]

Interoperability services, X. (n.d.), *e-Estonia*, https://www.eui.eu/research/library/researchguides/economics/statistics/dataportal/eu-silc. [43]

Jiang, M. et al. (2022), "Bringing older consumers onboard to online banking: a generational cohort comparison", *Educational Gerontology*, Vol. 48/3, pp. 114-131, https://doi.org/10.1080/03601277.2021.2021730. [24]

Jiang, M. et al. (2016), "Generational differences in online safety perceptions, knowledge, and practices", Vol. 42/9, pp. 621-634, https://doi.org/10.1080/03601277.2016.1205408. [8]

Jiang, M. et al. (2016), "Generational differences in online safety perceptions, knowledge, and practices", Vol. 42/9, pp. 621-634, https://doi.org/10.1080/03601277.2016.1205408. [25]

Luxembourg Government (n.d.), *National Interoperability Framework, Ministry for Digitalisation*, https://mindigital.gouvernement.lu/en/dossiers/2019/NIF-2019.html/. [44]

Matthews, K., J. Nazroo and A. Marshall (2019), "Digital inclusion in later life: Cohort changes in internet use over a ten-year period in England", *Ageing and Society*, Vol. 39/9, pp. 1914-1932, https://doi.org/10.1017/S0144686X18000326. [37]

Moret-Tatay, C. et al. (2019), "A Spanish Adaptation of the Computer and Mobile Device Proficiency Questionnaires (CPQ and MDPQ) for Older Adults", *Frontiers in Psychology*, Vol. 10, https://doi.org/10.3389/fpsyg.2019.01165. [12]

Narushima, M., J. Liu and N. Diestelkamp (2018), "Lifelong learning in active ageing discourse: its conserving effect on wellbeing, health and vulnerability", *Ageing and Society*, Vol. 38/4, pp. 651-675, https://doi.org/10.1017/S0144686X16001136. [27]

Nayak, L., L. Priest and A. White (2010), "An application of the technology acceptance model to the level of Internet usage by older adults", *Universal Access in the Information Society*, Vol. 9/4, pp. 367-374, https://doi.org/10.1007/S10209-009-0178-8/TABLES/7. [31]

No Isolation (2021), *Digital Exclusion: Touchscreens leaves 5.6million… | No Isolation*, https://www.noisolation.com/research/digital-exclusion-report (accessed on 6 April 2023). [33]

OECD (2024), "ICT Access and Usage by Households and Individuals", *OECD Telecommunications and Internet Statistics (database)*, https://doi.org/10.1787/b9823565-en. [39]

OECD (2023), "Assessment and upscaling proposal of the RRP pilot training scheme", [9]

https://www.oecd.org/els/emp/dgreformslovakia.htm.

OECD (2020), "Impact evaluation of labour market policies through the use of linked administrative data Final report", https://www.oecd.org/els/emp/Impact_evaluation_of_LMP.pdf (accessed on 20 July 2023). [38]

OECD (2013), "What the Survey of Adult Skills (PIAAC) measures", in *The Survey of Adult Skills: Reader's Companion*, OECD Publishing, Paris, https://doi.org/10.1787/9789264204027-4-en. [41]

Pénard, T., N. Poussing and R. Suire (2013), "Does the Internet make people happier?", *Journal of Socio-Economics*, Vol. 46, pp. 105-116, https://doi.org/10.1016/j.socec.2013.08.004. [20]

Publications Office of the European Union, L. (2020), *Ageing Europe: Looking at the lives of older people in the EU*, https://ec.europa.eu/eurostat/web/products-statistical-books/-/ks-02-20-655. [1]

Roque, N. and W. Boot (2018), "A New Tool for Assessing Mobile Device Proficiency in Older Adults: The Mobile Device Proficiency Questionnaire", *Journal of Applied Gerontology*, Vol. 37/2, pp. 131-156, https://doi.org/10.1177/0733464816642582. [19]

Roque, N. and W. Boot (2018), "A New Tool for Assessing Mobile Device Proficiency in Older Adults: The Mobile Device Proficiency Questionnaire", *Journal of Applied Gerontology*, Vol. 37/2, pp. 131-156, https://doi.org/10.1177/0733464816642582. [13]

Ručinská, S. and M. Fečko (2022), "eGovernment and Digitalization in the Slovak Republic – Current Development and Political Strategies", *Central and Eastern European eDem and eGov Days*, Vol. 341, pp. 251-262, https://doi.org/10.24989/ocg.v341.18. [29]

Statistical Office of the Slovak Republic (2022), *Survey on Information and Communication Technologies Usage in Households 2022*, https://slovak.statistics.sk:443/wps/portal?urile=wcm:path:/obsah-en-pub/publikacie/vsetkypublikacie/ea06a154-6369-49d9-b4dd-cd054675bec0 (accessed on 6 April 2023). [22]

Trading Economics (2023), *Slovakia - Level of internet access - 2023 Data 2024 Forecast 2010-2022 Historical*, https://tradingeconomics.com/slovakia/level-of-internet-access-eurostat-data.html (accessed on 12 April 2023). [32]

UNECE (2021), *Meaningful participation of older persons and civil society in policymaking DESIGNING A STAKEHOLDER ENGAGEMENT AND PARTICIPATION PROCESS Guidance note*, https://unece.org/mainstreaming-ageing (accessed on 12 April 2023). [28]

UNECE, E. (2019), *2018 Active Aging Index*, https://unece.org/population/publications/active-ageing-index-analytical-report. [2]

Vuorikari, R. et al. (2022), *DigComp 2.2: The Digital Competence Framework for Citizens - With new examples of knowledge, skills and attitudes*, European Commission, https://doi.org/10.2760/115376. [5]

Warf, B. (2018), "Teaching Digital Divides", Vol. 118/2, pp. 77-87, https://doi.org/10.1080/00221341.2018.1518990. [35]

Yamashita, T. et al. (2017), “Types of Learning Activities and Life Satisfaction among Older Adults in Urban Community-Based Lifelong Learning Programs”, Vol. 41/3, pp. 239-257, https://doi.org/10.1080/01924788.2017.1310583. [26]