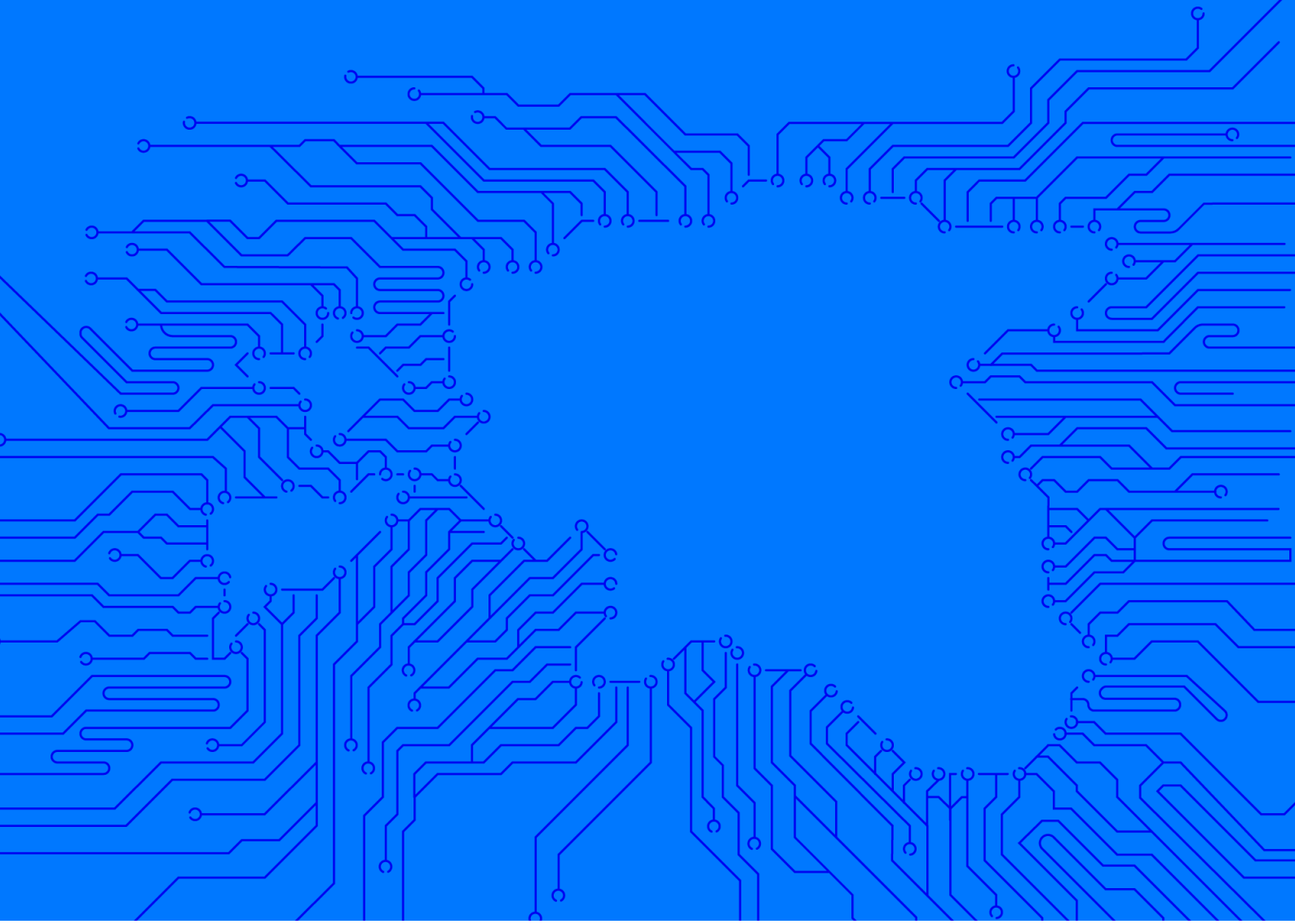

Real-Time Economy Vision (2020-2027)

Republic of Estonia
Ministry of Economic Affairs and Communications

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Abstract

Due to time-consuming support activities, Estonian business and economy lose money every day and a significant amount of "unproductive work" is done[1], which in turn has a negative impact on productivity and growth. The assessment of the economic impact of real-time economy[2] shows that real-time data exchange solutions (e-invoices, e-receipts, data-driven reporting to the state, e-waybills, etc.) save the business sector more than € 200 million a year. It is possible to save about 14.10 million working hours a year, which equals to the full-time work of 7,000 people. This enables a company to use saved expenses to increase the volume of operation, which in turn will have a positive effect on GDP growth.

Real-time economy (RTE) is a digital ecosystem where transactions between diverse economic actors take place in or near real time. This means replacing paper-based business transactions and administrative procedures by automatic exchange of digital, structured and machine-readable data in standardized formats.[3]

This results in faster and automated data exchange, better access to information and widespread adoption of RTE solutions, which should reduce process delays, save resources and transaction costs, increase organizational efficiency and business competitiveness, reduce bureaucracy in business, increase the speed and quality of decision-making processes, improve transparency, and stimulate economic and social innovation. In addition, a strong partnership, cross-border cooperation and interoperability will make it easier for companies to extend their business in the region and help increase export capacity.

In general, for the introduction of RTE, the following three issues need to be solved:

- First, **timeliness** - today, the data is received with a long delay, which leads to the situation where the information may be out of date at the time of decision making.
- Second, **unambiguous data** - the data is not based on the same semantic model, i.e. there is no unified approach to data standardization (i.e. the same data may be represented differently in different systems).
- Thirdly, **enabling of data exchange** - data cannot always be exchanged in a machine-readable form or shared as open data to oneself and other potential users.

In order to avoid further fragmentation of digital society and progressively increasing administrative burden, it is necessary to define the basics and rules for the future exchange of business data - the basis, standards and structure of exchange - to facilitate the digital transition and the function of real-time economy. These will serve as guidelines for the development of information systems of state agencies and the formation of legislation. The role of the public sector is to ensure non-inhibitory

[1] "Unproductive work" includes, for example, the preparation and submission of reports to the state (including duplicate reporting); filling in waybills; double and manual data entry and correction of errors, sending invoices by e-mail, excessive paperwork involved in purchasing a service or product, a paper receipt with faded text to prove the warranty, etc.

[2] Study of the economic impact of real-time economy (2020). Available at https://www.mkm.ee/sites/default/files/reaalajamajanduse_majandusliku_moju_uuringu_lopparuanne.pdf

[3] Robert Krimmer, Tarmo Kadak, Art Alishani, Maarja Toots, Ralf-Martin Soe, Carsten Schmidt (2019) "Real-time economy: definitions and implementation opportunities". Tallinn: Tallinn University of Technology. Available at: https://www.mkm.ee/sites/default/files/taltech_rte_final_report_en1.0.pdf

regulation of innovation and provide the necessary digital infrastructure to accelerate the implementation of RTE.

The goal of the RTE vision is to create technical and regulatory facilities by 2027 to increase the quality and availability of business data and enable their digital and automatic exchange in communication between different parties through semantic analysis, structuring and standardization of data and the use of appropriate data exchange channels.

The implementation of the vision will contribute to achieving the government's goal to reduce administrative burden and bureaucracy put on businesses and to apply the once-only principle and machine-readable interoperability in data collection. The vision supports the Estonian Research, Development, Innovation and Entrepreneurship Strategy for 2021-2035.

The main goal of the implementation of RTE is to carry out a structural change in the business environment and relations with the state, so that business administration and management activities could occur automatically in the background and significantly reduce the administrative burden on entrepreneurs and thereby indirectly increase productivity.

To achieve the main goal of RTE, the **following three cross-sectoral lines of action** have been defined:

1. Creating technical facilities for RTE

This line of action is aimed at increasing the quality and availability of business data and enabling their real-time exchange in communication between different parties through semantic analysis, structuring and standardization of data and the use of appropriate data exchange channels.

2. Regulating and supporting the transition to RTE in the cooperation between private and public sectors

This line of action is aimed at regulating and supporting the private and public sector organizations in the implementation of RTE solutions through a regulatory framework that enables it.

3. Cross-border cooperation in the Baltic Sea region and at EU level

The aim of the action line is to continue active cross-border co-operation in the Baltic Sea region, with the Nordic countries and more generally at the level of the European Union in order to move jointly towards the transition to RTE.

These lines of action are based on common strategic sub-objectives across sectors, which are in line with the action programme created as a result of the RTE initiative of Nordic countries[4].

The strategic sub-objectives with expected deadlines are:

[4] Nordic Smart Government 3.0. Available at: www.nordicsmartgovernment.org

- Widespread use of e-invoicing in business-to-business transactions (2023)
- Widespread use of e-receipts (2025)
- Transition to machine-readable reporting (including preferably the use of the XBRL GL standard) (2025)
- Widespread use of e-waybills (2025)
- Adoption of standardized digital product and service codes, information and catalogues (2027)
- Real-time and consent-based sharing of up-to-date company data to third parties (2027)
- Piloting and implementing the concept of RTE concept to introduce new solutions (2027)
- Active international cooperation with Member States, in particular with the Baltic Sea States and the Nordic countries (2027)

For the implementation of the RTE vision, an overall guiding work plan for 2020-2027 has been developed, which will be annually accompanied by a shorter-term, more detailed and regularly updated work plan prepared by the Ministry of Economic Affairs and Communications in co-operation with ministries, agencies under their administration, professional associations and private sector.

Regular review and updating of the work plan over time creates an opportunity to be flexible with regard to the next planned activities and according to the economic situation, and to make informed decisions in order to achieve the best results.

1. WHAT IS REAL-TIME ECONOMY?

1.1. Current situation

The purpose of this **vision of real-time economy (RTE)** is to agree on the concept, goals and lines of action of RTE necessary for the transition to RTE. The implementation of the work plan 2020-2027 presented in the annex to the vision will ensure that our entrepreneurs save time when communicating with the state and fulfilling their obligations as these can be completed automatically. In addition, the activities provided in the work plan will contribute to the automation of business-to-business transactions and the improvement of data quality.

The very goal of RTE is to carry out a structural change in the business environment and relations with the state, so that business administration and management activities could occur automatically in the background and significantly reduce the administrative burden on entrepreneurs. The implementation must account of the cross-sectoral and broad-based concept of the topic, which can mean a variety of automated and real-time activities, incl.

- business-to-business transactions,
- public-private partnerships,
- internal planning and decision-making,
- providing services to customers.[5]

Due to time-consuming support activities, Estonian business and economy lose money every day and a significant amount of "unproductive work" is done, which in turn has a negative impact on productivity and growth. The RTE impact analysis of 2020[6] shows that using RTE-based solutions (e-invoices, e-receipts, e-waybills, agricultural machinery data processing, real-time economic forecasts and data-based reporting in XBRL GL format) would save over 14 million man-hours and 200 million euros a year in Estonia. By switching to e-invoices alone would save Estonian taxpayers over 100 million euros a year. To increase productivity, a company should have an opportunity to direct saved expenses into increasing the volume of operating activities, which in turn will have a positive effect on GDP growth. The cost savings in the public sector can be channeled, for example, into providing better services to citizens and businesses or more motivating wages in sectors of concern, including education.

In real-time economy, the emphasis is on data, its quality and real-time availability and re-use, with a particular focus on business and economic data and their exchange. Today, data is not used to its maximum because it is not easily accessible or is ambiguous and it requires time-consuming manual work to understand it.

Today, the submission of VAT returns to the Tax and Customs Board (MTA) is already machine-readable, but the information is valid for the past month and has no value to the company at the moment and rather creates every month additional time and money expenses. In the future, the annual reports should not only reflect the situation of the previous year, but by transmitting real-time data, it is possible to create added

[5] Robert Krimmer, Tarmo Kadak, Art Alishani, Maarja Toots, Ralf-Martin Soe, Carsten Schmidt (2019) "Real-time economy: definitions and implementation opportunities". Tallinn: Tallinn University of Technology.
[6] Study of the economic impact of real-time economy (2020). Available at: https://www.mkm.ee/sites/default/files/reaalajamajanduse_majandusliku_moju_uuringu_lopparuanne.pdf

value for both the state and the company in order to constantly recognize the current financial situation of the company.
Thus, today, it seems as if successful data exchange is already functioning for many services, but in most cases it can in no way be called the data exchange that is considered to be the basis of RTE. Why?

- First, **timeliness** - today, the data is received with a long delay, which leads to the situation where the information may be out of date at the time of decision making.
- Second, **unambiguous data** - the data is not based on the same semantic model, i.e. there is no unified approach to data standardization (i.e. the same data may be represented differently in different systems).
- Thirdly, **enabling of data exchange** - data cannot always be exchanged in a machine-readable form or shared as open data to oneself and other potential users.

It is important to emphasize here that, for example, a machine-readable e-invoice created in one system may not be unambiguously interpreted in another machine-readable system for all substantive data fields, not to mention the cross-border aspect. In e-invoicing, we have European e-invoicing standard for this[7], which has made e-invoicing unambiguous between different systems. E-invoicing is one of the most successful examples of RTE, however, e-invoicing is merely a "drop in the ocean" considering the real potential of RTE. The data on the invoice forms only a small part of the data needs of the business environment and all the information exchanged with the state. **It is necessary to unambiguously share all business information in a single RTE ecosystem[8] (see Figure 1), and moreover, it must take place in real time and reflect the current situation.**

[7] European e-invoicing standard format. Available at: EN 16931-1:2017
[8] Robert Krimmer, Tarmo Kadak, Art Alishani, Maarja Toots, Ralf-Martin Soe, Carsten Schmidt (2019) "Real-time economy: definitions and implementation opportunities". Tallinn: Tallinn University of Technology. Available at: https://www.mkm.ee/sites/default/files/taltech_rte_final_report_en1.0.pdf

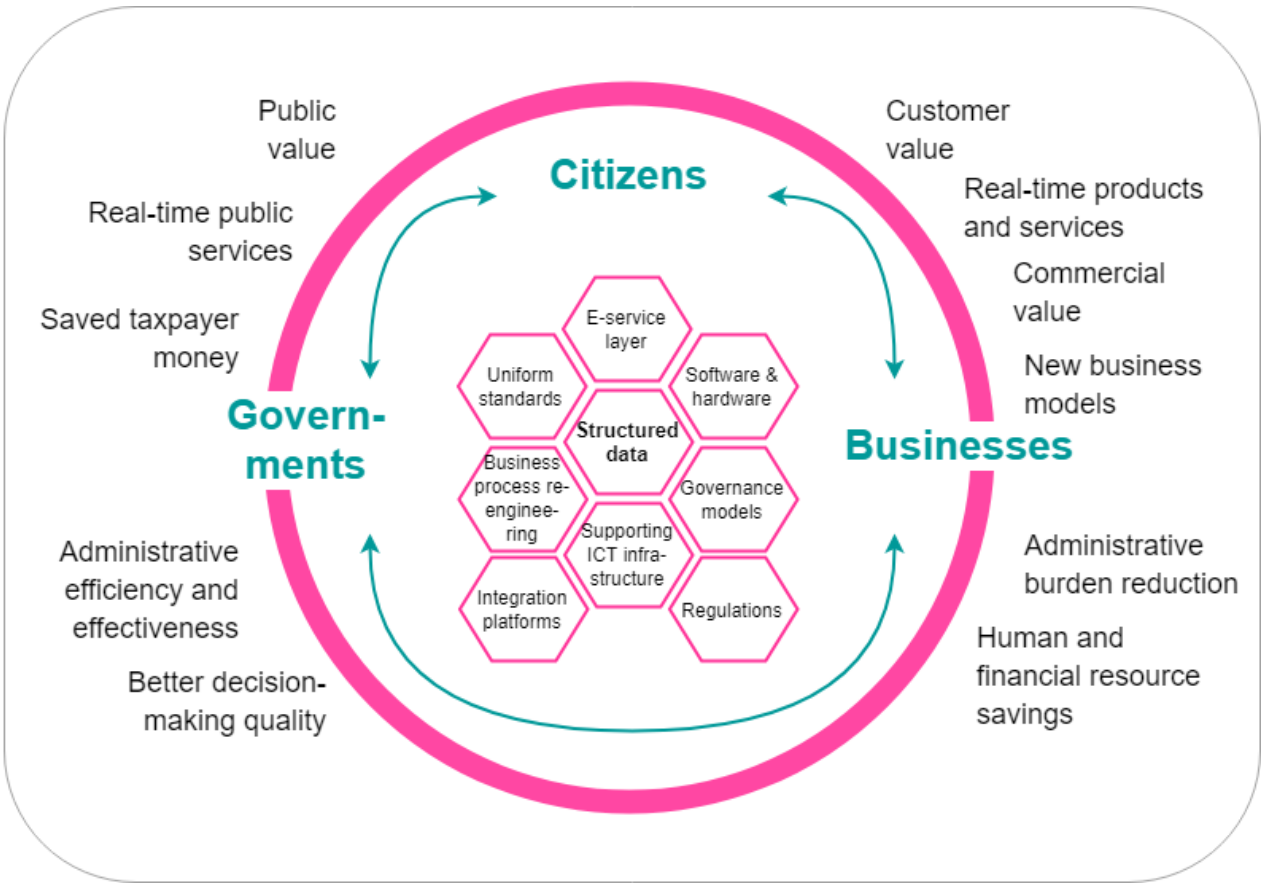

Figure 1. RTE ecosystem

In the RTE ecosystem, the traditional exchange of business data with the state will become data and needs-based and real-time data exchange will enable the company to make important strategic decisions of higher quality. For example, to assess the success of a company, the state may in the future request data from the previous financial year already in January, or an investor may request business data at any desired time for the last 12 months.

There are already innovative companies in many parts of the private sector that have noticed the benefits of a unified real-time data transmission vision - real-time transmission of standardized data in machine-readable form and the ability to use the same data in different information systems by a single submission. The Vision of the Estonian Association of Information Technology and Telecommunications (ITL) of Information Society in 2030[9] highlights the benefits of RTE and common vision. This document sees the greatest value in prompt digitalization and automation that makes joining the data economy as easy and mandatory as declaring your income is today while creating various facilities for this. On agreed basis, abrupt digital transition is also supported by the European Union data strategy[10] and new European SME strategy[11], which highlight the need for stronger support for business digitalization and for improving the quality and availability of data for their reuse in single data spaces and standards.

[9] ITL Visioon 2030. Available at: https://wp.itl.ee/files/Visioon%202050.pdf
[10] European Data Strategy document Available at: https://ec.europa.eu/info/sites/info/files/communication-european-strategy-data-19feb2020_en.pdf
[11] European SME Strategy. Available at: https://eur-lex.europa.eu/legal-content/ET/TXT/PDF/?uri=CELEX:52020DC0103&from=EN

An example of an ITL network is the *Internet of Business* project[12], where competing companies have joined, leading to the introduction of the European e-invoicing standard in 2018 and the introduction of a common standard for the recording and exchange of financial data, cost savings and creating better / more user-friendly customer experience in 2020. There are more similar examples emerging in the private sector, but unfortunately they do not always follow the same principles and standards, which in turn may deepen the fragmentation of digital society.

This is well reflected in the Digital Economy and Society Index (DESI)[13] that shows based on the 2020 report that Estonia ranks 7th in Europe in terms of the overall digitalization, but is lagging far behind in adopting digital technologies and services in the private sector, ranking 14th (score 41.1), which is slightly below the European average (score 41.4). This slows down the growth of general productivity in Estonia and impedes the achievement of productivity objectives of the forthcoming "Research and Development, Innovation and Entrepreneurship Strategy for 2021-2035".

The link between digitalization and productivity is clearly highlighted in the *Organization for Economic Co-operation and Development* (OECD) analysis[14], which shows a growing productivity gap between the world 's leading companies (top 5%) and the rest. World-leading companies tend to be larger, more innovative and more receptive to new digital technologies. Small manufacturing companies and long-established small service companies, which make up the majority of the market, are more likely to be passive towards digitalization and do not use any state-of-the-art digital technology or plan to invest in digitalization. A study by the European Investment Bank (EIB) in 2018[15] suggested that different level of digitalization of companies leads to a bigger digitalization gap, and in the economy with bigger number of small businesses, there is a greater risk for such digitalization divide. Removing barriers that prevent these companies from being digitally active should be an important focus in policy-making. The same study also considers lack of access to finance to be one of the biggest obstacles. Thus, improving their access to finance (including supporting digitization) can help reduce the digitalization divide. This is also in line with the ITL Vision 2030 document, which recommends that the state encourage digitalization, automation and robotics, rather than applying next tax system to new technologies.[16]

Quality problems occurring in data entry, poor data quality limiting the wider use of data analysis (i.e. collected data is not up-to-date, complete, structured on a clear basis and with a consistent calculation methodology) for themselves and other potential users[17] and low adaption of digital technologies are also reflected in the high administrative burden imposed on businesses by the state. For understanding the reporting and technical burden alone, based on the government regulatory burden index[18] in 2017, compliance with the requirements set by the state (e.g. permits, rules, reporting) for

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[12] Internet of Business project introduction. Available at: https://www.itl.ee/internet-of-business-maiandustehninaud/

[13] The Digital Economy and Society Index, Estonian report. Available at: https://ec.europa.eu/diaital-single-market/en/scoreboard/estonia

[14] OECD analysis. Available at: https://www.oecd-ilibrary.org/docserver/65629cc9-en.pdf?expires=1597665696&id=id&accname=auest&checksum=75A15F76650759D9195C57BAF8D52101

[15] EIB study. Available at: https://www.bruegel.org/wp-content/uploads/2019/12/PC-17_2019-101219_-1.pdf

[16] ITL Visioon 2030. Available at: https://wp.itl.ee/files/Visioon%202050.pdf

[17] „Andmete kättesaadavus ja kasutamine riigi targaks juhtimiseks" (Availability and use of data for smart state management) audit by the National Audit Office of Estonia (2020)

[18] Burden of government regulation. Available at: https://tcdata360.worldbank.org/indicators/govt.regu?country=EST&indicator=689&countries=AUT.FIN.HKG.NLD.SGP&viz=line chart&years=2007.2017&indicators=944

Estonian companies is more burdensome than, for example, in Finland, Sweden and the Netherlands. According to the burden index, however, Estonia is above the regional average and ahead of, for example, Denmark, Latvia and Lithuania that belong to the same region. ITL Vision 2030 emphasizes the same problem by pointing out that the legislative process is inclined to increase the administrative burden and the state structure is labor-intensive[19]. The ICT sector also makes clear in the vision document that the administrative burden on the public sector needs to be reduced in order to focus on value-creating activities.

In order to avoid further fragmentation of digital society and progressively increasing administrative burden, the state has to take a clear position and define the basics and rules for the future exchange of business data - the basis, standards and structure of exchange - to facilitate the digital transition and the function of real-time economy.

RTE's current indefinite and cross-sectoral nature has led to a situation where no central agreement has been reached at the national level. To reach to central agreements, goals and decisions, the Government is showing the initiative by adding activities to promote RTE to the National Reform Programme 2020-2023 and the Action Programme of the Government of the Republic 2019-2023[20] .

In order to promote RTE and introduce solutions more widely, the Ministry of Economic Affairs and Communications as the main promoter of RTE needs to establish the bases and objectives in cooperation with other relevant ministries, their subdivisions and the private sector, and make central decisions based on them. As a result, each state agency can be guided by jointly agreed bases, goals and decisions when developing its information systems and planning amendments to the law, in order to ensure faster transition to RTE. The role of the public sector must be limited to regulation and the provision of necessary digital infrastructure, including accelerating the introduction of innovative RTE solutions through pilot projects.[21]

[19] ITL Visioon 2030. Available at: https://wp.itl.ee/files/Visioon%202030.pdf
[20] Action Programme of the Government of the Republic 2019-2023. Available at: https://www.valitsus.ee/sites/default/files/content-editors/valitsus/Ratasellvalitsus/vabariigi valitsuse tegevusprogramm 2019-2023.pdf
[21] Robert Krimmer, Tarmo Kadak, Art Alishani, Maarja Toots, Ralf-Martin Soe, Carsten Schmidt (2019) "Real-time economy: definitions and implementation opportunities". Tallinn: Tallinn University of Technology. Available at: https://www.mkm.ee/sites/default/files/taltech_rte_final_report_en1.0.pdf

1.2. The concept and content of real-time economy

Real-time economy (RTE) **is a digital ecosystem where transactions between diverse economic actors take place in or near real time. This means replacing paper-based business transactions and administrative procedures by automatic exchange of digital, structured and machine-readable data in standardized formats.**[22]

By making business data unambiguous and available on the basis of consent, we create opportunities for automatic compliance with the requirements set by the state, facilitating business operations and reducing the administrative burden for both the company and the state. This results in faster data exchange and better access to information which should reduce process delays, save resources and transaction costs, increase organizational efficiency and business competitiveness, increase the speed and quality of decision-making processes, improve transparency, and stimulate economic and social innovation. From the entrepreneurs' point of view, RTE helps direct the resources saved through automation and data-based operation into increasing the productivity and export capacity, while from the state's point of view it reduces the shadow economy and money laundering risks due to increased transparency. In addition, as the administrative burden on the public sector is reduced, public spending will also be reduced, leading to lower taxes and/or better services.

In the future, the exchange of information and data between companies, as well as between companies and the state, must take place in real time, without excessive human intervention, additional reporting or documentation burden. Discussions with entrepreneurs and the public sector have highlighted the following examples that characterize real-time economy.

- State agencies have automatically access to the company's real-time data, which is necessary for respective operation. As a result, annual reports and monthly tax declarations are not required, at least not in a traditional way.
- Due to the real-time data exchange, tax accounting principles may change, for example, VAT billing can be a real-time background activity of other business processes.
- In business-to-business transactions, a good example is increased trustworthiness, i.e. companies can easily share their information about the company's current situation with a business partner in order to be transparent and reach a successful transaction with less risk and time.
- By uniformly structuring and standardizing the data, RTE also promotes circular economy, for example, a company can share real-time information about its production waste, so as it to be reused by another company or monitor real-time information on recovered waste.
- Today's accountants become the company's financial advisors or financial managers, who can provide valuable advice based on adequate financial information thanks to high-quality data and innovative technologies (e.g. artificial intelligence) that, by interacting, are able to make highly accurate economic forecasts.

[22] Robert Krimmer, Tarmo Kadak, Art Alishani, Maarja Toots, Ralf-Martin Soe, Carsten Schmidt (2019) "Real-time economy: definitions and implementation opportunities". Tallinn: Tallinn University of Technology. Available at: https://www.mkm.ee/sites/default/files/taltech_rte_final_report_en1.0.pdf

- Entrepreneurs have the opportunity to spend more than 90% of their time in their core business and invest in the development of new innovative products and services, as communication with the state is easy, real-time data exchange functions and requires minimal intervention by entrepreneurs.
- Thanks to reduced manual work, such as the verification and processing of data by an accountant / public employee, the administrative burden on the public sector and the resources is also significantly reduced and freed resources are directed at creating more efficient infrastructure and providing quality services that do not disturb or burden entrepreneurs.
- High-quality data together with innovative technologies provide an opportunity for the public sector to adequately forecast the use of resources and, if necessary, to optimize the operation of the state.
- In e-commerce, the report required for customs and tax operations is prepared at the moment of the cross-border transaction, as necessary reports can be created automatically on the basis of standardized transaction information. The report is sent to customs well in advance of the arrival of goods in order to avoid double data entry at the border crossing point and time-consuming verification processes.
- In road transport, thanks to up-to-date waybills that are available in real-time, it is possible to share relevant information on request to, for example, the police, without the police having to carry around large paper folders or perform manual roadside checks. As a result, delivery times are reduced and the entire logistics chain becomes smoother and delivery times more predictable.
- In banking, RTE helps prevent money laundering without overburdening the employees, as information about a person is available in real time from a relevant source based on the person's consent and third parties' request, without filling out excessive paperwork and carrying out extensive control measures.
- RTE technologies, combined with blockchain technology and automated data storage technologies such as QR and RFID, allow the product's journey to the customer to be digitally mapped so that customers can track the entire supply chain. As a result, the problem of counterfeit products will be significantly reduced, for example in the food industry (including wine and honey industries) and will increase the consumer awareness about monitoring the climate impact of consumption choices.

Real-time economy = "invisible" administrative activities = more time for business

To be able to assess the success of the transition to RTE, one must understand its enablers and building blocks or solutions. The main **enablers and building blocks** of RTE can be divided into three layers: core technological infrastructure (base solutions for RTE), e-services that are based on the core building blocks, and lastly the business processes and management decisions around the use of data for organizational purposes.[23]

Examples of core technological infrastructure or RTE base solutions are:

- Common standards for data exchange
- Cross-organization integration platforms
- Unified taxonomy for reporting[24]

Possible e-services or RTE solutions:

- Automatic accounting, quality assurance and auditing
- Continuous reporting, risk monitoring and assessment
- Data-driven machine-readable applications such as e-invoices and e-receipts
- E-address, e-ID, e-Signature
- E-Payment, e-Procurement and real-time forecasting
- Real-time income register, real-time taxation and asset reporting[25]

Organizations' data-driven business processes and management decisions:

- Automated business processes
- Business process re-engineering
- Human decision-making frameworks
- Trust between the participants[26]

Estonia has e-authentication, e-Signature, e-invoices, e-receipts, flash payments plus ongoing projects (international e-waybills, Aruandlus 3.0, Know-Your-Customer service (incl. in banking), e-commerce developments, circular economy initiatives, etc.) creating RTE solutions and initiatives. By combining the knowledge from the projects, the state can turn business-related activities into paper-, PDF- and reporting-free real-time activities, making many of today's time-consuming, self-evident and seemingly necessary activities a thing of the past.

RTE combines existing e-services, e-government image, RTE solutions and pilot projects to create future success stories and contribute to Estonia's productivity and export growth. Thanks to cross-border data exchange and once-only principle, cross-border sales of products and services are more simple for Estonian companies in countries that are moving towards the same RTE goals as Estonia. For an entrepreneur, cognitive national borders in a region operating with the same standards and data facilities will "disappear", which has so far created too many obstacles for companies.

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[23] Robert Krimmer, Tarmo Kadak, Art Alishani, Maarja Toots, Ralf-Martin Soe, Carsten Schmidt (2019) "Real-time economy: definitions and implementation opportunities". Tallinn: Tallinn University of Technology. Available at: https://www.mkm.ee/sites/default/files/taltech_rte_final_report_en1.0.pdf

[24] Ibid.

[25] Ibid.

[26] Ibid.

1.3. The impact of real-time economy

The main benefit of RTE is associated with the elimination of "unproductive work", normally done by businesses, citizens and the state, through real-time exchange of high-quality data. RTE's data is based on the accessibility of a company's key business data, such as sales and purchases, fixed assets and payroll data, in a standardized digital format that is machine-readable for circulation both between companies and between companies and the state. The benefits of introducing RTE have been studied in more detail in a study conducted by Tallinn University of Technology in 2019[27], which identified the benefits by various parties in society as follows:

Benefits for entrepreneurs:

- Companies that exchange and process real-time order, invoice, and receipt data have an operational overview of their business, enabling them to use resources more efficiently and **improve planning and risk management processes.**
- Real-time machine-readable data exchange between supply chain actors and automated payments **accelerate cash flow**, enabling companies **to operate more efficiently** and increase turnover and profits.
- The shift to fully digital transactions between business partners is believed **to increase trust and transparency**, which can reduce credit institutions' financing risks and may improve companies' access to credit and supply chain finance.
- Automated processing of e-invoices can **save 60-80% on costs[28]** compared to processing of paper invoices and released resources can be used **to invest in the development of new products and services.**
- According to the European Commission's Expert Group on e-Invoicing, the adaption of e-invoicing could save an additional 5 to 15 euros per invoice. E-invoicing accelerates payments and reduces the potential for human error and fraud.[29] **The widespread use of e-invoicing in the European Union could lead to estimated economic savings of € 2.3 billion.[30]**
- Switching to e-receipts, for example, could save Finnish companies **€ 900 million** a year alone[31].
- Transition to real-time supply chains will reduce companies' operating costs by **30%** and lost turnover by **75%.**[32]
- In addition to minimizing of costs, e-invoicing creates new market niches for **supply chain finance (SCF**), primarily by earning from receivables and liabilities. The global market for SCF solutions is estimated at $ 1.3 trillion for receivables management, $ 100 billion for dynamic discount solutions and $ 340 billion for

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[27] Robert Krimmer, Tarmo Kadak, Art Alishani, Maarja Toots, Ralf-Martin Soe, Carsten Schmidt (2019) "Real-time economy: definitions and implementation opportunities". Tallinn: Tallinn University of Technology. Available at: https://www.mkm.ee/sites/default/files/taltech_rte_final_report_en1.0.pdf

[28] Koch, B. (2017) Business Case E-invoicing/ E-billing. Billentis.
Available at: https://www.billentis.com/einvoicing-businesscase.pdf.

[29] Business-to-business transactions: a comparative analysis of legal measures vs. soft-law instruments for improving payment behaviour (2018). Available at:
https://publications.europa.eu/en/publication-detail/-/publication/c8b7591b-9b80-11e8-a408-01aa75ed71a1/language-en/format-PDF/source-search

[30] Turning Europe digital, preparing for future growth. Available at: http://europa.eu/rapid/press-release SPEECH-15-4770 en.htm

[31] Technology Industries Finland (2018). eReceipt guidelines. Available at:
https://teknologiateollisuus.fi/sites/default/files/file_attachments/2018_ekuittLeng_sisus_vedos_6.pdf

[32] Alicke, K. et al. (2016), October 2016. Available at: https://www.mckinsey.com/business-functions/operations/ourinsights/supply-chain-40--the-next-generation-digital-supply-chain

secured lending.[33]

Benefits for the state:

- The same corporate data can also be used by state agencies to **facilitate automated business reporting, real-time taxation** or to **compile national statistics** without imposing reporting burdens on companies.
- Real-time information can be used for better policy-making and optimization of public sector work.
- New tools and technologies for data analytics and machine-learning enable countries make use of real-time data from diverse sources, such as national or third party databases or IoT ('internet of things') sensors, which would allow governments **to build solutions for continuously monitoring and assessing the country's economic situation** and **develop models** for forecasting economic events (e.g. company failures, changes in tax revenues) based on real-time data.
- This would allow governments **to provide feedback** to companies (e.g. enabling companies to assess their indicators against their peers operating in the same sector or giving indications of possible risks) and **to develop early warning systems** for individual companies and the government.
- Reuse of data in both the public and private sector supports the **once-only principle (OOP)**.
- The implementation of RTE solutions will contribute to the realization of the European Union's single market and free flow of data.[34]

Citizens benefit from the realization of the benefits described above as they receive higher quality services at a more favourable price.[35] For example, e-waybills enable goods to be delivered to consumers faster and allow them to keep track of the source and origin of products as well as their climate impact. In addition, introduction of e-receipts, for example, provides more durable and convenient options for storing warranty documents and instructions. Both documents come with the e-receipt electronically attached to an e-mail or a mobile application, and excessive archiving of paperwork at home would save both time and space.

In the long run, however, the key to RTE's real economic benefits (revenue growth and innovative business models) lies in business-to-business **transactions and real-time supply chain management**. In these areas, innovation must be driven by companies, and in particular large companies that have a strong influence on smaller market players due to long supply chains. The role of the public sector should be limited to regulation and the provision of necessary digital infrastructure.[36]

To assess the impacts of RTE in the Estonian context, a study on the economic impact of RTE was carried out in 2020, which showed that:

- **E-invoices save Estonian taxpayers more than 100 million euros a year,** which is 0.86% of the 2020 national budget (€ 11.6 billion).

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[33] Robert Krimmer, Tarmo Kadak, Art Alishani, Maarja Toots, Ralf-Martin Soe, Carsten Schmidt (2019) "Real-time economy: definitions and implementation opportunities". Tallinn: Tallinn University of Technology. Available at: https://www.mkm.ee/sites/default/files/taltech_rte_final_report_en1.0.pdf

[34] Ibid.

[35] Ibid.

[36] Ibid.

- **By using RTE solutions[37], approximately 14.10 million working hours are saved in Estonia every year**, which is equal to the full-time work of 7,000 people who, when used at value-adding jobs, would increase Estonia's productivity.
- **Real-time and precision farming solutions enable Estonian farmers to earn additional income of over 200 million euros per year.** More specifically, it is possible to obtain higher yields at lower costs by using precision methods, if a farmer uses real-time information on fertilization recommendations when driving the machine and later analyzing the work data and planning new ones.
- **Greenhouse gas emissions in Estonia will decrease by at least 27,000 tons per year due to the analyzed RTE solutions**, which according to 2018 data is slightly more than 0.1% of Estonia 's annual greenhouse gas emissions (approximately 20 million tons), but still contributes to Estonia's 2050 climate target.[38]

The **barriers and possible risks** associated with the adoption of RTE have been analyzed most thoroughly in the study commissioned by the MEAC and conducted by Tallinn University of Technology in 2019.[39] In general, the study identifies **financial and economic, technological, organizational and perceptional barriers to the** adaption and implementation of RTE, based on past sources and the survey conducted in the study (see Table 1).[40]

[37] The study assessed the impact of e-invoicing, e-receipts, agricultural machinery data processing, e-waybills, real-time economic forecasts and implementation of XBRL GL in reporting as RTE solutions.
[38] Study of the economic impact of real-time economy (2020). Available at: https://www.mkm.ee/sites/default/files/reaalaiamaianduse majandusliku moiu uuringu lopparuanne.pdf
[39] Robert Krimmer, Tarmo Kadak, Art Alishani, Maarja Toots, Ralf-Martin Soe, Carsten Schmidt (2019) "Real-time economy: definitions and implementation opportunities". Tallinn: Tallinn University of Technology. Available at: https://www.mkm.ee/sites/default/files/taltech_rte_final_report_en1.0.pdf
[40] Ibid.

Table 1. RTE barriers[41]

Technical	Organizational
• Differences in data context, syntax and semantics • Problems with data quality • Incompatibility of technical applications • Technical difficulties in developing RTE solutions • Technical difficulties in connecting all RTE participants • Differences in the degree of digitalization • Lack of common and widespread data exchange standards	• Organizations' resistance to data sharing • Businesses' resistance to compliance with RTE principles • Organizational inertia • Offline and legacy processes
Perceptional	**Resource constraints**
• Conceptual complexity of RTE • Contradicting values between public and private organizations • Lack of common understanding of RTE components	• Cost of developing, deploying and maintaining RTE solutions • High business re-engineering costs • Lack of resources among SMEs • Lack of relevant expertise in the field

In addition, a way of thinking overly embedded in existing habits and often expressed in strong public opinion, can lead to short-term problems and delays in the transition to RTE in the society at large. This, in turn, prolongs the transition period, with earlier and newer solutions being used at the same time, and as a result the short-term cost of fully switching to RTE solutions may be higher.

As the future of RTE depends to a large extent on public opinion, it is important to raise awareness about potential risks associated with new RTE solutions, which, in order to be properly considered, require centrally made decisions in case of every RTE development. These central decisions and agreements are being created in both the European and Estonian data strategy and national digital strategy documents (see also Appendix 2). The study by Tallinn University of Technology (2019)[42] identified four main potential risks associated with the RTE solutions:

- **Creating a "big brother".** The biggest risk identified is the threat that RTE solutions will develop a sufficient infrastructure to establish government control or a so-called 'Big Brother' system. This requires a central agreement on precise rules on data sharing, access and privacy, and creating a central opportunity for the data owner to see who, what data and for what can be used with and without consent, if they so wish.
- **Data security.** Another risk emphasized by Estonian stakeholders refers to cybersecurity and security of data within RTE ecosystems.
- **Over-standardization.** Although standards are considered essential building blocks of RTE, a well-balanced level of standardization is still needed. Over-

[41] Robert Krimmer, Tarmo Kadak, Art Alishani, Maarja Toots, Ralf-Martin Soe, Carsten Schmidt (2019) "Real-time economy: definitions and implementation opportunities". Tallinn: Tallinn University of Technology. Available at: https://www.mkm.ee/sites/default/files/taltech_rte_final_report_en1.0.pdf

[42] Ibid.

standardization is often the result of delayed intervention, when different public and private standards are already in place and widely used. Agreeing on common cross-border standards established based on the EU data strategy[43] will reduce over-standardization in the future.

- **Developing digital islands.** The study suggested that RTE initiatives run the risk of developing isolated solutions that only work in the Estonian context or even more specifically within companies or institutions. Digital isolation is already a growing problem in today's society, which is why the EU data strategy [44] once again has pointed out the need to find a solution for this problem and planned the necessary activities for its further prevention and solution.

The potential risks and related assessments, together with the mitigation measures, are presented in more detail in Appendix 2 to the Vision.

The positive and potential negative impacts outlined above are present in all European countries, as all countries face problems with the quality, availability and machine-readable exchange of business data[45]. For example, a study carried out by the Centre for European Policy Studies (CEPS) found that 31% of SMEs with export experience and 21% of SMEs without such experience had difficulty in identifying business partners in another Member State, which hampers business throughout the internal market.[46] In addition, in the report of a study carried out in the Netherlands, 18% of self-employed people mentioned different technical standards as an obstacle.[47]

Therefore, we need to constantly engage in **active international cooperation and changing of the mindset at cross-border level.** RTE is breaking the processes that have become customary in some areas, to achieve maximum benefits. Maximum benefits can only be achieved by cross-border cooperation. For example, we must be in line with the activities of the RTE project launched in the Nordic countries[48], launch joint projects in the Baltic Sea Region and be generally proactive in achieving European Union's (EU) Digital Single Market agenda and free flow of data.

[43] European Union data strategy. Available at: https://ec.europa.eu/info/sites/info/files/communication-european-strateqy-data-19feb2020 en.pdf

[44] Robert Krimmer, Tarmo Kadak, Art Alishani, Maarja Toots, Ralf-Martin Soe, Carsten Schmidt (2019) "Real-time economy: definitions and implementation opportunities". Tallinn: Tallinn University of Technology. Available at: https://www.mkm.ee/sites/default/files/taltech_rte_final_report_en1.0.pdf

[45] Ibid.

[46] Centre for European Policy Studies 'Hidden Treasures: Mapping Europe's sources of competitive advantage in doing business', 2019 (Hidden Treasures report)

[47] Dutch Ministry of Economy, Dutch export agency, 'Doing Business in Europe', 2018

[48] RTE initiative of the Nordic Countries - Nordic Smart Government 3.0. Available at: https://nordicsmartgovernment.org/

2. OBJECTIVES AND IMPLEMENTATION OF REAL-TIME ECONOMY

2.1. Main objective and lines of action with strategic sub-objectives

The main objective of RTE implementation is to carry out a structural change in the business environment and relations with the state, so that business administration and management activities could occur automatically in the background and significantly reduce the administrative burden on entrepreneurs. The implementation must account of the cross-sectoral and broad-based concept of the topic, which can mean a variety of automated and real-time activities, incl.

- business-to-business transactions,
- internal planning and decision-making,
- public-private partnerships,
- providing services to customers.[49]

To achieve the main objective of RTE, it is necessary to agree on the main lines of action and related strategic sub-objectives. To achieve the sub-objectives, a regularly updated work plan for 2020-2027 will be created in cooperation with experts (see Annex 1), where more detailed activities are first separately set out for 2021. Regular review and updating of the work plan over time creates an opportunity to be flexible with regard to the next planned activities and according to the economic situation, and to make informed decisions for faster and more efficient transition to RTE.

During the transition to RTE solutions, the expected volume of investment may be higher in some cases, as institutions and companies have to keep several different systems operational. Consequently, the transition to RTE solutions must be as fast and smooth as possible in order to reduce excessive costs in the private and public sectors and to reach the break-even point and revenue growth faster. In a survey conducted in 2019[50], three key areas have been identified that need special attention: **real-time accounting and reporting, real-time economic forecasts and real-time supply chains (including the stimulation of RTE in business and industry).** The study also sets out in more detail six different recommendations for planning the next activities, which have been fully taken into account when planning the activities in the work plan provided in the annex to this vision document.

In addition to key areas and recommendations, the study showed that based on the opinions of Estonian stakeholder representatives and existing RTE pilot projects, it would be useful for Estonia to follow the broadest possible definition of RTE, which would include real-time data use initiatives for economic and social benefit.

[49] Robert Krimmer, Tarmo Kadak, Art Alishani, Maarja Toots, Ralf-Martin Soe, Carsten Schmidt (2019) "Real-time economy: definitions and implementation opportunities". Tallinn: Tallinn University of Technology. Available at: https://www.mkm.ee/sites/default/files/taltech_rte_final_report_en1.0.pdf

[50] Ibid.

Based on the above-mentioned key areas, recommendations, expert opinions and the results of the pilot projects, the **following three cross-sectoral lines of action** have been selected into this vision document:

1. Creating technical facilities for RTE

This line of action is aimed at increasing the quality and availability of business data and enabling their real-time exchange in communication between different parties (companies, state, citizen) through semantic analysis, structuring and standardization of data.

In order to simplify and streamline business processes, it is necessary to convert data into machine-readable form based on industry-agreed standards (e.g. e-CMR, XBRL GL, etc.), create the necessary data exchange layer and make important information system connections to create a network connecting different business processes. To put it simply, if the data is of high quality and of necessary detail from the outset, the company can automatically fulfill its obligations by allowing access to the required data sets or forwarding the data sets to the party that needs the information instead of compiling the information or reports manually.

The quality and availability of data is the basis of the RTE ecosystem and automated data exchange, the operation of which requires, among other things, the following activities across sectors, institutions, software and systems:

- analyze the results of Aruandlus 3.0 project and evaluate the impact and benefits of similar activities in other state agencies;
- to analyze the causes of problems with data quality, which according to the audit by the National Audit Office, arise from incomplete entry or non-entry of data;
- analyze the technical reasons for data unavailability and the quality control measures for data collection, which often exclude necessary data from the data analysis;
- analyze the real need for data collection (legal requirements vs. legacy data collection) in order not to burden businesses with the collection and transmission of unnecessary information;
- carry out a semantic analysis of data fields and data sets (especially in communication with the state) so that data collection in one agency takes into account the needs of different user groups for data exchange (i.e. collected data must be suitable for other agencies, up-to-date and collected based on the same classifications);
- establish a taxonomy against a commonly used standard (e.g. XBRL GL) and an agreed business framework for standardized and automated data exchange in both the private and public sectors;
- analyze the most widely used standards for data exchange in the European Union (EU) and elsewhere in the world;
- to avoid over-standardization, use existing and widely used standards in Europe and around the world (incl. adopt the regulations supporting them), such as the EU Norm for the exchange of e-invoices, the PEPPOL network for the exchange of e-documents (members from almost 30 different countries), for the transmission of PSD2, XBRL GL accounting and reporting information of banks, etc.;
- transfer the submission and exchange of data to the most automated and machine-readable format possible (i.e. the data collected must be up-to-date,

complete, structured on a clear basis and with a consistent calculation methodology) to ensure high-quality data analysis for themselves and other potential users;
- create widely accessible technical infrastructure and applications that allow machine-readable data to be securely stored in the original database and reused between different systems (i.e. to improve data availability in private-public operations).

2. Regulating and supporting the transition to RTE in the cooperation between private and public sectors

This line of action is aimed at regulating and supporting the private and public sector organizations in the implementation of RTE solutions through a regulatory framework that enables it.

The increase in the productivity of businesses is partly due to business environment, in which the volume of manual work has been reduced to a minimum in terms of internal and business-to-business financial transactions and administrative operations and reporting to the state. An environment that does not burden the company with "unproductive work" helps increase efficiency and reduce costs. Productivity growth occurs when a company directs the saved resources into profitable activities.

For the introduction and implementation of RTE solutions in larger extent on needs to, among other things:

- address legal obstacles to data exchange in order to improve data availability. The audit by the National Audit Office has highlighted, for example, the ambiguity of various data protection rules (incl. personal data protection and trade secrets) that have hindered the use of data, and new concepts that have not been regulated so far, such as "data mining" and "data warehouse";
- make a central decision to move towards data-driven reporting and economy, which in turn will enable electronic archiving, automated accounting and smoother reporting, including the data-driven economy being highlighted as a key future trend in the EU Data Strategy Paper;
- raise the awareness and readiness of Estonian companies to introduce RTE solutions;
- continuously analyze the concerns / hotspots and wishes of entrepreneurs associated with different RTE solutions;
- analyze and carry out necessary normative and regulatory changes for better and faster introduction of IT solutions;
- analyze, in cooperation with other relevant ministries and agencies, the needs and possibilities for prioritizing e-invoicing (B2B), e-receipts and other RTE solutions at the regulatory level;
- create preconditions and incentives for preparing Estonian companies to participate in the RTE ecosystem;
- pilot real-time data use in cooperation with the private sector;
- prototype innovative RTE solutions that make life easier and reduce administrative burdens for businesses;
- encourage companies (especially software providers) to implement RTE solutions more effectively so that the software used by SMEs and other companies is adapted to function with RTE solutions.
- carry out studies and analyzes (including in collaboration with the private sector)

to facilitate the introduction of RTE solutions, including cost-benefit assessments of real-time solutions, cost-benefit analysis of specific RTE solutions (such as real-time tax accounting or real-time supply chain monitoring), value chain digitization and real-time supply chain management and study on ethical issues and security of real-time data exchange, (especially at cross-border level);

- accelerate the introduction of RTE in the public sector and to support in the private sector the development of such services and applications: 1) that are of sufficient interest to encourage businesses to invest in technology, 2) are sufficiently useful, and 3) are frequently used by citizens and businesses; the latter is particularly important;
- continue involving businesses in working groups working on the development of real-time data exchange standards, technical infrastructure and governance models similarly to established EVS/TK 76[51] - the Technical Committee for Real-Time Economy under the Estonian Center for Standardization.

3. Cross-border cooperation in the Baltic Sea region and at EU level

This line of action is aimed at continuing active cross-border co-operation in the Baltic Sea region, with the Nordic countries and more generally at the level of the European Union in order to move jointly towards the transition to RTE.

The Nordic countries have strongly geared towards RTE, and in 2021, active implementation of planned activities will begin. The activities planned in Estonia are in line with the activities and directions developed in the Nordic RTE initiative. At the EU level, the free flow of data has on the one hand caused a need for the implementation of the "*once-only*" (OOP) principle.[52] and, on the other hand, for creating business opportunities through the use of data in order to increase the competitiveness of European Union companies[53].

The European Union's digital package and, more specifically, the data strategy[54] as well as the new SME strategy[55] have served as the basis for creating this RTE vision and planning the activities of the work plan. Therefore, in order to promote RTE internationally, Estonia must actively cooperate with neighboring countries, Baltic Sea States, Nordic and European countries in general, including:

- cooperate actively in the Baltic Sea region, one important part of which is to launch a flagship project[56], establish a common action programme, carry out necessary legal and technical analyzes for the development of a harmonized

[51] Technical Committee No. 76 of the Estonian Center for Standardization, which participates in standardization in the area of real-time economy and represents Estonia's positions and views in international working groups. The members of the Technical Committee include parties from both the public and private sectors.
[52] EU-wide digital Once-Only Principle for citizens and businesses: Policy options and their impacts, 2017. https://ec.europa.eu/digital-single-market/en/news/eu-wide-digital-once-only-principle-citizens-and-businesses-policy-options-and-their-impacts
[53] European SME Strategy. Available at: https://ec.europa.eu/growth/content/making-europes-businesses-future-readv-new-industrial-strategy-globally-competitive-qreen-0 en
[54] European Union data strategy. Available at: https://ec.europa.eu/info/sites/info/files/communication-european-strateqy-data-19feb2020 en.pdf
[55] European SME Strategy. Available at: https://ec.europa.eu/arowth/content/makina-europes-businesses-future-ready-new-industrial-strategy-globally-competitive-green-0 en
[56] A joint transnational project/process under the European Union Strategy for the Baltic Sea Region that contributes to the progress of the EU Strategy for the Baltic Sea Region and is considered as a "roof view" for bringing together different transnational sub-projects. The activities of the flagship project may include the development of key solutions, testing of new technologies or methodologies, initiation of cross-border agreements, creation of networks seeking new forms of cooperation.

legal space, appropriate standards, data spaces and technical infrastructure;
- actively cooperate in the joint RTE initiative of Nordic countries Nordic Smart Government 3.0 that is approved at the level of Prime Ministers of the Nordic countries[57];
- be a proactive partner in establishing a Digital Single Market of EU and achieving free flow of data, including launch high-level discussions for the development of real-time economy;
- support cross-border studies and pilot projects to assess both cross-sectoral and sector-specific impacts of RTE;
- analyze and invest in new cross-border technological solutions that use and add value to real-time data;
- encourage the creation of a cross-border critical mass of users of real-time solutions, giving priority to real-time data-driven services that are frequently used by citizens and businesses and create clear value for users;
- actively carry out cross-border communication and information activities in co-operation with the Baltic Sea States and the Nordic countries, and thereby focus on Europe and the rest of the world at large, including promote transnational cooperation.

Experiences of other countries show that nationally-led RTE initiatives tend to be inclined towards B2G data exchange. B2G e-invoicing and e-reporting can be an important incentive for RTE, but in order to create a truly diverse and innovative RTE environment that favors innovative business models, the focus must be on the cross-border aspect and in particular B2B communication and equal attention should be paid from financial reporting to production, logistics and sales.

The activities set out in all three lines of action serve common cross-sectoral strategic sub-objectives, which are in line with the action programme created as a result of the Nordic RTE project. The sub-objectives are set for estimated deadlines, which are flexible and based on the planning and implementation of more detailed activities presented or to be presented in the work plan.

The strategic sub-objectives with expected deadlines are:

- Widespread use of e-invoicing in business-to-business transactions (2023)
- Widespread use of e-receipts (2025)
- Transition to machine-readable reporting (including preferably the use of the XBRL GL standard) (2025)
- Widespread use of e-waybills (2025)
- Adoption of standardized digital product and service codes, information and catalogues (2027)
- Real-time and consent-based sharing of up-to-date company data to third parties (2027)
- Piloting and implementing the concept of RTE concept to introduce new solutions (2027)
- Active international cooperation with Member States, in particular with the Baltic Sea States and the Nordic countries (2027)

Given the broad-based, cross-sectoral and innovative nature of RTE, the need to add

[57] Nordic Smart Government 3.0 is a joint project of Nordic countries that aims to standardize all business information using the XBRL GL standard. Available at: https://nordicsmartgovernment.org/

new sub-objectives to the work plan during the period 2020–2027 must also be taken into account.

In the implementation of the main objective of RTE and the activities planned for its fulfillment, the following states can be achieved, especially when assessed perceptually and subjectively:

- The introduction of RTE ecosystem solutions has increased significantly, and RTE opportunities have been created for micro-enterprises to manage and administer their companies.
- Estonia has strong partnerships for the cross-border operation of RTE with the Baltic Sea States, the Nordic countries and the European Union, and Estonia itself as a country is ready for real-time cross-border automated data exchange. In terms of RTE, Estonia stands out at an equal level with Finland, Norway and other Nordic countries in Europe and the world.
- Citizens and businesses use a variety of RTE solutions on a daily basis, such as e-receipts and automated data-driven reporting to the public sector.
- The capability of the public sector to respond quickly to economic developments has improved significantly and, due to better data quality, there is a more objective input to legislation to promote RTE.
- Better opportunities have been created for planning state revenues, including more accurate economic forecasts.
- RTE has made business more transparent, accelerated the movement of goods, and digital data exchange allows for significantly better planning of activities and use of resources by supply chain actors.

If Estonia is able to improve the quality of data, implement RTE solutions in masse and through this make the RTE ecosystem to function nationally (and possibly cross-border) within the next decade, then as a country we have great opportunities to become once again the flagship of e-innovation in Europe and in the world for decades to come.

2.2. Implementation of the real-time economy vision

The Annex to the Vision contains a work plan for 2020-2027 prepared on the basis of the objectives and lines of action, with the initial activities, their estimated deadlines, results and ones responsible. Activities for 2021 are described in more detail. The work plan for each subsequent year will be reviewed and supplemented according to the economic and social situation regarding the transition to RTE.

Regular review and updating of the work plan over time creates an opportunity to be flexible with regard to the next planned activities and according to the economic situation, and to make informed decisions in order to achieve the best results. The implementation of the work plan will ensure that our entrepreneurs save time when communicating with the state and fulfilling their obligations as these can be completed automatically. The activities provided in the work plan will contribute to the automation of business-to-business transactions, the improvement of data quality and cross-border partnerships.

The work plan is updated and implemented in cooperation with ministries, their sub-agencies, professional associations and companies. To achieve these goals, working groups will be formed, involving experts from both the private and public sectors, to help regularly assess the relevance, timeliness and need for supplementation of activities in the work plan, including carrying out innovative pilots, amendments to the legislation and changes to fundamental business processes. The working groups will propose a work plan for the next year of operation that is in line with the market situation and favors the most effective transition to RTE solutions according to the current situation. The proposals will be presented to the RTE community.

The RTE community includes experts from both the public and private sectors as well as universities. As the members of the RTE community are of diverse background, it is also possible to carry out various activities at the same time. For example, public participants can help guide the internal processes of their institutions to facilitate the adoption of RTE solutions or implement the necessary legislative changes. Depending on their area, private participants can encourage the implementation of RTE solutions in software, systems or organizational management strategies. The RTE community can help raise public awareness about the opportunities and benefits of RTE and contribute to policy-making.

The implementation of activities involves the private sector, including service providers from logistics, accounting and financial services, and the public sector, including Statistics Estonia, the Tax and Customs Board, the Ministry of Finance, the State Information Systems Authority, the Ministry of the Environment together with agencies under their administration, etc.

For the implementation of cross-border activities, the foreign partners involved in the flagship project[58] are first involved and, through their contact points, also private and public actors in the Baltic Sea States who have an important role in the implementation of joint activities.

[58] A joint transnational project/process under the European Union Strategy for the Baltic Sea Region that contributes to the progress of the EU Strategy for the Baltic Sea Region and is considered as a "roof view" for bringing together different transnational sub-projects. The activities of the flagship project may include the development of key solutions, testing of new technologies or methodologies, initiation of cross-border agreements, creation of networks seeking new forms of cooperation.

ANNEX 1. REAL-TIME ECONOMY PLAN OF ACTION FOR 2020-2027

Annex 1.1. Creating technical capabilities for real-time economy

Table 3. Initial activities aimed at creating technical capabilities of RTE

Sub-objective 1: Widespread use of e-invoicing in business-to-business transactions (2023)	
Expected result: Business systems used in a business environment prefer/encourage the receipt and transmission of e-invoices.	
Activities	Responsibility of
Align business systems with the European e-invoicing standard (preferred) or the Estonian invoicing standard (2022)	Business software and operator service providers
Maintain and increase the introduction of PEPPOL network connections (2022)	Operator service providers
Sub-objective 2: Widespread use of e-receipts (2025)	
Expected result: Business systems used in a business environment are able to receive e-receipts and cash register systems are able to issue e-receipts.	
Activities	Responsibility of
Create a cross-border e-receipt standard in cooperation with the European Union (2021)	EVS/TK 76[59]: RTE Technical Committee
Active involvement of potential e-receipt service providers in the development process of the standard (2021)	Ministry of Economic Affairs and Communications (MEAC)
Create for the market the capacity to exchange e-receipts for a cross-border transaction over the PEPPOL network, once the PEPPOL network is ready for that (2023)	Operator service providers
Create e-receipt acceptance capabilities for business software (2023)	Business software providers

[59] Technical Committee No. 76 of the Estonian Center for Standardization, which participates in standardization in the area of real-time economy and represents Estonia's positions and views in international working groups. The members of the Technical Committee include parties from both the public and private sectors.

Create e-receipt acceptance capability in the systems of the service provider performing payment transactions (2023)	Payment service providers
Create the capability of issuing e-receipts for cash register systems, mobile applications and others (2025)	Companies creating receipts
Sub-objective 3: Transition to machine-readable reporting (including preferably the use of the XBRL GL standard) (2025)	
Expected result: More than 80% of companies submit reports to the state in the XBRL GL format, which are automatically created based on the standardized transaction information.	
Activities	Responsibility of
Analyze the journey of packaging and fuel reporting, questionable data and their necessity in different institutions, harmonize data fields, perform semantic analysis and create a taxonomy for the created data sets (2021)	MEAC in cooperation with the Ministry of the Environment, Statistics Estonia, Tax and Customs Board
Map reports submitted by companies to all ministries and their sub-agencies (mostly based on information derived from business software) (2021)	MEAC in cooperation with the state agency responsible for the respective data
Analyze the use, impact and benefits aspects of Aruandlus 3.0 results in all state agencies that have imposed reporting obligations on companies (2021)	MEAC in cooperation with the state agency responsible for the respective data
Create for the market the capability of transmitting information in XBRL GL format to the public sector (2021)	Business software and operator service providers
Establish (in case of market demand) availability of data by the state (2023)	State agency responsible for the respective data

Semantic analysis of mapped reports and the underlying transaction data - analyze and harmonize data sets by using previous work done in the Aruandlus 3.0 project (2025)	MEAC in cooperation with the state agency responsible for the respective data
Assess the need for data fields and the addition of new ones (based on EU and national legislation) (2025)	State agency responsible for the respective data
Supplement the cross-authority taxonomy created under Aruandlus 3.0 project with new data fields to be analyzed against the XBRL GL data exchange standard (2025)	State agency responsible for the respective data, Statistics Estonia
Create a harmonized and agreed set of business rules to supplement the analyzed semantics (2025)	State agency responsible for the respective data, Statistics Estonia
Create the capability to share reporting information in XBRL GL format in business software (2025)	Business software providers
Establish necessary connections/interfaces between systems for moving machine readable data (2025)	Business software and operator service providers
Ensure that transaction data remains unchanged throughout the transaction, i.e. the same transaction data can reflect information about the order, delivery note and invoice (2025)	MEAC in cooperation with the state agency responsible for the respective data

Sub-objective 4: Widespread use of e-waybills (2025)	
Expected result: Road transport can be carried out based on e-waybills and is connected to other modes of transport in machine readable form, automated control operations are in place.	
Activities	Responsibility of
Mapping of related participants' needs (2020)	Ministry of Economic Affairs and Communications (MEAC)
Creating interface descriptions (2021)	eCMR service providers and MEAC
Development of an e-waybill solution in cooperation with the state and private sector (2022)	eCMR service providers and MEAC
Introduction of an EU standard (2023)	eCMR service providers and MEAC
Creating interfaces between private and public institutions (2025)	eCMR service providers and public sector competent authorities
Sub-objective 5: Adoption of standardized digital product and service codes, information and catalogs (2027)	
Expected result: Standardized digital service and product codes with the necessary information and catalogs are widely used (especially in e-shops and e-commerce in general).	
Activities	Responsibility of
Introduce a common standard for cross-border e-order and e-catalogue at the initiative of the Nordic countries (2022)	Ministry of Economic Affairs and Communications (MEAC)

Create the capability to create, exchange and use e-orders, e-order confirmations and e-catalogue information based on a common standard in business software (2024)	Business software providers
Create for the market the capability to exchange e-orders, e-order confirmations and e-catalogue information in a cross-border transaction over the PEPPOL network (2025)	Operator service providers
Create product and service information that is available in business software in digital and standardized form based on codes (e.g. based on GS1) (2025)	Business software providers
Sub-objective 6: Real-time and consent-based sharing of up-to-date company data to third parties (2027)	
Expected result: With the consent, companies can share data in a standard form in accordance with a request from the state or a counterparty, bank or other third party.	
Activities	Responsibility of
Create standard profiles for sharing agreed data with third parties (2021)	Private service providers and the Ministry of Finance (MF)
Create for the market a capability enabling a company to share all business data, including data from national registers (2022)	Private service providers
Map and create connections at the state level, where data does not yet move over the X-Road and thus creates additional obligations for companies (2023)	MEAC in cooperation with the state agency responsible for the respective data
Map and update registries that lack capability and connections / developments to issue machine readable data (2023)	MEAC in cooperation with the state agency responsible for the respective data
Establish an early warning service for businesses (2023)	Statistics Estonia, universities
Establish an early warning capability for changes in indicators of national importance (based on real-time data) (2023)	Statistics Estonia, universities
Create a capability in business software to share your business data with different parties on a need-to-know basis (2025)	Business software providers

Annex 1.2. Regulating and supporting the introduction of real-time economy in private and public sectors cooperation.

Table 4. The introduction of RTE is facilitated by targeted activities to update laws, raise public awareness and support the introduction of RTE solutions.

Sub-objective 1: Widespread use of e-invoicing in business-to-business transactions (2023)	
Expected result: Business systems used in a business environment prefer/encourage the receipt and transmission of e-invoices.	
Activities	Responsibility of
Establish a working group of e-invoicing parties (e-invoice operators, business software providers, cash register system providers, accounting service providers, e-receipt operators, banks) (2020)	MEAC, MF
Actively carry out information work among accounting companies and business software providers (2023)	MEAC, MF
Actively carry out information work among clients of accounting companies, business software and operator service providers (2023)	Accounting companies, business software and operator service providers
Conduct regular trainings for different target groups (accountants, developers, software providers, entrepreneurs, etc.) (2023)	MEAC, MF
Analyze the opportunities and, if necessary, encourage the introduction of e-invoicing among large companies as well as companies in their supply chains, regardless of size (2022)	MEAC, MF
Analyze the opportunities and, if necessary, encourage business software users to use e-invoicing (Example: The price of any service provided by the software provider always includes sending and receiving e-invoices) (2022)	MEAC in cooperation with business software providers
Sub-objective 2: Widespread use of e-receipts (2025)	
Expected result: Business systems used in a business environment are able to receive e-receipts and cash register systems are able to issue e-receipts.	
Activities	Responsibility of
Create a specific service model, how the e-receipt works, what are the use sectors and restrictions (2021)	MEAC in cooperation with e-receipt experts

Analyze and, if necessary, encourage business software developers and users to adopt e-receipts (acceptance capability) (2022)	Ministry of Economic Affairs and Communications (MEAC)
Create a legal basis for exchanging e-receipts (preferably in the European e-receipt format) and create a priority over paper receipts (2022)	Ministry of Economic Affairs and Communications (MEAC)
Sub-objective 3: Transition to machine-readable reporting (including preferably the use of the XBRL GL standard) (2025)	
Expected result: More than 80% of companies submit reports to the state in the XBRL GL format, which are automatically created based on the standardized transaction information.	
Activities	Responsibility of
Test and pilot the use of a new taxonomy in collaboration with the private sector (e.g. MyCompanyData service by the private sector[60]) (2021)	State agency responsible for the respective data in cooperation with the private sector
Analyze various changes in the tax system enabled by data-driven reporting (2023)	MF
Analyze and, if necessary, implement priority measures for companies that offer solutions that meet the criteria of RTE in their business systems (2024)	Ministry of Economic Affairs and Communications (MEAC)
Encourage and, if necessary, support the introduction of standards for the submission of corporate reporting information to the state (2025)	Ministry of Economic Affairs and Communications (MEAC)
Ensure that transaction data remains unchanged throughout the transaction, i.e. the same transaction data can reflect information about the order, delivery note and invoice (2025)	MEAC, MF

[60] MyCompanyData service is a unique service offered to companies through e-invoicing operators and business software for automated business transactions and data-based reporting, created during the Internet of Business project.

Sub-objective 4: Widespread use of e-waybills (2025)	
Expected result: Road transport can be carried out based on e-waybills and is connected to other modes of transport in machine readable form, automated control operations are in place.	
Activities	Responsibility of
Mapping of legislative obstacles and analysis of the need for legislative changes (2020)	Ministry of Economic Affairs and Communications (MEAC)
Introduction of amendments in legislation in accordance with eFTI (*electronic freight transport information*) regulations (2022)	Ministry of Economic Affairs and Communications (MEAC)
Sub-objective 5: Adoption of standardized digital product and service codes, information and catalogs (2027)	
Expected result: Standardized digital service and product codes with the necessary information and catalogs are widely used (especially in e-shops and e-commerce in general).	
Activities	Responsibility of
Analyze and create a service model on the example of a single sector to understand the impact of classification and standardization of products and services and their linking to ordering and cataloging systems (2022)	Ministry of Economic Affairs and Communications (MEAC)
Actively carry out information work in the sector of e-commerce and e-shops and software providers used by them (2022-2027)	Ministry of Economic Affairs and Communications (MEAC)
Create a legal basis for exchanging e-orders, e-order confirmations and e-catalogue messages only on the basis of an agreed standard and create a priority over paper documents (2024)	Ministry of Economic Affairs and Communications (MEAC)
Make the use of digitalized and standardized product and service codes mandatory (2025)	Ministry of Economic Affairs and Communications (MEAC)

Sub-objective 6: Real-time and consent-based sharing of up-to-date company data to third parties (2027)	
Expected result: With the consent, companies can share data in a standard form in accordance with a request from the state or a counterparty, bank or other third party.	
Activities	Responsibility of
Greater mutual involvement of the public and private sectors and joint cooperation of both parties through the RTE cooperation network / community (2022-2027)	MEAC in cooperation with the state agency responsible for the respective data
Sub-objective 7: Piloting and implementing the concept of RTE concept to introduce new solutions (2027)	
Expected result: Through piloting and enabling legislation, new RTE solutions have emerged on the market	
Activities	Responsibility of
Create a broader and more detailed RTE roadmap for state agencies (2021)	Ministry of Economic Affairs and Communications (MEAC)
Develop a validation model for RTE initiatives (2021)	Ministry of Economic Affairs and Communications (MEAC)
Carry out the necessary legal analyzes to identify possible barriers to the introduction of RTE solutions (2021-2025)	Ministry of Economic Affairs and Communications (MEAC)
Actively organize information work, trainings and seminars to inform stakeholders about the benefits of RTE (2021-2027)	Ministry of Economic Affairs and Communications (MEAC)
Carry out extensive research to assess the progress of awareness about RTE in the society (2021-2027)	Ministry of Economic Affairs and Communications (MEAC)

Continue to implement legislation, policy-making, contribution to strategies that support RTE (2021-2027)	Ministry of Economic Affairs and Communications (MEAC)
Create sector-specific prototypes and pilot projects (2021-2027)	Ministry of Economic Affairs and Communications (MEAC)
Pilot real-time data use in cooperation with the private sector (2021-2027)	State agency responsible for the respective data
Analyze the needs and possibilities of making RTE solutions mandatory (2022-2027)	MEAC, state agency responsible for the respective data
To accelerate the introduction of RTE, the focus needs to be on services and applications that 1) are of sufficient interest to encourage investment, 2) are sufficiently useful, and 3) are frequently used (2022-2027).	Ministry of Economic Affairs and Communications (MEAC)
Continue to actively involve the private sector in the activities planned for the implementation of RTE (2021-2027)	Ministry of Economic Affairs and Communications (MEAC)

Annex 1.3. Cross-border cooperation in the Baltic Sea region and at the EU level

Table 5. Targeted activities that facilitate harmonized approach to and the introduction of cross-border RTE

Sub-objective 4: Widespread use of e-waybills (2025)	
Expected result: Road transport can be carried out based on e-waybills and is connected to other modes of transport in machine readable form, automated control operations are in place.	
Activities	Responsibility of
International prototype DIGINNO-Proto (2020)	Ministry of Economic Affairs and Communications (MEAC)
Signing international agreements for the introduction of cross-border eCMR (2021)	Ministry of Economic Affairs and Communications (MEAC)
Information and involvement activities within the DINNOCAP project (2021)	Ministry of Economic Affairs and Communications (MEAC)
Sub-objective 8: Active international cooperation with Member States, in particular with the Baltic Sea States and the Nordic countries (2027)	
Expected result: The Nordic countries and Baltic Sea States are ready to introduce cross-border RTE solutions thanks to RTE's activities (including the implementation of the flagship project)	
Activities	Responsibility of
Use NSG3 project documentation in agreeing on and implementing the RTE flagship project activities across the Baltic Sea States (2020-2027)	Ministry of Economic Affairs and Communications (MEAC)
Find partners and create a common RTE flagship project of the Baltic Sea States (2021)	Ministry of Economic Affairs and Communications (MEAC)
Create a common vision and action programme for the Baltic Sea States (2021)	Ministry of Economic Affairs and Communications (MEAC)

Carry out cross-regional studies and analyzes (incl. legal analyzes, impact assessments, sector-specific feasibility analyzes, etc.) (2022-2027)	MEAC, state agency responsible for the respective data
Contribute to the creation of common standards or the agreed introduction of existing ones (2025)	Ministry of Economic Affairs and Communications (MEAC)
Continue active international cooperation with the Baltic Sea States, including the Nordic project NSG3 and the Baltic Sea project DIGINNO (including DINNOCAP) (2021-2027)	Ministry of Economic Affairs and Communications (MEAC)
Involve the knowledge from all the Baltic Sea States necessary for the creation of cross-border e-services of RTE (20222027)	Ministry of Economic Affairs and Communications (MEAC)
Comply with the requirements of the eIDAS regulation in the Baltic Sea region to enable better and safer operation of RTE solutions (2022-2027)	Ministry of Economic Affairs and Communications (MEAC)
Implement internationally harmonizing legislation, policy-making and input into strategies to jointly contribute to the promotion of RTE solutions (2022-2027)	Ministry of Economic Affairs and Communications (MEAC)
Actively carry out general communication and information activities (seminars, workshops, information days, trainings) (2021-2027)	Ministry of Economic Affairs and Communications (MEAC)
Analyze and invest in new cross-border technological solutions that use and add value to real-time data (2022-2027)	MEAC, state agency responsible for the respective data
Encourage the creation of a cross-border critical mass of users of real-time solutions, giving priority to real-time data-driven services that are frequently used by citizens and businesses and create clear value for users (2022-2027);	MEAC, state agency responsible for the respective data
Be a proactive partner in establishing a Digital Single Market of EU and achieving free flow of data (2020-2027)	Ministry of Economic Affairs and Communications (MEAC)

ANNEX 2. Identified risks assessment table

Risk	Probability of realization	The impact of realization on achieving the real-time economy objective	Risk mitigation activities	Risk manager / Responsibility of
Cyber security	Low	High	Continue to use the best practices, security requirements, higher levels of security standards, etc. applied in the country for data exchange (X-Road, ISKE standards, etc.)	MEAC in cooperation with those leading specific projects
Data leaks	Low	High	Continue to comply with the applicable data protection rules in all state agencies that impose reporting obligations on businesses or otherwise collect data concerning a business, and in the analysis of data containing trade secrets or in the publication of aggregate statistical data	MEAC in cooperation with those leading specific projects
Excessive state control	Low	Medium	Continue to collect reporting data from companies in accordance with the requirements established by legislation. If possible, implement solutions more vigorously to enable the company to see the parties who have made inquiries about the company's data	MEAC in cooperation with those leading specific projects
Over-standardization	Medium	High	Analyze existing international standards and adopt the most common and recommended standards for both cross-border and national data exchange to ensure uniform data quality and unambiguity.	MEAC in cooperation with those leading specific projects

Digital isolation between agencies	Medium	High	Carry out semantic analysis, standardization of the data sets that form the basis for reporting in state agencies imposing reporting obligation, and introduce a unified taxonomy across the agencies and databases.	MEAC in cooperation with those leading specific projects
Digital isolation between states	Medium	High	Introduce the same semantic standards nationally and across borders and agree on rules for secure data exchange (security levels, appropriate channels) - for example, the EU e-invoicing standard over the PEPPOL network	MEAC in cooperation with those leading specific projects
Fear of new solutions	Medium	Medium	Carry out regular information activities for different target groups in order to explain the nature of real-time economy and increase the reliability of real-time economy solutions (e.g. e-invoices, e-receipts, e-waybills, data-driven reporting, etc.)	MEAC in cooperation with those leading specific projects
Companies / agencies / countries do not keep up with innovations	Medium	Medium	Carry out regular information activities for different target groups (the private and public sectors) in order to explain the nature, benefits and opportunities of real-time economy and increase the reliability of real-time economy solutions (e.g. e-invoices, e-receipts, e-waybills, data-driven reporting, etc.), including emphasizing the importance and opportunities of the cross-border component. It is important to emphasize that when using real-time economy solutions, companies, the state, institutions are not cut off from previously used solutions, i.e. machine-readable documents can be easily converted into paper or PDF documents, if necessary, and vice versa.	MEAC in cooperation with those leading specific projects

ANNEX 3. Preparation of the real-time economy vision and other related documents

The idea of preparing the RTE vision and work plan was born in cooperation between ministries and companies, and was started at the end of 2019. Various ministries, agencies, professional associations and companies have actively contributed to the preparation process. They were involved in active cooperated to gather information and suggestions for improving the quality of the vision and validating the set goals and results.

The RTE Vision is associated with the strategy, development plan and other important documents:

- **National Reform Plan 2020–2023** Annex 1, Category 3, Sections 1 and 5 on RTE promotion and Aruandlus 3.0 project.
- **Action Programme of the Government of the Republic 2019—2023:**
  - **Section 12.5.** "We stand for an internationally recognized good and competitive business environment." Task "Analysis and proposals for the implementation of real-time economy in Estonia";
  - **Section 12.15.** "We continue to reduce administrative burden on businesses and bureaucracy. When applying data, we apply the once-only principle" tasks "Analysis and proposals for the implementation of real-time economy in Estonia","Implementation of the Aruandlus 3.0 project";
  - **Section 13.11.** "We support the digitalization of the economy. We see the wider introduction of information technology solutions in the whole economy and the provision of relevant training and information in the education system as one of the important tools for increasing productivity and efficiency, and it is necessary to support sectoral competence centers, clusters, etc." task "Analysis and proposals for the implementation of real-time economy in Estonia".
- RTE contributes to the area that was identified in the **Estonian Research, Development, Innovation and Entrepreneurship Development Plan (TAIE**) under the acceleration of the development of competitive business environment, where the state must ensure digitalization and automation of business environment services, including using innovative solutions (artificial intelligence, event-based, proactive, real-time services).
- RTE fulfills the general objective of the Estonian Information Society Development Programme 2020 to create a well-functioning and secure environment for the widespread use and creation of smart ICT solutions.
- RTE contributes to the achievement of the objectives of the new **e-Estonia Development Programme 2025**.
- RTE contributes to the achievement of the objectives of the new **Transport and Mobility Master Plan 2021+**.
- RTE contributes to the strategic goal of **Estonia 2035** "An economic environment that promotes flexible, innovative and responsible entrepreneurship and fair competition" and creates preconditions for smart business.
- The importance of RTE is highlighted among the **priorities of Estonia's European Union policy** 2020—2021 (approved at the session of the Government of the Republic on 21.11.2019).
- The importance of RTE is emphasized in the joint statement of the Council of Prime Ministers in **the Baltic Council of Ministers**.

- RTE significantly improves the business environment and creates preconditions for productivity and efficiency growth, which will strongly contribute to tackling shortcomings identified in the **EU Country Report Estonia 2019** in terms of competitiveness reform and investments.
- RTE has been identified as a strategically important enabler in the first pillar of the **ITL Vision 2030** document "Smart and Brave Economy" and supports the goals of the "Smart and Vision Country" pillar.
- RTE contributes to the objectives and activities set out **in the European Commission's new work plan**:
    - establish an action plan to combat tax evasion and simplify taxation;
    - the objectives of the forthcoming **Green Agreement**, including the need to develop sustainable product policies and digital solutions to achieve climate-neutral circular economy (e.g. through the introduction of a standardized electronic product passport).
    - make a legislative proposal to create a **"Single Window"** service in customs to simplify administrative activities for businesses;
    - adhere to the "one-in, one-out" principle in legislation, including ensuring that new administrative obligations do not impose additional burden on citizens and businesses, and consistently apply the *"digital-by-default"* principle;
    - create a **"Fit-for-future"** platform that considers ways to simplify, reduce the burden, digitalize and check the suitability of legislation for the future, involving different actors in society.

ANNEX 4. Examples of real-time economy projects from Estonia and other European countries

RTE is a cross-border and cross-sectoral approach, focusing in particular on the quality and real-time exchange of business data. Given that companies from all sectors perform business transactions, RTE can help improve the efficiency and profitability of a wide range of companies. For all the examples below, automation of work is based on the real-time exchange of partially or completely high-quality business data.

RTE projects in Estonia

Aruandlus 3.0 (Reporting 3.0)

Aruandlus 3.0 is a joint project of the Tax and Customs Board, Statistics Estonia and Eesti Pank, which creates an opportunity for automatic and once-only transmission of data from businesses to the state. From 01.01.2018, the income and social tax declaration (TSD) can be submitted to the Tax and Customs Board via X-Road fully automatically (i.e. it does not need to be "re-confirmed" in the e-tax office) and Statistics Estonia is ready to receive data with a machine-machine interface. Eesti Pank does not collect data related to wages and labour, as it receives them from Statistics Estonia. Greater efficiency and motivation for taxpayers is expected once all important tax returns and statistical reports have been transferred to the new format. Currently, the second part of the ontology underlying the complete machine-machine interface is in progress: the taxonomy of income and expenses. The entire taxonomy is planned to be completed in 2021.

The project aims to significantly reduce the administrative burden put on companies but this will also enable to reduce the administrative burden of the state and direct the channel the resources into other value-adding activities.

Internet of Business – standardizing business transaction information

Four years ago, the Estonian ICT cluster launched the RTE project *Internet of Business*[61] with a vision to develop a secure and convenient environment for real-time automated business transactions. In 2017, the first project[62] containing developments was carried out, in the course of which all major Estonian e-invoicing operators adopted the European e-invoicing standard and interfaced their systems with the PEPPOL data exchange network, which is widely used in Europe. In addition, interfaces with X-Road were created so that the Estonian public sector would be available through the operators of e-invoices for cross-border e-invoices exchange over PEPPOL. The project was co-funded by the *Connecting Europe Facility (CEF) Telecom 2016: eInvoicing* program.

At the beginning of 2020, the next phase of the project was launched[63] by nine participants operating in the Estonian private sector. The partners include two professional associations, one development partner, one e-invoice operator and five

[61] https://www.itl.ee/reaalaia-maiandus/
[62] https://www.itl.ee/eesti-ikt-klaster/projektid/internet-of-business/
[63] https://www.itl.ee/internet-of-business-maiandustehningud/

business software providers. The aim of the project is to move one step closer to real-time exchange of business transaction information, for which the XBRL GL standard will be introduced into existing systems with the aim of standardizing business transaction information and creating a basis for automated reporting in the near future. This standard is planned to be adopted by Statistics Estonia and the Tax and Customs Board within the framework of the Aruandlus 3.0 project in order to be able to receive reporting information. In addition to the introduction of the XBRL GL standard, the loB project will bring it into line with the existing European e-invoicing standard and, for the first time, develop *MyCompanyData* application, which, among first services, will offer software to connect with X-Road and the capability to submit reports to the state in XBRL GL format. The cooperation of project partners will result in

a technical description of the project activities that will be completed at the beginning of 2021 together with guidance material that can be used both in Estonia and across other EU Member States to promote the MyCompanyData service model and XBRL GL standard. This project, too, is co-funded by *CEF Telecom 2019: the eInvoicing* program.

The project will enable companies to exchange data with the state faster and easier, keeping in mind and supporting the future development of the public sector towards data-driven reporting.

E-invoicing

In Estonia, it has been mandatory to use e-invoicing in transactions between companies and the state since 1 July 2019. According to the statistics of the State Support Services Center (RTK), which provides services to 160 state agencies out of 2,500, the fee for the e-invoice processing environment has decreased by approximately 50% after the introduction of the e-invoice obligation. In addition, RTK estimates that due to the elimination of invoice information verification and duplicate processing of invoices, the cost of working time has also decreased, this is an estimate and no accurate calculations have been made. So far, no changes have been noted in the payment terms due to the e-invoicing obligation.

However, it is estimated that in Europe the full adaption of e-invoicing can mitigate, among other things, the problems caused by long payment terms and delays. The average payment term in Europe is 30 days[64]. Companies that accept longer payment terms usually explain that this is common in their sector (55%) and that they do not want to damage business relationships (46%). **One of the main reasons for late payments is current capital management and insufficient cash flows due to unpaid invoices or administrative inefficiencies.** Late payment, in turn, creates additional interest or administrative costs or causes cash flow problems.

The issue of cash flow is not only the cause of late payment, but also the result. This can lead to liquidity problems and challenges for companies wishing to meet their contractual obligations to suppliers or employees, which in extreme cases lead to lay-offs. In the long run, problems with cash flow management may threaten a company's survival or lead to bankruptcy. With the implementation of RTE, such problems would

[64] Business-to-business transactions: a comparative analysis of legal measures vs. soft-law instruments for https://publications.europa.eu/en/publication-detail/-/publication/c8b7391b-9b80-11e8-a408-01aa75ed71a1/lanquage-en/format-PDF/source-search

disappear and fewer companies would be at risk of bankruptcy, companies would be more efficient.

E-receipt

An e-receipt is a structured, standardized machine-readable document that contains payment information in addition to the e-invoice information. Therefore, paper receipts and electronic images and PDF files are not e-receipts. For example, the e-receipt moves automatically and in real time from the seller's cash register system through the e-receipt operators into legal entity's accounting system or a private person's mobile application. Using this rectangular model, the service can operate both within Estonia and across borders. In order for the service to function, international participants have proposed to start creating a European e-receipt standard. The standard is expected to be completed by the end of 2020.

In Estonia, e-receipt is already in use today. In 2014, an e-receipt project led by Omniva and Telia was launched[65], which developed into well-known mTasku mobile application offered by Telia[66]. In September 2017, Alexela Oil AS was the first company in Estonia to start issuing universal machine-readable e-receipts. In addition to customer convenience, the e-receipt also considers nature conservation purposes. About 20 tons of paper is used to print about 400 million receipts in Estonia per year. Producing this amount of paper takes approximately 300 trees, 180 barrels of oil and 1440 litres of water and about 20 tons of waste is being produced.[67]

E-commerce

Estonia could be a gateway to automated declaration of goods for the whole Europe, at the same time enabling the increase of physical trade flows in both air and rail transit to the EU. In such case, the information needed for day-to-day accounting or declaration of cross-border goods is exchanged automatically and in real time (see Figure 1). In the case of business-to-business (B2B) transactions, all relevant accounting obligations can be completed in real time with solutions that can communicate in a common business reporting language. At the time of the cross-border transaction, it would be possible to gather the relevant information and send it in advance to the required customs procedures and tax obligations (both B2G and C2G). Pre-filled forms accelerate the handling of goods at the border, which in turn saves a lot of time for the trader, which they can invest in growing their business and not filling in the paperwork, but also for the consumer, as releasing the goods is easier.

[65] https://kviitung.ee/
[66] https://www.mtasku.ee/
[67] Omniva: https://www.omniva.ee/index.php7article id=653&paqe=580&action=article&

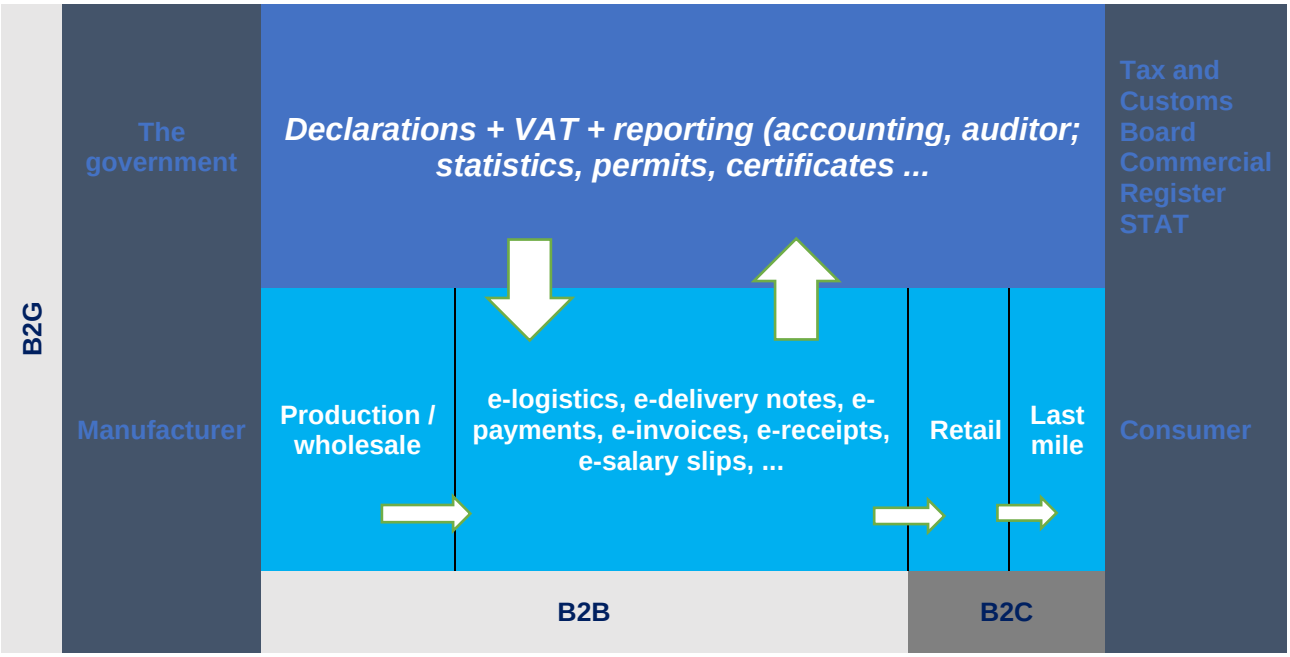

Figure 2. Example of RTE in trade (prepared by the Internal Market Department of MEAC)

The benefits to the economy come from additional tax revenue, providing customs and declaration services to other countries, as both digital goods information and physical goods move through Estonia. There will also be additional jobs and possible foreign investment in the form of interim warehouses.

Know Your Customer (KYC)

The purpose of the KYC service[68] is to automate and streamline data collection for carrying out KYC procedures and to enable obligated persons to make the greatest possible use of data already collected by the state and existing data. The data is transmitted in a machine-readable form, which reduces the resources spent on data collection, input and analysis as compared to the current situation. For example, with the implementation of the KYC service, a natural or legal person can, when applying for a bank loan, share with consent their data necessary for a transaction, making the process significantly faster and more reliable and reducing money laundering risks. In 2020, the draft architecture of the solution and necessary package of legislative changes, as well as initial prototype of the service will be prepared.

e-CMR

CMR is a consignment note used in road transport, which contains documentation of cargo, logistics, transport permits and other necessary information and is constantly changing over time. Today, the carrier has to have all the information on this consignment with them in paper form. The aim of the e-CMR project is to digitalize all the information on the consignment note used in road transport and make it available to the necessary parties in real time. By the end of 2020, a prototype of e-CMR cross-

[68] https://acceleratеestonia.ee/kvc/

border G2G data exchange solution is expected to be tested[69]. The purpose of prototype testing is to test the cross-border data query system between public registers of Estonia, Latvia, Lithuania and Poland. For example, as a result, Estonian police or customs can check cargo information with a foreign registration number through the system in real time without having to detain the truck, thus saving time and money for all participants. In addition to the cross-border project, a prototype of an e-CMR inquiry system between companies operating in Estonia[70] will have been created and tested by the end of 2020. In terms of data structure, the prototype will be in line with the cross-border prototype solution.

Circular economy project – real-time and automated information sharing on excess materials

The aim of the project[71] is to promote circular economy in Estonia by mapping excess materials from production and sharing this information in automatic information circulation. The main challenge in implementing circular economy solutions is ensuring the availability of the right information at the right time. Real-time exchange of information on excess materials helps overcome this market failure and create the foundation for the emergence of new companies and services, i.e. it is important to harmonize data when sharing product information. At the same time, such solution is very important at the national level, because such mapping provides a nation-wide overview of how much material (which is not yet waste) actually ends up in recycling.

Real-time monitoring of environmental impact indicators – Green Tiger

RTE helps achieve climate goals more efficiently. Use of the RTE principles enables to calculate relevant information on the environmental impact of a product or service, and presenting the results helps the consumer make an informed decision with each purchase, provides the state with a policy-making tool and the opportunity to assess the environmental impact of products. In addition to industry, it should be possible to display the environmental impact of a particular product and service to the billions of consumers whose respectively changed consumption behavior can have a more effective impact on industry. However, this requires the availability of adequate environmental impact information or, in the absence of information, the publication of information on the maximum scientifically calculated environmental impact components of the product group. Environmental impact indicator consists of 5 components:

- Climate Change Potential, kgCO2eq
- Biodiversity, on a scale of 0 to 100
- Water Footprint, on a scale of 0 to 100
- Contribution to Circular Economy, on a scale of 0 to 100
- Quality of life, on a scale of 0 to 100

The problem today is the lack of such indicator. Consequently, the aim of the Green Tiger project[72] is to create a solution for calculating the environmental impact indicator

[69] https://www.diginnobsr.eu/e-cmr
[70] https://accelerateestonia.ee/digitaalne-reaalaja-okosusteem-logistika-jaoks/
[71] https://accelerateestonia.ee/iaakmaterialide-voog/
[72] Project information is available at: https://www.rohetiiger.ee/

validated by the state, which among other things would provide the citizen with information on the environmental impact of products and services. The idea is to request relevant data from both public and private databases and use them to calculate the environmental impact of a product on the basis of a commonly agreed methodology. As an output, the private and public sectors can create applications that inquire the environmental impact indicator and its metrics from the calculation layer.

Access to dynamic environmental information enables a citizen make better choices when consuming environmentally friendly products and services, as the environmental impact of a product can be automatically monitored at the store. In the future, it will be possible to adjust the price of a product and service to the environmental impact, where a cheaper price means lower environmental impact.

RTE projects in other European countries

The Netherlands

The Netherlands has made first efforts in the field of standard business reporting (SBR) which helps enterprises automate their reporting. The aim of the effort is to reduce administrative burden, provide reliable and comparable financial data, adoption of technology to facilitate regulatory compliance, and to avoid duplication of data submission.

The core idea of SBR is to streamline data definitions, processes and technology, and put emphasis on the use of XBRL for this purpose, including XBRL taxonomies and XBRL for structured information in reports. After an originally low take-up of SBR, recent years have seen a significant increase — 99.6% of the annual report submissions to the Chamber of Commerce are done using SBR, 40% of the VAT declarations are already done using SBR, and 100% of the corporate tax is reported using SBR.

The adoption of SBR started in 2004 with the National Taxonomy Project, a parliament-led effort to develop a common national reporting taxonomy based on XBRL. The decision to adopt a single national taxonomy (while allowing extensions) helped prevent the semantic heterogeneity in the taxonomies used by different agencies and the systems that store the original data.[73]

Finland

Finland is home to the world's first academic competence center dedicated to RTE. The Real-Time Economy Competence Center (RTECC) was founded by the Aalto University's School of Business and Tieto OY and involves a number of industry partners in its work. The center's work is driven by the belief that RTE could bring "enormous" benefits to society, from increased productivity to environmental benefits. Over the years, RTECC and other stakeholders have launched a number of projects to advance RTE in Finland:

[73] Robert Krimmer, Tarmo Kadak, Art Alishani, Maarja Toots, Ralf-Martin Soe, Carsten Schmidt (2019) "Real-time economy: definitions and implementation opportunities". Tallinn: Tallinn University of Technology. Available at: https://www.mkm.ee/sites/default/files/taltech_rte_final_report_en1.0.pdf

- **The XBRL Finland Consortium** is a collaboration platform of Finnish private companies and public sector organizations established in 2012 to lead Finland's XBRL taxonomy development, raise awareness and promote the use of the XBRL reporting language in financial and tax reporting.
- **SME50** explored the possibilities to reduce SMEs' administrative burden by 50% through the automation of the financial value chain. This included studying how to utilize structured data on business transactions to automate accounting and cash flow estimates, exploring a universal reporting interface to transfer structured data to authorities (using XBRL), studying the possibilities for complementing financial information with information about environmental sustainability, and building models for enterprise risk management.
- **TARU** (2014-2015) was a collaborative research and development program aiming at the full digitalization and automation of financial administration processes. By way of the standardization of message content, interfaces and data, TARU aimed to facilitate the real-time B2B and B2G data exchange and the automatic collection of administrative reporting obligations from corporate financial systems.
- **TALTIO** (2016-2017) promoted business digitalization, starting from developing a standard model for structured data that defines formats for entering invoice, receipt and account statement information into financial management systems without any manual work.
- **RTECO** is a project launched by the Finnish technology industries' network (Teknologiateollisuus) in 2017 bringing together companies and public administration organizations to help develop RTE ecosystems. The project has two subprojects: one promoting the adoption of e-receipts and the other one focusing on business digitalization Adoption of e-receipts is planned in Finland in the near future. For this purpose, the RTECO e-Receipts Working Group has developed guidelines and organized briefings and discussions on the new solution. The Finnish tax authorities consider e-receipts to be an important prerequisite for the transition to automatic data-driven turnover reporting.
- **KATRE** (Income register project) is a joint project of the Finnish Ministry of Finance and the Tax Administration. It initially aimed to reduce the financial reporting-related administrative burden on SMEs but has expanded to a nation-wide initiative with the goal to simplify a number of reporting obligations and allow employers, citizens and public authorities to monitor data on earnings, benefits and pensions in real-time within their limits of access. The backbone of this initiative was the creation of a central national database, the Incomes Register, in 2018. As of 2019, the register contains information on wages and income but will also include information on pensions and social benefits by 2021. Employers report individuals' earnings to the Incomes Register in real time whenever a payment is made, and public authorities, such as the Tax Administration, Social Insurance Institution, Employment Fund or Statistics Finland, will be able to use this information to fulfil their duties. This saves companies from the need to report the same information individually to different authorities.
- Finland has also introduced legislative initiatives to support RTE. In 2010, the Finnish Government Program made e-invoices the default option in G2G and B2G transactions. In April 2019, the government adopted a new e-procurement and electronic invoicing law to implement the European e-invoice directive. This established the European e-invoice standard in Finland, increased the number of mandatory data fields, and allows both public and private organizations to

demand their suppliers to only submit e-invoices, should they decide so.[74]

Denmark

Denmark was one of the first countries in Europe to establish mandatory B2G e-invoicing in 2005. Since May 2019, central government agencies are fully connected to the PEPPOL network, with local and other agencies aiming to join in 2020 to enable greater cross-border interoperability within the EU. Compared to Finland, Denmark applied much stricter rules on the content and format of e-invoices. This has led to higher data quality but lower penetration of e-invoices than in Finland. By 2020, Denmark also plans to make B2B e-invoicing mandatory, seeing this as a key way forward for RTE. The Danish Business Authority supports the implementation of e-invoicing by providing IT vendors with guidelines, validation tools, open source components and information materials.

In 2011, Denmark introduced the obligation for certain categories of companies to submit their annual financial reports in the XBRL format. This obligation will be gradually shifting to full XBRL reporting for all companies in the following years. The availability of annual reports in XBRL has permitted the reports to be published as machine-readable open data and, more recently, testing machine-learning techniques to develop an early warning system for possible corporate failures using data from the XBRL financial statements. To this end, the Danish Business Authority uses historical data about bankrupt companies, such as solvency ratios or lags in annual reporting, and applies analytical techniques and machine-learning algorithms to match a company's data to its peers an predict its risk of closure or bankruptcy.

The government's efforts in standardization and the decision to introduce new requirements through a legal obligation can be seen as important drivers of the change.[75]

Nordic Smart Government 3.0 (NSG3)

Nordic Smart Government (NSG) is a joint RTE initiative of Nordic countries (Denmark, Finland, Iceland, Norway and Sweden). The project was launched in 2016 and the phase 3.0 currently in progress started in 2018. The project aims to support growth and innovation in the region and reduce the administrative burden of SMEs by making business data available in real time across country borders. NSG's ultimate goal is the development of an interoperable ecosystem of digital solutions by 2027 that will enable the real-time flow of business data between private and public actors in the Nordic region. This will allow automatic data sharing between business partners and real-time reporting to authorities. The project does not foresee the creation of a new database but instead facilitating the interoperability of data from existing ERPs and other digital systems through standardization and APIs. As an additional goal, NSG emphasizes a democratic data policy and fair access to data. The value of making financial data available to Nordic SMEs is estimated to be 27 billion EUR yearly from 2027. The project does not aim to create any new standards but is going to adapt the existing

[74] Robert Krimmer, Tarmo Kadak, Art Alishani, Maarja Toots, Ralf-Martin Soe, Carsten Schmidt (2019) "Real-time economy: definitions and implementation opportunities". Tallinn: Tallinn University of Technology. Available at: https://www.mkm.ee/sites/default/files/taltech_rte_final_report_en1.0.pdf

[75] Ibid.

PEPPOL infrastructure and document taxonomies.[76]

European Commission

In 2004 the **European Commission** launched the IDABC program (Interoperable Delivery of European eGovernment Services to Public Administrations, Business and Citizens) to further ensure the interoperability of services. The program was followed by the ISA and ISA² Program. These programs have provided an umbrella for a number of interoperability projects over the years. Perhaps most importantly, the so-called Large-Scale Pilots (LSPs) have been initiated to support the implementation of legislation and foster the use of ICTs in specific sectors. The first LSPs were domain-specific projects focusing on EU solutions for **electronic identities (STORK), e-Invoicing (PEPPOL), the Service Directive (SPOCS), judicial area (e-CODEX) and e-health (epSOS).**[77]

In addition to sector-specific projects, broader cross-sectoral initiatives have been launched with the aim of generalizing the technical building blocks from the LSPs into building blocks that can be used in different areas. The large-scale project **e-SENS** was launched in 2013 to develop a set of interoperable basic services (e.g. eID, e-Delivery) reusable in areas such as health, public procurement, business mobility or justice.

Based on these technical building blocks, generic services can be implemented at the EU level that allow citizens and companies to save resources by providing their data only once to public administrations and other data consumers. The Single Digital Gateway Regulation (EU) 1024/2012 provides a legal basis for the infrastructure for implementing the once-only principle (OOP) and allows business and governments to develop new cross-border online services, including business-relevant services such as filing reports to tax authorities and business registers.[78]

[76]Robert Krimmer, Tarmo Kadak, Art Alishani, Maarja Toots, Ralf-Martin Soe, Carsten Schmidt (2019) "Real-time economy: definitions and implementation opportunities". Tallinn: Tallinn University of Technology. Available at: https://www.mkm.ee/sites/default/files/taltech_rte_final_report_en1.0.pdf
[77]Ibid.
[78]Ibid.

Definitions and explanations

B2B - business-to-business transaction

B2G — business-to-government transaction

C2G — consumer-to-government transaction

e-invoice — a machine-readable invoice that is entered into the system once and contains data that is machine-readable between computers.

e-CMR — an electronic consignment note containing information necessary for road transport. It serves as the basis for the exchange of electronic freight information and consist of internationally agreed rules for the transport of goods.

eFTI — electronic Freight Transport Information, i.e. electronic freight information, for which a proposal for regulating has been made to the European Parliament and the Council to oblige Member States to adopt electronic freight information, including in the electronic format, data composition and data processing bases provided by the European Commission.

EIB — European Investment Bank

eIDAS — REGULATION (EU) No 910/2014 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC

e-receipt — a structured, standardized receipt in machine-readable format.

EVS/TK 76: Real-time economy — Technical Committee No. 76 of the Estonian Center for Standardization, which participates in standardization in the area of real-time economy and represents Estonia's positions and views in international working groups. The members of the Technical Committee include parties from both the public and private sectors.

G2G — government-to-government transaction

GS1 —Global Standards 1, a global standards organization that creates and manages global standards for business

Internet of Business — a project based on the concept of real-time economy and initiated by the private sector, which aims to develop a secure and convenient environment for real-time automated business transactions.

ITL — Estonian Association of Information Technology and Telecommunications

KYC — Know Your Customer — a solution where one party shares automatically and in real time information about their current situation with all other interested parties. For example, a natural or legal person can, when applying for a bank loan, share with consent their data necessary for a transaction, making the process significantly faster and more reliable and reducing money laundering risks.

Flagship project — a joint transnational project/process under the European Union Strategy for the Baltic Sea Region that contributes to the progress of the EU Strategy for the Baltic Sea Region and is considered as a "roof view" for bringing together different transnational sub-projects. The activities of the flagship project may include the development of key solutions, testing of new technologies or methodologies, initiation of cross-border agreements, creation of networks seeking new forms of cooperation.

NSG3 — Nordic Smart Government 3.0 project aims to support growth and innovation in the region and reduce the administrative burden of SMEs by making business data available in real time across country borders. NSG's ultimate goal is the development of an interoperable ecosystem of digital solutions by 2027 that will enable the real-time flow of business data between private and public actors in the Nordic region. This will allow automatic data sharing between business partners and real-time reporting to authorities.

OECD — The Organization for Economic Co-operation and Development

Once-only principle (OOP) — a single-time submission of data from a citizen or business to the state and the re-use of the submitted data within the country and between countries.

PEPPOL - The Pan-European Public Procurement On-Line, an international data exchange network that provides a set of technical specifications and allows trading partners to exchange standards-based electronic documents (including e-orders, e-delivery notes, e-invoices, e-catalogs, message level responses, etc.) by making existing solutions interoperable across Europe through the PEPPOL network.

Real-time economy (RTE) — a digital ecosystem where transactions between diverse economic actors take place in or near real time. This means replacing paper-based business transactions and administrative procedures by automatic exchange of digital, structured and machine-readable data in standardized formats.

SCF — supply chain finance

Single Digital Gateway Regulation (SDGR) - REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on establishing a single digital gateway to provide information, procedures, assistance and problem solving services and amending Regulation (EU) No 1024/2012

SME - a small and medium-sized enterprise

XBRL GL - eXtensible Business Reporting Language Global Ledger