REPUBLIC OF SLOVENIA
MINISTRY OF EDUCATION, SCIENCE AND SPORT

Strategic guidelines for further implementation of ICT in the Slovenian education until 2020

January 2016

Index

1 INTRODUCTION

Aim of this document

The strategic guidelines for further implementation of the information-communication technology (ICT) in the Slovenian education until 2020 is the development planning document that was produced by the Programme comittee for IT implementation in education to provide basis for the continuous activities of the Ministry of Education, Science and Sport.

Definition of the area

Creativity and innovation, as well as within that scope, the use of new technologies are key factors of creating new value. The EU documents emphasises the diversity and dispersal of initiatives, uses and exploitation of the latest technology (as important factors of development). Thus, they point out that efficient measures are only possible if clear vision, objectives and indicators are set. One of the key areas of realising set objectives is education (EU, 2013; Bocconi, 2012, 2).

The premise of the educational policy is to provide facilities for open learning environment that is conceptualised as an environment **of entertaining myriad of possibilities of using ICT through innovative pedagogical strategies in the process of learning and teaching.**

Thus, this document **defines the common vision, goals and principles** for further ICT implementation in the Slovenian educational institutions until 2020. We strive to **establish an amplified synergy of developing and implementing measures to realise the common vision and goals, as well as to strenghthen Slovenian and international partnerships.**

Area specific guidelines and initiatives

The purpose of the document is to place within the Slovenian education the current initiatives, policies and other documents of Slovenia, European Union and beyond. For a detailed description of the documents, please see the Annex 1.

The EU guidelines, initiatives and documents: Communication Opening up education[1] (2013), Framework for Developing and Understanding Digital Competence in Europe - DIGCOMP[2] (2013), Rethinking education[3] (2012), Digital agenda for Europe[4] (2012), Grand Coalition for digital jobs[5] (2013), Open Educational Resources Unesco Paris Declaration[6] (2012), Supporting growth and jobs – an agenda for the modernisation of Europe's higher education systems[7] (2011), Council Resolution on a renewed European agenda for adult learning[8] (2011), Strategic framework for

[1] European Commission Communication Opening up Education.
http://www.openeducationeuropa.eu/sl/initiative

[2] European Digital Competence Development Framework – DIGCOMP, http://ftp.jrc.es/EURdoc/JRC83167.pdf

[3] Rethinking education, COM(2012) 669, www.cedefop.europa.eu/files/com669_en.pdf

[4] European Digital Agenda, COM(2010) 245.
http://europa.eu/legislation_summaries/information_society/strategies/si0016_en.htm

[5] Grand Coalition for Digital Jobs, http://ec.europa.eu/digital-agenda/en/grand-coalition-digital-jobs

[6] UNESCO Paris declaration, Open Education Resources (OER).
http://www.unesco.org/new/en/communication-and-information/access-to-knowledge/open-educational-resources/

[7] Supporting growth and jobs, COM (2011) 567.
http://www.eumonitor.eu/9353000/1/j9tvgajcor7dxyk_j9vvik7m1c3gyxp/visyrzh2fxzx

[8] Council Resolution on a renewed European agenda for adult learning, EU Official Journal, 2011/C372/01,
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2011:372:0001:0006:EN:PDF

European cooperation in education and training - ET 2020[9] (2009), Memorandum on Lifelong Learning[10] (2000), Draft 2015 Joint Report of the Council and the Commission on the implementation of the strategic framework for European cooperation in education and training (ET 2020), new priorities for European cooperation in education and training[11] (2015), NMCHorizon 2020: 2015 report - school and higher education edition[12], as well as Digital single market strategy[13] (2016).

The national documents, directions and initiatives: Information society development strategy until 2020[14] (2015), bottom up initiative Opening up Slovenia[15] (2014), Continuous computerization of schools Action plan[16] (2006), Slovenian Education Netwok - Action plan[17] (2007), E-learning National strategy until 2010[18], National higher education programme Resolution 2011–2020[19], Digital coalition for digital jobs[20] (decision of the Government of the Republic of Slovenia, 2014, as well as Digital Coalition- e-digitalna, 2016). The documents was developed concertedly with the EU fund Operational Programme 2014–2020[21], and it is trailing the development activities anticipated by the Erasmus+ programmes (EU's programme to support education, training, youth and sport in Europe) [22], as well as Horizon 2020 (EU Research and Innovation framework programme 2014–2020) [23].

We complied also with the national documents of separate sectors, namely documents that take in further development and guidelines of ICT use in teaching and learning (e.g. National language policy programme Resolution 2014–2018, National adult education programme Resolution 2013–2020, Modernisation of higher education - High Level Group on the Modernisation of Higher Education, 2013), as well as common documents, such as the Education white paper of the Republic of Slovenian, 2011.

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[9] European Strategic Framework for cooperation in education and training 2020, EU Official Journal, 2009/C119/02. http://ec.europa.eu/education/policy/strategic-framework/index_sl.htm

[10] Lifelong learning Memorandum. http://linux.acs.si/memorandum/prevod/

[11] Draft Draft 2015 Joint Report of the Council and the Commission on the implementation of the Strategic framework for Europeanooperation in education and training (ET2020; 2015) http://ec.europa.eu/dgs/education_culture/repository/education/documents/et-2020-draft-joint-report-408-2015_en.pdf

[12] NMCHorizon 2020: 2015 report: school edition https://www.nmc.org/publication/nmc-horizon-report-2015-k-12-edition/ and higher education edition https://www.nmc.org/publication/nmc-horizon-report-2015-higher-education-edition/

[13] Digital Single Market strategy, https://ec.europa.eu/digital-single-market/en/digital-single-market

[14] Information society development strategy until 2020 (Slovenia), http://www.mju.gov.si/fileadmin/mju.gov.si/pageuploads/DID/Informacijska_druzba/DSI_2020.pdf

[15] Bottom up initiative Opening up Slovenia (coordinating by the Institute Jožef Stefan), http://ouslovenia.net

[16] Action plan of continued IT implementation in education, 2006. http://www.mizs.gov.si/fileadmin/mizs.gov.si/ pageuploads/podrocje/IKT/akcijski_nacrt_informatizacija_solstva_8_2006.pdf

[17] Slovenian Education Netwok - Action plan (2007) http://www.mizs.gov.si/fileadmin/mizs.gov.si/pageuploads/podrocje/IKT/SIO_10_2007.pdf

[18] National e-education strategy until 2010, 2006. http://profesor.gess.si/marjana.pograjc/%C4%8Dlanki_VIVID/Arhiv2006/Papers/DELKokalj2006.pdf

[19] National Higher Education Programme Resolution 2011–2020, 2011. http://www.uradni-list.si/1/content?id=103885

[20] Digital coalition for digital jobs – Government decision, 2014; Digital coalition: http://www.digitalna.si/digitalna-koalicija.html

[21] Proposal Operational programme of drawing EU funds. http://www.eu-skladi.si/

[22] Erasmus+, programme EU for cooperation in education, training, youth and sports 2014–2020. http://www.erasmusplus.si/

[23] Horizon 2020. http://www.mizs.gov.si/si/obzorje2020/

2 RECOMMENDED STRATEGIC GUIDELINES

2.1 Vision

Open up possibilities of education in an **open, innovative and sustainable learning environment facilitated by innovative use of information-communication technology that will enable individuals to gain knowledge and develop skills, key competences**[24]**, as well as competences of the 21st century**[25] that are essential for a successful integration in a society. Thus, the quality and competitiveness of knowledge and competences of our pupils and students at all levels of education system shall improve and qualify them to make innovative and competitive contribution to the national market and empower them to enter the labour market (including EU) successfully.

2.2 Goals and measures

GOAL 1 – Didactics and e-material

Develop and test **innovative pedagogical approaches**, **models** and **strategies** of student-centered learning and teaching that rationalise the use of ICT at all stages of learning (including critical evauation of the didactical importance of ICT, necessary changes in teaching and learning, virtual environments of communication and cooperation, application of various sources, progress monitoring, assessment and (self)evaluation of competences, special needs, etc.). Develop **didactical aids** or **tools** (e.g. multimedia and interactive learning e-material, mobile and web-based applications, e-portfolio), and accordingly, adapt the existing educational approaches.

To realise goal 1 we plan to:

- Implement development interdisciplinary projects at the national level and participate in development strategic international projects related to developing innovative and alter the existing pedagogical approaches, models and strategies of student-centered teaching and learning;
- Develop comprehensive didactics of teaching and learning in open learning environments that change substantially the existing situation of subjects, professional and other domains (including cross-curricular and interdisciplinary ways);
- Develop multimedia and interactive learning e-material for various platforms that support and promote innovative pedagogical approaches.

[24] European reference framework, http://bookshop.europa.eu/

[25] OECD, 21st century skills and competences for new millennium learners in OECD countries, 2009, http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=EDU/WKP%282009%2920&doclanguage=en

GOAL 2 – Platforms and cooperation

Set up an open platform of information technology, e-content, (e-)services, **pedagogical concepts and approaches, added-value models**, as well as **motivation mechanisms** (e.g. positive legislation) in an open education. In this way, **upgrade the Slovenian education network – SIO** (including efficient use of technology, e.g. cloud technology)**,** establish **synergy environment for (interdisciplinary) partner cooperation** of all stakeholders in development and research of efficient use of ICT in the process of education, including economically effective business models of IT implementation.

To realise the goal 2 we plan to:

- Promote and enhance the use of the SIO e-services
- Upgrade the SIO platform and e-services
- Continue to counsel the educational institutions (leadership), didactical as well as technical support
- Expand the research and development environment by interdisciplinary cooperation of various stakeholders
- Reform and complement key legislation, as well as modernise spaces of autonomy of various institutions.

GOAL 3 – E-competences

Raise the level of digital competence and enhance the use of ICT within the overall educational system, and contribute significantly to improvement of **key competences and 21st century skills of students at all levels of education, as well as participants in adult education**, namely on a premise of comprehensive development of competences of teachers, ICT coordinators, head teachers, higher education teachers and other education staff (formal education and continuous education and training) **through effective forms of training** (face to face and online)**, by strengthening the professional (e-)communities, active exchange of good practice, peer learning, as well as and providing quality (e-)services** (counselling, support).

To realise the goal 3 we plan to:

- Urge educational institutions to use ICT in teaching learners on a daily basis
- Improve international comparable digital competences of learners (autonomous problem solving in computer supported learning environment as well)
- Promote the development of competences at higher cognitive levels of learners (development of algorithms and programming; computational thinking)
- Open up various forms of training (seminars, workshops, counselling, and support) of teachers at all levels of education and other educational staff and head teachers to gain quality and effective education supported by ICT
- Participate actively in the process of international certification of digital competences (teachers at all levels of education and other educational staff, as well as head teachers) and apply international recommendations.

GOAL 4 – Informatization of institutions

Set up **open learning environments in educational institutions that shall enable innovative approaches.** It includes **higher level of collaborative leadership** (planning, managing, evaluation) **and improved flexibility, as well as e-operations, upgrade of activities pursued by the school e-development teams** (curriculum, e-content, e-services, etc.) and **enable an efficient and secure infrastructure**: clients (mobile devices, computers, etc.), interactive devices, cloud services, standardisation and portability among various platforms, widebands and safe internet access, as well as efficient **spatial** and **ergonomic planning.**

To realize the goal 4 we plan to:

- Assist educational institutions in setting up systematically e-development teams that includes the informatization planning, its implementation and monitoring, flexible organisation, as well as evaluation
- Set up proper infrastrucutre at educational institutions (e.g. meet, for example, the criteria for equipment[26]): clients with safe wideband internet connection and wireless network at educational institutions, and
- Promote the set-up of secure internet to support various activities and services.

GOAL 5 – E-education (higher education, adult education)

Promote **e-education in higher education** as a way of **formal education** (accreditation of subjects, modules or the overall study programme); promote a form of transmitting the current higher education knowledge and skills, as well as new (scientific) knowledge or findings as part of the **lifelong learning**; increase the use of e-learning in terms of **improving the deficit in the knowledge of students** when they transfer from upper-secondary to higher education or between study programmes and graduates who strive to refresh or improve their knowledge with the knowledge of new (scientific) findings; preparation courses for **foreigners** who come to study or exchange students in Slovenia (mobility), as well as to promote e-education (e-learning) in adult education (formal as well as non-formal).

To realize the goal 5 we plan to:

- Promote the development of study programmes and adult education that apply e-education as a way of implementing a separate subject, module or the overall programme
- Assist educational institutions (independent or university higher education institutions) to augment the choice of open content.

[26] Source: Investment directorate, MIZŠ (Recommendations for standards and norms).

GOAL 6 – Evaluation

Provide sustainable and quality implementation of the strategy by **measuring and evaluation of the current situation, by analysing the indicators** (including the indicators of the strategic guidelines); by benchmarking in the Republic of Slovenia, EU and beyond, namely the condition, use, efficiency and effectiveness of ICT in education; by data collecting at the national as well as international level, whereby it is practical to retrieve proper data and indicators of the international programme for research in education (large-scale international assessment, as well) that will provide international standards of quality and the comparability of indicators of ICT in education.

To realise the goal 6 we plan to:

- Assist educational institutions to take part in the process of evaluating the informatization development (including self-evaluation at institutional level)
- Promote periodic national research into the use of ICT in teaching and learning
- Support the cooperation in international research in the scope of developing indicators for the digital literacy and competences (computational thinking, digital literacy and competneces including assessment with the use of ICT).

2.3 Provision of funds and principles

To achieve goals and indicators effectively, it is necessary to **establish a comprehensive approach, namely the simultaneous provision of informatization in all fields**. It is essential to implement services under 2.2 in a sustainable manner and at the same time maintain the proper ratio between investment into human resources and development at one side and investment in efficient and secure technology (table 1) in the other. **Funding of IT implementation in education** should be equally distributed in all fields, so the use of funds shall be prudent, cost-conscious, have equal and sustainable footing; it is necessary to develop and take in different business models.

Table 1: Recommendation on the ratio for financing the most significant fields

Activity	Percentage share
1. Investment in human resources, innovative approaches of education, new approaches of developing quality e-content, efficient organisation of activities and services of education and institutions, as well as in evaluation	50%
2. Investment in efficient and secure facilities, wideband internet, quality multimedia and interactive e-material, continuous development of services of the Slovenian educational network, as well as in quality and efficient support to all stakeholders (clients, developers)	50%

On the basis of experience and internationally comparable results, it makes sense to provide various sources of funding, such as: national budget, cohesion funds, funds of EU (ESS and ERDF), other international funds (available via Unesco, educational and research foundations, etc.), municipal budgets, own funds of educational institutions, as well as funds of other stakeholders (enterprises, NGOs, etc.) and individuals (e.g. parents, students). In doing so, it is necessary to attempt to earmark substantial shares of funding to educational institutions and public institutes that were set up for the purpose of development and support educational process (National Education Institute, Centre for vocational training, National school for school leadership, National Research Institute, National examination centre, Academic and research network of Slovenia, …). Relevant points:

- define the scope and estimation of projects according to the **range of clients** (type and number of educational institutions and the number of children, pupils, upper-secondary students, higher education students, teachers, higher education teachers, management staff and other (educational) staff at educational institutions):

- total of approximately 1,000 educational institutions at over 2,500 locations, over 30,000 pre-school teachers, teachers (ISCED 1, 2, 3) and other staff, over 330,000 children, students (ISCED 1, 2, 3), as well as over 200 educational programmes and relevant plans;
- 48 higher education institutions: 5 universities (55 univeristy members) and 43 independent higher education institutions, as well as 79,481 higher education students, 5,600 higher education teachers, and over 3,000 higher education staff;

- **Infrastructure**:
  - within a 7-year period the significant part of the infrastructure will overcome two life cycles;
  - total ownership cost of infrastructure include hardware and software, support to users, and maintenance.

For the implementation of activities to enable efficient use of ICT in educational work, it is necessary to comply with the following principles:

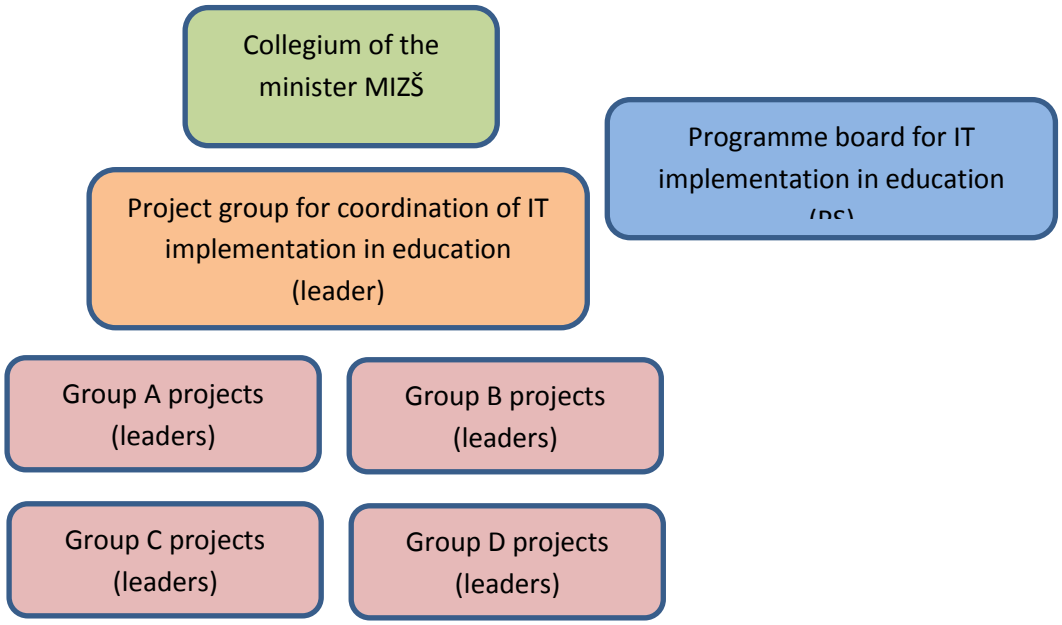
- **equal opportunities** and **accessibility** of infrastructure that enables the use of ICT in educational and home environment. To use possibilities that ICT provides in personalised learning. This opportunity applies in particular to the pupils with special learning needs (socially deprived environments, special needs children, talented children, pupils with learning difficulties, adults without upper-secondary education, unemployed, …);
- **openness of sources** used in the educational process;
- **contextual links between initiatives and operations** of all stakeholders, namely top down, as well bottom up;
- **continuing activities of projects and systematic incorporation of results in the educational system** for the purpose of quality improvement as projected;
- include and coordinate with all stakeholders in the development of activities and the professional discussion: enterprises, NGOs, upper-secondary and higher education student organisations, trade unions, NAKVIS, etc.;
- **care of healthy and secure life style**.

2.4 Introducing the strategic guidelines

For the comprehensive implementation, it is necessary to foresee the proper management and governance of strategic orientation for continued implementation of ICT in the Slovenian educational institutions until 2020 and the implementation of projects at the level of educational institutions.

For setting up a proper **environment for partnerships** of all stakeholders in the development and for implementation in synergy of the strategic directions for continued implementation of ICT in the educational system it is essential to institute the following bodies:

1. The **programme boar for IT implementation in the Slovenian education (PS)** is a consultative body that gives opinions and recommends initiatives for the strategic directions of implementing ICT in the Slovenian educational institutions.



Picture 1: Organisation of continued implementation of ICT in the Slovenian educational institutions

2. The **project group for coordination of IT implementation in education** coordination and an agreed approach to computerisation of organisations in pre-school education, basic school education, upper-secondary education, short cycle higher education and higher education, all under the auspices of the Ministry of education, science and sport. The head of the project group for coordination of IT implementation in education coordinates and manages the work of the project group. The head appoints the responsible member of the project group for the development of individual public tenders, public calls or direct signoffs of operations to manage and coordinate with the other members of the working group. Based on the reports by individual responsible members the head develops a joint report and submits it to the cabinet of the minister and to the programme board for IT implementation in education.
3. The **project** (group of actions A, B, etc.) is a basic unit of pursuing activities. The head of the project has at the disposal a project group of members with content- and technology related expertise. Members may be internal or external (operators). The head of the project reports periodically to the head of the project group for the coordination of the IT implementation in education and together they seek solutions to eventual issues, changes in the plan, …
4. Where appropriate, the collegium of the minister for education, science and sport gets involved. The head of the project group for the coordination of the IT implementation in education following the reports by the responsible for projects develops periodic joint reports about results and submits them to the collegium of the minister and to the programme board for IT implementation in education.

We recommend the project management as the method of implementation, monitoring and actions for the strategic directions; to support the project management we recommend the setting up of a project office.

3. CURRENT SITUATION OF ICT IN SOCIETY AND EDUCATION

3.1 Role and importance of ICD in a modern society

EU estimates [27] that the ICT sector creates directly around 5% of the European GDP while its market value totals €660bn per year. It is necessary to consider the indirect effects on the productivity growth (20% share directly from the ICT sector and 30% from investment in ICT). We may not link the ICT effect simply to the productivity growth, as it is inseparable with the development potential and innovation in creating new products as well as in designing new ways of management and governance, new approaches in research, and other methods of work. The ICT effect on the social processes and/or everyday life of people is increasing in significance, as well. Merely the fact that almost 250 m people use Internet in Europe and that practically all Europeans own a mobile phone highlights the role of ICT not only in economy, research and innovation but also in everyday life of people. We can release this great potential of ICT with a well-oiled cycle of activities. It is necessary to make the interoperable and limitless internet environment the setting of attractive content and services. This will increase the demand for greater speeds and capacities, which again justifies businesswise the investment in faster networks. The setting up and use of faster networks is opening way to innovative services that make use of greater speeds.

Along the endeavours of the European Commission, Slovenia, too, should intensify its endeavours to reduce the lack of digital literacy and to improve e-inclusion of population that is with relevant policies, initiatives and partnerships as points of departure, and follow the example of certain other European countries. It is essential to incorporate further actions into currently setup instruments for better access to ICT to improve their use, as well as develop new services to meet the requirements of the digital era and thereby encourage the competition in creating new job opportunities. Certainly, the digital literacy of people is essential, because only in this way they will be able to become part of the digital society and its new social interactions. Digital literacy has effect on the individual and society as a whole; it is one of the key factors behind setting up a smart, sustainable and inclusive growth. The statistics and analyses for Slovenia, however, show a great discrepancy between the availability of ICT and its actual use. The results of targeted research project “E-competent citizens of the Republic of Slovenia” suggest that key reasons why households in Slovenia do not use Internet beside the financial obstacles (high cost of Internet access, high cost of equipment) were, in particular: lack of knowledge and skills to use computer or Internet, as well as lack of general interest for Internet. In 2013, there were 76% households in Slovenia with access to Internet (EU-28 79%). The most common reasons why the households did not have access to Internet, there were 24% of such households, were the lack of need (77%; EU-28 49%) and knowledge deficit (63%; EU-28 37%). In 2013, 69% of population in Slovenia were using the Internet at least once per week (EU-28 72%), 23% of population has never used (EU-28 21 %). Slovenia dominates in particular for the use of Internet among retired and inactive people who hinder behind in every aspect and thereby impair the comparative position of Slovenia. Otherwise, as to the data of the European digital agenda by the European Commission (source: http://ec.europa.eu/digital-agenda/en/scoreboard), Slovenia ranked tad above the European (EU-27) average in the share of individuals aged 16–74 with basic or above basic computer skills (52%, year 2012). The share of individuals aged 16–74 with basic or above basic Internet skills ranked Slovenia at the EU average (47%, year 2013). The share of individuals who developed their ICT skills in formal educational institutions is 31% (year 2011), above the EU-28 average of 28%. The share of enterprises (enterprises with 10 or more employees, financial sector excluded) that employed ICT specialists was 21% in 2012, the EU-28 average 21% in 2012. Fourteen percent of

[27] e-Skills week 2012: There is a job waiting for you, http://europa.eu/rapid/press-release_IP-12-259_en.doc

enterprises enabled their ICT specialists in 2011 to upgrade and develop skills in ICT (9% EU-28). Twenty-three percent of all enterprises (financial sector excluded) enabled in 2011 other staff to upgrade or develop skills to use ICT (17% EU-28). The system of education and training for employees has to include competences that are necessary if we want to realise goals of the Smart specialisation strategy that defines production and process technologies and ICT under first out of three horizontal priority fields. This field is under priorities by scope of investment in research and development and signifies a potential for development of services of higher benefit that reflects in the boost of enterprises of this industry.

It was also the European Commission that recommended to Slovenia to increase the inclusion of older and low-skilled workers in the life-long learning, namely in the Commission position paper about the development of the partnership agreement and programmes in Slovenia for the period 2014–2020. Furthermore, the latest findings of the research in the national policies about e-knowledge, e-managerial skills and digital literacy of all member countries, Slovenia showed low and/or very low level of activity; among the 27 member countries Slovenia achieved 0 on the 5-level scale of the e-skills activity index. Thus, Slovenia together with Portugal, Malta, Greece and Czech Republic ranked among the least active (or inactive) countries in promoting e-skills and e-knowledge, namely among those that have been defined in the research as the country with "poor results".

3.2 Role and significance of ICT in education

The digital technologies are today part of life and work, but EU reckons that the systems of education in training across Europe have not yet exploited its full potential. A recent study[28] into the use of ICT in European schools showed that 63% of nine-year-olds are not learning in schools with "good digital facilities" (that is, up-to-date equipment, fast wideband connections and high "connectivity"). While 70% of teachers in EU recognised the importance of training in digitally supported learning and teaching, only 20–25% of pupils attend lessons by teachers who have confidence in their digital skills and support the use of digital technology. By and large, teachers use ICT to plan their lessons, and not to work with children during lessons. Fifty to eighty percent of pupils in EU never use digital textbooks, computer programmes for exercise, broadcasts/podcasts, simulations or didactical games. In EU, there is not sufficient quality learning content and applications available for certain fields and for different languages, as well as there is not sufficient connected facilities for all pupils and children.

The EU documents advise caution about the fragmentation of approaches to introduction and implementation of ICT in education, as it is adding to the gap between the ones with access to the innovative technology-based education and those with no such access in EU. It is essential to monitor this increase to the "digital gap" in education, according to EU, compared with USA and several Asian countries. By transforming, modernisation and internationalisation of educational systems, there is visible improvement at schools and universities as to access to education and its cost, teaching practices, global good name or brand name. Most digital content, for example, provide actors beyond Europe, among other educational institutions that deliver its programs all over the world via massive open online courses (MOOC) (hereinafter: learning courses MOOC).

[28] European Commission: Survey of Schools: ICT in Education, Final Report, 2013.
http://ec.europa.eu/information_society/newsroom/cf/dae/document.cfm?doc_id=1800.

The digital revolution in education is opening up opportunities to improve efficiency and equal opportunities. Individuals now easily find and obtain knowledge from various sources. It is possible to reach out to new groups of pupils. Learning is no longer limited to special classroom timetables, only. Education can be individualised more widely. Teachers face less difficulty in exchanging good practice. Teachers and pupils can access a wider range of learning sources because open technologies allow us all to learn wherever, whenever, by whichever device and with whosever help and support. Increased use of new technologies and open access learning sources leads to an improved access to education. However, for the positive influence on equality it is necessary to invest constantly in education infrastructure and human resources.

ICT offer significant benefits for greater flexibility, individualisation and personalisation of learning and teaching that we should recognise (Bocconi, 2012).

The use of ICT in the process of learning and teaching is not an end in itself, but it makes sense if it supports pupils to reach their goals as set by curriculum and if it contributes to the empowerment of pupils, upper secondary students to use competences for the 21st century and improve learning outcomes (reading and numerical literacy, literacy in natural science and other literacy). The practicality of ICT use in the process of learning and teaching may as well be realised in view of complexity of dimensions and factors that influence the efficient use of ICT in education.

It involves eight intertwined dimensions (see diagram below): curriculum, evaluation, good practice in the learning process, good practice in the teaching process, organisation of the educational process, management/governance and values, interconnections, as well as infrastructure. The so-called reference parameter define each one of the dimensions – total of 28 reference parameters (Bocconi, 2012).

Picture 3: Eight intertwined dimensions

There should be a link by analogy between the learning and teaching with IKT, as well, namely by taxonomic levels of various theoretical reference tested in the past that are in part outdated.

Let us remember the upgrading of taxonomies with the focus on the development of two dimensions:

- Development of knowledge, table 6 (Anderson et al., 2010)

Table 6: Development of knowledge

concrete knowledge → abstract knowledge			
factual	**conceptual**	**procedural**	**metacognitive***
knowledge of terminology knowledge of specific details and elements	knowledge of classifications and categories knowledge of principles and generalizations knowledge of theories, models, and structures	knowledge of subject-specific skills and algorithms knowledge of subject-specific techniques and methods knowledge of criteria for determining when to use appropriate procedures	strategic knowledge knowledge about cognitive tasks, including appropriate contextual and conditional knowledge self-knowledge

- Development of cognitive processes as shown in the picture (Anderson et al., 2010)

Table 7: Development of cognitive processes

lower order thinking skills → higher order thinking skills					
remember	**understand**	**apply**	**analyze**	**evaluate**	**create**
recognizing • identifying recalling • retrieving	interpreting • clarifying • paraphrasing • representing • translating exemplifying • illustrating • instantiating classifying • categorizing • subsuming summarizing • abstracting • generalizing inferring • concluding • extrapolating • interpolating • predicting comparing • contrasting • mapping • matching explaining • constructing models	executing • carrying out implementing • using	differentiating • discriminating • distinguishing • focusing • selecting organizing • finding coherence • integrating • outlining • parsing • structuring attributing • deconstructing	checking • coordinating • detecting • monitoring • testing critiquing • judging	generating • hypothesizing planning • designing producing • constructing

3.3 Overview of current activities of IT implementation in education in Slovenia

A systematic deployment of ICT use in the Slovenian education started in 1994, namely with the project of computer literacy (RO – *Računalniško opismenjevanje*). The aim of the project was to equip the Slovenian educational institutions with hardware and software (system and didactical), computer facilities, organise training of teachers in teaching with ICT, as well as realise development and research projects for new approaches to the use. We have set up the Slovenian educational network (SIO – *Slovensko izobraževalno omrežje*) and created the Trubar web-based catalogue of material and events, as well as organise promotion at home and beyond and the international conference MIRK. Thus, since 1994 until present day, the training of pre-school teachers, teachers and head-teachers, and servicing the Slovenian educational institutions with ICT, as well as other activities have been ongoing without greater interruptions in view of the annual national funds).

1. E-school (2009–2013): the Ministry of Education, Science and Sport funded one of the biggest system breakthroughs through the funds of the European social and regional fund, namely in line with the Action plan for digitalisation of the Slovenian education until 2006. The ministry realised several public tenders and direct projects at public institutions (ZRSŠ and ARNES) under the name **e-education (e-šolstvo)**:
a) Development and implementation of the e-competent teacher and head-teacher norm via seminars; there were 177 developed or upgraded seminars; individual seminars include development and acquisition of separate competence (primarily, the seminars cover specific subject fields, some on the other hand cover the use in all subjects). There were 27 development groups set up. Individual development groups continue to work regularly – monitors and develops new approaches to teaching and learning. There are professionals from ZRSŠ/CPI, faculties and several practitioners from schools in the group. Thousands of teachers (annually roughly 8,000) and head-teachers attended the seminars at least 50% of time; they were distance-learning workshops. The **recommended norm e-competent teacher** that encompasses six basic e-competences (see picture below), has not yet been introduced formally.

Picture 4: Competences of the standard e-competent teacher

b) Development and implementation of counselling, didactical aid and technical support to schools in a way to support the expansion of standard and new service tailored to individual schools, that is to the needs of the head-teacher, teachers and pupils.

c) There were **seven international conferences SIRIKT (**web of education and research with ICT); annual international conference SIRICT hosts 1,200 participants;
č) Organisation of e-school: shared planning, development, implementation and evaluation of the project and access point for users (schools, head-teachers, teachers, pupils, etc.).

2. E-competent teachers in bilingual schools (2012–2013)

Activities:

a) DEVELOPMENT OF E-LANGUAGE COMPETENCE IN HUNGARIAN: develop and hold workshops and provide other training to pre-school teachers, generalist teachers and teachers of specialist subjects in Hungarian language, in particular, in view of proficiency in specialist terminology in Hungarian language, as well, and improve business communication and e-competence of head-teachers, namely in Hungarian language;
b) DEVELOPMENT OF E-MATERIAL: develop specialist e-material in Hungarian language for the purpose of bilingual educational process (multimedia and interactive e-material for various school subjects in basic and upper secondary schools), as well as set up and update the online dictionary as an teaching or learning aid for lessons in specialist subjects;
c) DEVELOPMENT AND UPGRADE OF LESSONS IN HUNGARIAN LANUGAGE 2 with the use ICT: develop and provide training as to methodology and practical knowledge for generalist teachers who teach Hungarian language 2 with the use of ICT, develop e-material as a subject of training for teachers (supplementary teaching or learning material for lessons in Hungarian language 2);
d) FORMS OF PROMOTING LEARNING OF HUNGARIAN LANGUAGE AND CULTURE WITH ICT: promote the learning of Hungarian language with the use of ICT in monolingual basic schools in the vicinity of the bilingual upper-secondary school; pilot language camps with the use of ICTS for teachers of pupils at monolingual basic schools who enrolled in the bilingual upper secondary school (participation of students is a prerequisite for a proper implementation); develop and introduce new optional subjects relevant to values of Hungarian language and culture; improve optional (extracurricular) lessons in Hungarian language outside ethnically mixed area with the use of ICT, as well as possible integration of upper secondary students.

3 Development of Internet based multimedia and interactive e-material (2006–2010): one developed 128[29] e-material units for different subjects of basic school, upper secondary school and short-cycle higher vocational school, as well as pre-school institutions: physics, mathematics, chemistry, biology, Slovenian, English, geography, history, technology, business math, computer science, electro-techniques, vocational training, etc. The projects encouraged professionals (school, research institutions, non-profit and profit institutions) to join in various groups and design new approaches to teaching and learning through the development of multimedia and interactive e-material.

4 E-material was further developed into e-textbooks and in 2011, the **first four pilot e-textbooks** emerged; today they are over 40 for core curriculum subjects of natural science and basic school.

[29] Table of e-material by separate subjects and levels of education: http://portal.sio.si/gradiva

One also developed **Starting points and recommendations for e-textbooks** (Kreuh et al., 2011, Čuk et al., 2014).

5 E-textbooks:
- Natural science (2011–2013): in the scope of the project at ZRSŠ, there were over 25 e-textbooks developed, mostly by external specialists of ZRSŠ;
- Humanities (20013–2015): in the scope of the project e-Schoolbag at ZRSŠ, there have been over 15 e-textbooks in the process of development, mostly by external specialists of ZRSŠ.

6 Continuous development and implementation of the **Slovenian education network** (http://www.sio.si/): education, online communities, support, legislation, news, etc. Up to 10,000 teachers, head teachers and pupils use daily the e-services.

7 Pedagogy 1:1 in the light of 21st century competences: develop and implement, and evaluate new approaches of teaching and learning with mobile devices used by all pupils in separate classes at certain schools; the focus being on inclusion of socially disadvantaged groups, too.

8 Infrastructure and technological potential for inclusion of persons with special needs in the education system (2013–2015)
The working packages, tasks and activities of the project "Infrastructure and technological potential for inclusion of persons with special needs in education": methodology, computerisation and technical aids for education, training, counselling, as well as promotion and leadership, coordination and administration of the project.
The package of methodology is divided in infrastructure for education, social environment, technical aids for education, and concept of training and counselling implementation.

9 In the **project e-Schoolbag**, one has been developing along with e-textbooks in humanities the first universal e-services. The central ICT infrastructure has been set up at pilot schools to test all previous products in the process of teaching and learning (from e-textbooks to clients of e-services).

10 International projects: In the EU Folio (2012–2015), 15 pilot schools in Slovenia developed portfolios with emphasis on formative assessment and inclusion of 21st century competences supported by ICT, the Creative Classrooms (2012–2015) takes on creative learning environments supported with ICT, in particular with pedagogy 1:1.
In 2015, new international projects were initiated in the area of assessment of digital competences for pupils and teachers (two projects 2015–2017).

11 The aim of the project **IR optics** (€14.7 M, 2013–2015) is to solve the pressing issue of optical lines between institutions in research and education that are essential for their operations. We shall provide optical lines to new clients and also to institutions that have already been using those services, but at a too high lease cost. Along with the purchase of optical fibres, the purchase of active facilities for the speed of at least 1Gb/s that is essential for the realisation of the setup up optical lines in the Slovenian education and research network shall be financed through the project IR optics, as well. There have been 50 locations or 671 entitled organisations in 52 packages tendered for the public procurement, and one plans a repetition of the public procurement to include entitled organisations from Ljubljana (roughly 150 organisation) that were excluded from the investment programme by reason of signed umbrella contract between the City municipality of Ljubljana and Telekom Slovenije that was terminated in the meantime. The aim of this tender

notice could be a call to 34 organisations, which offered no lines. The operation has been implemented in the scope of the Operational programme for strengthening regional development potentials for the period of 2007 to 2013, development priority Economic-development based infrastructure, priority policies Information society.

12 Distance learning studies or e-education in 2014 in higher education has not been regulated systemically yet. Separate universities or higher education institutions apply the significance of ICT and development policies to their missions and visions in line with the Resolution on National programme of higher education 2011–2020. They have integrated them in the strategic priority areas and indicated them in the elements to meet the conditions and requirements of the strategy realisation, by placing special emphasis on the internationalisation of the university. They have been developing strategic priority areas, such as:

- to create and transfer knowledge (e.g. projects of university library activity, data bases of primary information, repositories, projects of domestic and international knowledge flow and visibility)
- quality of educational processes (e.g. project Quality at individual universities, projects of distance learning, teaching by using modern tools of ICT, education and training of teachers and university staff)
- information system of universities (e.g. development projects and projects of integration)
- computer systems optimisation (e.g. standardisation of processes, provision of joint information services).

13 In **2013, the majority of projects mentioned completed.** The rest will complete in the current or next year. Based on these projects, a continuous systematic leap to significant segments of investment, in particular in human resources, that is the firm base of future activities, was taken.

14 In this context, the ministry set up the **programme board for IT implementation in education** already in 2013.

15 Since 2004, Slovenia has been participating in activities of **working groups of the European Commission**.

16 Initiative by the Jožef Stefan Institute Opening up Slovenia (2014)

The Ministry of education, science and sport cooperates openly in the area of development, that is, it embraces initiatives of development by different stakeholders, and enters into partnership only after an in-depth examination. The initiative **Opening up Slovenia** is one example of the ministry's **active partner cooperation** in which the ministry intervenes with guidelines and gains knowledge.

Slovenia currently enjoys a strategic advantage in the area of open education, in particular, but not an exclusive. The activities of the Laboratory for artificial intelligence at the Jožef Stefan Institute are focused on the promotion of science among the young. In cooperation with the Centre for knowledge transfer in information technologies (CT3), they are developing and maintaining the educational portal VideoLectures.NET (awarded by the United Nations), and have been organising contests ACM in computer knowledge for several years now. In Slovenia, there are highly developed information technologies highlighting the artificial intelligence technologies. The most significant areas of research and development in intelligent technologies are: (a) data analysis focuses at textual, online, multimedia and dynamic data, (b) technics of analysing large quantities of date in real time, (c) visualisation of complex data, (d) semantic technologies, and (d) language technologies. All has an applicative indication in education, economy and the state. Technologies for which we have been acknowledged in the world and have been invited to join the projects as partners:

http://eventregistry.org, http://unesco.ijs.si, http://enrycher.ijs.si, http://scienceatlas.ijs.si/, http://videolectures.net/, http://newsfeed.ijs.si, http://searchpoint.ijs.si, http://scienceatlas.si, http://www.ist-world.org/, http://exploredu.ijs.si in http://exploredu.org. These are the technologies on which at the same time we base all other projects created within the initiative Opening Up Slovenia. Furthermore, the stakeholders of Opening up Slovenia specified the extraordinary and comprehensive portfolio of Slovenian competences and good practices in open education, and developed on their own a set of (current) projects of all stakeholder within Opening up Slovenia.

A) AREA OF ACTIVITIES

The aim of the initiative Opening Up Slovenia (OuS) is to develop an innovative approach of activities that no country has succeeded to realise yet, thus the activities are being constantly improved, upgraded and integrated into the existing system or they complement it. The initiative's starting point is opening education and research (education and training, research and development) to a wider area of life and work, therefore it includes:

1. Not only education and science in the narrow sense, but opening all of these activities in all sectors, also in economy, culture, sports, health, etc.
2. All three pillars of society: state, economy and civil society.

B) STRUCTURE

There are over fifty institutions joined in the initiative. The list of all participants is published online on http://www.ouslovenia.net. To facilitate the operations, there was an organisation board set up for the initiative OuS, mainly to support the initiative's obstacle free operating and form of operations, as well as to implement the strategy at local, regional, national and global level. Member of the organisation board come from various public (MIZŠ, universities, schools and other public institutions) private (companies), non-profit institutions, as well as associations (head teachers).

17 School libraries

The school laws and laws on the activities of libraries are the normative references for school libraries. The school laws specify the library activity as the support activity in implementing the school-based educational process and since 1996, by law schools have to have their own school library (Article 68 Organisation and financing of education Act).

At several schools, school libraries are central information spaces, thus ICT in education has been tightly linked to school libraries:

- Set up of ICT facilities in libraries (hardware – computers, printers, scanners, barcode readers, etc.; software, wideband Internet access).
- Development activities: since 1996 and within the scope of the programme Computer literacy, one has been involved in development in various fields, libraries as well: development and designing various approaches to ICT use in libraries. The activities resulted in various forms of training (seminars, workshops, etc.) and training material. In the scope of the project E-school, the special developmental groups for this area ceased its operations in 2009.
- Training of librarians: the developmental groups of the previous indent developed training for teachers and other education staff that were implemented by trainers (teachers or librarians). In the scope of the project E-school, there were no special training aimed at librarians, thus they participated at the e-competence development seminars.
- Involvement in international projects: librarians joined various projects via Internet (I*EARN, Kidlink, Etwinning), for example. "Medvedek" (promotion of reading and writing stories), as well as other projects of various content on the subject of ecology, etc.

The law of 2015 specifies the implementation of the COBISS (developed and maintained by IZUM) in the school libraries.

18 ROID at schools and ICT coordinators at upper secondary schools

The computer-organizer of information activities has been a systemised post (the same staff requirements apply as for basic-school teachers) in basic schools and institutions for education children with special needs since 1999. The duties and obligations are of subject nature (promote and coordinate ICT use in teaching and learning among colleagues). The activities of the computer-organizer of information activities did not develop in the same way at all schools; it depended on the professional skills of the computer operators and the level of the ICT use in teaching and learning at different schools.

At upper secondary schools, the post is systemised at the level of technical staff (university or Master's degree). Thus, the content and coordination of ICT use in teaching and learning has been the responsibility of professors in computer and information science or active teachers (enthusiasts).

3.4 Current situation estimation as basis of system approach upgrade

Below, you will find essential challenges that limit – in greater or smaller scope – the next system leap of the practical and efficient use of ICT in teaching and learning, as well as school administration.

The key results are important, in particular of the last two international researches that include stakeholders (pupils, teachers, head-teachers) and monitor quality indicators:

- EU study on the use of ICT in education (Survey of Schools: ICT in Education - open Commission, 2013), and
- ICILS 2013 international study on digital literacy of grade 8 pupils.

Significant data were collected and published in a compendium, namely for the programme board for IT implementation in education (Brečko et al., 2014).

The results of both studies showed above average results for Slovenia in areas to which systematic resources were allocated for longer periods of time and below average results in areas in which there were no systematic investments, for example:

- average or even below-average everyday use of ICT during classes (pupils and teachers)
- above average pursue of activities by teachers through the use of ICT (distance training, Internet communities, virtual classrooms)
- above-average support for upgrade of school ICT strategies at schools
- above-average level of equipment
- above-average access to e-materials for various school subjects.

Essential aspects of the study ICILS results (Slovenia ranked 7th – 10th among 14 countries:

- results showed that “digital natives” are not able to create alone the added value, thus the role of a teachers and school is even more important in terms of promoting, supporting and motivating improved creativity;
- results were no surprise for us, because we train teachers and pupils at schools for 2 to 3 level that our students do attain (that is, they are skilled in solving problems according to instructions, but they are not skilled in solving problems in terms of being creative and exploring various paths);
- study showed that in different subjects roughly 20% of teachers apply ICT intuitively during everyday classes.
-

Nonetheless, Slovenia is faced with the most important challenge that most (or all) countries face, namely the use of ICT is a systematic and routine integral part of the instruction and learning; accordingly, so have not yet got the most out of it, for example lack in awareness about disadvantages of overuse (for example, children using smartphones in their free time or at home).

Youth and other learners do not acquire knowledge and develop skills, key competences and competences for the 21st century that are required for a successful integration into society and contribution to innovative and competitive domestic market, and they are not sufficiently empowered to enter the labour market successfully (including EU).

One of the key aspects is continuous financing of activities:

- No all-embracing development of new approaches to teaching and learning ICT that would mean an in-depth change of instruction (of individual subjects, inter-curricular cooperation or other).
- In 2013, there was roughly €3 m per year allocated to training of teachers and head-teachers, namely 16,000 participated at seminars or counselling coursers; in 2014 and 2015, there was only €100,000 allocated in the scope of pilot projects.
- No funds earmarked for development of new approached to multimedia and interactive e-material, educational games, etc.
- As to facilities, since 2011 the funds for equipment of educational institutions have been on a decline, and that is something that would need to change in the future. Since 2004 and €7 m per year (€4 m state and 3m local funds), one witnessed a decline in 2011, namely to virtually zero; in 2014 and 2015, there was only €3 m allocated to equipment (1.5 m by the Ministry and 1.5 m by schools), alongside pilot projects on a limited number of schools (15).

An important aspect (for a more sustainable funding, as well) is the need to cooperate with other current projects in education that have to contribute to new quality education, in terms of synergy, in line with the development of the society, market competiveness and new jobs for the young. All that we need is a new leap.

3.5 Users of the computerisation of the Slovenian education

In Slovenia, the users of computerisation of the Slovenian education are:

a) Educational institutions:

- kindergartens: 399 (independent and adjoining basic schools; total of kindergartens and their units 1,100)
- basic schools: 450, independent, branches: 400
- upper-secondary schools: 123 (upper-secondary school centres and institutions with several schools are defined as one schools, total of 183 upper-secondary schools)
- basic schools with the adapted programme: 28
- residential homes for upper-secondary students: 39
- independent higher vocational colleges: 4
- institutes for children and youth with special needs: 16
- music schools: 63
- adult education centres: 34
- total around 1,000 educational institutions at over 2,500 locations
- 48 higher education institutions: 5 universities (55 university members) and 43 independent higher education institutions

b) Users:
- over 30,000 pre-school teachers and teachers
- over 270,000 children, pupils and upper-secondary students
- over 200 learning programmes and the relevant number of plans
- over 79,000 higher education students
- over 5,600 higher education teachers and over 3,000 higher education staff.

c) and public institutes in education (ZRSŠ, CPI, ŠR, ACS, RIC, CŠOD, ARNES, etc.).

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Annex 1: Orientations, documents and incentives in Slovenia and European Union as to ICT

The goals specified in chapter 2 come also from the recommendations, orientations and documents of EU, Slovenia and beyond, and below, there is the summary of those goals.

1 Orientations in EU

Even if the success in providing conditions to raise digital competences and effectiveness of ICT use in the process of learning and teaching underlies individual countries, the role of EU is important, for the complexity, as well as key orientations for all member countries. EU may promote best practices and support exchange among member countries. It may provide the benefits of economy of scale and interoperability, and thus, prevent fragmentation. It may support the expansion and availability of digital technologies and contents by providing financial support, set up public-private partnerships and provide recommendations. The strategies and activities are also well recognised (e.g. UNESCO – declaration Open Educational Resources and movement.

Important documents and initiatives of EU (under chapter 1, page 4, as well) in the area:

a) Digital agenda
b) Recommendations for the European strategic goals for ICT in education (EUN School net and Liegeu University
c) Initiative Opening up education
d) Guidelines for the successful development and implementation 1:1
e) Digital Competence Framework for citizens
f) Grand Coalition for Digital Jobs
g) Council Resolution on a renewed European agenda for adult learning
h) Strategic framework for European cooperation in education and training (ET 2020)
i) Lifelong learning memorandum
j) Horizon Report Europe 2014: Schools edition
k) Horizon Report Europe 2014: Higher Education Edition
l) Other EU communication and recommendations.

a) Certain priority areas from the <u>European Digital Agenda:</u>[30]

Key orientations or goals of the European Digital Agenda:

- fast and ultrafast access to Internet
  To build on a strong economic growth, to create jobs and to foster well-being, as well as to provide access of citizens to contents and services they search, we need a very fast Internet.
- General coverage through wideband connections with improved rates
- Improvement of digital literacy, knowledge and inclusion
  The spirit of digital era should cater for empowerment and emancipation; social origin and knowledge should not linger in the way of this potential.
- Digital literacy and knowledge
  All European citizens have to learn the skills of using ICT and digital media, in particular enlist participation of the young in the education for ICT.

[30] European Digital Agenda, COM, 2010.
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0245:FIN:SL:PDF

b) Results of the research[31] and recommendations by *EUN* and the *University of Liegeu* for European strategic goals in the area of ICT in education

Based on the priorities of the digital agenda that emphasise in particular general coverage with fat Internet and endeavours to improve digital literacy and knowledge the following goals are aimed more at continuous ICT implementation in education based on the research of the European Commission's Survey of Schools: ICT in Education, final report, 2013:

- Quality improvement: use of ICT should systematically improve the level of quality of teaching and learning.
- Learning digital competences: the young people and adults should become aware of urgent need to have digital competences (skills) for their personal, professional, social and cultural successes.
- Improvement of possibilities for success on the market of labour: school education should provide basic ICT skills with which learners should enter labour market (where currently, professional knowledge are expected to be complemented with ICT competences).
- Boost of efficiency: use of ICT in educational and cultural administration should help make the organisation more effective. Thus, it is important to have infrastructure and services of sufficient capacity set up.
- Social inclusion: the use of ICT should strengthen the inclusion and social integration; major challenge represent the media and security.
- Support art and culture: learning to use ICT should be present in arts and creativity, but separately from traditional arts. Therefore, future generations of artists should be able to decide for this tool, as well. Furthermore, the use of ICT should promote the importance of arts, culture and creativity.

c) Message or initiative of EU Opening up Education,[32] September 2013)

It specifies a plan to promote high quality and innovative methods of learning and teaching by also using new technologies and digital contents. The message includes the measures recommended for open educational environments that would provide more quality and efficient education, thus, support the pursuit of goals of the Strategy Europe 2020 to improve competitiveness and growth in EU with more qualified workforce and jobs.

The diagram below shows major areas and planned activities of the initiative.

Figure 2: Major areas of the initiative Opening Up Education

[31] European Commission: Survey of Schools: ICT in Education, Final Report, 2013. http://ec.europa.eu/information_society/newsroom/cf/dae/document.cfm?doc_id=1800

[32] Opening up Education, http://www.openeducationeuropa.eu/sl/initiative

d) Guidelines for successful development and implementation 1:1

To develop and implement Pedagogics 1:1 a model leading to as success of Pedagogics 1:1 with 21 steps and four levels was developed. The model is used by schools in Slovenia and beyond.

Table 2: Leading to success of Pedagogics 1:1 with 21 steps and four levels

Leading to success of Pedagogics 1 on 1 with 21 steps and four levels		
Level 1: Planning Step 1: Research Step 2: Vision development Step 3: Inclusion of parents and interested public or school council Step 4: Planning the communication strategy Step 5: Assessment of operational readiness Step 6: Development of project plan Step 7: Development of detailed budget Step 8: Selection of relevant proprietary and financial model	**Level 2: Preparation** Step 9: Provide teachers with notebooks Step 10: Organisation of education and training of teachers in implementing Pedagogics 1 on 1, planning the change in the strategy of management Step 11: Physical setting up of classrooms Step 12: Choosing proper software for pursuing pedagogical goals Step 13: Testing hardware and reviewing options of cooperation with different suppliers Step:14: Estimate of costs to implement the programme Step 15: Taking of strategic decisions Step 16: Planning responses and answer to anticipated questions	**Level 3: Implementation** Step 17: Set up of support structures Step 18: Meeting with parents and/or interested public Step 19: Acquisition of hardware and organisation of distribution Step 20: Distribution of notebooks to students **Level 4: Evaluation** Step 21: Review and improvement

e) Digital Competence Framework for citizens[33]

The aim of the Digital Competence Framework in Europe (DIGCOM) is to identify and describe key components of digital competences in view of knowledge, skills and attitudes. There is a variety of initiatives, but there is lack of common understanding and directions at the European level. The framework developed representatives of different countries by working together, the same as the initiative Opening up Education. The structure of the digital competence frameworks follows the MATRIX of five dimension (table 3):

- Dimension 1: competency areas (5)
- Dimension 2: competences (21)
- Dimension 3: levels (3)
- Dimension 4: examples of knowledge, skills and attitudes
- Dimension 5: examples of various uses (education, employment)

Table 3: Matrix of 5 dimensions

[33] Digital Competence Framework in Europe – DIGCOMP. http://ftp.jrc.es/EURdoc/JRC83167.pdf

Dimension 1 Competency areas	Dimension 2 Competences
1 Information	1.1 Browsing, searching and collecting information 1.2 Evaluation of information 1.3 Storing and recalling information
2 Communication	2.1 Interaction via technologies 2.2 Exchange of information and content 2.3 Inclusion in the online citizenship 2.4 Cooperation via digital paths 2.5 Net ethics 2.6 Managing digital identity
3 Content creating	3.1 Content development 3.2 Inclusion and development 3.3 Copyright and licences 3.4 Programming
4 Security	4.1 Protection of facilities 4.2 Personal data protection 4.3 Health protection 4.4 Environment protection
5 Problem solving	5.1 Solving of technical problems 5.2 Identifying the needs and technological responses 5.3 Innovation and creative use of technology 5.4 Identifying gaps in digital literacy

f) Grand Coalition for digital jobs[34]:

Goals of the grand coalition for digital jobs:
- Improve quality of special knowledge and skills of employers and learners in computing and computer systems.
- Establish partnerships and effective cooperation between education and economy, of existing activities.

g) Council Resolution on a renewed European agenda for adult learning[35]

The ***document*** highlights the importance of the contribution by lifelong learning and adult education as essential parts of the continuity of lifelong learning in pursuing goals of the strategy Europe 2020.

[34] Grand Coalition for Digital Jobs. http://ec.europa.eu/digital-agenda/en/grand-coalition-digital-jobs
[35] Council Resolution on a renewed European agenda for adult learning, EU Official Journal, 2011/C372/01. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2011:372:0001:0006:EN:PDF

The priority areas of the European programme for adult education 2012–2014 include the following recommendations:

1. Promotion of flexible ways of learning for adults, **area 1 Implementation of lifelong learning and mobility**.
2. Development of digital literacy under **area 3 Promotion of fairness, social cohesion and active citizenship with support of adult education**.
3. **"Improved use of ICT in adult education**, namely as a tool to provide wider access to education and better quality of offers, for example with the use of new ways for distant learning and setting up tools and platforms for e-learning. All would help us reach new target groups, in particular those with special needs or those living in outlying areas, **area 4 Foster creativity and innovation of adults and new learning environments**

h) Strategic framework for European cooperation in education and training (ET2020):[36]

The ***Strategic framework for European cooperation in education and training (ET 2020)*** highlights at several points the significance of education and training as to pursuing goals of Europe developing into the most competitive and dynamic, as well as knowledge based economy in the world. For ICT we may find relevant goals in three strategic goals of the document. Under the **strategic goal 1: Implementation of the lifelong learning and mobility principle** it is written among other that one should strive to set up more flexible learning paths, enable greater openness for non-formal learning, promote adult education, as well as endeavour to augment the attractiveness of learning through developing new forms of learning and use of new technologies for teaching and learning. Under the **strategic goal 2: Improvement in quality and efficiency of education and training** defines the most important challenge the acquisition of key competences. Under the **strategic** goal **4: Strengthening of creativity and innovation, including entrepreneurship, at all level of education and training** highlights the importance of innovation and creativity for economic development, acquisition of transversal skills such as learning and digital literacy.

i) Memorandum on lifelong learning[37]

Among key goals of the Memorandum is to open possibilities of lifelong learning to all learners in their environments and by ICT support, as close as possible and where appropriate. The document specifies three messages related to ICT, namely under paragraph 4:

- **1: New basic skills for all** which focuses on the significance of basic skills for active participation in the society of knowledge;
- **3: Innovation in teaching and learning** which highlights the potential of ICT for innovation in methods of teaching and learning;
- **6: Let us bring learning closer to home**, which highlight the great potential of ICT for dispersed and isolated populations, the signification of lifelong learning as driving forces for local and regional renovation and localisation of learning centres at everyday locations chosen by people.

j) Horizon Report Europe 2014: school edition[38]

There were 53 European professionals who researched, discusses and developed the first report Horizon Report Europe: 2014 Schools Edition. The European Commission and non-profit organisation

[36] Strategic Framework for European cooperation in education and training 2020, EU Official Journal, 2009/C119/02. http://ec.europa.eu/education/policy/strategic-framework/index_sl.htm

[37] Memorandum on lifelong learning. http://linux.acs.si/memorandum/prevod/

[38] Horizon Report Europe – 2014 Schools Edition, https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/horizon-report-europe-2014-schools-edition

New Media Consortium (NMC) participated, as well. The series of the NMC Horizon Report depict the five-year predicted influence that new technologies will have on school communities all over the world. Research has been ongoing and published for over 12 years, thus the series may be indicated as the longest study of the emerging technologies and their use in education.

The professionals agreed about two important and imminent trends: **changing roles of teachers due to ICT and the influence of social media platform** such as Facebook and Twitter that found their way into classrooms. These are only two of 18 topics that the Horizon Report Europe: 2014 Schools Edition reports on and in which the key trends, important challenges and technological development that will most likely bring about changes in basic and upper secondary schools in the next five years in 28 member countries

Medium-term or in over two to three years in Europe, we will focus more at open access learning sources and use of traditional as well as virtual teaching methods. These trends are defined at global level as well as trends that promote new models of teaching and learning by drawing form ample contents accessible online via Internet.

Table 4: Highest rated trends of the three research projects NMC Horizon

NMC Horizon Report 2014 Global K-12 Edition	Horizon Report Europe 2014 Schools Edition	NMC Horizon Report 2014 Global Higher Ed Edition
Fast Trends		
Rethinking the Role of Teachers Shift to Deeper Learning	Growing Ubiquity of Social Media Rethinking the Role of Teachers	Growing Ubiquity of Social Media Integration of Hybrid Learning
Mid-Range Trends		
Increasing Focus on OER Integration of Hybrid Learning	Increasing Focus on OER Integration of Hybrid Learning	Rise of Data-Driven Learning Shift to Students as Creators
Long-Range Trends		
Acceleration of Intuitive Tech Rethinking of the School Day	Evolution of Online Learning Rise of Data-Driven Learning	Agile Approaches to Change Evolution of Online Learning

Table 5: Highest ranked challenges of three research projects NMC Horizon

NMC Horizon Report 2014 Global K-12 Edition	Horizon Report Europe 2014 Schools Edition	NMC Horizon Report 2014 Global Higher Ed Edition
Solvable Challenges		
Authentic Learning Personalising Learning	Integrating ICT in Teacher Ed Students Low Digital Competence	Lack of Rewards for Teaching Low Digital Fluency of Faculty
Difficult Challenges		
Complex Thinking and Communication Increased Concern about Privacy	Authentic Learning Blending of Formal/Non-Formal	Competition from New Models Scaling Teaching Innovations
Wicked Challenges		
Competition from New Models Keeping Education Relevant	Complex Thinking and Communication Students as Co-Designers	Expanding Access to Education Keeping Education Relevant

k) **Horizon Report Europe 2014: Higher education edition**[39]

Over fifty European professionals from 13 countries contributed to the development of the Horizon Report Europe: 2014 Higher Education Edition, as well as the European Commission and non-profit organisation New Media Consortium (NMC). The same as the school edition the higher education edition of the reports NMC Horizon Report depicts the five-year prediction for the influence of the evolving technologies on higher education community worldwide. The research have been ongoing and published for over 12 years, so the series may be considered as the longest research of evolving technologies and their use in education.

The group of experts highlighted in the report two key and imminent trends that policy makers will have to face. Learning, teaching and assessing based on data analysis and new forms of flexible institutions that respond faster and with more effort to changes in environment. Under short-term trends that will reach their pick in two years, one defined:

- Potentiated growth and ubiquitous of social networks of which full consequences are not yet known, because open issues exist as to information reliability that students receive in such communication, but at the same time, one witnesses positive trends of changed and more open way of communication;
- Connecting and interlinking distant learning, online, hybrid and group learning. Web environments enable new and flexible forms of learning and teaching, as well as open dilemma and provide cases of good practice as to the ways of assessing knowledge. In certain cases, these approaches resulted in improved critical and creative thinking of students and their cooperation.

Medium-term trends that shall reach their peak in 3 to 5 years include learning, teaching and assessment based on data analysis that all stakeholders in the process of education shall submit online to the web. Such kind of data analysis may enable, among other, the individualisation of teaching or learning, as well as early identification of problems that may lead to dropout. In this period, one will witness an evident transformation of students from users to co-developers of the study process.

Long-term trends are the new forms of flexible institutions that respond promptly and ambitiously to changes in environment, as well as the continuing development of online education.

l) Other communication and recommendation by EU

The European Commission has issued a report "Supporting growth and jobs – Modernisation of the European higher education systems programme"[40]. The report reflects "a strong need for flexible, innovative approaches to teaching and learning to improve quality and relevance in view of increasing number of students, extended cooperation of various groups of learners, as well as doing away with dropouts. As specified by the European Digital Agenda[41], it is key, among other, to take transformation advantages of ICT and other new technologies and herewith enrich teaching, improve learning experience, support with individualised learning, facilitate access through distant learning and virtual mobility, rationalise the administration, as well as create new research opportunities".

[39] Horizon Report Europe – 2014 Higher Education Edition. http://redarchive.nmc.org/publications/2014-horizon-report-higher-ed

[40] Supporting growth and jobs, COM (2011) 567).
http://www.eumonitor.eu/9353000/1/j9tvgajcor7dxyk_j9vvik7m1c3gyxp/visyrzh2fxzx

[41] European Digital Agenda, COM(2010) 245.
http://europa.eu/legislation_summaries/information_society/strategies/si0016_en.htm

2 Policy in Slovenia to date

The relevant documents and initiatives in Slovenia that were used, in particular, to develop goals and indicators as under chapter 1 include:

a) Strategy of Information Society Development Si2010
b) Action plan 2006
c) Action plan SIO (of 2007)
d) National E-education Strategy until 2010
e) National coalition for digital jobs
f) Resolution on National Higher Education Programme 2011–2020

a) Strategy of information society development– si2010[42]

The goal of the strategy si2010 it to advance the development of the information society that will have a significant impact on fostering innovation and competitiveness of the Slovenian economy and society, increasing the number of jobs with high added value, improving quality of life and constant regional development.

Si2010 includes three main areas of measures:

- Single European information space and Slovenia;
- Innovation and investment in ICT, and
- Inclusive information society and quality of life.

Measures keep to the following six principles of activities:

- Interoperability and open standards;
- Safety and privacy;
- Intellectual property;
- Access and inclusion;
- Knowledge and skills, and
- Slovenian language and cultural identity.

The Strategy si2010 specifies the area of education and in the field of the information society development highlights the following challenges: low use of ICT in learning process, low level of knowledge and skills, as well as insufficient offer of e-contents and e-services in Slovenian language.

Directly, the strategy connects ICT with the area of education also under chapter e-education that it specifies as "*learning and teaching by using modern information-communication technology*".
The vision si2010: "*until 2013, establish an efficient and overall information supported national education system that shall allow modern ways of rendering and acquiring knowledge with the help of modern information-communication technology".*
The strategy specifies the following strategic goals:

[42] Pending strategy upgrade: Draft Strategy of Information Society Development until 2020 (2015), http://www.mizs.gov.si/si/delovna_podrocja/direktorat_za_informacijsko_druzbo/digitalna_slovenija_2020/

- Allow faster, simpler, friendly and individual's needs and abilities adapted access to knowledge to all citizens of the Republic of Slovenia;
- Set up a single point (Internet portal) with all available contents open to all participants interested in e-knowledge;
- Set up the (organisation) system of acquiring knowledge and support in ICT for all interested participants;
- Adapt instruments and realise incentives of public-private partnerships for research-development activity in e-education and flow of knowledge among people.

b) Action plan for continuing leap of ICT in education of 2006[43]

The programme board for IT implementation in education specified in 2006 the action plan for continuing leap of ICT in education and its four main areas and based on it a set of specific goals and measures for 2007–2015.

Strategic areas or directions:

- *PROFESSIONAL DEVELOPMENT OF INDIVIDUALS*

Raise the quality of ICT knowledge of pupils, teachers, and school leaders so they will become active creators of ICT in education focused on the active use of modern ICT to improve their knowledge.

- *RESEARCH-DEVELOPMENT AND EDUCATIONAL PROCESSES*

Expand and partner-up the development and research, as well as raise the level and provision of education and training to use ICT in teaching, learning and administration, as well as upgrade the content support to users.

- *CONTENTS*

Expand the assortment of e-material and raise the level of modern, quality and (public) accessible e-contents that employs the media options (interactivity, multimedia). Include all types of professionals and institutions in the development of e-material. Set up a system for production and distribution of e-material proficiency at all levels, namely as to didactics and technological aspects.

- *ORGANISATION OF IT IMPLEMENTATION IN SCHOOLS AND INFRASTRUCTURE*

Expand facilities for each individual and educational institutions, their Internet connection, as well as upgrade the technical assistance and counselling so that ICT will facilitate and assure efficiency and quality education and its management.

c) Conceptual design of the programme of projects to set up the Slovenian education network[44] (2007)

There were detailed services on the Slovenian educational network (SIO) recommended for the conceptual design. Sum-up of gaols defined aimed to:

- create a community of users that shall cooperate, acquire new knowledge, develop and use didactical approaches in the educational process, namely with the support of SIO;
- provide access to quality educational material (contents), information, and activities for all users, as well as for wider public in the Slovenian, Italian and Hungarian language;

[43] Action plan for the follow-up leap of the IT implementation in schools, 2006. 2006http://www.mizs.gov.si/fileadmin/mizs.gov.si/pageuploads/podrocje/IKT/akcijski_nacrt_informatizacija_solstva_8_2006.pdf

[44] Conceptual design of project programme for developing the Slovenian educational network http://www.mizs.gov.si/fileadmin/mizs.gov.si/pageuploads/podrocje/IKT/SIO_10_2007.pdf

- establish SIO as the central place for important information in education for all target groups;
- cooperate with international institutions, initiatives, associations of the field;
- cater for continuous development and improvement of offer and operations of SIO;
- pursue promotional activities for the use of ICT and SIO, motivational workshops, designated training, and similar;
- cater for excellence of ICT use in the Slovenian education; and
- provide technical support.

d) National strategy of e-education until 2010[45]

Common goals of the National strategy of e-education of 2006:

a. By way of e-education support the pursue of four strategic goals of the Development of Slovenia:[46]
   1. Economic development goal: in ten years, raise beyond the EU's average level of economic development and increase the employment in line with the goals of the Lisbon strategy;
   2. Social development goal: improve the quality of life and wellbeing of all individuals;
   3. Intergenerational and nature friendly development goal: implementation of the sustainability principle as the common quality criteria in all areas of development;
   4. Slovenia's development goal in the international environment: became a country with global recognition and of good reputation, namely with the development pattern, cultural identity and engaged operations in the international community;
b. improve access, effectiveness and success of learning and teaching at all levels of the Slovenian society;
c. enable fast, easy, friendly and to the individual's needs and abilities adapted access to knowledge to all citizens of the Republic of Slovenia;
d. raise the level of knowledge as the common value for growth, development and success of an individual as well as of the whole Slovenian society aimed at active inclusion in the process of lifelong learning;
e. improve the structure of educational qualifications and the scope of competences of citizens of the Republic of Slovenia, and in this way facilitate employment, support better and increase the number of jobs, as well as accelerate the development of quality services and products, the results of the domestic knowledge;
f. guarantee to all educational institutions and companies proper conditions for pursuing the highest quality services of e-education, namely in line with their status of public or private institution;
g. adapt the rules and improve the initiatives to provide and use services, as well as products of e-education among natural as well as business persons;
h. upgrade the initiatives for public-private partnerships in terms of supporting research-development activities in the area of e-education and knowledge flow among them.

The Strategy of e-education pursues five development priorities of the Slovenia's development strategy (SRS). In particular, the e-education strategy focuses on the realisation of the second development priority "Improvement in quality of education and promotion of lifelong learning".

[45] National e-education strategy until 2010, 2006, http://profesor.gess.si/marjana.pograjc/%C4%8Dlanki_VIVID/Arhiv2006/Papers/DELKokalj2006.pdf

[46] Slovenia's development strategy, www.slovenijajutri.gov.si

e) National coalition for digital jobs

The recommended set up of the Slovenian digital coalition shall make it possible to avert the dangers of the rising digital noncompliance and to pursue actively the advantages of using the new ICT. Accordingly, the designed projects may be considered under the defined benefits of the planned Operational programme 2014–2020 that focuses, in particular, to measures of "providing support to target groups in acquiring knowledge, skills, general and vocational competences needed for the individual to enter labour market, including the development of digital literacy and digital competences for integration of individuals in (e)-communities". To plan the development for the multi-annual period 2014–2020 one analysed the setting and defined key requirements: enhance inclusion in the lifelong learning to improve general and vocational competences, link between education and labour market, make the system of recognising non-formal and informal learning more effective, increase the use and development of e-tools in education, invest in development of ICT infrastructure in educational institutions. To improve the response and quality of the education system it is necessary to use ICT that alters the way of teaching, learning contents and processes, as well as to develop digital skills of included individuals as well as professional staff, and introduce new didactical learning models that shall include as acceptable use of ICD in lessons and learning and development of e-contents.

Operational goals of the Slovenian digital coalition:

- enhance and improve the implementation of the European digital agenda
- boost the use of ICT for new jobs
- improve digital literacy of target groups of citizens in line with the recognised gaps
- improve e-skills and greater e-inclusion
- intensify inclusion of ICT in education and lifelong learning to allow the inclusion in a digital community
- enhance the use of e-services (e-administration, e-banking, e-health…) and the advancement of ICT in public sector.

With the strategic national partnership for digital jobs or employments, the Slovenian digital coalition, Slovenia shall enhance the activities for the development of modern digital community and by doing so take advantages of opportunities provided by ICT.

Recommended partners of the Slovenian digital coalition:

1. public sector (state and public bodies): Office of the Prime Minister, Ministry of Education, Science and Sport, Ministry of Labour, Family, Social Affairs and Equal Opportunities, Ministry of Economic Development and Technology, Ministry of the Interior, Ministry of Health, Ministry of Culture, Slovenian Intellectual Property Office;
2. ICT companies (employers of ICT professionals and users of ICT services), the Chamber of Commerce and Industry of Slovenia and the Chamber of Craft of Slovenia, providers of electronic communication networks and services, providers and producers of ICT facilities and services, companies in the area of traffic and transportation, companies in the area of production and distribution of energy and energy-producing product, bank and insurance sector, technological centres and start-up companies, centres of excellence and competitive centres in the area of ICT;
3. education sector (universities, vocational schools and adult educational organisations in the area of ICT);
4. professional associations and organisation of civil society in the area of ICT;
5. promotor of digital technology in the area of e-inclusion.

To do the tasks consistently in terms of realising the defined operational goals of the Slovenian digital coalition the partners would meet periodically and in narrower working groups wherein each partner would assign its own representative. The groups would be organised by themes in line with the operational goals. The Ministry of Education, Science and sport would be responsible for the coordination of activities and provision of administrative and technical support to the Slovenian digital coalition.

The Slovenian digital coalition shall be set up for the period until 2020 and it shall include annual reviews of the implemented activities and transitional reviews of outcomes achieved until 2016 that shall be made public.

f) National higher education programme Resolution 2011-2020[47] (NPVŠ)

NPVŠ is a strategic document that defines the goals of higher education and the activities for the development and efficient work in higher education, among other. Under the paragraph Quality and responsibility, action 27, the NPVŠ 2011–2020 foresees the institutional adjustment in all fields of activities of higher education institutions for the use of new technologies and ICT facilities. It is an administration and/or managerial activity of institutions and the implementation of new technologies in the process of learning and/or support the learning process. The higher education institutions are to provide education and training of staff and students for the use of that facilities and other support. In the scope of the Operational programme for human resources development 2020, there is an action foreseen for flexible and innovative form of education and learning.

The National higher education programme Resolution 2011–2020 defines under goals in the paragraph Quality and responsible the “improved incorporation of studying by distant learning in the Slovenian higher education system”.

[47] Resolution on the National programme of higher education 2011-2020, 2011, http://www.uradni-list.si/1/content?id=103885

Responsible for the development of the Strategic directions for continued implementation of ICT in the Slovenian educational institutions until 2020:

- members of the programme board for the IT implementation in education: Aleš Ojsteršek (chair), Marjan Turk, mag. Gregor Mohorčič, Elvira Šušmelj, Iztok Žigon, Mišela Mavrič, PhD, mag. Urban Krajcar, mag. Darinka Cankar, dr. Andreja Barle Lakota, mag. Borut Čampelj, Janez Čač, dr. Marko Colnar and Bronka Straus (all MIZŠ), dr. Vinko Logaj (ZRSŠ), mag. Vlasta Poličnik (ŠR), dr. Mojca Štraus (PI), Elido Bandelj (CPI), mag. Marko Bonač (ARNES), dr. Janez Bešter (Faculty of electrical engineering, UNI LJ), dr. Boris Aberšek (Faculty of natural science and mathematics, UNI MB), mag. Mitja Jermol (Institute Jožef Stefan), dr. Tomaž Turk (Faculty of economy, UNI LJ), Nives Počkar (ŠC Ljubljana), Bogomir Marčinkovič (OŠ Bistrica ob Sotli), and mag. Andrej Flogie (Institute of Anton Martin Slomšek Maribor), and
- other specialists: mag. Nives Kreuh (ZRSŠ), Davor Orlič (Institute of Jožef Stefan), mag. Tomi Dolenc (ARNES), Barbara Neža Brečko (IPTS Spain), Mirko Stopar, Borut Šorli, and Duša Marjetič (MIZŠ).