From Group Training to Individual Advanced Education
(Developing Human Resources in Slovak Statistics)

Tibor Papp, Institute of Informatics and Statistics
Igor Prívara, Institue of Informatics and Statistics
Peter Smutný, Statistical Office of the Slovak Republic

Key words: statistical education, eLearning, ECDL, individual advanced approach

1. Introduction

In principle, the statistical system of the Slovak Republic is centralized. Major part of official statistics is produced by the Statistical Office of the Slovak Republic (SO SR). Some statistics are produced also by other (public administration) institutions, but under the methodological supervision of the SO SR.

From the organizational point of view, the SO SR is also centralized and it has 8 regional branches. Almost 80% of statisticians of the central office have university degree. In the regional offices this number is approximately 50%. Academic education usually enables faster adaptability of new employees to the specific know-how required for fulfillment of the statistical tasks.

The dynamically changing environment, staff turnover and rapid development of modern statistical methods all require the national statistical offices (NSO) to invest considerable amounts of resources into continuous education and training of the staff. Such an approach to continuous education and training of human resources aimed at the official statistics is also one of the key priorities in the long-term strategy of the SO SR.

Based on this strategy, the midterm conception of education and training within the SO SR was approved in 2005. Currently, the results of these activities are evaluated and analyzed. Following the evaluation, adjustments are made in educational activities for the coming years.

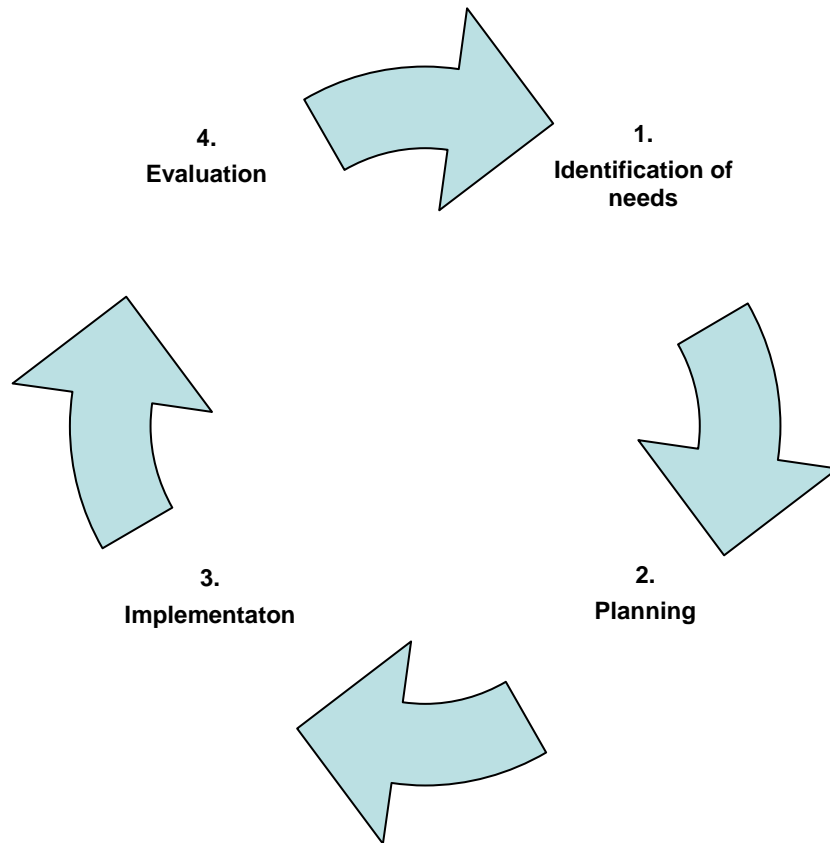Consequently, the main objectives of the presentation are:

- to summarize medium term strategy of education and training in the SO SR,
- to outline our preliminary visions of human resource development at the SO SR in the near future.

Educational activities within the SO SR are implemented in close co-operation between the SO SR and Institute of Informatics and Statistics (INFOSTAT), research and development institute of the SO SR.

2. Summary of Educational Activities in Last Period

Based on the development strategy of the SO SR, human resources policy of the SO SR and „The Conception of Education of SO SR Employees" a systematic approach to education activities is applied, which is helping to increase efficiency of the education and training process. We refer to this approach as to the education and training cycle.

The education and training cycle consists of four consecutive phases: identification, planning, implementation and evaluation of education and training (see Figure 1 below).

Figure 1 - Education and training cycle

The annual education cycle is initiated by identification and analysis of needs. During the planning phase design (content, choice of methods and forms), budget and schedule of education activities are proposed. After implementation of educational activities (third phase) the results and effectiveness of educational activities are evaluated. Evaluation is based primarily on feedback from participants, their managers and educational institution. The results of evaluation are taken into account in the first two phases of the next cycle.

Experience with this approach to education within the SO SR is positive, namely because it

- provides regular education and training of employees,
- continuously forms the employees working competence inline with the specific needs of the SO SR,
- continually improves knowledge and skills of the employees,
- contributes to working output of the employees and to the quality of statistical products and results,
- contributes to more effective expenditures on the education of employees,
- improves quality of the educational process by a regular feedback,
- improves attitude employees to the SO SR and increases their motivation,
- contributes to the personal evolution of employees and their career growth,
- improves working and human relations among the employees within the SO SR, as well as, with the customer and partners of the SO SR.

Education and training within the SO SR was aimed to develop an internal environment as a knowledge-information institution. The specific educational activities were clustered into the following main subject areas:

- preparation of managers and their successors,
- preparation of experts for state statistics,
- training in acquisition of ICT skills.
- improvement of language abilities,
- development of the employees „soft skills".

The prevailing form of educational activities during the past period was face-to-face courses. Nevertheless, we have the first positive experience with blended learning (combination of e-learning with short face-to-face consultations) in courses for ECDL certificates (see next chapter). In general, traditional group approach was preferred, but requests for individual approach and for training supervised by a tutor are becoming more frequent.

As the main problems hampering the educational activities during the past years were considered

- limited financial resources for education and training from the SO SR budget,
- lack of experienced lecturers for advanced statistical topics.

The first problem was mentioned also in the World Bank study "Statistical Capacity Master Plan for the SR" with recommendation to increase the budget for education and to look for some external financial resources.

On the other hand the main achievements are

- development and successful implementation of the Schola Statistica Program (see brief description below),
- extensive educational project for state statistics financed from external sources (European Structural Funds) managed by INFOSTAT from 2005 to 2007,
- more than 80% of all employees of the SO SR obtained an ECDL certificate.

The last two items are mentioned in more detail in the next chapter.

Schola Statistica Program: The education and training program Schola Statistica provides participants with

- the basic information about mission, goals and tasks of the SO SR in national as well as European context and the role of state administration and its employees,
- overview of the tasks solved in particular statistical departments,
- exercise of the basic statistics methods,
- overview of basic database technologies for the processing of statistical data,
- enhancing skills with typical application software.

The program consists of 3 blocks, of which two are considered basic and one is advanced. The basic blocks are intended mainly to newcomers. The third, advanced, block is recommended also to employees willing to enhance their acquaintance with the statistical methods. In the first block, information of the general nature are conveyed to all newcomers. The second block is oriented to the specific needs of statisticians (basic statistical methods, Excel for statisticians). The third block focuses on specialized statistical methods, as well as, on software systems and tools used at the SO SR.

The advanced block is delivered in co-operation with INFOSTAT. Currently, it is also the part of the more extensive program „Practical statistics and statistical informatics".

3. Role of INFOSTAT in the SO SR Education and Training

INFOSTAT is the research and development institute of the SO SR. Therefore, its activities are to significant extent connected to the needs and activities of the SO SR.

The main areas of INFOSTAT´s activities are statistical methodology, statistical informatics and design and development of IS (mainly for state administration).

The activities of INFOSTAT are predominantly connected with the SO SR. However, it is involved also in the projects for other agencies of state administration, as well as, in international research projects.

As a research and development institute, INFOSTAT is already a traditional partner of the SO SR also for education and training. For many years INFOSTAT provides for the SO SR the courses on advanced statistical methods and information and software systems and tools (developed by INFOSTAT). The educational activities are one of the natural forms how to transfer the results of applied research and development into the statistical practice.

In the last period, the long term experience with statistical education and training culminated in two activities

- large educational project (financed by ESF – European Structured Funds) for state statistics,
- accreditation of the integrated educational program "Practical Statistics an statistical informatics" by Ministry of Education of the SR.

ESF project: At the end of 2004 INFOSTAT procured the European Social Fund project „Education of employees of the public administration as a human resources development aimed at the state statistics". The main goals of the project were

- increasing adaptability of the state statistics employees to utilize progressive statistical methods and modern ICT,
- enhancing competiveness of statistical research and development in solving actual problems and projects in co-operation with the research groups and institutes in the realm of European statistics,
- development and raising efficiency of state administration.

As for the content the project was aimed to enhance competence and professional knowledge the state statistics employees with the focus on

- increasing managerial competence and skills

  The courses for managers and perspective managers focused on the principles and functions of state administration management, effective representation in the EU bodies and the project management (including preparation and guidance of the EU funding projects).

- vocational education and training in statistics and demography

  The courses for the personnel of state statistics (not only the SO SR) focused on analysis and evaluation of statistical data, with emphasis on development of statistical method used in the ESS, methodology of setting the statistical indicators, forecasting tools, trends in excercitation of mathematical-statistical methods etc.

- common education and training in statistical informatics

  The courses were focused on efficient application of technological systems tools used in the SO SR (statistical information system AŠIS, Oracle) and on improving the skills level in using computers (ECDL program).

- specialized informatics training for information systems developers

  The advanced courses for the statistical systems developers reflected the technological environment of the SO SR (Oracle, Microsoft) covered the development tools of the Oracle database system (including technology of data warehouses), MS development tools and object-oriented methodology of design and development of information systems.

- professional English language skills

  The goals of the courses were to improve language abilities for active and fully-fledged participation and co-operation on international projects, as well as, to enhance proficiency in the communication skills necessary for active participation at the international statistical events, meetings of working groups and committees EU etc. The language courses were organized in two forms, intensive (a full week conversation classes) and semi-intensive courses (4 hours weekly for 6 month)

The ESF project, as the most extensive educational activity within the SO SR, was realized during the years 2005 – 2007. As one can see from the following table, the courses were attended by the large number of statisticians (predominantly from the SO SR). Figures in the table are number of courses, course duration in days and number of participants. The prevailing majority of courses were organized by INFOSTAT, only the specialized Oracle training courses were delivered by Oracle Slovakia and the language courses were provided by a language school.

During the project, more than 80% of the SO SR staff obtained the ECDL certificate or ECDL Start certificate (73 ECDL certificates and 279 ECDL Start certificates). The ECDL training was the first significant experience with blended education and training within the SO SR. The e-learning course materials were available at the intranet for all participants. Before the ECDL tests, the participants attended one day training (with brief summary, clarification unclear issues and demo tests). The blended approach to training had clearly positive response (a possibility to self organized study). After project experience indicates an important fact, significant increase of efficiency in using computers.

Increasing managerial competence and skills			
Principles and functions of management focused on the state statistics	3	15	62
Project management	2	5	28
Vocational education in statistics and demography			
Methods of statistical analysis and forecasts	4	5	75
Seasonal analysis	3	5	45
Sample surveys	3	5	56
National accounts, tables of use and supply, SAM matrices	3	5	43
Demographic analysis and forecasts	3	5	28
Common education in statistical informatics			
Exploitation of the AŠIS information system	5	5	77
Innovations of the AŠIS information system	2	1	31
Database system Oracle for statisticians	1	5	20
ECDL modules – training	26	1	392
ECDL modules – tests	55	1	513

Specialized informatics training for developers			
Oracle database – languages, tools, administration	17	2-5	67
Methodology of IS design and development	1	5	8
Microsoft tools for developers	4	5	53
English language skills			
Intensive daily courses	12	5	17
Semi-intensive courses (4 hours weekly)	4		43
English for EU	3	5	30

Educational program "Practical Statistics and Statistical Informatics": After decades of practice, INFOSTAT elaborated the educational program "Practical Statistics and Statistical Informatics". The program has been successfully accredited by the Ministry of Education of the SR in 2008.

The goal of the program is to provide the state statistics staff with integrated educational system supporting lifelong training in the key thematic areas necessary for increasing the competence.

The program consists of approximately 20 modules divided into 3 thematic clusters:

- modern statistical methods and their practical application in statistics,
- mastering principles and functions of the Automated Statistical Information System (AŠIS),
- effective use of personal computers (ECDL).

The courses in the cluster „Modern statistical methods and their practical application in statistics" contribute to education of the public administration employees in the areas exploitation, analysis and interpretation of statistical data. They reflect actual aspects of the statistical practice, development of statistical methods in context of European statistics, methodology of the statistical indicator setting, tools for forecasting, trends in application of modern mathematical-statistical methods etc.

The education and training in the area of statistical informatics is focused either to effective application of technological tools used in the SO SR (statistical information system IŠIS) or to improvement of the computer skills (ECDL program and certificate).

The cluster "Modern statistical methods and their practical application in statistics" currently consists of the following 7 modules:

- Introduction to mathematical and economical statistics
- Mathematical and statistical methods for analysis and forecasts of economical development
- Seasonal analysis of time series
- Sample surveys
- Introduction to demography
- Demographic analysis and forecasts.

The employees can choose the modules relevant to his/her professional profile. The student (trainee) will acquire qualification, knowledge and practical skills, for application methods and techniques used in/by official statistics. The list of available modules will be gradually changed, according to the needs of the SO SR.

The cluster "Mastering principles and functions of the Automated Statistical Information System (AŠIS)" provides detailed user training to the AŠIS, information system of the SO SR

- Introduction to AŠIS – an Automated Statistical Information System
- REGIS – a subsystem for administration of statistical registers and classifications v in AŠIS
- METIS – presentation and administration of metadata in AŠIS
- DS – database system of AŠIS
- Calculate estimations for the sample surveys in AŠIS
- Working with the administrative data sources in AŠIS
- Administration of administrative data sources in AŠIS
- SLOVSTAT – ELIS the public data base on internet
- Regional statistics – what is new in the MOŠ/MIS system.

Usually, the modules of this cluster are compulsory (except for the last one) for all new employees. The courses are innovated in accordance with the AŠIS system updates.

The last cluster "Effective use of personal computers" is based on the ECDL concept. ECDL (European Computer Driving License) is internationally recognized (vendor neutral) program coordinated by the ECDL Foundation (www.ecdl.com). It consists of 7 modules

- Concepts of ICT
- Using the computer and managing files
- Word processing
- Spreadsheets
- Using databases
- Presentation
- Web browsing and communication.

In order to achieve ECDL certificate (or ECDL Start certificate) the candidate must pass a test for all 7 modules (or 4 selected modules). ECDL certification proves competence in use of computers and common computer applications.

Each module of the program can be, on demand, end-up by a test. In this case, INFOSTAT is qualified by accreditation to issue certificates to successful participant of a module or the program. INFOSTAT is also accredited by the Slovak Society for Computer Science (license holder for Slovakia) as the ECDL test centre.

Educational program „Practical statistics and statistical informatics" is one of the forms to transfer the results of applied research on statistics and statistical informatics into the everyday statistical practice.
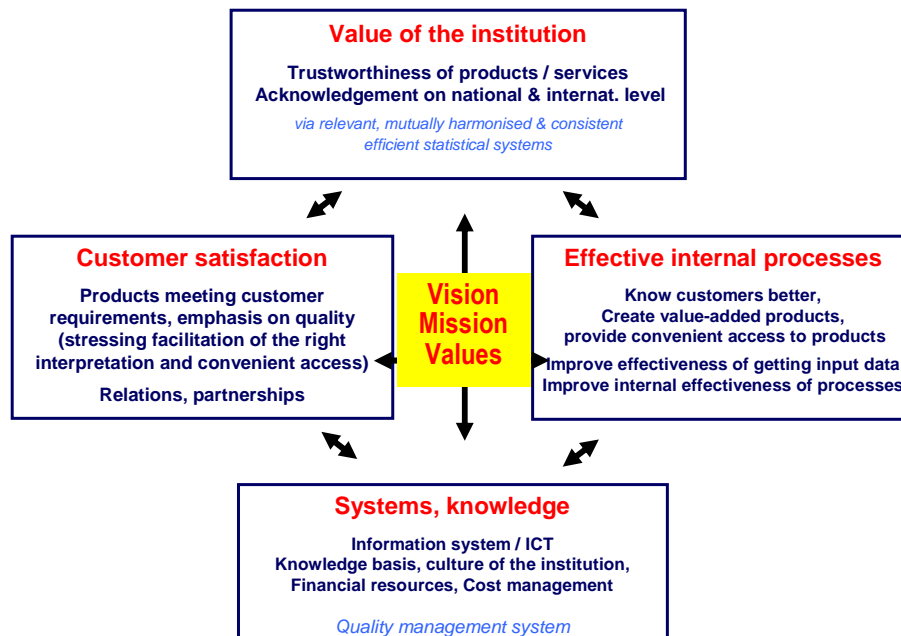
4. Conclusion - Vision for the Future

At the end of the year 2008 a new strategy of the SO SR development by the year 2012 was adopted. The main strategic objective is **to increase systematically the institution's value (credibility, legitimacy, independence, integrity, transparency and effectiveness) and its acknowledgment both, on national and international level**. All strategic goals are sketched at the SO SR strategy map (Figure 2)

The objectives focused on knowledge are

- ensure the development of knowledge base of the institution so that it enables creation of an added value for the customer with the inclusion of our know-how in the development and provision of our statistical products,

- contribute to the development of knowledge base of all main external interested parties, so our contribution can support the correct interpretation and use of statistical products, enables better preparation to provide high quality entry data for the needs of state statistics, as well as, a full participation on the development of official state statistics.

Value of the institution
Trustworthiness of products / services
Acknowledgement on national & internat. level
via relevant, mutually harmonised & consistent efficient statistical systems

Customer satisfaction
Products meeting customer requirements, emphasis on quality (stressing facilitation of the right interpretation and convenient access)
Relations, partnerships

Vision Mission Values

Effective internal processes
Know customers better, Create value-added products, provide convenient access to products
Improve effectiveness of getting input data
Improve internal effectiveness of processes

Systems, knowledge
Information system / ICT
Knowledge basis, culture of the institution, Financial resources, Cost management
Quality management system

Figure 2 - SO SR strategy map - basic logic

Based on the general strategic objectives of the SO SR, a new action plan for education and human resources development of the SO SR employees is prepared. In this phase of preparation, the following main priorities of the strategy are discussed:

- long term evolution of the SO SR as the learning institution,
- extending the scope of the statistical education from the SO SR also to our partners in the National statistical system and to the users of the state statistics,
- career management within the SO SR based on the "parallel career lines" model,
- advanced education of the top specialists.

Our vision for the future is to develop the SO SR as **a learning organization**. As the key technological concept for this development we consider the e-learning paradigm. The intention is to shift emphasis from group to individual approach in education, complemented by tutorial supervision (coaching, mentoring) and supported by newly developed **e-learning technologies and tools**. Although traditional training is very important for the competence development, we plan to build this way a learning environment supporting the everyday individual learning.

The main goal of the prepared project is to build a virtual education network accessible for all employees from the central office, as well as, from the regional branches. In the first phase we plan to transform the traditional courses of the Schola Statistica Program into the e-learning courses. Our intention is not only "to translate" the original study materials but to

extend them using currently available multimedia techniques and also to enable to the students also relevant study and training materials available on the internet.
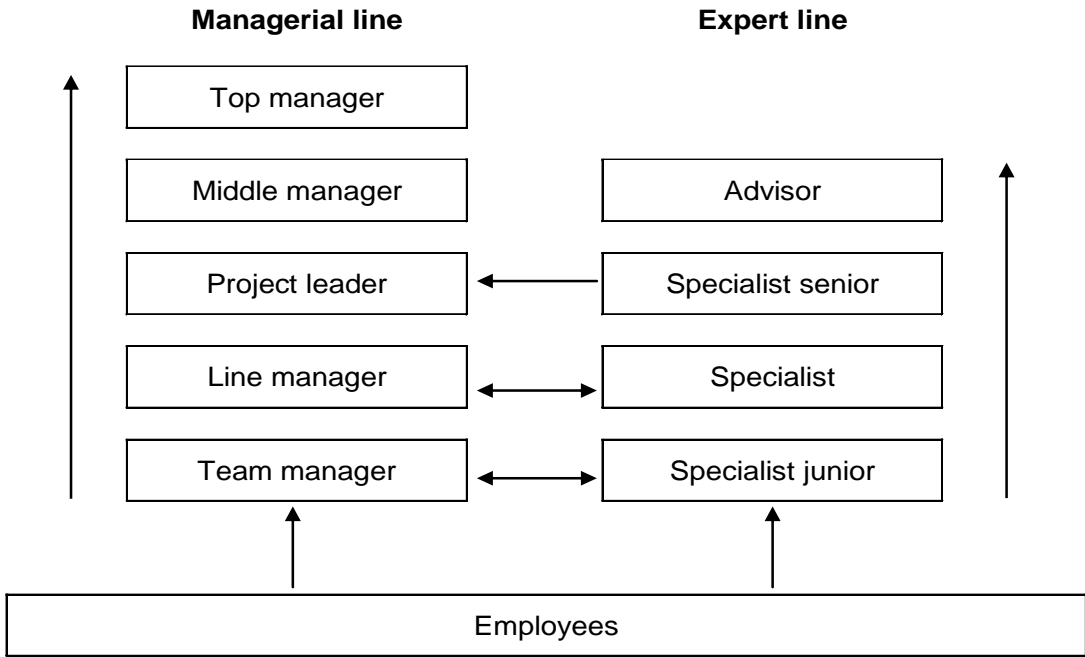
In the finishing phases of the project a gradual replacement of the face-to-face education and training by e-learning and blended learning will take place,

Although, the Slovak statistical system is centralized, some statistics are produced also by others state administration agencies. The study of the World Bank "Statistical Capacity Master Plan for the SR" stated necessity to improve training not only within the SO SR but also **training of the partners within the National statistics system** and, especially, **training of the users** of the statistical information.

The aim of training statisticians in the partner agencies is to harmonize the methods used and to ensure quality of the produced data according the European statistical system standards. It turns out that a basic training on "how to understand and use" statistical data for the users (journalists, politicians, state administration officers) is necessary. These groups of end users often do not understand the basic principles of the statistical survey techniques, do not differentiate the statistical results from different sources based on different assumptions and methods, underestimate the role of statistics etc.

It is relatively easy to accomplish the tasks to train the statisticians from other agencies. We can either organize for them special selected courses from the Schola Statistica Program or to invite them to our courses. The second approach is even more suitable, such mixed courses can be place for exchange of experiences among the statisticians from different agencies. However, for the end user it will be necessary to design and develop the special elementary courses. In perspective, we plan to enable to our partners an access to the pertinent e-learning courses.

As a very important part of the human resource development we consider the **career planning and succession planning**. Therefore a new model of the parallel career planning within the SO SR is discussed. One possible alternative of such a model is illustrated by the Figure 2.

Figure 3 - Parallel career plans

The managerial line represents preparations and education of the managerial staff from the team leaders to the top managers. In this line the managerial skills are accentuated while the statistical expertise is secondary. The expert line characterizes preparation and education of the key specialists for the professional statistical positions without which the SO SR cannot guarantee its functions and development. Usually, moving from both lines is possible only on some levels (indicated in Figure 3). On the higher levels it is practically impossible because preparation of top levels managers and specialists is a long term process of individual development.

In the current managerial culture of the SO SR the role of generalists (professional managers representing the straight managerial line in the Figure 3) is underestimated. In the given circumstances, it seems to make sense to change this attitude due to growing needs and requirements on managerial competence and skills.

Training of junior specialists and, to some extent, also specialists in the SO SR is covered by the Schola Statistica Program and by international European Statistics Training Program (ESTP courses). However, there is a clear **shortcoming of advanced education and training for top statistical experts** both on the national and international level.

We already discussed a possibility to create the Academica Statistica Program as an advanced alternative to our Schola Statistica Program. The problem with such a project is his funding because the advanced program on the national level is dedicated only for a limited number of candidates (for particular courses). Therefore, we are ready to open this problem at the international level and to support an idea of an international project within the ESS with the goal to design and implement advanced statistical education and training program based on e-learning paradigm.

In fact, it is not necessary to build such system from scratch. We refer to the research project "Virtual Library for Computer Assisted Training in Statistics" (VL-CATS-IST1999-10971) solved within the 5-th Framework Program of Research and Development EU.

According the project description in the monograph "EPROS: Progress Report R&D in Statistics 1999-2000" the main objectives of the LV-CATS project were

- to create a virtual library with reference materials and multimedia training courses on official statistics,
- to develop a system based on groupware technology for delivery of distance training in virtual classes or on self-study sessions,
- to define and implement standards w. r. t. the structure of teaching materials and to develop tools supporting these standards,
- to produce course material in various subjects of interest, e.g. introductory statistical concepts, official statistics, quality control, time series analysis, statistical modeling, data analysis, price indicators,
- to create a user group for virtual library in official statistics.

In the current terminology it means to develop an e-learning system with content (courses) specialized for official statistics. Unfortunately, the official project site does not exist anymore and also the project deliverables are not easily available (of course, it should be archived by EUROSTAT).

Nowadays, all necessary technological e-learning systems and tools are available. We do believe that it is possible and would be very effective to design and implement e-learning system (a library of e-learning courses) for advanced study in official statistics as a common standard for ESS.

5 References

1. *The Conception of Education of the SO SR Employees by the Year 2007* (in Slovak). SO SR 2005.
2. *EPROS Progress Report R&D in Statistics 1999-2000.* Monographs of Official Statistics, EUROSTAT 2001.
3. *Statistical Capacity Master Plan for the SR.* SO SR and World Bank, ADIN, s.r.o. 2006, ISBN80-89244-08-04
4. *Strategy of the SO SR Development by the Year 2012* (in Slovak). SO SR 2008