RTD INFORMATION SYSTEMS IN SERBIA: A SHORT REPORT AND OUTLINES FOR FURTHER DEVELOPMENT

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Pero Šipka

Centre for Evaluation in Education and Science, Belgrade and
University of Novi Sad, Faculty of Philosophy
esipka@sbb.co.yu

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RTD information systems in Serbia are a product of self-initiative of small groups, formal or informal, rather than derived from the national R&D strategy and initiated by the government. The Government of Serbia traditionally saved its efforts for building ICT infrastructure, and other related priority programs, such as provision of international journals and databases. System of Science and Technological Information of Yugoslavia (SNTIJ), a large-scale project launched before this country disruption and continued in Serbia for some time in its survival form (as SNTIS), was concentrated on building infrastructure and library system support, leaving databases development literally "to interested parties within the academic community".

In recent years, some of the individual projects earned the trust and support by the Ministry of Science, or the Secretariat for Science of Voivodina Province. Most of the resulting databases, repositories, and online services are still in developing phase, some are at the early beginning of public exploitation, and only few of them entered the stage of mature development, stable financing, and regular maintenance.

(a)   Inventory of existing databases and information systems on RTD capabilities

The existing web-based databases, services, and registries in Serbia (Appendix) do not always meet criteria for modern ISs. Sometimes they are not robust enough or easy to use, and the other time not extensible or "future proof". Still, their general quality and adequacy exceeds the level of their exploitation, especially by the decision makers. In this regard MiuWOS service is probably the only exception, but it is still far behind popularity of other available international services, e.g. Journal Citation Report or full text databases provided by KoBSON. None of the domestically produced ISs was so far explicitly built into the documents of the Ministry of Science regulating RTD activities. The reason might be they aim at future, rather than present needs of policy makers.

Most of the RTD ISs in Serbia are intended for domestic users. Only a few of them have proper English interface and help, and some are even accessible only for the users of the Academic Network of Serbia. This is somehow in discord with the fact that Open Access is well accepted in Serbia. Namely, almost all of the national scientific journals are now published in OA regime, and there is also several comprehensive and regularly updated institutional repositories.

In-house information system of the Ministry of Science can also be regarded as a part of the national RTD system. It is not openly accessible, but is internet-based, contains an online application service, as well as valuable data on researchers and research organizations which, if made public, would make an important part of a future national RTD system.

There are also few "expert databases" produced as a result of pioneering, rather naive projects. Some of the products, such as Database of ICT experts by JISA (*http://www.jisa.org.yu /indeks2/index2.htm*), or Database on Important Human Resources, by YUBIN (*http://www. bcproject.org/site/pages/sr/baza.php),* are motivated by commercial reasons and consequently doomed for failure. Considering their duration and size, they are obviously abandoned projects. These and similar trials are worth mentioning only to illustrate efforts made in vain, which is also typical of the history of S&T information systems development in Serbia.

(b) Databases and systems supported by the government and/or public entities

All ISs listed here, except DOSITHEuS and E-CRIS-SR, are supported, either by the Ministry of Science, or Secretariat for Science and Technological Development of Voivodina Province. There is some duplication of ICT projects supported by the two institutions, indicating lack of strategic planning and coordination. It seems that R&D authorities and information scientists in Voivodina tend to gather and publish information about R&D activities in the region which are already contained or planned to be covered by the ISs developing for the national level.

(c) The main causes preventing the creation of a national RTD IS

The main responsibility for the lack of unique national system of R&T information rests with the Government of Serbia. Serbian government has separate ministries for science and education. All responsibilities related to the provision of research information and ISs development are imposed at the Ministry of Science, while the most research is taking place at the universities. This is a potential threat to the efficiency of accreditation and evaluation process, which started recently in Serbia. Also, there is a lack of communication and coordination between the Ministry of Science and Statistical Office, Agency for Intellectual Property, and other potential contributors to the national RTD IS.

It seems that Serbia needs a worked-out strategy for building RTD information resources as an integrated system. In the absence of clear aims and sufficient resources, groups acting as ISs developers are in the competing position, pressing for their projects, and having no interest for knowledge sharing and mutual cooperation. As a consequence of non-transparency, there is too much overlapping among both finished and ongoing projects. At least a few projects supported by the state institutions of various level are of dubious outcome due to the incompetence of the developing teams. To conclude, ICT developers within research community also contribute heavily to the lack of common efforts in developing a unique and efficient national RTD IS.

(d) Organizations that could undertake such a national project

There is no governmental institution working exclusively on RTD systems development. The Yugoslav Bibliographic Institute was privatized and changed its scope of activities, which left Serbia without a specialized state-owned institution capable of undertaking a large national project in the field. As pointed out, present ISs are products of several groups, but the largest contribution came from the strategic partnership between NLS, a public institution, and CEES, a non-governmental organization. However, both institutions lack human resources, and would not be sufficient for such an undertaking. Joint venture of all developers already in action, backed by experts from some universities and innovation centres and supervised by the Ministry of Science, could lead to the success in a relatively short period.

The Ministry of Science, as the only potential sponsor, is the only one to decide about the best organizational framework for present ISs integration. The alternatives are either to establish a new state-owned RTD information institute, or to initiate a programme bringing all the present actors under the same umbrella.

(e) Is there currently an RTD information system proposed?

At the moment there is no project devoted specifically to building a unique R&D information system in Serbia. Considering scope and quality of the few already operational systems and the importance of existing in-house databases of the Ministry and PSSTD, building such a system from the scratch is not necessary. Instead, an integration of all present databases and registries into a modern distributed controlled system (DCS) is a more feasible solution to the problem.

DOSITHEuS, a product of an internationally funded project by CEES, was developed as a mock-up (model database) to be proposed to the Ministry of Science as a core of the national RTD information system. DOSITHEuS is based on the CRIS architecture and CERIF as a standard, which gives it good prospects to become a part of integrated European RTD information system. There is also similar system by IZUM (E-CRIS-SR), which is of regional character and, in Slovenia from which it originates, serves well both evaluation and policy making needs. However, it is based on a technology of data acquisition and indicators generation which is not easily applicable in Serbia. The differences in organization of research activities between Serbia and most EU countries are still large, and the process of narrowing them proceeds too slowly. The two systems are not incompatible, and are even partly integrated via COBISS, so there is a room for their combining in implementation.

(f) What could be done (from outside) to initiate such a project?

When looking at the suitable basic platform for building a national RTD IS in Serbia, the CRIS architecture and CERIF as a standard are naturally seen as the best possible choice, since they ensure interoperability with the EU systems. The encouragements by the EU institutions and organizations (e.g. euroHORCS, SEE-ERA.net, etc.) addressing Serbian authorities to harmonize its national RDT statistics, regulations, and data acquisition with the EU standards and practices, can be of serious help in raising sensitivity for the project and choosing the right direction in its development.

Present ISs integration might be a regional project. An European-led project of the scope would have better chances to be accepted in all WBC countries, especially if planned as long-term, stepwise program. The project can start with building a regional directory of organizations, ongoing projects, and local journals. If filled with shallow data and, at the same time, extensible to full CERIF, it would be a cost-effective and sustainable project.

(g) Would such a system help Serbia to become more successful in EU RTD programmes?

Considering present state of Serbian economy and prospects for better research-industry cooperation, orientation towards international cooperation seems to be the best road to the advancement of Serbian S&T, especially now when access to the EU funds are opened for the Serbian participation. A comprehensive RTD information system, one that can offer European scientists reliable data on capacities of Serbian R&D institutions and expertise of local researchers, their ongoing projects, and previous results, is absolute necessity. The visibility of Serbian research community is still well below its potentials, limiting prospects for the better cooperation with EU partners.

(h)   Which EU portals, media ads, and information systems are being used most frequently by the RTD stakeholders from Serbia

In Serbia, Belgrade University Computing Center (RCUB) is the central communication node of the academic network, and is supervising other distributive nodes. RCUB is in the best position to record user statistics that can help in answering strategic questions of above nature.

Regrettably, cumulating user statistics is not RCUB's permanent activity. This convenience is used only occasionally, at special request, showing under-exploitation of data in strategic decision making in Serbia. In the absence of reliable data, it would not be wrong to claim that EU portals are regularly used in Serbia by minimal number of people and institutions. This can partly be explained by good work of the service of the Ministry of Science, which regularly communicate news and events related to Serbia. Further dissemination of such information became a routine practice of the most universities.

Expressing interests within CORDIS, as well as other formal initiatives for international cooperation, happen only sporadically. Such habits will eventually be acquired gradually with growing participation of Serbian researchers in EU frameworks.

(i) Concluding remarks

In conclusion, individual web-based RTD ISs in Serbia are generally of a good quality. They suffer the problem of non-timely maintenance, they also vary in data coverage and reliability, but taken together, they meet basic needs of the members of academic community. Also, they offer decision makers more than they are presently ready to utilise for evaluation, quality control, and strategic planning.

What they lack the most is friendliness for users outside national academic community, both international and those coming from industry. To achieve the former, developers of ISs have to ensure multilingual interfaces, common exchange formats, and international classifications. In years to come, this challenge will be difficult to meet without more coordination, or even centralisation, ending with a unique and functional RTD information system of national level.

Appendix. **Web based RTD databases and services in Serbia**

title and location	publisher	content	size	status
Research organizations http://147.91.185.4/nio/instituti.asp	MSRS	accredited instutions	small	under development
PhD Repository http://diglib.ns.ac.yu/frontOffice/index.jsp	SSTDVP	PhDs	small (164 entries)	under development
Researchers Files http://apv-nauka.ns.ac.yu/vece/indexd.jsp?zd_dokumentId=80&Oblast=13	SSTDVP	persons	medium (aprox. 2.000 entries)	no maintenance
E-CRIS-SR: Information System on Research Activities in Serbia http://ecris.sr.cobiss.net/default.aspx?lang=scr	IZUM, UBSM	persons, institutions	large (7500 persons, 82 institutions)	under development
SCIndeks: Serbian Citatiaon Index www.scindeks.nbs.bg.ac.yu	CEES	locally published journals	large (5-years volumes of 372 journals, 101 as full text)	regular update from 2002 on
DOSITHEuS: Digital Online System of Information on Technology Education and Science http://nainfo.nbs.bg.ac.yu/Dositheus	CEES	projects, persons, institutions, funds, and journals	large (9621 persons, 165 institutions, 1411 projects, 8 funds, and 375 journals)	beta version
Journal Bibliometric Report http://nainfo.nbs.bg.ac.yu/kategorizacija	CEES	journals	large (461 national journals)	regular update from 2002 on
MIuWoS: Articles of Serbian Authors Published in WoS Journals http://nainfo.nbs.bg.ac.yu/Kobson/service/MiUWOS.aspx	NLS	persons publishing papers in WOS journals	large (aprox.12.000 articles)	regular update from 2000 on
NLS Repository http://nainfo.nbs.bg.ac.yu/repozitorijum	NLS	national journals, archived	large (375 journals)	regular update from 2002 on
doiSerbia: Digital Object Identifier Repository http://www.doiserbia.nbs.bg.ac.yu/	NLS	cross-ref national journals	small (25 journals)	regular update from 2002 on

MSRS: Ministry of Science of the Government of Serbia; **SSTDVP**: Secretariat for Science and Technological Development of Voivodina Province; **NLS**: National Library of Serbia; **CEES**: Centre for Evaluation in Education and Science; **IZUM** Institute of Information Science, Maribor; **UBSM** University Library, Belgrade