CARDS: 2003
Furtherance of the Agency of Science and Higher Education in its Quality Assurance Role and the Development of a Supporting Information System

Higher Education Information Systems
Proposal for an overall Concept for Higher Education Information Systems in Croatia

Component 3
Key Expert 3
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1. Introduction

The CARDS 2003 Project „Furtherance of the Agency of Science and Higher Education in its Quality Assurance Role and the Development of a Supporting Information System“ has a Component 3 focusing on the development of an information system for quality assurance. If one regards the quality assurance procedures the Council and the Agency are dealing with, i.e. Accreditation, Evaluation and Audit, one realizes that in each case of programme accreditation, institutional and programme evaluation and audit, the institution has to provide the review panel in the form of a self-evaluation or self-report with a predefined set of information. This delivery of information is undertaken just for the respective evaluation process, and in the next case of evaluation, be it at another or the same institution, it has to be undertaken again. Thus one cannot identify an information “system” that is used specifically for these three types of quality assurance procedures, and one cannot say that an information system is needed dedicated only for these QA procedures.

However, one should expect that as part of the institutional quality, the information required for the self-reports needs not to be generated ad hoc, just for these reports, and again and again for each of the QA procedures, but that this information (i.e. this kind of self-knowledge of the institution) is permanently available in an institutional information system which is used for the management of the educational processes including the institution’s own quality assurance of these processes and their outcomes.

And indeed, the majority of the Croatian Higher Education Institutions have the so called Information System for Higher Education Institutions (ISVU) implemented which helps manage the educational processes, monitor these processes from the point of view of quality assurance, and enables the delivery of the majority of quantitative information for the self-reports.

Thus if one conceives quality assurance in higher education as these three evaluation procedures only, then there seems to be no need for another information system than the existing ISVU on institutional level, apart from more procedural supporting systems like the existing „Module of the Agency for Evaluation support“ (MOZVAG) and an information exchange system (Internet based QA Forum) related to quality assurance issues.

If one broadens, however, the concept of quality assurance beyond these explicit evaluation procedures, incorporating the information of clients, stakeholders and the public about higher education, incorporating higher education policy and planning focusing on the higher education system as a whole and beyond, than one realizes that higher education information systems on a national level are missing in Croatia, systems which should enable and facilitate the communication between higher education, the relevant public (clients and stakeholders), and higher education policy (advisors and makers). This (national level system) gap would exist equally if ISVU would be implemented and used by all higher education institutions in the country.

Having both the core concept of quality assurance (external accreditation, evaluation and audit) as well as the broadened concept of quality assurance in view, Key Expert 3

CARDS 2003
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- proposed and promoted the wide spread use of ISVU on institutional level for the study process management including institutional quality assurance and delivery of information for external evaluations (first mission)
- developed a system design for a national level higher education data base and report generator (second mission)
- developed a system design for a (national) study programme data base (second mission)
- developed a system design for a MOZVAG upgrading (i.e. evaluation procedure supporting system for the Agency) (second mission)
- developed a design for an internet platform related to quality assurance (Quality Assurance Forum) (third mission)
- provided the Agency, SRCE, the Ministry and Higher Education Institutions with some information about the (overall concepts of the) German Higher Education Information Systems in order to help identify possible equivalents in the Croatian Higher Education System.(fourth mission)

This paper now tries to summarize and provide an overall concept of Higher Education Information Systems in Croatia where each of these just mentioned systems has a dedicated role and position. Determining individual information systems’ role requires to identify information needs and flows in higher education, which can and should be supported by the respective information system.
2. Identifying Information Needs and Information Flows in Higher Education

One might regard higher education as an exchange process according to a market model. There is a service provider, the higher education institution providing services for the service receiver, i.e. the student. In exchange for the services the service provider receives funds from the service receiver.

There seem to be three identifiable flows of information involved in the exchange process:

**Ex-ante information (information that flows before the service is provided):**
- the service provider has to inform the potential service receiver about the services (e.g. information about the study programme) and he has to collect information in designing and shaping the services (curriculum) according to the needs (of society and labor market)
- the service receiver (students) might collect information about the institutions, the study programmes and the respective teachers for his/her institution and programme choice decisions

**Accompanying information (information that accompanies the provision of the services):**
- Besides the fact that the service itself in the case of education is an information transfer, the accompanying information consists of contract information (application, enrollment, registering for courses and exams, student records) and user manuals (i.e. the curriculum plan)

**Ex-post information (information that flows and is handled after the service provision):**
- Both sides might evaluate the service processes and results in order to decide whether they continue or make changes and adjustments with regards to the services (study programmes).

**Figure 1: Exchange process model of higher education**

![Diagram](attachment://exchange_process_model.png)
But this market-like exchange model would be too simple to capture the full reality of higher education. In the Croatian case as in the majority of other country’s higher education systems funds for higher education only come to a minor extent from the clients (service receivers), but rather from the public purse (governments). And as is usually the case for public goods, the final service receivers (beneficiaries) are not only the individual students, but the society as a whole in general, and the employers of higher education graduates specifically. Government has to take over responsibility for higher education and in this context has to make decisions (higher education policy and fund allocation).

![Figure 2: Information needs in the exchange processes](image)

Thus with regards to information needs, which should be met by information systems in higher education, we might summarize so far:

What is needed is:

- information to inform potential students and potential employers of the graduates
- information to inform government to enable higher education policy and fund allocation
- information in the context of self-evaluations of the services by the service providers (self-knowledge of the HEI)
- information management in the context of the higher education processes (educational processes and resources management processes).
Yet, with this extension of the service exchange and information model the picture of higher education is not complete. Governments as well as the consumers are not experts enough to deal with higher education information. They need advisors, facilitators, information interpreters, even consumer protection is appropriate especially in the case of market like relations between higher education institutions and their clients. The sum of information from all institutions and programmes is not the whole truth. Information has to be presented in an intelligent, consistent, comparable form, may be aggregated, and maybe commented, dealing with the whole higher education system. And not all information is available from institutional higher education management information systems (like ISVU), some has to be generated through research on higher education (surveys) other has to be collected from national statistics.

Thus between service providers (higher education institutions) and the government on the one side and clients on the other side there are usually „buffer“ organizations, having the role of information facilitators:

- national higher education policy advisory bodies
- quality assurance bodies (accreditation and evaluation agencies)
- national higher education information centers (developing, maintaining and operating national higher education information systems, presenting information)
- research on higher education units (to conduct surveys and other investigation on higher education
- national statistical offices.

In the Croatian case we have

- the National Council for Higher Education as a policy advisory body
- Council and AZVO as the quality assurance unit
- and the National Statistics Office, which collects so far information on higher education directly from the students and higher education institutions.
What is missing so far is a research on higher education unit, and a unit which deals with a national higher education information system, as such a system does not exist so far. Thus we have no higher education information center. Such a unit could be part of the Agency, but it could also be a separate organization under the auspices of the National Council for Higher Education.
3. Input-Process-Output: Information for Decision Making and Management Information

In order to fully understand the role of the various information systems in higher education, we should elaborate a bit more on the input-process-output-model, and make the distinction between information systems for decision making and information systems for management.

We might conceive the input-process-output model of higher education as supply demand relationships on both sides, the input side and the output side. Higher education institutions with public and to a certain extent with private funds provide (supply) study places for students for certain study programmes (scientific areas and fields). And there is a demand for these study places from the side of potential and eligible students (upper secondary graduates). Higher education institutions provide (supply) the society in general and employers specifically with graduates of specific study programmes (in specific scientific areas and fields). And there is a demand from potential employers for graduates of higher education institutions.
A higher education institution „has“ a certain number of study places in certain study programme (in scientific areas and fields), with a defined curriculum, with clearly defined expected/planned educational outcomes (competencies of the graduates) and expected employment opportunities (employability) for the graduates. Capacity for study places in study programmes means the availability of a certain number of teachers (or proportion of a teachers workload for an individual study place) with the relevant qualifications, course offerings, such as to make studies feasible within the regular study time, and premises and equipments and other resources needed for the achievement of the planned educational outcomes of the programme.

In this higher education input-process-output system decisions have to be made for which information is needed and to be made available through higher education information systems:

- Potential students have to make decisions about which programme to study at which institution
- Employers have to make the decision which graduate from which institution and which programme to employ
- Governments, institutions as a whole (Universities or Colleges) and Faculties have to make decisions:
  o How many students to admit according to the existing study place capacity
  o How many study places for which study programmes to provide according to student demand
  o How many study places for which study programmes, with what a curriculum to provide according to societal and labor market needs.

There should be national higher education information systems available which are accessible by the decision makers (and their advisors) in order to facilitate and support these decisions. About study places (including the study programmes and processes) and graduates qualitative and quantitative information is needed. And information on the quantity (of study places, graduates etc) as well as on their quality is needed.

For the Croatian case I suggested to have a study programme register (PR) and a national level higher education information system (HEIS) to support these decisions.

Within the higher education institution information is needed and needs to be managed for the educational and supporting processes. What we need within institutions with regards to Management Information Systems is:

- the educational process management system (What is to be managed?: A student applies for enrollment in a certain programme at the institution, a student registers for a course according to the modules of the programme, the course is attended by a group of students having registered the course (class), the course is taught by a teacher in a certain room at a certain time, the student registers for exams, the student undergoes the exams, the student earns credits, student records have to be kept and handled)
the resources management system (What is to be managed?: Accounting, procurement, human resources and payroll, asset inventory, premises, stock control, budgeting).

In Croatian Higher Education one can identify ISVU as a powerful, comprehensive and reliable Management Information System for educational process management at the institutional level. ISVU is not implemented at 100% of Croatian Higher Education Institutions, but I really recommend to encourage the remainder of non using institutions to have this system implemented for their educational processes. With regards to resources management systems I am not informed about existing systems or related policies.

There is a relationship between the institutional Management Information System and the national higher education information system. While information „emerges“, is entered, stored and handled in the institutional information system in the context of process management it can be transferred to the national Higher Education Information System, in order to be available there for decision making.

For the Programme Register the information on study programmes can be delivered from the institutional ISVU, and can be updated whenever the respective Institution wishes to do so. The filling of the Programme Register can be given into the full responsibility of the institutions and their programme responsible. For the National Higher Education Information System student, staff, courses and examination data have to be delivered at fixed agreed upon dates from all institutions (snapshots) and this snapshot data (including historical snapshots from the previous reporting periods) have to be available for a flexible report generator as part of the National Higher Education Information System. In the HEIS design I suggested that the student, staff, courses and examination data should be delivered as individual, not aggregated data (with the student data being anonymized). Equally for the national Higher Education Information System the institutional resources management system can deliver data, i.e. on finances and space, again at fixed agreed upon dates.

Most but not all information of the national Higher Education Information System may be derived from ISVU and the institutional resources management system. There are some other sources: statistics from the National Statistics Office (demographic statistics, school statistics and labor market statistics), and results of empirical research on higher education (potential student surveys, student feedback surveys, alumni surveys, employer surveys).
## Figure 5: Information and its Sources

<table>
<thead>
<tr>
<th>Input</th>
<th>Process</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Demand</td>
<td>Curriculum Plan, Enrolled Students, Teachers, Courses</td>
<td>Learning Outcomes, Examinations, Graduate</td>
</tr>
<tr>
<td>Student Attitudes</td>
<td>Equipment</td>
<td>Success Rate</td>
</tr>
<tr>
<td>Student Qualifications</td>
<td>Non-Teaching Staff, Finances, Premises</td>
<td>Time to Employment, Unemployment</td>
</tr>
<tr>
<td>Applicants / Admitted Students</td>
<td>Lecture Halls / Labs, Duration of Studies</td>
<td>Alumni Satisfaction</td>
</tr>
<tr>
<td>Teachers</td>
<td>Student / Staff Ratios</td>
<td>Employer Satisfaction</td>
</tr>
<tr>
<td>Non-Teaching Staff</td>
<td>Student / Premise Ratios</td>
<td></td>
</tr>
<tr>
<td>Finances</td>
<td>Cost per Student / Study Place</td>
<td></td>
</tr>
<tr>
<td>Premises</td>
<td>Student Satisfaction</td>
<td></td>
</tr>
</tbody>
</table>

### Data Sources
- Demographic Statistics / Projections (Census Data)
- School Statistics (Upper Secondary Education)
- Student Surveys
- Resources Management System
- Study Process Management System
- Student Feedback Surveys
- Labour Market Statistics
- Alumni Surveys
- Employer Surveys

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4. Overall Concept for Higher Education Information Systems in Croatia

We now can summarize and draw the picture of the overall Higher Education Information System for Croatian Higher Education. The overall system consists of two institutional systems, i.e. ISVU as the Study Process Management System and a Resources Management System. The national level has again two systems: the Programme Register (PR) and the Higher Education Information System (HEIS). PR and HEIS are fed by ISVU and the Resources Management System. In addition national statistical data and survey results are fed into PR and HEIS. On the other side HEIS can provide the National Statistics Office with higher education related statistics. Finally there are two additional supporting systems on the national level: MOZVAG the evaluation processes support system for the Agency and a QA FORUM for QA related information exchange.

And we also may clearly assign information roles to the respective information systems of the overall Croatian Higher Education Information System.
**Figure 7: Information Matrix**

<table>
<thead>
<tr>
<th>Management</th>
<th>Decision Making</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Informing Potential Students and Employers / Informing the Public</td>
<td></td>
</tr>
<tr>
<td>1. Individual Participant in Educational Process</td>
<td>ISVU</td>
</tr>
<tr>
<td>2. Individual Study Programme</td>
<td>ISVU</td>
</tr>
<tr>
<td>3. Provider of Educational Service</td>
<td>ISVU</td>
</tr>
<tr>
<td>4. The Higher Education System</td>
<td>HEIS</td>
</tr>
</tbody>
</table>