Express path to interoperable solutions – case of the Oncology Institute of Vojvodina

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The Autonomous Province of Vojvodina has the population of about two million.

Most of them are the Serbs (about 70%), but numerous nations and nationalities live here as well.

The official languages in Vojvodina are Serbian, Hungarian, Romanian, Slovak and Ruthenian.

The capital town is Novi Sad.

Cancer in Vojvodina

- About 8,000 newly diagnosed patients per year.
- About 5,000 patients die from cancer each year.
- About 17,000 cured patients who need permanent follow-up.
The Oncology Institute of Vojvodina is a highly specialized health, educational and research institution in the field of oncology. Within its capacity the Institute is also engaged in other epidemiological studies, multidisciplinary clinical researching of precancerous and malignant tumors, in researching, introduction and application of new methods related to tumor prevention, diagnostics, treatment and rehabilitation. The Institute organizes a professional supervision not only within its clinics and departments but also in other hospital oncology departments, out-patient departments over the whole territory of the Autonomous Province of Vojvodina. The Oncology Institute of Vojvodina is a referent center for oncology and medical informatics.
Oncology Institute of Vojvodina

Employees: 531
• Physicians: 101
• Nurses & technicians: 286
• Beds: 239

XP computers: 250
Servers: 10
Users IHBIS: 500
<table>
<thead>
<tr>
<th>Modality</th>
<th>No. of procedures</th>
<th>No. of patients</th>
</tr>
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<tbody>
<tr>
<td>MR</td>
<td>10,612</td>
<td>7,480</td>
</tr>
<tr>
<td>US</td>
<td>5,901</td>
<td>5,171</td>
</tr>
<tr>
<td>US of breast</td>
<td>2,711</td>
<td>2,572</td>
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<tr>
<td>Stereotaxis</td>
<td>230</td>
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<tr>
<td>Mammography</td>
<td>3,770</td>
<td>3,108</td>
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<tr>
<td>Stereotaxic biopsy</td>
<td>30</td>
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<tr>
<td>CT</td>
<td>3,439</td>
<td>1,686</td>
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<tr>
<td>PET/CT</td>
<td>550</td>
<td>515</td>
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<tr>
<td>Scintigraphy</td>
<td>3,412</td>
<td>3,401</td>
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Making decisions and goals defining

- A successful implementation of IHBIS starts with making a decision and defining goals which we wish to accomplish.

- The goals must be clearly established, realistic and comprehensible, and accepted at all levels of medical institution organization.

- IT managers in hospitals must decide how to contribute to cross-organizational integration and what strategy and means to choose for achieving interoperability.

- If a system is poor in its interoperability, any increasing functions or little changes could stop its working properly.
Our goal

• Generation of EPR

• 5 p’s of electronic medical documentation:
  • proper information
  • on a proper patient
  • available to a proper person
  • at a proper place
  • in a proper time
Brief project chronology

26.08.2005 – tender
“Integrated hospital business information system”

04.10.2005
Public opening of Bids

23.11.2005 – signing of the contract, initiation of the project
Contract – signed

16.06.2006 – the end of the project
Official commissioning of the contracted activities

15.-16.04.2007 – start of IHBIS

04.09.2007 – Commissioning Minutes – signed

01.01.2008 – Business-Technical Cooperation Contract
Maintenance Contract
The Project was financed by the Executive Council of AP Vojvodina
Implementation

Users’ training on a test system

• Recognition of key users

• Training of key users

• Training of other employees
Realized Goal

Semantics, communication and legislation interoperability
Standards: ISO/TC215, CEN/TC251, HISA, HL7

IHBIS Integrated hospital-business information system

- Communication, security
  - HL7
  - ISO 21549
  - CEN 13608
  - CEN 12924
  - DICOM
  - XML

- Electronic medical record
  - CEN 13606
  - CEN 1828
  - ISO 18308

- Architecture
  - CEN 12967
  - HISA
CIS - L@BIS integration (HL7)

- Basic functions of L@BIS are:
  - Acceptance of order entries from CIS with generation of protocols and working lists.
  - Operation with analyzers, data transmission and taking over the results from analyzers.
  - Findings verification and preparation of necessary reports.
  - Distribution of verified findings in CIS.

- Integration of L@BIS and CIS:
  - Can be observed in two-way transmission and availability of data. CIS electronically sends the orders with the patient’s data and requested examinations, and, in the same manner, electronically, it receives from L@BIS, the examination results. The results are presented in CIS in their original form, as they were created in L@BIS, and they are visible immediately after the performance of the verification in L@BIS.
  - For the integration of L@BIS into a unique HIS, the systems need to communicate by note exchange in accordance with HL7 standard.
CIS - L@BIS integration

Request for analyses
**CIS - L@BIS integration**

Requested analyses review

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<td>1280501</td>
<td>K-KKG</td>
<td>150</td>
<td>400</td>
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Semantics, communication and legislation interoperability
CIS-RIS-PACS *integration* (HL7, DICOM)

- Integration of HIS with PACS
- CIS: Reception of order entries and appointment scheduling for patients:
  - From the Department
  - From the Outpatient clinic
  - External orders
- Orders processing in RIS:
  - Orders’ preparation
  - Selection of modalities
  - Sending the order to a modality
- Modality: Processing and sending of a picture in PACS
- CIS: Possibility of pictures from PACS review
CIS-RIS-PACS integration (HL7, DICOM)
CIS-RIS-PACS integration

Semantics, communication and legislation interoperability
CIS-RIS-PACS integration
CIS-RIS-PACS integration

Functional MRI

Before operative fMRI

After operative fMRI
CIS – LIRPIS integration
• Prescribed therapy for a patient in basic or alternative unit measure (ml, mg, tbl, ...)

• Distribution of goods on the basis of E-requisition order at the pharmacy

• CIS – LIRPIS integration
Cytostatics tender review
Frame purchase order
Purchase order by the supplier *Velefarm* in accordance with the tender documentation
Order form for suppliers and the central pharmacy

Semantics, communication and legislation interoperability
1. Standardized medical data

Diagnoses ICD10
2. E-requests (ordering)
3. Clinical pathways (procedures, medications, materials)
Radiotherapy

- Brachytherapy protocol
Nurse care

<table>
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<th>Code</th>
<th>Description</th>
<th>Unit</th>
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<tr>
<td>1</td>
<td>Venous injection</td>
<td></td>
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<tr>
<td>2</td>
<td>Intravenous injection</td>
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</tr>
<tr>
<td>3</td>
<td>Intramuscular injection</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Pain management</td>
<td></td>
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<tr>
<td>5</td>
<td>Pain measurement</td>
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**Clinical Procedures**

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<th>Code</th>
<th>Description</th>
<th>Details</th>
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<tbody>
<tr>
<td>1010</td>
<td>Vital signs</td>
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<tr>
<td>1020</td>
<td>Blood pressure</td>
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<tr>
<td>1030</td>
<td>Temperature</td>
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**Pain Management**

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<tbody>
<tr>
<td>2010</td>
<td>Pain relief</td>
<td></td>
</tr>
<tr>
<td>2020</td>
<td>Pain assessment</td>
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**Anesthesia**

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<th>Description</th>
<th>Details</th>
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<tbody>
<tr>
<td>3010</td>
<td>Spinal anesthesia</td>
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</tr>
<tr>
<td>3020</td>
<td>General anesthesia</td>
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**Legislation Interoperability**

- Compliance with ISO and IEC standards
- Integration of EHR systems
- Regulatory frameworks
E-request (Ordering) – L@BIS
Planning of chemotherapy

Semantics, communication and legislation interoperability
Material and medication consumption per patient

- Administration of a prescribed therapy
Security model
Project results

• The fulfillment of the prerequisites for the implementation of IHBIS demands full engagement of the management, organizational units’ managers, physicians, medical personnel and of course, IT experts.

• A human factor is crucial for the successful creation of prerequisites for IHBIS implementation, and the synergy of all participants in this process is obligatory.

• It is to be known that the fulfillment of prerequisites for IHBIS implementation, leads our medical institution into information social surroundings, which contributes to the development of entire information society, which is a 21st century strategy at the state level.
Realized goal

- **Organizational**
  - Rendering of services and material process standardization
  - Change of business processes
  - Reduction of time: request-realization

- **Medical**
  - Standardization of methods and procedures in the process of rendering medical services
  - Increase of therapeutic and diagnostic quality by authorized access
  - Control of quality and reliability of services and data

- **Economic**
  - Its primary goal is not saving but rationalization of consumption
  - Increase of service span
  - Reduction of in-hospital days
  - Expenditure principle of business activities
  - Saving of materials and poorly connected financial funds in stock supply

- **Qualitative**
- **Scientific-research**
Interoperable solution
A recommended system of standardized medical data, methods and procedures, as well as the amendments of business processes, which was successfully implemented and passed a two-year long testing period at the Oncology Institute of Vojvodina, is the model, which will be implemented in all the secondary and tertiary level medical institutions at the territory of Vojvodina.

The budget of AP Vojvodina for the year 2010 anticipates the financial funds for the further implementation of IHBIS, which leads to the realization of our primary goal:

Interoperable e-health of VOJVODINA
Thank you!

- "Mediocrity does not win"
  We were never mediocre, and now, we went even further
- "Be unique"
  Yes, today, we are the only medical institution in Serbia with IHBIS
- "Get connected"
  Yes, we cooperate with people leading in rendering of services related to business systems’ planning and maintenance
- "Remember, an average number of smiles per an employee is a pretty good sign of the future company’s performance"

yes, we are smiling!