



**Information Processing Institute (in Polish: Ośrodek Przetwarzania Informacji – OPI)** is a research institute supervised by the Ministry of Science and Higher Education. Its principal aim is to provide access to complex and up-to-date information concerning Polish science. In addition, the institute conducts its own R&D projects, mainly of an applicable character, which can serve as a stimulus for development of science, technology transfer and improvement of the higher education system.

OPI **conducts research** on Polish scientific developments and assesses activities of other R&D entities, universities and centres for technology transfer. It focuses on expediency and efficiency of scientific projects and ways of their financing.

OPI **creates complex IT systems** on science and higher education: from technology architecture through data collection and verification (organisation of processes, Internet search, semantic analysis) to data aggregation and visualisation.

OPI acknowledges the importance of **interdisciplinarity** in contemporary science. Hence, its projects combine IT studies (artificial intelligence, cognitive science, human-computer interaction), sociology and economy of science (sociology, psychology, statistics), and user-experience design.

The core recipient of OPI's work is the Ministry of Science and Higher Education for which the results of the comprehensive research serve as an instrument for better decision-making.

Accordingly, Information Processing Institute provides analysis for the two central R&D financing agencies: the National Science Centre and the National Centre for Research and Development, as well as for the Ministry of Regional Development, other governmental bodies, public sector experts, and entrepreneurs.

OPI creates linkages between public and private entities: entrepreneurs, local government officials, and NGO's representatives. OPI is a member of the Creative Communication Cluster. OPI's researchers to come up with unprecedented solutions, spot complexity and interconnections of processes and occurrences.

# OPI – INTERDISCIPLINARY RESEARCH INSTITUTE

## SELECTED RESEARCH PROJECTS IN PROGRESS

### READING PRACTICE

#### Use of audio description methods in the learning process

The research describes reading practices – the process of assimilating texts that are available on portable devices, especially those with Internet access. Reading practices are tracked on three levels: cognitive, qualitative and quantitative. Currently tests are conducted to check the effects of different data structuring on the effectiveness and depth of assimilation. Audio description – method usually used to teach the visually impaired – seems to be very promising as a teaching tool.

### SUPPORT SYSTEM FOR SELECTION OF REVIEWERS

#### System engineered to assist in the process of selecting reviewers of scientific projects and works

This intelligent information system provides information about potential reviewers of scientific undertakings. It consists of: ranking of reviewers, system for research paper analysis (automatic keyword extraction), and databases (content: scientists, publications, keywords *etc.*). It is designed to overcome the problem of cognitive bias in peer-review process.

### Research team and research experience

We believe that any research project is best done through teams of individuals with different background and know-how, working together. Therefore, our institute connects scientific thinking, innovativeness and multidisciplinary expertise. In order to meet expectations of our cooperatives we have gathered a team of people who think about research tasks unconventionally. We employ a handful of carefully selected project managers, specialists and scientists in various fields: programmers, system analysts and designers, interaction designers, user-experience experts, statisticians, research evaluators, economists, psychologists, sociologists, lawyers, technology transfer specialists, EU structural funds experts, international relations specialists and others. **Our people create, embrace and drive innovations.**

Interdisciplinarity of the team significantly influences the way in which research projects are conducted in OPI. We specialise in finding unprecedented solutions and are able to spot complexity and interconnections of processes and occurrences in the field of R&D. Approaching research problem from many perspectives allows us to create high-quality products tailored to the needs of our demanding clients.

Starting from the concept, through background research we gather, interpret and visualise requested information.

### OPI's research laboratories

We believe that innovation is a semi-product of enhanced cooperation. Therefore, our research configuration comprises four closely cooperating divisions:

- Laboratory of Statistical Analysis and Evaluation;
- Laboratory of Interactive Technologies (LABi);
- Laboratory of Intelligent Information Systems (LIS);
- Laboratory of Business Systems.

### Laboratory of Interactive Technologies

This laboratory's (LABi) areas of interest are the phenomena associated with individual human interaction with the screen as well as the broader social context of the human-computer communication. The laboratory works on analysis of multiple aspects of human interaction with electronic devices.

LABi's employees focus on designing new ways of human-computer interaction (HCI) – not only innovative forms of mutual contact, but also on the importance of cognitive psychology and emotional factors on the effective use of technology.

Thanks to collaboration with the leading research centres in Poland and abroad LABi uses the most up-to-date methods of research. Constant contact with IT and industry sector representatives ensures transfer of research outcomes to the business.

**Laboratory of Interactive Technologies** carries out **marketing, attitude and opinion research**, and **advanced data analysis** (SPSS, R, BeGaze and other). LABi's domains are observational researches with a use of highly advanced technology in the field of human-computer interaction (HCI). LABi's scientists combine the latest scientific research methods with cognitive psychology and neuropsychology, plus vast experience in the fields of consumer, marketing and usability research. The laboratory includes a modern, ergonomic observation room in the centre of Warsaw. It is equipped with professional audio-video gear, a 40-inch touch screen, posts for translators, **Eye-tracker SMI Red 250**, and **Observer XT**.



## SEMANTIC SEARCH ENGINE

Our latest project – semantic search engine – should improve web-search accuracy. By understanding contextual meaning of terms, the new search engine will eliminate the need to sort through a list of loosely related keyword results and will directly deliver the exact query information.

## POL-ON

### Information system on higher education

An integrated information system on science and higher education supports various operations of Departments of the Ministry of Science and Higher Education as well as other entities such as the Central Statistical Office in Poland and Polish Academy of Science.

POL-on assists in controlling and decision-making when it comes to the orientation of expenditures on education and material aid for public universities. It is the most innovative and the largest system of this kind in Poland. It collects data on academic laboratories, research apparatus, libraries' resources, conducted investments, scientific projects, patents and activities disseminating knowledge.

Another areas of LABi's interests are social aspects of new media. Research projects conducted on this subject explore the impact of Internet technologies on social life of individuals and groups. LABi investigates such the phenomena as: social engagement, one-to-one CMC, social bonds and processes of information consumption.

Laboratory's research facilities permit advanced empirical projects on human-computer interaction. A comfortable room for individual and group interviews is equipped with mirror for one-way observation and advanced technology solutions such as video system for behaviors' observations (Noldus Observer XT) and the state-of-the-art eye-tracking solutions (SMI). Diagnose of tested system with the use of such equipment is comprehensive. For the duration of each experiment LABi's specialists scrutinize the process of capturing non-verbal behavioral variables and visual attention measures.

### Laboratory of Intelligent Information Systems

Laboratory's (LIS) research team designs and implements software for both: commercial and public use. It creates advanced IT systems that support decision-making process and conducts research on intelligent algorithms,

tools for natural languages processing, web-search, big data analysis and their visualisation *etc.*

The main focus of LIS' projects is to perform research using the best technologies that push the envelope of artificial intelligence and computational intelligence studies. The resulting goal is to develop new user-friendly methods of text and web mining that can be used for a previously defined purpose or software that can be used for business purposes.

LIS designs universal tools that aggregate data on current events by searching the Internet, especially social networks. Such tools can be used for multiparametric analysis of social behaviours and give an overview of public opinions.

By using agile methods of management Laboratory designs its software in a flexible manner, engages its clients in many stages of the project. Hence, customers' requirements are always fulfilled.

### Laboratory of Business Systems

The Laboratory created and now manages a unique system for online registration of applications for funding research. This system significantly enhanced the efficiency of the Polish applications handling process.



### Laboratory of Statistical Analysis and Evaluation

Team of experts from this Laboratory is always up-to-date with current changes in science policy. By performing professional statistical analysis it models relationships between these changes and their economic effects. Moreover, Laboratory thoroughly evaluates research projects and programmes. The results of evaluation are transformed into recommendations that are then communicated to the public and appropriate governmental agencies. On the request of private entities our specialists analyse and visualise concrete data retrieved from OPI's databases.

### Aggregation of data about Polish science

OPI creates complex IT systems that gather information about science and higher education architecture in Poland. **Polish Science Database** (administrated by OPI

since 1991) is one of the most important sources of data on Polish scientific and R&D units, scientists and their research papers, conferences *etc.* Another two are:

- **Polish Technologies**, which foster communication between science and high-tech industry sector;
- **Research Equipment Database** that contains data on research apparatus based in Poland, and worth more than 125 000 euros each.

These databases were done from scratch – starting from information architecture, through data collection, and finishing on data aggregation. On individual request we retrieve relevant data from our databases and cumulate gained material in a form of a statistical analysis (if needed – divided into groups e.g. R&D research equipment in specified regions of Poland) or in a form of: summary, comparison, in-depth special report *etc.*

### OPI as an R&D funds operator

OPI has long experience in allocating and transferring EU structural funds, resources available under Polish-Swiss Research Programme and Polish-Norwegian Research Fund (OPI was the operator of the Fund for the period 2007–2012). We have supported many public scientific institutions and private sector representatives in a process of obtaining irrevocable subsidy. Additionally, we ourselves are involved (as partners or coordinators) in many R&D projects co-financed from budgetary or EU funds. We recognise and know how to overcome the main obstacles in the process of project realisation with which scientists are confronted. Therefore, we can consult others on all matters regarding the preparation of project, checking both: formal requirements completion (documentation) and management methods accuracy (project planning, organising, leading and controlling). Our two-sided perspective is something that distinguishes us from other consulting organisations.

**Laboratory of Intelligent Information Systems holds the recourses needed for the development of complex scalable business software.** Laboratory handles full life cycle of the application: from preliminary analysis through planning stage to system implementation, service, and maintenance on its own devices. Software can be delivered either as a network service or as a completed tool.



## R&D PROJECT FINANCING

Except for military R&D projects (which are financed through direct transfers from the Ministry of Finance to the Ministry of Defence), governmental support for separately budgeted research is channelled through the Ministry of Science and Higher Education, National Centre for Research and Development and other agencies.

Information Processing Institute is the implementing institution for the XIII Priority Axis of The Operational Programme Infrastructure and Environment (Higher education infrastructure) and for some measures from the I Priority Axis of the Operational Programme Innovative Economy (Research and development of new technologies).

European Operational Programmes are the most important sources of funds for R&D projects conducted in Poland. With OPI's help 322 research projects have already received approximately 482 million euros of financial support. Another 375 million euros are yet to be allocated. More than 77 million euros were spent on new high-tech research equipment.

## Publications

Immense resources from our databases combined with knowledge gained through empirical research are applied for creating detailed and thematically tailored reports on R&D and scientific challenges that lie ahead.

Reports based on empirical analysis and theoretical foundations are transformed into scientific publications that spread knowledge and best practices in the fields of management, evaluation and commercialisation of scientific project's results. The following volumes were published so far:

- **Managing research and development projects in the field of science:** a presentation of the best practices in managing R&D in scientific units, extended by an overview of problems with which scientists are confronted and the specifications of management process.
- **Managing research and development projects in the industrial sector:** an empirical definition of profit and loss factors in commercial R&D activities.
- **Reviews procedures and reviewers selection (volume I & II):** results of an undertaking set out to create a system engineered to assist in the process of selecting reviewers

of scientific projects and works. In a detailed way it addresses the issue of cognitive bias.

- **The role of academic innovation centres in technology transfer:** overview of ways these institutions function in the Polish economy, expanded by an assessment of their declared activities compared with the real impact they have on linking the science with business.
- **How to evaluate and monitor effects of projects in the fields of R&D and higher education?:** first Polish practical textbook serving as an introduction to the evaluation of R&D sector that contains descriptions of complex tools applied in evaluation studies.
- **The culture of offending in the Internet?:** the publication overthrows many myths that arose around the Internet. The authors prove that Internet is not, as many have assumed, full of insults and hatred.

Needless to say our work goes beyond producing reports and publications. Thanks to a rewarding cooperation with other OPI's experts, the final outcome of some of these undertakings was the development of specialised software tools. Profitable back-linkages are created in this process as the database resources inspire us to undertake new scientific research projects that in turn are the foundation of a new

## MANAGING R&D IN POLAND

From 2010 till 2011 Information Processing Institute conducted a unique and comprehensive research on the Polish R&D management methods used in scientific – business and public – units.

The research was divided thematically into three parts:

- managing R&D in scientific units (such as technical universities and research institutes);
- managing R&D in industry sector (Polish firms in comparison to companies operating abroad such as Boeing, Siemens, IBM, Kraft Foods *etc.*);
- socio-psychological profiles of scientists and their competences.

Apart from providing comprehensive information about micro and macro scale factors that affect Polish R&D, the research presents Polish scientists' overall research potential.

According to the OPI's research Polish scientists are extravert and open to new experiences, their interpersonal and leadership skills and teamwork abilities are above the average level, but they lag behind their foreign colleagues in terms of management know-hows. They infrequently use R&D-specific management techniques; lead their projects on common sense basis.

Despite that, some companies manage their R&D exemplary; use universal or project-tailored management methods and adjust them to the needs of project leaders and their teams.



extensive database. Other type initiatives include:

### Evaluation and monitoring of the effects of projects in the field of R&D

Our original model of interaction, results and products indicators helped conceptualise a system that collects data about the results of undertakings financed by the European Union and the national budgetary funds. The database will serve, among other uses, as a decision-making support tool for institutions involved in development of EU programmes financial framework 2014–2020.

### Activity analysis of centres for technology transfer

The essence of the project was the creation of a tool for computerised

modelling of socio-economical processes adherent to technology transfer. An innovative methodology of web-agent modelling was applied. It ministered the analysis of emerging phenomena occurring in the system due to public intervention. The tool will simulate the outcomes of innovations settlement for the economy.

### A multimedia library of publications and reports on research projects conducted in Poland

Although the results of projects co-financed by the European Union are communicated to the public, we are still missing a single place where one could access them all and compare valuable data. This database will enable searching for resources according to selected criteria; certain resources will be available in form of multimedia content.

A common characteristic of the changes occurring within the system of scientific communication is the need for accessibility and attainability of scientific content. The effects of studies and analysis conducted by OPI are situated in the increasingly popular drift towards open access to science. Many of our summaries, reports and publications are available free of charge on public domains. Hereby we ensure that the discourse on knowledge systems and scientific research increases its reach, engages scientists, politicians and experts, as well as anyone interested in participating in the civil society.

#### WE CARRY OUT:

- advanced analysis and data visualisation
- marketing, attitude and opinion research
- project evaluations and research programmes
- research in the field of user experience

#### WE PREPARE:

- analytical reports and data compilations regarding the research and development sector

#### WE CREATE:

- intelligent software systems
- databases



## R&D SECTOR ANALYSIS

We conduct research on R&D projects management, evaluation and transfer of research outcomes from scientists to business.

## OPI – FINDING FUNDS FOR R&D

OPI helps allocate funds for R&D:



**INFRASTRUCTURE  
AND ENVIRONMENT**  
NATIONAL COHESION STRATEGY

- 45 investments have already received more than 663 million euros,



**INNOVATIVE ECONOMY**  
NATIONAL COHESION STRATEGY

- 298 projects have received almost 240 million euros,



**Polish-Swiss  
Research Programme**

- 31 projects have received 31 million CHF\*.

\* As at October 2012

**INFORMATION - CONNECTION - INNOVATION - BUSINESS**

Information Processing Institute provides access to the most complex database replete with information about every Polish scientific initiative\*. We gather information about scientists, whose work may revolutionise the industry and business.

We cooperate with Polish government and institutions responsible for R&D financing and with other leading organisations across public and private sector. We provide IT services to the Polish system of R&D budget allocation.

We conduct our own research on R&D management practices and thus have deep functional expertise that allows us to consult and advise others.

We build support for any scientific undertaking that may change Polish socioeconomic environment. From a concept through background research and funds finding, we reach practical recommendations.



\*Information Processing Institute administrates three main databases: Polish Science (information about scientific units, people, research projects and other scientific undertakings), Research Equipment Database (data on research apparatus in Poland worth more than 125 000 euros each) and Polish Technologies (technologies exchange portal that stimulates cooperation between scientists and advanced technologies business).

**TO LEARN MORE VISIT OUR WEBSITE**

[www.opi.org.pl/en/](http://www.opi.org.pl/en/)

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