TECHNICAL UNIVERSITY OF LIBEREC
Centre for Nanomaterials, Advanced Technologies and Innovation

SELF-ASSESSMENT REPORT

Project Title: Centre for Nanomaterials, Advanced Technologies and Innovation (CZ.1.05/2.1.00/01.0005)

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Preamble

The self-assessment report describes the current status of the project Centre for Nanomaterials, Advanced Technologies and Innovation (registration number: CZ.1.05/2.1.00/01.0005 in the Regional Centres programme, PO 1.2) (hereinafter referred to as the Centre), whose recipient is the Technical University of Liberec (hereinafter referred to as TUL), Studentská 1402/2, Liberec I – Staré Město, 461 17 Liberec, Czech Republic, Company Reg. No. 46747885. The project is performed under the university title "Institute for Nanomaterials, Advanced Technologies and Innovation" (hereinafter referred to as the Institute), which was founded at TUL on the 10th of February 2009 based on a decision of the Academic Senate of TUL (hereinafter referred to as AS TUL).

The report is structured according to Annex 4: Template and the related requirements for the elaboration of self-assessment reports, Evaluator guides for ongoing evaluation of the priority axes 1 and 2. The report is based on the technical description of the project in its original form and in the version as of the 19th of October 2012. The aim of the report is to provide a document for the evaluation process of the Centre by the Management Programme of OPR&DI (hereinafter referred to as the MP) and thus promote better management and successful fulfilment of the objectives of projects financed by the PA 1 and 2 of OPR&DI.

List of abbreviations

7.FP EU	7.Framework Programme of the EU
ALFA	Programme to support applied research and experimental development provided by TACR
AMIA	Advanced Materials Industrial Association
AS TUL	Academic Senate of TUL
BP	Bachelor project
CE	Competitive engineering – research program
CC	Competence Centres (TACR programme)
CxI	Institute for Nanomaterials, Advanced technologies and Innovations of TUL
ČTU	Czech Technical University
DW	Diploma work
EC TEMPUS	Programme EU for cooperation and mobility
ERIH	European Reference Index for the Humanities (database)
EU	European Union
FTE	Full-time equivalent
FRVS	University Education Development Fund
GSF	Czech Science Foundation
HORIZONT 2020	EU Framework Programme for Research and Innovation
KSR FS	Department of Glass Production Machines and Robotics of TUL FS
MIT	Ministry of Industry and Trace
MIT TIP	Research Programme of MIT
MLSA	Ministry of Labour and Social Affairs
MSP	Managing Successful Programs
MEYS	Ministry of Education, Youth and Sports
MR	Material Research – research program
NPU I	National Feasibility Program I
NTI FM	Institute of New Technologies and Informatics of TUL FM
OGP	Department of Grant Support of CxI
OP PI	Operational Programme Enterprise and Innovation of MIT
RAWRA	Radioactive Waste Repository Authority
RIV	Database of research and development results ČR
R&D	Research and Development
SCOPUS	International abstract and citation database
TA	Technical Annex
TAČR	Technology Agency of the Czech Republic

TUL	Technical University of Liberec
TUL EF	Faculty of economics of TUL
TUL FA	Faculty of Architecture of TUL
TUL FM	Faculty of Mechatronics, Informatics and Interdisciplinary Studies of TUL
TUL FP	Faculty of Education of TUL
TUL FS	Faculty of Mechanical Engineering of TUL
TUL FT	Faculty of Textile of TUL

SECTION 1 - Project Management

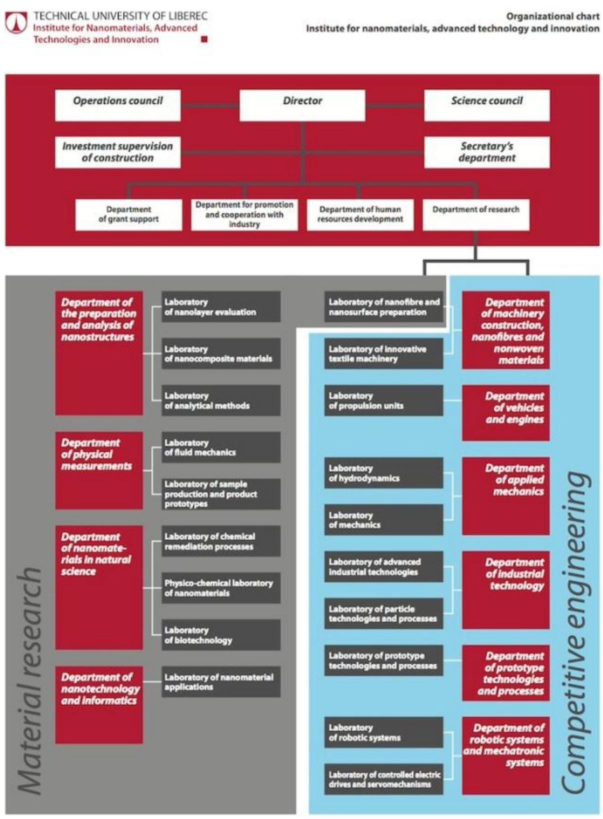
Project management is based on the project application, or the Technical annex to the Grant Decision (hereinafter referred to as the TA). The current management structure does not significantly differ from the TA. The only significant difference is the creation of departments which are intermediary management units between the laboratories and the research programmes. In addition, heads of departments are members of the Operations Council of the Institute instead of heads of laboratories (see below). This change was approved by the MP and is newly defined in the TA.

1.1 Overview of the management system of the organization

Updated project organizational chart

The organizational structure of the project corresponds to the original project proposal with one exception. The original organizational structure of the project envisaged a two-stage level where the whole project is divided into two research programmes - Material Research (MR) and Competitive Engineering (CE). Individual research programmes are performed by 19 laboratories (10 in MR and 9 in CE).

Direct management of a large number of laboratories during the first year of the project proved to be not as effective as the project management demanded. On this basis, the original 19 laboratories were grouped into larger organizational units called departments, whereas the professional profile of individual laboratories and the whole Centre remained unchanged. This model proved to be more operational. The process will probably continue to reduce the number of departments to about 6 or 7 in a near future.



The structures of the implementation and research teams were built based on the approved organizational chart. The implementation team consists of the Director of the Institute, nominated through a selection process, the Secretary of the Institute and her Secretariat, the Department of Grant Assistance (mentioned as Project service in the TA), the Department for promotion and cooperation with industry, the Department for the development of human resources and the Department for research. The latter covers the two research programmes - CE, which covers 6 departments with 9 laboratories, and MR, which covers 4 departments and 10 laboratories. At the time of the building the organizational structure also included investment supervision of construction.

Functioning of top management within the management structure of the project

Apart from the individual members of the project team whose roles are listed below, the main control unit is the Operations Council of the Institute.

The Operations Council is an advisory body to the Director of the Institute and mainly evaluates proposals of new research topics and decisions of the director to perform projects for industry. The Chairman of Operations Council is the Director; members are automatically included based on their capacity as Director of the Department for Research, Director of the Department for Human Resources Development, Director of the Department for Promotion and Cooperation with Industry. The project also assumed that members will be all 19 heads of laboratories of the Institute. As a result of the merger of the laboratories into departments, members of the Operations Council are only the heads of departments, thereby reducing the number of members. This change was approved as a substantial change in the project and was recorded in the Technical Description. This model has proved to be more operational (meetings with ten department heads are simpler and discussion is more efficient).

The Operations Council of the Institute meets approximately once per month.

List of people involved in the project implementation

The list of key personnel of the project is based on the list of persons specified in the grant project application, in some cases there was an exchange of persons for reasons such as retirement or fulfilment of other tasks. The list is divided into the main person managing the project, who are described in detail in section 1.3, and other key persons who are listed in the table below.

Head of department	Name
Head of MR research programme	Prof. Ing. Petr Louda, CSc.
Head of CE research programme	Prof. Ing. Jaroslav Beran, CSc.
Preparation and analysis of nanostructures	Prof. Ing. Petr Louda, CSc.
Physical measurement	Prof. Ing. Václav Kopecký, CSc.
Nanomaterials in natural science	Doc. Dr. Ing. Miroslav Černík,CSc.
Nanotechnologies and informatics	Prof. Dr. Ing. Jiří Maryška, CSc.
Construction machines, nanofibres and non-woven material	Prof. Ing. Jaroslav Beran, CSc.
Vehicles and engines	Prof. Ing. Celestýn Scholz, Ph.D.
Applied mechanics	Prof. Ing. Ladislav Ševčík, CSc.
Industrial technologies	Ing. Jaromír Moravec, Ph.D.
Prototype technology and processes	Ing. Petr Zelený, Ph.D.
Robotic and mechatronic systems	Doc. Ing. František Novotný, CSc.

Overlapping roles in various bodies

At the level of the Institute there were no overlaps in the roles of individual bodies and no significant overlaps in staffing with other bodies of TUL. Exceptions are employees at the level of management of research programmes, who are also heads of departments in their original faculties (Prof. Beran, Head of the Department of Textiles and Single Use Machines FS; Prof. Louda, Head of the Department of Materials FS). The second overlap was at the level of heads of departments who are also the heads of departments of their original faculties (in one case by the Dean). This partial overlap ensures the transfer of scientific activities and contractual relations from the departments of faculties to Institute workplaces.

1.2 Management system at the supervisory level - Scientific Council

The Scientific Council of the Institute is the authority with powers of supervision of the project.

The Scientific Council of the Institute discusses the strategic plan for the educational, scientific, research, developmental, artistic or other creative activities at the Institute prepared in accordance with the long-term goals of the public university. It also comments on the issues presented to it by the Director.

List of members of the Scientific Council of the Institute

No	Name	Organization	Function
1	Prof. Ing. Jaroslav Beran,	TUL FS	Head of CE
2	Doc. RNDr. MiroslavBrzezina,	TUL FP	Dean
3	Ing. Jiří Cvejn	MAGNA	Head of R&D
4	Prof. Ing. František Hrdlička,	ČVUT FS	Dean
5	Prof. RNDr. Oldřich Jirsák,	TUL FT	Professor
6	Prof. Ing. Václav Kopecký,	TUL FM	Dean
7	Prof. Ing. VojtěchKonopa,	TUL FM	Professor
8	Ing. Jaroslav Kopta	KHK Liberec	Vice-Chairman
9	Doc. Ing. Dora Kroisová, PhD.	TUL FS	Assoc. Prof
10	Ing. Roman Kumpošt	Steinel	Managing
11	Prof. Dr. Ing. Zdeněk Kůs	TUL	Rector
12	Prof. Ing. Petr Louda, CSc.	TUL CxI, FS	Head of MR
13	Prof. Ing. Miroslav Ludwig,	UniPardubice	Rector
14	Prof. RNDr. David Lukáš,	TUL FT	Professor
15	Doc. Ing. Miroslav Malý, CSc.	TUL FS	Dean
16	Ing. Ladislav Mareš	Nafigate	Managing
17	Prof. Dr. Ing. Jiří Maryška,	TUL CxI, FM	Head of NTI FM
18	Doc. Ing. František Novotný,	TUL FS	Head of KSR
19	Ing. Vladimír Opatrný	KHK Liberec	Chairman

20	Prof. Ing. Petr Sáha, CSc.	Uni. T. Bata	Rector
21	Ing. Jiří Sloupenský, CSc.	Rieter CZ	Head of R&D
22	RNDr. Jiří Slovák	SÚRAO	Deputy to
23	Doc. Ing. Petr Tůma, CSc.	TUL CxI, FM	Director
24	Prof. Ing. Petr Vavřín, DrSc.	VUT	Rector Emeritus
25	Doc. Stanislav Zippe	TUL FA	Vice-dean
26	Doc. Ing. Miroslav Žižka, PhD.	TUL EF	Dean

Explanation: FS-Faculty of Engineering, FE- Faculty of Economics, FM-Faculty of Mechatronics, Informatics and Interdisciplinary Studies, FA - Faculty of Art and Architecture, FT- Faculty of Textiles, FP-Faculty of Sciences, Humanities and Education

Conduct of the scientific council, rights and duties of members

The Scientific Council of the Institute was composed pursuant to the provision of the Higher Education Act No. 111/1998 Coll. to sufficiently cover both internal experts of the Institute and representatives from industry and consumers. Specifically, it consists of representatives of faculties of TUL, representatives of other technical universities and companies cooperating with the Institute.

The Scientific Council is an advisory body of the Director of the Institute. Members of the Scientific Board are required to attend meetings of the Scientific Council. These are either in the form of meetings held in person (at least once a year) or by correspondence. The Scientific Council met for the first time on the 22nd of November 2011 and again on the occasion of inauguration of building “L” on the 10th of October 2012.

Overlapping roles between members of the SC and other functions

Overlapping roles between members of the SC and other functions are twofold:

1. The members of SC are the Director of the Institute and the two heads of the research programmes. This overlap is intentional and was directly specified in the Technical Description. The purpose is to provide information on the activities of the programmes to the SC on the one hand and the possibility of direct interaction of these programmes by SC on the other hand.

1. The members of the SC are heads of some of the laboratories (departments) of the Institute. Their role in the SC is based on their position at the faculties of TUL (professors, Dean). These members were nominated as representatives of the faculties.

1.3 Top management of the project

Positions, names, qualifications and experience of the executive management of the project

All planned positions for head personnel at the Institute were occupied based on a selection process and all planned departments were put into operation. The exception is the position of Director of Human Resources, who is responsible only to the proper function of the selection process (based on the project the department is planned for Q4 of 2012). Staffing of positions and qualifications and experience of the nominees are as follows:

Director of the Institute: Doc. Ing. Petr Tůma, CSc.

Qualifications:

- Experience in management (in the past ten years, head of department or institute, vice dean, vice rector of TUL)
- Member of the Academic Senate of TUL and a faculty of TUL.
- Manager of many development projects, research projects and contractual research projects.
- Experience with the commercial sector (2004-2005 Technical Director of the Liberec branch of Cadence Innovation company).
- Since 2008, participated in the preparation of the university project for OPR&DI Centre for nanomaterials, advanced technologies and innovation.

Experience:

- Technical cybernetics, industrial automation, electrical engineering, electronics, software creation, etc. In the listed disciplines, participates in the search for solutions to problems that arise in industrial production.
- Management of projects for industry (2003-2010 contractual research projects totalling over 18 million CZK). Contracts, especially for companies Magna Exteriors&Interiors (Bohemia), s.r.o., Škoda auto a.s. and Sklopan.
- Work on research and development projects with the support of grant programmes (Research Centres, MIT TIP, OP EI programmes, etc.).
- Legal protection of scientific results (originator of filed patents).
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Research Director: Doc. Dr. Ing. Miroslav Černík, CSc.

Qualifications:

- Assoc. Prof. in the field of science engineering (application of nanoparticles for the remediation of water)
- Active knowledge of English, Russian, partial German
- 30 scientific publications, 422 citations and H-index 12

Experience:

- Long-term experience with management of R&D projects, both in industry and academia (in the position of investigator or co-investigator)
- Work on international R&D projects (EU Framework projects)

- Experience in top management (Director of Science and Research at AQUATEST a.s.)
- Knowledge of R&D law follows from the management of R&D projects and also from the position of opponent for TACR projects

Director for publicity and relations with industry: Ing. Stanislav Petrík, CSc.

Qualifications:

- Master of Science in the field of physical engineering - engineering of solids and PhD in the field of radioelectronics.
- Active knowledge of English, French and Russian, partial German.
- Publications: 2 books, 17 refereed articles in scientific journals, 24 contributions to conferences, 4 patents, 3 temporary college textbooks, 16 reports from research and development projects.

Experience:

- 5 years experience as a senior manager (research and development, strategic development and co-operation between industry and universities) and 8 years experience in middle management (technical development and research).
- More than 10 years of experience in technical, business and strategic negotiations with foreign partners (U.S., Japan, France, United Kingdom, Austria, Germany).
- Interdisciplinary experience from a production environment, research and quality control (ISO 9000+).
- Deep theoretical foundations and practical experience in material engineering, engineering physics, chemical technology and nanotechnology.
- Member of the Materials Research Society, American Filtration and Separation Society, Member of the Scientific Board of the Faculty of Textiles, Technical University of Liberec

Department for Development of Human Resources: Ing. Miloš Hernych

Qualifications:

- Technical university graduation
- Active knowledge of English language, partial knowledge of German and Russian

Experience:

- Several years of experience leading OPEC and OPR&DI project teams, aimed at the popularizing of science, search and development of

talented individuals and their motivation for scientific work, in the position of principal investigator or co-investigator (incl. managing teams of 100-150 employees)
- Participation in R&D projects (TACR, CSF, MIT)
- Participation in contractual research for domestic and foreign partners (RAWRA, Skoda Auto, ČEZ, ABB Mannheim)
- Management of FRVŠ grants
- Management of student work (BP, DW, projects)

Secretary of the Institute: Ing. Adéla Zemanová

Qualifications:

- Economics graduate, Faculty of Economics in the field of Business Economics, Technical University of Liberec, graduated 2009
- Active knowledge of English and Russian languages, passive knowledge of German
- Financial management of projects: OPHRD, OPEC, OPR&DI, international project EC TEMPUS

Experience:

- Preparation and management of finances of national and international projects in accordance with the laws and requirements of different providers
- Management of a working group, control of project fund spending, budgeting.

Director of Department of Grant Assistance (OGP): Ing. Markéta Dubová, Ph.D.

Qualifications:

- Ph.D. focusing on the organization and management (dissertation about the problems of exchange rate as an instrument of economic policy),
- Active knowledge of English language, German language passively,
- Currently project investigator - OPEC – Development of R&D project management teams at the Technical University of Liberec (CZ.1.07/2.3.00/30.0024, from 2012 to 2014 and OPEC – Implementation of fullcost methodology at the Technical university of Liberec (CZ.1.07/2.4.00/16.0010, 2011-2013).

Experience:

- Several years of experience in academia - teaching in English, research and publishing activities,
- Preparation and management of finances of national and international projects in accordance with the laws and requirements of different providers,
- Management of a working group, control of project fund spending, budgeting,
- Co-author of central methodology of calculation of indirect costs (fullcost) at the Technical University in Liberec.

Existing management activities within the project

Individual managers are responsible mainly for the following areas:

Director of the Institute

- Manages the implementation of the investment part of the construction of buildings, purchase of instruments and equipment
- Manages the actual running of the Institute
- Other heads of departments report directly to him.

Director for Research

- Coordinates research/development activities of the Institute (e.g. preparation of this report, the project for the National Programme for Sustainability (NPU I) or the project Competence Centres.
- Coordinates Czech and international scientific cooperation.
- Provides scientific information to department through regular seminars at the Institute.
- Responsible for the fulfillment of relevant indicators (RIV results, R&D projects)

Director for promotion and cooperation with industry

- Coordinates the promotion and presentation of project results at professional events (e.g. presentation for Olympic Games in London, Science Month in Prague, etc.)
- Builds relationships with industry (new industrial customers)
- Collaboration organized in the form of Industrial Association for Advanced Materials (AMIA)
- Responsible for the fulfillment of relevant indicators (volume of contractual research, number of collaborative projects with industry)

Director of Human Resources

- Provides recruitment (in collaboration with heads of departments)
- Provides training of staff and students involved in the activities of the Centre
- Responsible for the fulfillment of relevant indicators (staff composition)

Secretary of the Institute

- Ensures the routine operation and organization of the Institute;
- Manages the Secretariat of the Institute
- Responsible for the preparation of monitoring reports and budget

Director of OGP

- Provides information about new calls for projects, preparation of new projects.
- Provides registration, agenda and financial management of R&D projects.
- In cooperation with the Director for Research records results in the RIV.

Observations on possible overlapping of roles

Responsibilities and duties of individual managers are disjunctive and there are no overlaps. Individual managers at Institute are engaged in other management positions within the TUL.

1.4 Risk Management

Identified risks of project failure

Several potential risks of project failure identified in the project proposal. High risk was associated with a failure to comply with the deadlines for the construction. Even though the construction was delayed and finishing of individual works is still running, the activity of the institute was started according to the expected schedule and work was carried out temporarily in other areas of TUL. Individual laboratories and departments were created in time; personnel were provided and applications for research projects submitted and work with industry is continuing. No other risks identified at the beginning of the project materialized (technical, legal, organizational, human resources).

The following risks currently exist or have been identified:

Risks associated with users of research and development

Given the ongoing economic crisis, there is a real risk of a lack in demand and user motivation for utilization of the capacity and services of the provider. Many businesses have reduced their budgets for activities that do not bring immediate economic benefits, including support for the innovation process. However, in terms of meeting and exceeding the relevant indicators for contractual research in these years (see below), there is a strong commitment to meet these indicators in the future as well. Relations established with industry are long-term and bring tangible benefits to industrial partners.

Risks associated with the sustainability of the project

Risks that are generally associated with obtaining R&D funds from national sources to support research and development can never be eliminated, and depend largely on the willingness of the State to promote research and development. Currently, we

are fulfilling and significantly exceeding the indicator for budget from national sources (see below). Moreover, a number of supported projects have a time period significantly affecting the period of sustainability of the project. We also do not expect a sharp reduction in these grant funds.
In the case of lack of interest of the users for the research results in any of the segments of our research activities, the structure of the workplaces (laboratories) will be operationally optimized in order to fulfill the mandatory monitoring indicators of a financial nature.

Measures taken to eliminate risks

There was a risk of excessive thematic as well as personnel fragmentation relating to the existence of 19 laboratories. Because there has been a different development of laboratories and there was a risk of stagnation for some of them, the laboratories were merged into higher units – departments, which are less prone to temporal variations in both contractual research and in obtaining contracts and other funds for operation and research. Management of the Institute will continue in this trend.

1.5 Relationships with key partners

From the perspective of the parent organization of TUL the project is classified under the academic institute “Institute for nanomaterials, advanced technologies and innovation” established by the Rector by the Academic Senate of TUL on the 10th of February 2009 pursuant to Article 34 of Act No. 111/1998 Coll. the Higher Education Act. The Institute operates in a separate building "L" of the TUL built as significant part of the project.

The project has no partners. Relations with other institutions are dealt with at the level of the Director of the Institute or the Department for Research or the Department for cooperation with industry according to the type of cooperation.

1.6 Additional Analysis

Comprehensive evaluation of tasks

Project management is on schedule with the project plan and is unchanged, with the exception of the above mentioned change (in the Operations Council).

Outline of key future tasks/challenges

In the next three years development activities at the Institute will be performed in order to meet the key indicators of the project by the end of 2015. Although some indicators have already been met well in advance it is important to keep the pace up. This requires the following:

- Maintain and improve staffing at the Institute especially for the performance of quality R&D projects, including international projects.
- Increase the pace in the results given in the RIV database (particularly impacted quality publications) and continue with submission of patents.

- Increase the volume of contractual research in order to reach the desired value of 20.3 million CZK by 2015, and especially more intense and long-term collaboration with industrial partners.

SECTION 2 - Human Resources

2.1 Human resources policy in general

The aim of the Centre is to build leading research teams in the areas of material research and competitive engineering. The potential of existing employees of TUL was mainly utilized in the first phase of the project. Due to the fact that from the outset the Centre is understood and conceived as a university-wide project, it was possible to draw from a wider portfolio of applicants from TUL personal than it was in the case for university R&D projects. In addition to in-house employees we have accepted external, including foreign, employees from the beginning as well.

Recruitment

Recruitment is carried out in accordance with the "Director's guideline for the selection process for positions of R&D employees at the Institute for nanomaterials, advanced technologies and innovation", which amends the "Order for the selection process for filling academic staff and other employees of the Technical University of Liberec". In accordance with the TA, the guideline describes the procedure for the selection of candidates.

Information about the announced selection procedure is published on the official notice board of TUL, the portal of MLSA, and also e.g. in daily newspapers or domestic and foreign professional journals and the relevant websites (e.g. http://www.euraxess.cz). According to the rules set out in the Grant Decision No. 0005/01/01, all recruited researchers (in addition to those previously listed in the TA) undergo a standard open selection procedure set by the above mentioned Director's guideline. The procedure takes place in two rounds. The first is the evaluation of candidates based on an evaluation questionnaire according to the methodology described in the guideline. The second round evaluates the results of a structured interview, aimed at verifying the motivation of the applicant and an assessment of their current results. Candidates can obtain bonus points who:

a) have completed a post-doctoral internship abroad for at least one year in the last 10 years,

b) have been employed in industrial research for at least one year in the last 10 years,

c) fall into the category of "women researcher under 35 years old", to ensure the relevant gender structure of the research teams.

Evaluation of the work performance of employees

The evaluation of employees is performed using the "Director's guideline: Career ranking of R&D employees at the Institute of nanomaterials, advanced technologies and innovation", which is based on the principles defined in the TA and elaborates a quantitative and qualitative point of view, according to which the evaluation is conducted. The criteria under evaluation are:

a) Application of results - patents, prototypes, approved technologies, authorized software.

b) Teaching and leadership of doctoral students, graduation of courses of continuing education.

c) Scientific publications - articles, books, presentations at conferences.

d) Efficiency - the amount of funds obtained from grants and from industrial partners.

The evaluation is done annually and is also the basis for possible career advancement.

Career growth

Opportunities for career growth of employees of the Institute are also outlined in the "Director's guideline: Career ranking of R&D employees at the Institute of nanomaterials, advanced technologies and innovation". For researchers positions are defined in 3 stages: Junior Researcher - Senior Researcher - Head of the research programme, it is possible to reassign employees based on objective criteria of achieved results (non-fulfillment or conversely exceeding of defined activities in two consecutive evaluation periods).

Disciplinary aspects

The issue of the rights and obligations of employees is solved in the "Conditions of Employment of TUL". The Institute has prepared its own internal directive on disciplinary sanctions, but in terms of occupational performance (see Evaluation of work performance of employees) sanctions can be applied according to the conditions of employment. For students it is possible to apply the "Disciplinary Code of TUL".

2.2 Project team

Contrary to Annex No. 1 to the Grant Decision No. 0005/01/01 (TA), there were several minor changes in staffing and workload for personalized project positions during the implementation of the project. The most significant change was the replacement of the head of the research programme of Material Research Prof. RNDr. Oldřicha Jirsáka, PhD., forced retirement, Prof. Ing. Peter Louda, PhD. Other changes concern changes in work time or changes to the composition of the research team and its gradual expansion. These adjustments do not go beyond the scope of normal changes.

Number of researchers

The team is divided into two groups according to the focus of the research programmes. The following data refer to the end of 2012. Compared to the plan there was an increase in numbers and converted work time in all categories of employees.

	Research team- plan		Research team – actual									
				Qualification structure						Work time		
	total	Work time	**total**	P	A	Ph	M	B	O	start-up	projects CxI	**Total**
Head of dept. and research program			**10**	8	2					2.06	4.97	**7.03**
senior researcher	**28**	**14**	**40**	6	15	12	7			16.26	12.69	**28.95**
junior researcher	**32**	**16**	**63**			40	23			21.85	29.46	**51.31**
technic/laboratory			**36**			3	20	4	9	12.65	16.58	**29.23**
total	**60**	**30**	**149**	14	17	55	50	4	9	52.82	63.7	**116.52**

P- professors, A – associated professors, Ph- PhD., M – MSc., B – BSc.,O-others

2.3 Training and professional development

An integral part of the work with human resources system is the system of continuous training and upgrading skills of employees at the Institute. The general problem, which occurs in most workplaces that have diversified and professionally diverse activities, is the lack of mutual information about the tasks and issues that are dealt with in the workplace, as well as the possibility of these workplaces to offer their instrumentation and services to others. Hence, a system of regular seminars was implemented at which individual laboratories and departments present their work and technical equipment or collaborative possibilities. Seminars take place on a weekly basis.

Furthermore, a system of seminars was introduced during which individual doctoral students and postdocs present specialized topics. They also inform about their internships etc. These seminars are also held weekly.

The system of further education of employees includes a mobility plan document, which specifies the organization of long-term internships and professional work placements of staff and postgraduate students of the Institute at similar workplaces both in the Czech Republic and abroad.

In 2011, four employees were given work placements abroad (USA, Netherlands, Ireland, Germany) and in 2012 at least 14 junior researchers (Sweden, Germany, USA, Canada, Switzerland). In addition, the Institute hosted 5 international and 3 domestic interns.

An integral part of the activities of professional growth and continuing education of employees is also training of soft skills. At present, companies are being selected to ensure that during the next period of approximately 1.5 years a series of about 30 single or multi-day training sessions take place for the staff of the Institute in the following areas:

- managerial skills,
- communication skills
- work-life balance,
- specific skills,
- presentation skills.

In the framework of the OP EC project “Open University” an offer of about 35 short trips to foreign institutions with a focus on “best practice” in the management of project teams, patent protection of R&D outputs, promotional activities and work with human resources is being prepared for selected project team members.

2.4 Further information

Working with future students

One of the main aims of the project is to train highly-qualified human resources - Doctoral graduates and Master’s students, who could apply research or innovations in the public or private sphere. In addition to the standard system of finding suitable candidates, such as writing and managing topics for diploma work, focusing on issues addressed by the Centre or identifying and subsequent leading doctoral by staff of the Institute, untraditional methods have begun to be implemented. Such methods include a long-term work with talented youth individuals and their motivation for future careers in research. In the first implementation phase of the project, focus was mainly on synergistic projects of OP EC Human resources in research and development “New Talents” and “STARTTECH - Start with technology”, whose target audience was mainly young people in primary and secondary schools. The first focused on reaching the widest possible base of young people, the second then complemented the long-term individual work with “captured” talented individuals. These projects are currently linked to another OP EC project “Open University”, whose main objectives include the creation of a system for finding and long-term work with possible future candidate Master’s and Doctoral students, who would thematically conform with the focus of the Institution. Within its framework are tested various ways of motivating young people to scientific work, either in the form of a Children's University, a mentoring programme (internship students from secondary schools), thematic competitions, supporting interesting ideas or student research conferences.

Current challenges and issues

In line with the project of the Centre the Department for Development of Human Resources was established in the second half of 2012. Until this time the selection procedure for employees and other activities of the department were carried out in conjunction with the Rectorate of TUL and the Secretary’s Department. The department is therefore currently mainly focusing on the implementation and development of activities described in section 2.1 and 2.3, i.e. finding and supporting suitable candidates for Master's and Doctoral degree programmes and the professional development of existing staff.

Future topics

The following issues will need to be prepared in the near future:

- The application to calls of operational programmes in the next programme period 2014-2020. These tools proved to be very useful to the Institute in the previous period for finding and promoting human resource development, particularly in building a long-term system for working with talented individuals or obtaining excellent staff from around the world.
- The implementation of other forms of human resource development, based on the experience of the currently developed activities. Existing and new employees must constantly prepare for the changing situation and learn new trends and knowledge.
- The introduction of a system for finding and recruiting new employees who will come under normal fluctuation.
- The introduction of a system of entry training for new employees. This system is not yet at the Institute or TUL as a whole. New employees are trained only by their heads, which is an unsustainable situation.

Another tool for improving the quality of the research and development team of the Institute is long-term involvement of local and foreign employees with excellent results in a global comparison or with the potential to achieve these results in a short period of time. The project OPEC “Development of R&D project research teams at the Technical University in Liberec”, among other things, is underway in support of this aim and has led to the Institute having seven domestic and seven foreign (India, Poland, Bulgaria) doctoral graduates.

SECTION 3 - Financial Aspects

3.1 The overall project budget

The total budget of the project

Based on the Grant Decision No. 0005/01/01 from the 24th of November 2009 the budget for the whole duration (12/2009 - 12/2013) was set at a total sum of about 800 million CZK, of which 669 million CZK was intended for capital expenditure and 131 million CZK for expenditure of a non-investment nature. During the project performance various minor changes to the budget were discussed with the provider within the regime of significant changes which resulted from both the needs of the implementation and research teams and also from the selection procedure which in some cases led to a substantial change in prices of the acquired assets. On the basis of the Joint methodological guideline No. 1 dated 15th of March 2011 issued by the Managing Authority of the Ministry of Education, Youth and Sports (MEYS) the originally planned expenditure in section 2.3 Acquisition of buildings was reduced and the budget recorded a decrease in eligible expenses of 145 million CZK. The newly approved budget assumes eligible expenses totaling less than 655 million CZK, of which the investment part constitutes 517 million CZK and the non-investment part 138 million CZK.

Individual categories of the budget and their changes and variations

Utilization of individual items of eligible costs and changes in the budget are described in detail in the individual budget items:

Intangible assets

The project allowed for the acquisition of intangible assets in the form of software and valuable rights in the total of 353 thousand CZK for the whole duration of the project, which represents 0.05% of the total budget. At the time of finalizing this report, these funds have not been spent as their use is planned for 2013.

Tangible assets

The largest item in the budget is that of tangible fixed assets, namely the construction of the new building "L", which currently houses the University Institute CxI, and also the purchase of equipment. The proportion of tangible fixed assets from the total budget is nearly 79%. At the time of finalizing this report approximately 63.5% of the funding for the acquisition of tangible fixed assets had been utilized.

The tender for construction of the new building "L" was published in April 2010. The following companies submitted a bid: GEOSAN GROUP a.s., HOCHTIEF CZ a.s., OHL ŽS, a.s., SDRUŽENÍ TU Liberec PSG&BREX, BAK stavební společnost, SKANSKA a.s., SYNER, s.r.o. a Metrostav a.s. – division 8. The most economically advantageous tender bid was from the company Metrostav a.s. whose bid price was

259 million CZK without VAT. This low bid price led, based on the Joint Methodological Guideline No. 1, to the decrease in the eligible costs of the project (see above). The recipient of the grant was left with a saving of 30% from the savings made on the construction works, which in this case amounts to 62 million CZK. Part of the savings is left for any extra work and part will be utilized for the purchase of instruments and equipment.

At the time of finalizing this report, the construction of new buildings had utilized nearly 82% of the funds. In the coming months (no later than June 2013, i.e. the end of the infrastructure part of the project) we plan to utilize 100% of the funds earmarked for the construction of building "L".

Another very large budget item is **instrumentation** – over 34%. The instruments were purchased in an open above-limit tender in accordance with the Act on Public Procurement. The Centre project originally envisaged the acquisition of instrumentation and other equipment totaling 180 million CZK. Based on a request from TUL, this budget item was increased to almost 220 million CZK. At the time of finalizing this report more than 90 devices has been acquired and approximately 172mil CZK of the funds had been utilized (including concluded tenders) Announcements of remaining ones are expected by the end of Q1 2013. In addition to instrumentation, the budget assumed the acquisition of **other equipment** in the original amount of 220 thousand CZK, after discussing changes with the provider of 4 million CZK. This item has currently utilized more than 50%.

Salaries (staff costs)

Salaries make approximately 14% of the project budget. The project originally envisaged the total utilization of 82 million CZK. After the discussed changes the budget for staff costs increased to 91 million CZK. The increase in the budget items was mainly due to the inclusion of employees of the Technical Division of TUL to the project implementation team and the need to strengthen the technical and investment supervision of the construction. The recipient originally assumed that this would be provided in the framework of the services but these very specific activities needed knowledge of the internal environment of the recipient and synergy with other departments of TUL.

The staff costs item consists of both the salaries of the implementation team (management and other support functions) – approximately 17.5% of total staff costs – and the salaries of researchers, which include the heads of the research programme, senior and junior researchers and technical workers. The item also includes fees paid based on service contracts and work agreements and the costs of social and health insurance.

The implementation team includes the Director of the Institute, Financial Manager, a tender specialist, and the heads of departments: research, human resource development, promotion and cooperation with industry and the Department of grant support. The team also includes the creative, investment and technical supervision of the construction and many more. At the time of commencement of the project the implementation team included a total of 22 persons with an equivalent capacity (hereinafter referred to as the FTE) of 5.59. At the time of finalizing this report (end of 2012) the implementation team has new staff for promotion, project managers, department directors and administrators - a total of 36 people with 17.76 FTE, of which 8.24 FTE is paid from the Centre project.

Staff costs of the **research team** consist of more than 82% of the budgeted staff costs of the Centre. The research team includes laboratories scientists in the positions of junior researcher, senior researcher and also technicians. In 2010, the Centre project and R&D projects employed a total of 29 persons at Institute in the position of senior researcher, which accounted for 8.22 FTE. At the end of 2012 a total of 37 persons work as a senior researcher with 20.81 FTE, of which 9.7 FTE is paid directly from the Centre project. At the start of the project a total of 21 persons worked as a junior researcher with 4.60 FTE, of which 3.84 FTE was paid from the Centre project. At the end of the year, this number in all projects of the Institute increased to 32.90 FTE, the staff of 40 people is paid from the Centre project with 14.95 FTE. Technical staff is also involved in the scientific tasks of the Centre - at the start of the project 3 people with 0.2 FTE, at the end of 2012 there were 15 technicians at Institute with 8.16 FTE, and 2.55 FTE paid from the Centre project. One head of the research programme is responsible for each area of research - material research and competitive engineering.

The total FTE of all the above-mentioned persons working exclusively on the Centre project in 2010 was 18.8, in 2011 it was 35.2 and in 2012 it is 36.84. The total FTE of employees within all of the R&D projects registered at Institute was as follows: 19.72 (in 2010), 51.13 (in 2011) and 80.99 (2012).

The total volume of staff costs for the Centre project results from valid Internal payroll regulations of the Technical University of Liberec, which determine the tariffs for different wage bands, groups of work activities and the amount of the variable components of salaries for TUL employees and also the Career regulations of the Institute. At present, the volume of funds utilized from the Centre is approximately 45%. Due to the completion of building “L” and the work beginning in the new premises during 2012 there was a significant increase of these funds being utilized in 2012 and this trend will continue in the Centre in 2013.

Material (consumables and operating) costs incurred in direct relation to the Centre project were planned to a total amount of 18 million CZK, which represents less than 3% of the project budget. The recipient uses these funds to pay for operating computers, equipping laboratories, chemicals, materials for utility models, prototypes and other applied R&D results, as well as to cover the purchase of literature and necessary expenses for the operation of the Centre. The biggest expense of this chapter was the purchase of office, chemical and engineering furnishings in 2012. Currently, 52% of this item has been utilized.

Costs or expenses for services were planned to a total amount of 14 million CZK, which represents about 2% of the project budget. During project implementation, this item was reduced by about half to 7.2 million CZK. These funds were mainly used for patent attorney services etc., laboratory accreditation cost, purchasing of licensed software, advisory and consultancy services for preparation of technical specifications for tenders, fees for conferences and various training workshops or seminars, industrial gases or translations of documentation and promotional materials mainly to English. At the end of 2012 approximately 16% has been utilized.

Publicity was planned to a total amount of 0.8 million CZK. During the project this item was increased to 1,8 million CZK, which is about 0.3% of the project budget. Funds for publicity were mostly used for setting up and editing the website of the Institute, for the preparation of information and communication materials (boards, posters, brochures), the information panel on building "L" and many other things. All of these materials have displayed the logo of the Operational programme R&DI, the EU and other compulsory elements of publicity. Currently, approximately 26% of the budget for publicity has been utilized. Again, there has been an increased use from the operation of building "L".

Foreign and domestic travel was planned to a total amount of 2.7 million CZK. During the project implementation, this item was increased to 5.6 million CZK based on an application from heads of departments, which is about 1% of the project budget. These resources are utilized for travel expenses, accommodation and meals at domestic and international conferences, where articles and other contributions are presented. In addition, these funds were spent on visits to industrial partners who were interested in the application of the results of the Centre in their manufacturing practices or cooperation on projects or contracts for complementary activities.

Total ineligible expenditure

Ineligible expenses in the original project budget were planned only to pay for the project ineligible VAT. During the project, however, some of the non-investment or investment costs are identified in the MP as being ineligible. The recipient reimburses these costs from their own resources, which were placed on the project account.

Overheads

A total of 12 million CZK were planned in the project, which represents less than 2% of the total budget. Utilization of these funds is subject to acceptance in accordance with the methodology of calculation of overheads based on the full cost model. Due to the fact that the full cost methodology at TUL has yet to be certified by MEYS, no funds were spent in the period 2010 - 2012 to cover overhead costs. The use of funds to cover overhead costs is expected in 2013, when the methodology should be fully certified.

In total, on the date 30.11.2012 approximately 423 million has been utilized on the project, which is roughly 63% of the approved budget. The reason for the low utilization of non-investment funds is an extension of work on the construction of the building "L", when the implementation team could not be fully joined to the research work. With the delayed completion of the building "L" less funds were utilized for materials, services and travel than was originally planned. A significant increase in the use of individual items is expected due to the development of activities in the building “L” in 2013.

3.2 The financial detachment of the recipient from the parent institution

The Centre project is linked to the creation of a new organizational unit at TUL – Institute for nanomaterials, advanced technologies and innovation, the functioning of which is governed as well as the functioning of the whole university by Act No. 111/1998 Coll. the Higher Education Act. The Institute observes the internal rules applicable throughout the Technical University of Liberec as well as its own internal regulations. The institute has its own budget, which is separated from other parts of the university budget. Management and internal administration of the Institute is performed by the Secretary to the extent stated in the Statute of TUL. The funds are recorded separately in cost centres of the individual departments, projects and contractual research or complementary activities.

The institute has currently no income from institutional support or from educational activities (see below).

3.3 Generating income

A necessary condition for the sustainable development of activities of the Institute is to provide a sufficient volume of income. The operating budget of the Institute, according to the project plan, consists of five main items:

- Contractual research
- National grants
- International grants
- Institutional financing
- Other sources (rentals, sales of customized activities, industrial associations, etc.)

3.3.1 Planned vs. actual income and deviations

The Centre planning with income divided into individual items (shown for the period 2010-2 and the plan to the OP R&DI target date of 2015), which are accordingly fulfilled (all in million CZK):

Source	2010		2011		2012		2015
	Plan	Actual	Plan	Actual	Plan	Actual*	Plan
Contr. res.	1.3	1.3	3.7	16.4	4.7	24	20.3
CZ grants	1.3	2.4	3.7	31.0	4.7	79	38.0
International	0	0	0	0.2	0	0.4	4.0
Institutional	0	0	0	0	0	0	10.0
Others	0	0	0	0	0	0	14.9
Total	2.6	3.7	7.4	47.6	9.4		87.2

*as of December 2012

In the first years of the project (2010-12) operating income was planned to be low due to the fact that the project did not have its facilities (Building L) and individual teams were just beginning to emerge. In fact, there was a significant increase in revenues compared to the plan in 2011, particularly from national grants (8x exceeding the indicator) and also from contractual research (4x). This trend continued in 2012, with these numbers being close to those planned for 2015. In this period no indicators were established for income from international projects, institutional support or other items of revenue. Hence, these items have not been fulfilled, with the exception of income from international projects, where one project was performed under FP7 EU (see section 4).

3.3.2 The main successes/failures and future plans

The set of indicators in financing the Institute have been achieved since the beginning of the project (or significantly exceeded). This applies primarily to revenues from national grants and income from contractual research. In the case of grants, it can be assumed that their volume will remain at least at the level of 2012 for the duration of the project, because most of the grants will run for a period covering the next few years. The situation is worse in the case of contractual research, where in the near future we cannot expect a recovery of the economic situation and greater business investment in applied research or development through contractual research. Even so, we believe that existing links with industry and the forthcoming programme of cooperation will permit us to meet the criteria of the project. We expect improvement even in the category of international grants. One FP7 EU project is in the negotiation phase, which will significantly improve the parameter for the next four years. Overall it can be concluded that the parameters of the Institute were well set and their fulfilment in the near future is realistic.

3.3.3 Policy/strategy for reinvestment of income

Since 2014, the project team will reinvest income to the sustainability of the built research capacity of the Institute to the sum of 22.8 million CZK per year. The income from NPU I (see below) will be crucial in this respect, since this programme counts on the capital costs or expenses for the acquisition and restoration of tangible and intangible assets necessary for the project. Besides this programme the Centre will also rely on the utilization of other sources (internal resources of TUL).

3.4 Additional Information

3.4.1. Evaluation of the problems that emerged in this field and their solutions

In terms of the financial aspects of the project **obtaining private funding** for research and development projects appeared to be problematic. Providers of grant funds for science and research projects, in line with Act No. 130/2002 Coll., on research and development from public funds do not provide 100% reimbursement of the grant budget for industrial research and experimental development and the remaining portion is required to be covered by private funds. Companies, which cooperate with staff of the Institute and which have an interest in the results of joint research, often do not have enough of their own private funds for additional funding. Therefore, although TUL as a research organization may require 100% funding from grants, they offer during the acquisition of joint projects with industry a certain share in the additional funding. The institute therefore looks for ways to obtain this money through its business activities.

Another problematic aspect of financial is the **demonstration of overhead costs** in accordance with the requirements of the OPR&DI programme. Due to the fact that the full cost methodology at TUL has yet to be certified by MEYS, no finances have been utilized in the period 2010 - 2012 to cover overhead costs within the Centre. TUL the recipient addresses this issue in the Operational programme Education for Competitiveness project, entitled "Implementation of the full cost methodology at the Technical University of Liberec", Reg. No. CZ.1.07/2.4.00/16.0010. TUL expects the full implementation of the methodology as of the 1st of January 2013 and thus the payment of overhead expenses from the Centre in 2013 will be covered.

3.4.2. A brief summary of future challenges/issues that we can expect in the next 3 years

By the end of 2013, the activities of the Institute will be funded mainly by targeted support from the Centre project, as well as specific funds from already acquired R&D projects, contractual research and contracts for additional activities. The project expected an institutional support from 2014. This support should have been obtained from the National Research Programme III. However, publication of this programme was cancelled by the government during the performance of the Centre project. A possible source of institutional support may be from the R&D results registered in the RIV (Register of Information on the results of science and research for the Czech Republic). This may logically be expected to conflict with the interests of the faculties of TUL because many of the employees are shared and both subject share interest in the results.

This year (2012), the Czech government issued a call for tender under the National Sustainability Programme I (NPU I). The aim of the programme, which the Institute intends to participate in, is to ensure the continuous development of the research infrastructure of the Centre, which will promote social and economic development of the regions where the Centre operates.

SECTION 4 - Research programmes

The project is thematically divided into two research programmes - Material Research (MR) and Competitive Engineering (CE).

Materials Research

with a particular focus on nanomaterials and their applications and possible uses. Specifically, in the following areas:

- basic research aimed at the complete description of the physical processes occurring during electrostatic spinning of polymer solutions and melts
- new spinning processes and their modifications (preparation of different types of nanosurface treatments and composites based on nanofibres)
- applied nanomaterials research is focused on the study of their properties and their usability for specific applications (development of filters, surface treatments in medicine and engineering and biotechnological materials for water treatment and other remediation procedures).

Competitive engineering

with a particular focus on the field of robots with mechatronic systems, new propulsion units for machinery and mobile equipment, safe machinery constructions and advanced technology for the processing of technical materials. Specifically, in the following areas:

- development and production of machines, equipment and vehicles and provision of a higher degree of innovation in industrial production,
- implementation of advanced technologies in the development of production machinery, equipment, mobile equipment and technological systems to ensure the workability of materials, manufacturing of components and final products at high operating speeds, and with higher reliability and low operating costs,
- reduction of energy consumption and environmental impact,
- comprehensive solutions to specific problems in the field of engineering techniques focussing on optimizing the properties of machines, equipment and vehicles in interaction with the new working processes.

4.1 Progress in implementation

Objectives, milestones, outcomes and monitoring indicators

The basis of the Centre was to reassume on the experience of TUL in research of (nano)materials and advanced technologies. Although the main objective of the programme of Regional Centres is to provide research capacity for industry through contractual research, a necessary condition is active participation in research programmes which is provided by the high quality professional staff of the Institute.

The aim therefore was from the very beginning of the project to initiate activities that lead to the acquisition of research projects in the given fields. This fact is reflected in fulfillment of the planned indicators of the Centre. From the perspective of research programmes, indicators are mainly overall income, the number of collaborative projects with industry, various types of RIV outputs and numbers of MSc and PhD. graduates, on which employees and workplaces of TUL are involved. Overview of indicators and their fulfilment is shown in the following table:

Indicators	2010		2011		2012*	
	Plan	Actual	Plan	Actual	Plan	Actual
Income from CZ grants	1.3	2.4	3.7	31.0	4.7	79
Income from int. grants	0	0	0	0.2	0	0.4
RIV						
Jimp	0	0	0	0	4	10
Jneimp	0	0	0	0	5	10
Patents (CZ)	0	0	0	0	0	9**
Patents (international)	0	0	0	0	0	0
Certified technologies	0	0	0	0	0	5
Utility and industr. design	0	0	0	0	0	9

*as of December 2012

**patents submitted, not granted

More details on the fulfillment of these indicators are included in this chapter.

Account of what has been achieved

If we were to assess the achievements of the Centre, they can be summarized as follows:

- The center is involved in a number of diverse research programs and thus significantly exceeds the indicators defined for each year. This is also reflected in the volume of contract research, when this indicator (see next section) is also considerably exceeded. Center here followed the existing cooperation and aspire to further it deepen.

- Thematically, the research directions are divided according to research programmes. In the area of material research the projects deal with biotechnology and nanotechnology such as water purification, nanofibre filters for water and air, the use of nanomaterials for energy storage, coating technology with an oriented nanostructure, smart textiles for demanding conditions, etc.

- In the field of competitive engineering projects include increasing the efficiency of gear trains, technology for the production of inorganic nanofibers, the development of new methods of welding and heat treatment of advanced materials and increasing the efficiency of internal combustion engines, robotic structures.

- Although activity at the Centre is at the beginning we can already see the specific results of individual work teams. The results are both applied results (filed patents, approved technologies or utility models) and also publishing activities (Jimp and Jneimp).

- A specific example is that of weir spinner. The technology is based on the electrostatic spinning of the free surface of a thin dual-layer polymer. This creates a **core-shell type coaxial nanofibre**. The weir spinner is composed of two filling chambers which feed the polymer solutions and a waste chamber, which is used to remove the used non-fibrous polymeric material. An electrode connected to a source of high voltage is placed between the filling chambers and the waste chamber. The advantage is the creation of an increased amount of fluid nozzles, thereby increasing the productivity of the entire system.

Since its foundation the Centre has been engaged in research activities through announced research programmes, mainly TIP programmes from the Ministry of Industry and Trade (MIT). With the establishment of the Technology Agency of the Czech Republic (TAČR) Centre has also been involved in the ALFA programme and from this year in the Competence Centres programme. This has resulted in Institute employees being currently involved in 40 research projects. The vast majority of the projects are in applied research and experimental development. This can be demonstrated by the fact that the provider is TAČR within the ALFA programme (18 projects), Competence Centre (3) and MIT in the TIP programme (16). Nowadays, only one project is a basic research project funded by CSF.

In the long term participation in TAČR Competence Centre (CC) projects will be important. These projects have duration of up to 8 years and involve significant collaboration with industry. Although the Institute did not obtain a CC in the first call, we participate as co-investigators on the performance of three CC. Namely, the CC of Josef Božek automotive industry (investigator CTU); the CC of Environmentally friendly nanotechnology and biotechnology for water and soil purification (investigator UPOL Olomouc) and CC Advanced technologies for heat and electricity production (investigator CTU Praha).

Another important project from the perspective of implementation of results is the project of new technologies and special machinery components implemented within the PRE-SEED funds programme, i.e. preparing for the introduction of new technologies into production.

Planned and achieved indicators

Besides the possibility of development of individual laboratories and departments working on these projects and the training of staff of the Institute, these projects reflect the fulfillment of indicators of the project. As mentioned above, one of the indicators of the project is the volume of national grants (optional indicator). The financial volume of allowable costs of these grants greatly exceeds the indicators of the amount of funds of national grants for individual years (see section 2). It should be noted that the volume of allowable costs for all of these projects over the years of performance and for all recipients is more than 1.7 billion CZK.

The budget of contracted grants for 2013 is over 85 million and it is important to note that in 2012 the Institute submitted another 13 projects to CSF programme, 32 projects to the TAČR ALFA 3 programme and other projects to other providers. On the 14th of December the results of the tender for the TAČR ALFA 3 programme were announced, and the Institute received a total of 8 projects (in the role of recipient 4 and also 4 in the role of co-recipient) in a total volume of 31.3 million CZK for the entire duration of the intended project performance (3-4 consecutive years). The Institute did not obtain any of the projects from the Ministry of Culture tender. Results of other competitions were not known at the time of writing this report.

Another indicator which reflects these projects is the number of collaborative projects with industry, or number of industrial partners involved in these projects with their own resources. There are 49 entities which have the volume of their funds invested in joint projects greater than 100 thousand CZK (SME) or 250 thousand CZK (others) in 2012. The list of entities is given in the annex to this report.

Another criterion is the number of outputs recorded in the RIV database of research results. These indicators for 2010 and 2011 were set at zero and they began to be fulfilled in 2012. The first indicator in a number of papers published in journals with an impact factor. Since the collection of data for the RIV database is yearly performed in the month of March, the value of this indicator is not finite. The required value for the year 2012 is four outputs; this indicator will be significantly exceeded. We expect around 10 impacted publications (Jimp) submitted or accepted in 2012. E.g. Rampichová M, Martinová L, Košťáková E, Filová E, Míčková A, Buzgo M, Michálek J, in Přádný M, Nečas A, Lukáš D, Amler E, (2012), A simple drug anchoring microfiber scaffold for chondrocyte seeding and proliferation, Journal of Materials Science: Materials in Medicine, 23:255-263, IF 2010 = 2.325.

Another indicator is the number of other publications (Jneimp), i.e. publications that were published in a periodical contained in the world renowned ERIH or SCOPUS database. The size of this indicator is 5 publications in 2012. At the date of preparation of this report more than 10 Jneimp outputs were recorded. Additionally, members of the Institute participated on above 50 international conferences and their contributions are presented in appropriate proceedings. Another group of RIV results is made up of results protected under a special legal regulation (Czech and international patents) and applied research (pilot operation, verified technology, utility and industrial design, etc.). In both groups, indicators to 2013 are zero but 9 patents have already been filed, as well as 9 utility designs, 4 functional models, 5 verified technologies and 1 software that relate to the activities of the Institute. A list of applicable results is in a table in the Annex.

The international dimension of research at the Centre

International cooperation at the Centre is divided into several directions:

- Scientific cooperation through joint research projects (FP7, EUREKA, GESHER, Cíl/Ziel 3, etc.)
- Mobility - cooperation without project backing - mobility of scientists between the Institute and foreign institutions
- Recruiting of PhD. students and junior researchers from other countries to work both on common themes and also the establishment of cooperation in their countries of origin
- Recruiting of senior researchers for participation on Centre activities.

Scientific cooperation

Besides national grants, the aim of employees of the Institute is to actively engage in international research programmes. The individual departments follow on from the scientific contacts built within the EU and other countries. In 2010-2012, the Institute participated in the international project of the 7th framework programme EU entitled "Development of Intensified Water Treatment Concepts by Integrating Nano- and Membrane Technologies" (theme 6: environment). Its coordinator is VlaamseInstellingvoor Technologisch Onderzoek N.V. (VITO) in Belgium and the project involved a total of 11 entities from across Europe. This project ended in 2012.

Since 2011 (to 2014) the Institute has been involved in the project "Application of a magnetic field in the biological decontamination of wastewater" in the framework of the international programme EUREKA. Although the EUREKA programme is not an international project in terms of programme indicators, the project can lead to establishing international links.

Another major project is a project within the 7th EU Framework programme entitled "Taking Nanotechnological Remediation Processes from Lab Scale to End User and Applications for the Restoration of Clean Environment", which was filed under the theme Nanotechnology solutions for in-situ soil and groundwater remediation. Staff of the Institute was heavily involved in its preparation. The project will be launched in February 2013 with the budget for the Institute around 10 mil CZK. Assoc. Prof. Černík is a member of the Project Management Group and responsible investigator for Work Package on nanomaterial research.

Besides research projects, the Institute also works on a project under the Erasmus Mundus programme since 2012, entitled "Networking on Environmental Safety &

Sustainability Initiative for Engineering” (2012-14). The project is expected to lead to exchanges between professionals from different foreign institutions.

Other links and mobility

In the context of international cooperation, the mobility of researchers to cooperating institutions abroad and arrivals of foreign experts to the institute is monitored. In 2012, 14 researchers travelled abroad. In terms of mobility the numbers are not important, but rather the quality of these links. As an example we can mention collaboration with Kenneth A Dawson, Professor of University College Dublin, who is currently considering participation in the activities of the Institute as a visiting professor, and thus significantly contributing to the shaping of the biotechnology laboratories, including its involvement in international cooperation.

PhD students and postdoc

In the framework of the OPEC project “Development of research teams for R&D projects at the Technical University of Liberec” (CZ.1.07/2.3.00/30.0024) fourteen young postdocs were recruited from the Czech Republic and abroad, who had to meet stringent selection criteria and who will be involved in national and international scientific projects and in cooperation with industrial partners. Of these, 5 are postdocs from abroad (2x India, also from Poland, Bulgaria and Egypt) and will *inter alia* establish scientific contacts with their countries of origin.

The Institute also receives foreign PhD. students (students studying at some of the faculties of TUL and working at the Institute as part of their scientific work on topics which focuses closely on issues researched by the Institute). At present, we have PhD students from e.g. Poland, Vietnam.

4.2 Additional Information

Despite the very good success rate in obtaining R&D projects (e.g. 40% in the 2nd call of TAČR in 2011, 25% in the 3rd call of TAČR in 2012), not all departments are equally active and successful. This is due to both thematic reasons where some departments solve industrial problems through direct one-off procurements of contractual research, and by the fact that individual departments are listed for different subjects and programmes are appropriate to differing degrees. Another problem is the different activity of the employees of each laboratory. This was also the reason to merge some of the laboratories and the creation of larger and more stable units - departments. This process will continue and some departments will be merged in order to improve their motivation.

Another problem is international cooperation, where the links to foreign institutions of each department are again different and unbalanced. The programme to support postdocs and other programmes of international cooperation help to solve this issue and the stabilization of teams is expected to improve.

Future challenges

The situation concerning state R&D funding is currently uncertain and difficult to predict. The state guarantees a stable part of the state budget for R&D (or even the slight increase), but the specific implementation of this plan is unclear. The TAČR ALFA programme will not be any more announced and other programmes, such as the MIT TIP programme, do not have the funds for further calls. The second call for the Competence Centres programme is planned for March 2013. The ALFA programme should be replaced by the EFKOM Programme, which is in the planning stages and it is not clear if it will be appropriate for the funding of the activities of the Institute (e.g. unknown share of private funding contribution). All this is further complicated by the information on the change of the evaluation of the results of science through the RIV database. Applied results which are important indicators of the fulfilment of the objectives of the project and create conditions for their achievement at the Institute, will probably be less significant. A greater importance will probably be placed on the results of professional publications (Jimp) that arise mainly from basic research. These changes would significantly weaken the position of regional Centres, whose aim is to support industry and its research and development. If state aid is directed to basic research at the expense of applied and industrial research, it would be difficult to obtain industry partners because applied research is the basis for cooperation with enterprises.

Hope for the support of the Centre is linked with the sustainability of the NPU I Centre programme which was announced in December, and which can mean significant financial resources for sustainable functioning of the Centre.

As in the case of national programmes of R&D support, the situation in the European programmes is also unknown. The 7th Framework programme is ending and the new Horizon 2020 programme is still in the preparation phase.

SECTION 5 - Interaction with industry

The project builds on the traditions of long-term cooperation with industry at TUL. Due to the fact that key members of the research team have established long-standing professional and often personal relationships with industry (especially in the Liberec region), many of the themes solved for industry continue this tradition. A significant advantage is the fact that the team has a many experts who have worked in industry in the past.

The project team has managed to meet and exceed the level of planned indicators.

The Department for cooperation with industry was created at the Institute for interaction with industry, it currently has 3 employees.

5.1 Planned and actual results

The technical University of Liberec is the largest and most comprehensive research organization in the region of Liberec. The newly created Institute offers cutting-edge technology in the field of material research and engineering technology research. Instruments, equipment and other technology at the Institute meet the strictest criteria of the current requirements for research and serve to support commercial and other entities. These entities, who do not have the research capacity to implement specific research tasks, order these tasks at the Institute in the form of contractual research. The project has two parameters that characterize this cooperation. One is the number of collaborative projects with industry and the other is the volume of contractual research.

According to the definition of the indicator, the number of collaboration projects with industry includes the number of entities from industry who have an annual volume of cooperation of at least 250 thousand CZK/year (in the case of SMEs 100 thousand CZK/year). The project understands cooperation as a joint activity - R&D services or purchase of other types of services with high added value from the Centre, or a joint research project. The following table includes a comparison of planned and actual indicators for the years 2010 to 2012. Only organizations with which the cooperation is organized in the form of contractual research (in the relevant monitoring reports) is given for the years 2010 and 2011. For 2012, entities with joint R&D projects are also included (calculated volume of in-house funds invested in the project by an industrial partner).

	2010	2011	2012
Indicator	2	4	6
Contractual research	4	18	20*
VaV projects	-	-	49
Sum	4	18	69

*as of December 2012

Examples of partners in 2012 include:

Contractual research for the company **Nanoprogress, z.s.p.o.** is ensured by the Department of machinery construction, nanofibers and nonwoven materials. The subject of the contractual research is the supply of 2 pcs of test equipment for research of reproducible preparation of coaxial nanowires with a core-shell structure. At the same time one piece of equipment will be designed for a normal environment, the second will be constructed so that its internal environment will meet a Class A clean environment during the operation of the machine and air conditioning without running the spinning process.

Volume: 8.9 million CZK; Delivery time: 30/10/2012

Škoda Auto, a.s. is the traditional sponsor of research work at TUL. Research areas have a wide scope and the research itself is composed of many smaller contracts. One of the biggest contracts in 2012 was focused on the identification of temperature distribution in the base plate of a cylinder head of an EA111.03E engine and measurement of passive resistance of an engine on test equipment at different temperature levels of lubricating oil and coolant. Additional contracts included construction of a 3D model, analysis of weld metal and use granulates in the materials used.
Volume: 1.9 million CZK; Completion date: ongoing

RAWRA. For the years 2011-2014 research was focuses on the comprehensive monitoring of THMC (thermo - hydro – mechanical - chemical) phenomena in the rock massive, which is performed in the conduit from the dam Josefodolska přehrada to the water treatment plant in Bedřichov. This research is being performed by the Department of nanomaterials and informatics. The total financial volume of research work is nearly 4 million CZK. The research was commissioned by the Radioactive Waste Repository Authority (SÚRAO)
Volume: 1.8 million CZK (2012); Completion date: 28/2/2014

The company **Magna Exteriors&Interiors (Bohemia) s.r.o**. is a multinational company based in the Liberec region and closely cooperates with TUL in the area of research. In 2012, the research has been focussed on the regulation of temperature fields in the form the Slush No.4 production line. In addition, modifications were made to regulatory programs on Slush production lines No.1 and No.2.

Volume: 1.4 million CZK, Completion date: 1/10/2012

Other regional company with long-term research collaboration is **Sklopan Liberec**, a.s. The company operates in the engineering and glass industry and acts as a subcontractor for Škoda Auto, a.s. In 2012, the Institute was commissioned for research on stiffness measurements and an analysis of the control system program FrontEnd. Furthermore, the Institute participated in the modelling and the subsequent production of sets of electronics for control systems incl. recovery of these systems.
Volume: 0.6 million CZK; Completion date: On-going

An important partner in R&D is the company **AQUATEST a.s.** This partner, collaborates on contractual research as well as works with the Institute on a range of research projects. In 2011, the Institute entered into a works contracts with AQUATEST a.s. for the supply of research services for a French partner in the field of surface modification of zero-valent iron nanoparticles for in-situ treatment of contaminated groundwater.
Volume: 0.6 million CZK; Completion date: 30/11/2012

Research activities for the company **Clean-Air s.r.o.** consist in the production of prototype parts on a 3D printer. These 3D models serve as a basis for modelling and technical preparation for mass production lines.
Volume: 0.6 million CZK; Completion date: On-going

The second indicator is the volume of contractual research for individual years of the project listed in the financial section (section 3.3.1.). It is clear that although the current turnover and number of cooperative projects significantly exceed the plan, the estimated values by 2015 are a great challenge and it may not be possible to achieve them by simply increasing the extensive activities of the research team. It is necessary to seek other forms of increasing interest of industrial enterprises in the research services of the Institute. The relevant activities of the team in this direction are described in Section 5.4.

5.2 Technology transfer and intellectual property protection

The technology transfer strategy at the Institute is developed in coordination with the TUL. Some components of this strategy are formed and gradually implemented in the synergy project OPEC 2.4 Partnership and COPERNIC networks (System partnership at Technical University of Liberec).
The working document “Principles of intellectual property policy and administration process” describes the basic assumptions and the proposed process of dealing with intellectual property at the Institute in the environment of TUL (see diagram in Annex). These processes are currently governed by the Rector's Directive No. 2/2010 “Protection of intellectual property at the Technical University of Liberec” and

the “Bursar’s Organization Directive No. 5/2012 on the organization and provision of complementary activities”. Intellectual property protection is ensured by professional patent agencies in the form of outsourcing.

Although TUL can boast one of the most famous cases of technology transfer in the Czech Republic - Nanospider™ technology, the strategy and transfer process are not yet sufficiently developed and individual solutions are usually commercialized on a case-by-case basis. The TUL has yet to establish a department of technology transfer. The biggest problem today is the fragmentation of relations with users, where individual researchers act not only on technical aspects but also the legal and financial aspects of contracts. Part of this strategy is to improve this situation through natural development with a gradual increase in administrative and legal services, which are provided by the Department for promotion and cooperation with industry. This development is linked to a risk of potential breaches of personal relationships between researchers from the Institute and sponsors, which is necessary to be eliminated.

A new directive is currently being finalized in the framework of the COPERNIC project which will apply to all intellectual property at TUL including at the Institute.
In addition to the traditional method of transfer in the form of licenses, the Institute seeks to take advantage of an opportunity offered by the Pre-Seed programme to support spin-off companies. In the first call, one of the two projects submitted was successful.

5.3 Trade policy/strategy

The current level of relations with users of the results of the Institute is shown in the following diagram:

A new form of relations with users is currently being built at the Institute i.e. “active network” AMIA (Advanced Materials Industrial Association), which adopts a (successful in the U.S. over the long-term) model of collective support for basic/curiosity driven research by a group companies. Basic principles of the active network are as follows:

The active network is built on a contractual basis between the Institute and individual users. The text of the contract has been prepared. At the same time the principles of this model are being presented to potential participants from large and small enterprises in the Czech Republic (e.g. Preciosa, Crytur, Škoda Auto, Elmarco, Miconex) and abroad (Millipore, USA), AspenAerogels, USA) and Mann+Hummel, Germany). We expect the first contract to be signed in January 2013. Users of the active network will contribute to the costs associated with the solution of the supported research topics. The main purpose of the network is the systematic building of long-term relationships with industry that will generate new contractual research projects.

In addition to our own network of long-term relationships the Institute also gradually builds relationships with other consortia, clusters and associations, which we see as an opportunity to cooperate and advance the needs of industry in cases where know-how or equipment is necessary which the Institute does not have. An example of this is a cooperation agreement with the association NCRC (Nonwovens Cooperative Research Centre) at the University of North Carolina, which has successfully cooperated with more than 70 major companies based on these principles for over 20 years. We are in discussion about extensive collaboration with the University of Waterloo in Canada, which recently opened a similar centre - Quantum-Nano. Negotiations on the cooperation with Czech entities are also underway (e.g. MEDEC).

The trade policy of the Institute is based on the need to actively address potential users. The task of the Department for promotion and cooperation with industry is to generate support for the acquisition of new projects and collaborative research through systematically developed activities, especially through the promotion of the possibilities and results of the Institute at exhibitions, trade fairs and other special events, especially outside the Czech Republic.

This department is responsible for administrative support of contractual and collaborative research, implementation of activities related to technology transfer, preparation of contracts and other activities associated with the implementation of contractual relations.

An important task in the implementation of the trade policy of the Institute is to create a price list of services in order to be able to prepare offers for users quickly and consistently. Currently only some departments have itemized price lists (use of equipment). To complete the price list it is essential to map out the actual costs associated with the various activities. In this respect, we will benefit from the transition to the fullcost methodology at TUL.

5.4 Additional Information

Basic problems in the field of interaction with industry which the implementation team faces are:

- Thematic and factual fragmentation, lack of clear and functional processes at the Institute and TUL
- Low competence of manufacturing companies in the country. Companies are often part of multinational corporations with centralized research and development usually outside the Czech Republic. Decision-making processes are therefore time-consuming; it is difficult to find the right contacts to the “decision-makers”.

Strengths are as follows:

- The tradition of successful collaboration with industry and commercialization (Nanospider™), and the related good reputation in the field of nanotechnology (home and abroad).
- Good personal relationships with users (from previous collaborations, experience of work in industry).

Risks/ challenges:

- World economic situation: The current negative trend of GDP in Europe causes industrial companies to invest with caution into new technologies. Cost saving is often reflected in the reduction of expenditure on research and development. On the other hand, sharpening of the competitive struggle in times of crisis forces companies to look for new opportunities. The strategy of the Institute is to convince potential partners of the high added value of our results, in which it pays to invest.

- Many negative experiences of potential users with various associations/consortia/clusters, created artificially or purposefully for obtaining grant support - harder to motivate companies to enter into new relationships (e.g. Active Network AMIA).
- Relatively little international experience of the Institute and TUL in general: In today’s globalized environment it is necessary to also find customers abroad. The vast majority of successful firms operate transnationally and take advantage of an open market, at least within the EU. This also applies to their purchasing behaviour of research and development services.
- Value of the TUL/Institute brand: Part of the business strategy of the Institute is systematic brand building. The good name of TUL and Liberec in the Czech Republic and abroad, often associated with nanomaterials, is an opportunity to acquire not only new customers but also talented human resources. The Institute also has the motto “Research on the Top”, which expresses its interest to be a leading institution in the field.

SECTION 6 - Infrastructure and equipment

6.1 Buildings

Planned construction

The project included the construction of building “L” (certified copies of project documents were submitted with the Centre project application). The construction was planned on the premises of TUL in place of the existing building L (boiler with technical facilities) and its surroundings. The project also included other auxiliary buildings (shack for storage of industrial gases, connections for telephone, electricity, water and waste, warm air).

Building “L” has a trapezoidal ground plan with 5 above-ground floors and 2 underground floors of approx 46 x 64m, and two upwardly protruding prisms - longitudinal wings interconnected by a communication bridge. The total floor area of the building was planned to be 10,820 square meters at a total construction budget of 477.7 million CZK. The construction was planned to be built between Q2/2010 and Q4/2011.

Current Status

Building “L” and other construction works were carried out according to the original documentation without significant changes. Significant changes are mainly considered changes in the technical and economic parameters of the construction and these changes did not occur. The construction work was planned for Q2/2010 and Q2/2012. The total budget for construction work was reduced to 259 million CZK a result of the selection process based on the lowest cost. Since October 2012 the building has been in pilot operation, with the final building approval estimated to be granted in the Q1 of 2013. Currently, the vast majority of the space is occupied by individual laboratories which are being established here.

Current use

Use of the building corresponds to the two research programmes. The lower floors (brighter rooms, greater load capacity of floors and better accessibility for larger technology) are occupied by the competitive engineering laboratories, the higher floors (towers of the building) are mainly for the lighter laboratories of material research. The occupancy of the individual floors and their main use are included in the following table:

Floor	Use
2nd basement	Machine room and substations, laboratory technical areas
1st basement	Heavy laboratory, engine testing, hydrodynamics laboratory with hydraulic engine room
1st floor	Two-storey entrance hall, heavy laboratory hall space, four crane runways
2nd floor	Light laboratories, offices and researcher workrooms
3rd -5th floors	Two separate towers - light laboratories, researcher workrooms, offices
Beyond the building	Light gas storage, fuel management (underground storage tank - petrol, diesel - linked to the areas of building L, underground connections), consolidated surface near Bendlova street for placement of solid waste containers

6.2 Equipment and instrumentation

Planned equipment (according to TA) and actual situation

In the TA of the project equipment was originally planned to be purchased for 180 million CZK. Based on the funds saved from the construction a request was submitted for a substantial change in this item and it was increased to a total of nearly 220 million CZK. At present, 90 machines and instruments have been acquired for approximately 95 million CZK. If we include the tendered but not yet supplied machines, this amount is much higher. The remaining equipment (planned overall around 100 planned machines and equipment) is being gradually acquired and will be supplied by the middle of 2013, at the latest.

The most important (and most expensive) investments which are already installed and in operation include:

- Scanning electron microscope for low vacuums (17.3 million CZK) with an accuracy of 0.8 nm and additional modules. EDS and WDS modules for qualitative and quantitative analysis of local chemical composition, EBSD module for local crystallographic information.
- Instrumentation assembly (AFM + confocal microscope)/ microscope with scanning probe (6.6 million CZK) - an instrument for measuring atomic force.
- 3D printer for creating prototypes (6.0 million CZK) - the option to create functional prototypes of various materials and their combinations. Models can be used for visualization, testing, kit assembly tests for less stressed parts as well as fully functional components.
- Apparatus for preparing and producing nanofibres and high voltage work (4.2 million CZK) - The equipment uses the principle and technology of electric spinning. It uses polymer solutions in a high voltage electrostatic field to create nanofibres. Unlike traditional electric needle spinning, the spinning technology does not use needles but the free level of the polymer on the surface of the spinning electrode.
- Mass spectrometer with inductively coupled plasma ICP-MS (4.0 million CZK)- Possibility to determine most elements of the periodic table in ultratrace concentrations of down to 0.5 ppt.

- Machinery for PIM technology (3.9 million CZK) - injection moulding machine with a robot and kilns for ceramic and metal forming.
- Climate chamber for mechanical action (2.5 miles CZK) - Mechanical testing of components under different climatic conditions. Important mainly for testing plastic parts whose properties are strongly influenced by temperature. The ability to perform crash tests of components over a large temperature range, high speed and large sample size, makes this a cutting-edge test instrument.

6.3 Details on the use of equipment and facilities

Use for R&D of the recipient

As indicated above, the equipment is in various stages of acquisition, and less than half of the investment has been delivered and thus put into operation. Most of the equipment is in the installation and commissioning phase, but some instruments are already in use. An example may be the biggest investment - SEM microscope from the company Carl Zeiss, which although staff is gradually being acquainted with the different modules and possibilities of their use, it is already serving its purpose and is being used for task of individual laboratories.

Each instrument has an operational log which records its use from three various perspectives. Firstly, to record the use of the instrument as a whole, this is necessary for the overall monitoring of how long it is used. Secondly, to record which department is using it and for which project the instrument was used. This is need to help determine the financial burden of each project and department. Although internal (in the Institute) and external (within TUL) financial compensation for the use of equipment does not exist at the Institute it will be necessary in the future to share the operating costs of the equipment according to its use by various departments. Thirdly, to record who is working with the equipment. This information is important both to determine damage to the equipment, if happen and also to demonstrate student and staff work on Institute equipment. This in turn is important to monitor indicators of student participation in the running of the Institute and to demonstrate the use of instrumentation for RIV outputs of the Centre.

The above reasons have led to the development of electronic instrumentation logs. Currently, a web interface is being tested that allows better, faster and more accurate records of the use of the equipment.

Use for study purposes

Given that building “L” of the Institute was completed in 2012 and individual laboratories are in the completion or start-up stage, the use of investment for educational purposes is only at the beginning. Students in the Institute link both the use of instrumentation and equipment purchased from the project with work on topics that are addressed within the activities of the Institute (R&D projects or cooperation with industry). The indicator for 2012 is 200 students of all levels using the infrastructure. The fulfillment of this will be documented by an excerpt from the instrument logs.

Full participation of laboratories in teaching mostly Mgr. and PhD. students is planned for 2013. This corresponds with the value of the indicator of 380, which remains constant up to 2015.

Students of the following fields are engaged in the Institute:

Faculty of Mechanical Engineering: Applied Mechanics, Production Systems and Processes, Material Engineering, Construction machinery and equipment, Manufacturing Technology and their English equivalents.

Faculty of Textiles: Textile Technology, Textile Material Engineering.

Faculty of Mechatronics, Informatics and Interdisciplinary Studies: Technical Cybernetics, Science Engineering, Applied Sciences in Engineering.

Commercial use

The Institute currently does not lease any of its equipment or facilities for commercial purposes. The only a part of laboratory space is rented to the companies Nanoprotex s.r.o., Nanoprogres z.s.p.o., Magna Exteriors&Interiors (Bohemia) s.r.o. (joint workplace) and the Faculty of Mechanical Engineering of TUL. All of these tenants are working on topics that are close to the Institute, and cooperation is running or expected. The total leased area is 789 m^2, which is 12% of building “L” research area. Several other areas of the Institute are used as joint workplaces between the Institute and the Faculty of Mechanical Engineering on a contractual basis.

6.4 Additional Information

The tasks and problems that have occurred in this area

The problem in building “L” construction was the change in the schedule of completion. The actual completion of the construction was behind schedule by nearly half a year, which led to delays in its furnishing, in the commencement of work and team building. Another problem is that the construction had and still has many backlogs and claims which are progressively being eliminated but craftsmen activities often hamper the laboratory activities.

Due to changes in the use of some areas, which occurred in the period from the approval of the project documentation of building “L” until its completion, certain laboratory space did not comply with its purpose and had to be furnished later. This applied mainly to water and waste distribution (e.g. chemical furnishings), electrical wiring (for several devices), changes in air conditioning (requirements for extraction of air from digester hoods) or floor and wall materials (e.g. ultraclean environment). These works meant further delays in finishing the work in various laboratory areas, and in some cases the delay still exists. Management of the Institute is solving these problems in cooperation with the technical department of TUL.

Other changes to the original project are related to instrumentation. There was not only an increase in the chapters concerning funding but also a change in some items (change in instrumentation for more up to date devices based on the current activities of the Centre). In all cases, the changes were approved by the MEYS, which sometimes led to the extension of their purchase time, which was preceded by a tender in accordance with the Law on Public Procurement. This problem was also caused by frequent changes of the responsible persons at MEYS and different views to the need for approval of these changes.

Future challenges in the coming years

In 2013, we expect to fully launch all activities of the Institute and laboratory space. This may bring associated problems e.g. the already mentioned inability to invoice equipment used on R&D projects internally, as a result of the requirements of many providers. A paradoxical situation arises whereby it is administratively easier to outsource the appropriate services than to commission them within the Institute in the laboratory next door. The management of the Institute has collected data from the instrument logs about the use of instruments within the project and is looking to solve this problem.

From the point of view of the challenges ahead, we expect in connection with the launch of the National Programme of Sustainability (NPU I) the centre is obtaining a grant for reinvestment of instrumentation which was originally planned from other grant sources.

The Institute does not expect any significant future changes in the use of the building or its equipment or increasing the proportion of leased space in building “L”.

SECTION 7 - Other comments, issues and questions

This section includes the annexes of the document which illustrate cooperation between the Institute and industry. There is a list of filed patents and other applied results of the Centre. In addition, there is a list of companies who have commissioned research projects in which they contribute a minimum of 250,000 CZK (100,000 CZK for SMEs) of their own finances per year and a list of contractual research companies fulfilling the same criteria. The third annex is diagram of how intellectual property is protected at TUL.

List of applicable results of the Centre

The following table is a list of filed patents:

Patent name	status
Technical University of Liberec, Liberec, CZ. Track Wheel for Vehicle. Author: doc. Ing. Mgr. Václav Záda, CSc.	Filed
Technical University of Liberec, Liberec, CZ. Pleated Fabric, Author: prof. Ing. Ladislav Ševčík, CSc.	Filed
Technical University of Liberec, Liberec, CZ. Mobile platform to move along the vertical walls. Author: doc. Ing. František Novotný, CSc.	Filed
Technical University of Liberec, Liberec, CZ. Method yarn distribution during yarn winding the coil and device for carrying out this method. Author: prof. Ing. Jaroslav Beran, CSc.	Filed
Technical University of Liberec, Liberec, CZ. Equipment for testing drive belts. Author: prof. Ing. Jaroslav Beran, CSc. prof. Ing. Aleš Richter, CSc., Ing. Josef Černohorský, Ph.D. Ing. Petr Váša	Filed
Technical University of Liberec, Liberec, CZ. Method of in-situ remediation of contaminated rock environment. Author: Jaroslav Nosek, Miroslav Černík.	Filed
Technical University of Liberec, Liberec, CZ. Mobile platform to move along the vertical walls. Author: Novotný, F., Horák, M., Plavec, M.	Filed
Technical University of Liberec, Liberec, CZ. Coating agent a polymer solution in the string spinning electrode. Author: Ševčík, L., Nýdrle, M., Petrů, M., Vejrych, D.	Filed
Technical University of Liberec, Liberec, CZ. Valve, especially for equipment for the production of nanofibers by electrospinning of polymer solutions. Author: Ševčík, L., Nýdrle, M., Kovář, R., Petrů, M.	Filed

The following table is a list of other applied results:

Name of applied result	Type
Technical University of Liberec, Liberec, CZ. High-strength geopolymer composite. Author: Louda, P., Kroisová, D., Hung, T.D., And Nguyen, T.X. Cz 23179 U1, On record 05.01.2012.	Utility model
Technical University of Liberec, Liberec, CZ. High-strength geopolymer composite. Author: Louda, P., Kroisová, D., Hung, T.D., And Nguyen, T.X. Cz 23173 U1, On record 05.01.2012.	Utility model
Technical University of Liberec, Liberec, CZ. High-strength geopolymer composite. Author: Louda, P., Kroisová, D., Hung, T.D., And Nguyen, T.X. Cz 23172 U1, On record 05.01.2012.	Utility model
Technical University of Liberec, Liberec, CZ. High-strength geopolymer composite. Author: Louda, P., Kroisová, D., Hung, T.D., And Nguyen, T.X. Cz 23171 U1, On record 05.01.2012.	Utility model
Technical University of Liberec, Liberec, CZ. High-strength geopolymer composite. Author: Louda, P., Kroisová, D., Hung, T.D., And Nguyen, T.X. Cz 23174 U1, On record 05.01.2012	Utility model
Technical University of Liberec, Liberec, CZ. High-strength geopolymer composite. Author: Louda, P., Kroisová, D., Hung, T.D., And Nguyen, T.X. Cz 23175 U1, On record 05.01.2012	Utility model
Technical University of Liberec, Liberec, CZ. High-strength geopolymer composite. Author: Louda, P., Kroisová, D., Hung, T.D., And Nguyen, T.X. Cz 23178 U1, On record 05.01.2012.	Utility model
Technical University of Liberec, Liberec, CZ. Coating agent a polymer solution in the string spinning electrode. Author: Ševčík, L., Nýdrle, M., Petrů, M., Vejrych, D.	Utility model
TUL, Liberec, CZ. Valve, especially for equipment for the production of nanofibers by electrospinning of polymer solutions. Author: Ševčík, L., Nýdrle, M., Kovář, R., Petrů, M.	Utility model
Nosek, J., Pluhař, T.: Special laboratory stirrer	Cert. technol.
Pluhař, T., Nosek, J.: Mixing unit for geopolymers	Cert. technol.
Pluhař, T., Nosek, J., Gaňa, P.: Simple mobile logging unit	Cert. technol.
Nosek, J., Černík, M., Cádrová, L.: Technology supporting migration of iron nanoparticles in rock environment with an electric current	Cert. technol.
Nosek, J., Černík, M., Cádrová, L.: Reduction technology to improve the properties of iron nanoparticles by application of electric current.	Cert. technol.
Pokorný, P., Zelený, P., Keller, P., Lachman, M., Šafka, J. 2012. Laser cutter	Functional sample
Moravec, J.: Preparation for welding with a precisely defined heat transfer coefficient to the surroundings, arc welding methods, focusing on the use of numerical simulation	Functional sample
Moravec, J.: Tool for measuring displacements and deformations during welding and cooling focusing on the use of numerical	Functional sample

simulation	
M. Hernych: System of distributed temperature measurement in the field	Functional sample
D. Frydrych: ISERIT – Computational system for the transport of heat and moisture in the form of steam and immobile water	software

List of companies meeting the criterion of cooperative projects with industry (joint projects)

Firm	budget	Number of projects
AQUATEST	1960.7	5
PRO-AQUA CZ, s.r.o.	536	2
ENACON	423	2
Dekonta	1315	3
ISATECH	1554.2	4
ČGS	1032	3
ARCADIS	3501.83	5
PROGEO	260	2
MEGA	3703	4
GEA Heat Exchangers, a.s.	444	2
SIGMA	765	2
MikroChem LKT	4314	4
EPS	811.78	3
GEOTEST	1210	3
ELMARCO	5963.54	3
VÚTS	908.6	3
GEA	1508.9	2
ÚJV Řež	11787	3
Termizo	373.68	2
Ecotex	840.4	2
Magna Exteriors & Interiors (Bohemia)	1666	3
Lenam	536.08	2
Rieter CZ	17984	2
LINET	8503	2
Enki	321	2
Kemwater	334	2
Plosab	541	2
EKOHYDROGEO Žitný	1362	2
AECOM	2233	3
Vodní zdroje	203	2
Paramo	638	2
VÚB	1257	2
MECAS ESI	1265	2

GME	404.91	2
PROGEO	175	2
Wikow MGI	918	2
LAC	1884	2
GASCONTROL	1944	2
SLD-reacont, a.s.	1031	2
AICTA Design Work, s.r.o	479	2
BRANO a.s.	847	2
HONEYWELL, spol. s r.o.	480	2
MOTORPAL, a.s.	849	2
RICARDO PRAGUE, s.r.o.	3503	2
ŠKODA AUTO a.s.	2281	2
TATRA, a.s.	948	2
TÜV SÜD Czech s.r.o.	2961	2
ČZ a.s.	950	2
KH Sanace	102	2

List of companies meeting the criterion of cooperative projects with industry (contractual research)

Firm	Description of research	Cost (w VAT)
Nanoprogress	Testing equipment for nanofibres	4 450 000
Škoda Auto, a.s.	Construction of 3D model, research program on engine EA111.03E, welding of two plates	1 918 378
Magna	Analysis of the control system, installation of new PC and training	1 404 300
SÚRAO	Analysis of THMC effects in rock massif	1 300 000
Sklopan	Production of plates including recovery and stiffness, for construction equipment for glass recycling	678 800
Měření sterilizátoru	Check of sterilizers	647 454
Clean-air	Prototype production	576 181
Aquatest	Testy PSOD-T1	263 700
Lenam	Methodology for experimental data evaluation	231 800
SHM	Production of 600 etalon wheels	211 514
Eifeler	Machine polish	175 715
United Energy	Testing, case study	170 000
Elmarco	Abrasion analysis of nanofibrous samples	166 000
Kobit	Calculation of ROPS	145 000
Surface Treat, a.s.	Development of 3D plotter for sample and plasma nozzle positioning	145 000
Farmak Moravia	Production and testing of nanofibrous substrates	120 000
K.M.B.	Development of circuit wiring of ferroresonance limiter	120 000
Trumpf, s.r.o.	Production of cable tester	120 000
Tomáš Erbert	Electrode installation	109 000
Supply Service	Emission measurement	104 400

Procedure for ensuring the protection of intellectual property at TUL