INSTITUTIONAL DEVELOPMENT PLAN OF ICMET CRAIOVA

FOR THE PERIOD 2012 - 2015

1. Scientific SWOT analysis

Strengths	**Weaknesses**
• ICMET Craiova has a procedure-based research activity to assure optimization of the management, interventions by corrective actions and periodic result monitoring • ICMET Craiova has a specialized structure of personnel enabling the approach of complex scientific research projects with applicability on the domestic and worldwide market and technical issues from the following fields: - High voltage techniques - High current techniques - Electric materials - Electromagnetic compatibility - Electrosecurity - Electric materials - Non-conventional technologies - Force measurement technique - Electric phenomena monitoring systems - High and low voltage equipment development • ICMET Craiova is the owner of the national interest installation „Short-circuit current generation measurement and recording systems • Due to its testing technique, measuring systems and personnel professional skills ICMET Craiova is classified among the first three European accredited testing centers comparable with CESI, Italy and KEMA, the Nederlands • ICMET Craiova is recognized as national leader in the fields:	• Age average – the personnel involved in the research activity is on the average over 45 years old • Fluctuation of young highly educated personnel engaged with indefinite period contract due to the low salary level in comparison with the one offered by Romanian private companies or foreign ones High energy consumptions due to the fact that laboratory buildings do not have the proper thermal isolation

- Research, development and testing for electrical equipments
- Research, development and technological transfer for:
  - autotransformers with output voltage continuous adjustment
  - power transformer monitoring equipments
  - Composite insulators for aerial lines
  - Medium voltage load disconnectors

- ICMET Craiova has national metrology standards for:
  - high forces (1 – 32 MN)
  - high voltages (alternating and continuous voltages, lightning and switching impulse voltages, electric load)
  - high currents
- ICMET Craiova laboratories are nationally accredited by RENAR for:
  - *Testing:*
    - High voltage tests
    - High power tests
    - Electromagnetic compatibility
    - Fire safety and environmental tests
    - Low voltage tests
    - SAR determination at mobile phones
    - Wireless equipment
  - *Calibration:*
    - High currents
    - High voltages
    - Electromagnetic fields
    - High forces
- ICMET Craiova is implementing projects within the frame of the European Programs:
  - Operational Sectorial Program "Improvement of Economic Competitiveness" cofinanced by European Fund for Regional Development
  - Operational Sectorial Program for Human Resources Development cofinanced by European Social Fund
  - Romania - Bulgaria cross-border cooperation program 2007-2013
- ICMET specialists participate in technical committees, consortiums, international platforms:
  - International Electrotechnical Commission (IEC): TC 14, TC 36, TC42
  - International Council on Large Electrical Systems: WG A2.25, WG A2.26, WG A3.13, WG D1.33, WG D1, WG A2.42, Emerging EMF Technologies and Health Risk Management
  - Short Circuit Testing Liason (STL)

Threats/ Risks

- Keen competition on the European market from the following laboratories:
  - KEMA, the Nederlands
  - CESI, Italy
  - IPH, Germany
  - FGH, Germany
  - Veiki, Hungary
- The operating duty of the installations from the High Voltage Laboratory and High Power Laboratory is many times at the limit of the designed parameters reason why equipment stress is extremely high leading to possible major failures that can cause testing activity interruption on a considerable period of time

  The cost of repairing or replacing the equipments to be higher than the one provided by the insurance

Opportunities • ICMET participation in EU funded projects • Constant request of product certification services and design tests due to the rapid development of Turkish and Arabian countries industry Growth of Romanian market of lifetime diagnosis services for the equipments of the National	

2.2. Strategic scientific objectives

2.2.1. Keeping the status of national research – development institute

2.2.1.1. Increasing the number of scientific papers published in ISI quoted magazines

2.2.1.2. Increasing the number of patents resulted from the research activity

2.2.1.3. Increasing the number of reviewers at ISI quoted magazines

2.2.1.4. Increasing the number of researchers with PhD degree

2.2.1.5. Constant participation in the main national and international symposia in the interest fields of ICMET Craiova

2.2.1.6. Participation with research projects in the Frame Program 7 of EU by establishing partnerships at European level

2.2.1.7. Constant participation with research projects of great interest, for Romanian electrical engineering industry, in programs PNCDI II, "Sectorial" Program and "Nucleu" Program

2.2.2. Keeping/ extending the accreditations both at national and European level obtained by the constituent laboratories according to ISO/IEC 17025 and recognized at worldwide level

2.2.2.1. Keeping RENAR accreditations for the testing laboratories

2.2.2.2. Keeping RENAR accreditation for the calibration laboratories

2.2.3. Keeping/ extending the authorizations and certifications obtained by ICMET:

- At national level:

2.2.3.1. Authorization of BRML (Romanian Bureau of Legal Metrology) Craiova for the Metrology Laboratory

2.2.3.2. Attestation of BRML Craiova for the Metrology Laboratory

2.2.3.3. ICMET acceptance as supplier of products and services for SC Transelectrica SA

2.2.3.4. ICMET attestation by the Romanian Energy Regulatory Authority – ANRE – so:

- Attestation - type E1 for "design of electric stations and installations intended to the electric part of the electric power plants"

- Attestation - type E2 for "manufacturing of electric stations and carrying out works at the electric part of the electric power plants"

2.2.3.5. Trading authorization for products intended to SC Electrica SA

2.2.3.6. ARCE (Romanian Agency for Energy Conservation) authorisation as energetic auditor

2.2.3.7. ISCIR (State inspection for boilers, vessels under pressure and hoisting unit control) authorization in the activity fields of ICMET Craiova

- At international level:

2.2.3.8. STL (**Short-Circuit Testing Liaison**) member status for the High Power Laboratory

2.2.3.9 LOVAG (**Low Voltage Agreement Group**) member status for the Low Voltage Laboratory

2.2.4. Keeping/ obtaining the certification of the quality management system, environment management system and labour safety and health management

2.2.4.1. Keeping the certification of the quality management system according to EN ISO 9001

2.2.4.2. Keeping the certification of the environment management system according to EN ISO 14 001

2.2.4.3. Obtaining the certification for labour safety and health management system according to OHSAS 18 001

2.2.4.4 Obtaining the certification for Electrical Material Laboratory according to ISO/IEC 17025

2.2.5. Keeping ICMET brand registered at WIPO (World Intellectual Property Organization) Geneva

2.2.6. Developing and modernizing the testing and research - development capability with a view to compliance with the present technique stage and the standards in force

2.2.6.1. Modernization of High Power Laboratory by structural funds financing of the project „High Power Laboratory Modernization with a view to reaching the technical and qualitative level compliant with EU requirements" that will be achieved in the program POS CCE – priority axis 2 – CDI – Operation 2.2.1

2.2.6.2. Results valorisation for the projects won within the programs: "PARTENERIATE" and "NUCLEU":

- Laboratory for electroinsulating oils analysis

- Installation for circuit breakers and switch disconnectors testing at capacitive current coupling

- Installation for transformer oil regeneration

- Implementation of transformer insulation moisture determination technique

- Opto-electronic current instrument transformer

2.2.6.3. Proposals of new projects within the frame of the competitions organized by ANCS for the programs: "CAPACITĂȚI"; POS CCE (Sectorial Operational Programme - INCREASE OF ECONOMIC COMPETITIVENESS) operations 2.2.1, 2.1.1 and "NUCLEU"

2.2.6.4. Drawing up of medium and long term maintenance programs for the basic laboratories equipments

2.2.6.5. Organizing periodical working meetings with world wide known personalities in ICMET activity field.

2.2.7. Development in experimental research field

2.2.7.1. Development and application of the fiber optic measurement technique and transmission of information on voltages, currents, high potential powers to the National Power Grid

2.2.7.2. Application of high accuracy static commutation and electromagnetic compatibility to medium voltage laboratory equipments

2.2.7.3. Electric and magnetic fields measurement in transformer stations with a view to obtaining environmental approvals, including achievement of electromagnetic field maps

2.2.7.4. Partial discharge measurement by electric and acoustic emission method with a view to locating them, including manufacturing of equipments intended to this end

2.2.7.5. On-site, on-line and laboratory diagnosis of electric power equipments (power transformers, HV circuit breakers, electric generators from thermo and hydro- power plants etc.) by partial discharge measurement, frequency characteristic measurement, dielectric spectroscopy, oil dissolved gases analysis etc.

2.2.7.6. Development of new testing techniques for high voltage equipments (e.g.: insulators strings, fuses; surge arresters etc.) and type tests in accredited laboratories for: power/ instrument transformers; high voltage switchgear and controlgear; current limiting reactors; coupling coils; arresters; insulator chains for aerial lines; medium and high voltage cables; earthing and shortcircuiting devices; switch disconnectors; fusibles; low voltage instruments and equipments a.s.o.

2.2.7.7. Internationally accredited tests in EU regulated fields – electromagnetic compatibility, low voltage, radio equipments, telecommunication terminals

2.2.7.8. Electroinsulating material characterization tests including materials taken from equipments in operation

2.2.7.9. Development of partnerships with universities especially for projects assuming the physical achievement of models and prototypes

2.2.7.10. Technologies using compressed air at supersonic speeds

2.2.7.11. Development of force measuring systems with applications in metallurgy, coal mining, shipyards etc.

2.2.7.12. Development of personalised software for experimental data processing and transient phenomena simulation

2.2.8. Development in research, development, innovation and technologic transfer field

2.2.8.1. Electric power supply safety increase by:

- Development of monitoring and diagnosis systems for transformers, high power generators and other electric power equipments, increase of monitored parameter number
- Development of on-site treatment methods for power transformers insulation
- Modernization of the excitation systems own to generators, hydro-generators, electric motors
- Constructive optimization of medium voltage electric substations

2.2.8.2. Increase of electric power efficiency

- Active filtering and compensation systems
- Electric power quality monitoring systems for medium voltage networks
- Stress relief equipment and technologies for metallic constructions using controlled mechanical vibrations generated with different types of driving systems/ mechanisms

2.2.8.3. Environment protection

- Use of new, advanced materials able to provide increased performances of products and equipments
- Characterisation of physical and chemical performances of bio-degradable oils
- drawing up recovery technologies for materials from electrical engineering components

2.2.8.4. Technological transfer

- Project and manufacturing technology for composite insulators manufacturing at Romanian industrial producers
- Project and manufacturing technology for medium voltage disconnectors with composite insulators and remote control

- Achievement of tests stands for transformers, motors, electroinsulating materials for SMEs

- Modernisation of transformer coil dimensional forming based on automated control of pressing force and imposed dimension
- Achievement of IT system for energy consumption administration at electric locos achievement of IT system for energy consumption administration
- Optimization of the drying process of transformer paper-oil insulation using new principles for real – time moisture measurement

2.2.8.5. Safety in operation increase at hoisting devices by:

- Development of electronic load measurement and limiting systems.

3. The human resources strategy

The managerial policy related to human resources is essential for the institute future because within the next 4 years an important number of specialists having key technical responsibilities both in the execution of the scientific research contracts and in developing equipments, technologies as well as monitoring or measurement systems will get retired

The managerial policy has the following objectives:

- Engineer skills improvement by courses organized within the Institute frame emphasizing on the practical issues
- Doubling the key positions, with responsibilities, specified by the quality documents of the accredited laboratories with young specialists to take over the activities any time it is necessary
- Employing at least 4 young graduates every year by organising competitions
- Providing the improvement of the young newly employed persons' skills at Technical Universities from France and Germany on reciprocity basis taking into account that within the last 4 years ICMET Craiova hosted on the average 4 foreign students for the yearly practical stage for periods of times from 2 to 3 months
- Assurance of a fund from the yearly ICMET budget for the financial support of the young specialists registered for a PhD degree
- Organizing monthly workshops in ICMET to present the scientific research works finalized or in the course of solving

4. Mechanisms for stimulating the appearance of new research directions

The Research-Development activities performed in ICMET should contribute to:

- Reaching the compatibility and competitiveness level necessary for full integration in the European research area

- Development of a dynamic and competitive social-economic environment focused on the high tech fields, able to meet the strategic requirements of long term development, in the context of globalized economy.

In order to stimulate the appearance of new research directions, the following measures are necessary:

- Use of the testing infrastructure within the frame of the laboratories and for RDT (Research- Development-Testing) activities

- Concluding applicative research contracts with companies concerned in some R&D projects within the framework of certain new research directions from the national programs

- Participating in research activities within the frame of cluster type or competiveness pole organisations.

- Development of human potential

  - Planning of human resources which consists in rendering evident the research sectors poor in terms of specialized staff and implementation of the personnel recruiting policy
  - Recruiting, selection and integration of human resources

Recruiting methods: advertising, information network, connection with the specific faculties

Recruiting criteria: competence, ability for research-work, ability for teamwork, knowledge of a widely circulated language

- Creation of a research group in the interface fields within the EU frame programmes;

- Development of a performance based wages/rewards system specifying some measurable indicators meant to ensure objectivity;

- Attraction of experienced researchers, young post-doctorate researchers and doctorate students;

- Private sector involvement:

  - Stimulation of private environment participation in RDT (R&D&Testing), inclusively the increase of innovation capacity, technological development capacity and research results assimilation in production
  - Involvement in development of public-private partnerships (competence centers, technological platforms, scientific parks);
  - Attraction and support of private companies in RDT schemes focused on co-funding.

5. Financial SWOT analysis

Strengths	**Weaknesses**
- Making the financial activities to be procedure - based so that all expenses to be under control for compliance with the assigned budget per categories of expenses - Teamwork availability of the research -development staff and of the staff with financial attributions - Endowment with computers and proper software for recording and tracking the financial operations - Periodic training of the staff with financial attributions for professional knowledge improvement	- High costs related to the interests for the credits that provide the necessary temporary funding - Impossibility to use the same procedure for the financial activity dedicated to different types of research activities. Different software programs are necessary for each source funding the research activities - In the yearly budget, the source for supplying it from the research activities is uncertain
Opportunities	**Threats**
- Facility of funding with advances amounting to 90% of the yearly value of the R&D projects from national plan - Facility assured by the rhythmic	- Decrease of the GDP percentage allotted by the state budget to R&D activities - High costs related to the interests and guarantees for bank loans

funding of the expenses for objectives of national interest - Regulation of basic institutional funding with effect from 01 January 2012	

6. Infrastructure investment plan and strategy

ICMET management strategy on infrastructure has the following objectives:

- Keeping the technical performances of the own equipment by planning yearly predictive maintenance customized for each equipment. To this end, the yearly budget of the institute provides expenses for revisions, repairs and functional parameter measurement
- Acquisition of new equipment or measuring instruments necessary for the implementation of new tests requested on product certification market
- Acquisition of new testing equipments which to replace the ones having already reached the safe operation period. At present the necessary amount is 3 mil EURO which will be distributed for the next 5 years. The critical point is the high voltage laboratory which is the only operational one in Romania
- Development of a competence center in the field of the equipment intended to smart grids and its endowment with the necessary hardware and software as well as with electric and non-electric quantities measurement systems using fiberoptics
- Acquisition of equipments necessary to determine the electric products lifetime following the accelerated ageing of materials
- Development of measurement instruments involved in energy efficiency labelling of electric equipments according to EU Ecodesign Directive
- Expanding of the calibration field with the measurement technique necessary to validate the measurement accuracy of the instruments involved in electric energy quality evaluation

7. Technology transfer and attraction of non-public funds

The present cooperation requests received from private capital companies for technological transfer for the next years have the following structure:

- Composite material bushings with reduced weight and dimensions, free of partial discharges at rated voltage (24 or 36 kV)
- Design and achievement of a factory stand for design and type tests of high voltage motors
- Applicative research aiming at improving the performances of three different types of high voltage disconnectors
- Optimization of power transformer coil drying process related to electric and thermal power consumption
- Technical assistance and consultancy for design and functional condition evaluation before the type tests
- Researches aimed at finding a technical solution which to enable the identification of high voltage lines insulators with incipient failures
- Researches together with Renault group aimed at developing in common an air conditioning installation using a non-conventional method patented by ICMET

Up to the present, we have the following cooperation proposals from abroad in applicative research field:

- Development of an early streamer emission lighting conductor with streamer initiation advance – YLCODER, Turkey
- Achievement of an infested transformer oil reconditioning equipment with removal of copper and sulphur ions – VIMAP, Serbia
- Accuracy evaluation for partial discharge location using acoustic method using an equipment achieved by OMICRON, Austria.

ICMET Craiova prognosis for yearly budget takes into account the attraction of non-public funds amounting to 80% of the minimum necessary budget.
This budgetary policy will enable a cash-flow enough to avoid bank loans.
The main non-public income sources are the accredited tests performed by ICMET Laboratories.

8. Strategic partnerships and visibility: events, communications, collaborations

ICMET policy related to achieving cooperations with foreign partners provides participation in international fairs having ENERGY as topic like: Hannover – Germany, CIGRE – Paris, France, Plovdiv – Bulgaria, Istanbul – Turkey, Dubai – United Arab Emirates, Belgrade – Serbia where we participated constantly and their economic efficiency was proved.
For the research domain, funds from the yearly budget will be provided for the participation in the meetings of CIGRE and IEC WGs where topics possible to be developed within the frame of the European research programs by consortiums agreed within the WGs are approached.
Taking into account the interest of the Arabian countries for Short-Circuit Testing Liaison (STL), ICMET will participate in all its meetings aiming at becoming full member, now being associate member (active participation in all working meetings for 5 years is the condition to be met to become full member).
ICMET Craiova aims at maintaining the cooperation relationships with:

- German Metrology (PTB – Braunschweig) with which we cooperated during the previous years within the frame of a non-reimbursable assistance program from the Federal Ministry of Economic Cooperation and Development (BMZ) to execute the project: "Measuring system optimization. High Voltage Technique" finalized in 2007
- High Volt Company, Dresden, Germany with which we cooperated within the frame of the European project ERBCIPACT 940 137 from COPERNICUS Program finalized in 2000. They are interested in on-site diagnosis
- Technical University – Karlsruhe, Germany with which we have an agreement for specialist exchange.

For the next 4 years a new approach will be implemented for the participation in international symposia and conferences by selecting the ISI quoted ones where papers with a high scientific level will be delivered. To this end, the Scientific Council of ICMET will achieve every year a schedule for the participation in these events selecting one paper from at least two competitive ones.