



RESEARCH PROJECTS 2014

UNITN INTERNAL CALL FOR PROPOSAL

1. Objectives of the call

In line with its Strategic Plan 2014-2016, the University of Trento promotes research projects on transversal topics on wide research themes which foresee joint interdisciplinary initiatives involving different UNITN departments or research centers, with a focus on the participation of young researchers and on the cultural, economic, environmental and/or social significant impact of the project results.

The foreseen budgetary allocation for this call is of 1.500.000 Euro with the aim of supporting research projects with a duration of 18 months.

In order to be eligible a proposal should pursue the following general objectives:

- the recognition and valorization of aspects specific of research in some areas of knowledge and the identification of research sectors requiring targeted financial support;
- the promotion of innovative and exploratory activities in identified research fields;
- the promotion and support of research competitiveness at both national and international level;
- the increase in the number of researchers involved in competitive projects.

Indicative budget and max number of projects for each area:

Macroarea	Max. number of Funded Projects	Max. budget allocated
Foundations of knowledge in the humanities, legal sciences, mathematics, physics and quantum technologies	4	400 000,00 €
Life sciences	2	300 000,00 €
Population, <i>welfare</i> and economic development	3	300 000,00 €
Sustainable development: environment, land and natural resources	2	250 000,00 €
Technology Innovation and support to the technological development	2	250 000,00 €

An extract from the University Strategic Plan 2014-2016 is attached to the call.

2. Eligible applicants

To be eligible, applicants must be professors or assistant professors of the University of Trento.

3. Proposals preparation and submission

The proposals:

- should be written in English (only in specific cases the use of Italian might be authorized);
- must be drafted by using the attached form;
- must be sent only by email to research.support@unitn.it within 15 September 2014.

Enquiries may be sent by email to research.support@unitn.it.

The forms and a list of FAQs will be published on the webpage of the Scientific Research and Technological Transfer Division <http://www.unitn.it/ateneo/50012/bandi-di-ateneo> (English version available).

4. Evaluation procedure

Proposals will be assessed by external reviewers selected by the internal "Comitato di Reclutamento di Ateneo". Proposals will be evaluated against the evaluation criteria, applying the weighting factors indicated in the following table and giving a score (from 1 to 10):



Evaluation Criteria	Weighting for Macroarea 1	Weighting for other Macroareas
Quality of the proposal: <ul style="list-style-type: none"> - relevance of the proposal to the <i>macroarea</i>. Originality and innovation. The appropriateness of the budget and the financial contribution request. Quality and completeness of the proposal. Capacity of creating external collaborations - Commitment to fundraising. - Impact on advanced training and on the territorial reality - External advisory board (if foreseen) 	40%	30%
Quality of the applicants <ul style="list-style-type: none"> - Quality of the PI(s) and of the other persons involved in the management of the project. - Involvement of young researchers in the scientific coordination of the project (young researchers shall have been awarded his/her PhD no more than 12 years prior to the publication date of the call, with the exception of extension in duly justified cases - e.g. maternity and paternity leave, long term illness - up to max 16 years and 6 months) 	40%	30%
Inter-departmental and multi-disciplinary proposals (even through events that could facilitate the interactions between PhD students and researchers of different disciplines)	20%	40%

A threshold on the Quality of the proposal applies: 7/10 (*40%=2.8/10 or *30%=2.1/10).

After the remote evaluation by external reviewers, the Senato Accademico prepares a ranked list of proposals.

Projects recommended for funding will be financed if sufficient funds are available. Proposals will be funded in priority order based on their rank. The Senato Accademico may decide for proposals budget reduction.

5. Reports

The following reports will be required for all the funded projects:

- 1) a scientific report after 8 months following the start-date of the project;
- 2) within 2 months after the end of the project a final report that should include:
 - a. a scientific report containing information about:
 - the results achieved;
 - a list of publications, patents etc.;
 - the dissemination initiatives.
 - a. A financial report detailing the expenses incurred in the project. The unspent amount will be made available to the University.

Internal guidelines and the templates for the reports will be made available to the applicants of approved projects in due course.



Description of the Areas (from “STRATEGIC PLAN 2014 – 2016”)

Strategic macro-area: Foundations of knowledge in the humanities, legal sciences, mathematics, physics and quantum technologies

Scientific research is the result of human activity as base of knowledge. The study of models and mechanisms of knowledge is, in fact, the essential starting point for the understanding of complex cultural, social and technological dynamics, for the acquisition of the theoretical tools necessary to the building of personal and collective identity, current and future, based on the values of the tradition of past centuries and on the ability to adapt them to the changes of the present world.

Basic research, not aimed at the immediate application of results, promotes the integration between disciplines, through the circulation of ideas and the dissemination of expertise, both locally and internationally. The objectives aim to consolidate the already achieved levels of excellence, by optimizing the potential of human resources and the existing working groups at University.

Notwithstanding the fact that university scientific research always contributes to the foundations of knowledge even in those fields that are historically more focused on application, this strategic macro-area identifies some research key directions, not included in further strategic macro-areas.

The macro-area of intervention, here described, is divided into four sub-areas: humanities, legal sciences, mathematics and physics and quantum technologies.

The University of Trento has always paid great attention to thematic issues related to such sub-areas, achieving high level quality results. Some of the expected actions, mainly in legal sciences and humanities, are related to local issues and to the valorization of territorial resources, whilst keeping their purpose of enhancing international relations.

Sub-area of Humanities

The objective is the consolidation of already achieved excellence, by optimizing the potential of University human resources and working groups. Main actions are developed along five thematic axis:

1) *Cultural and linguistic diversity*. The territory of the Autonomous Province has an exceptional cultural and linguistic richness where the coexistence of polyglot minorities with the majority of Italian speaking people requires targeted studies and research. In this field, theory-based, interdisciplinary and interdepartmental research becomes the starting point for practical intervention projects at local level.

2) *Territorial cooperation, education and cultural training*. Inter-university cooperation between the Universities of Trento, Bolzano and Innsbruck, which share the same geo-linguistic region, aims at the enhancement of the training/educational and cultural offer at regional level.

3) *Textual traditions and new humanism*. The valorization of the book and artistic heritage in Trentino and the protection of cultural traditions can be achieved only through interdisciplinary projects, across fields in the Humanities, involving intra and inter-departmental infrastructures and expertise and aiming at broad dissemination of knowledge, by using both traditional instruments and new technologies.

4) *Philosophy of planning*. Philosophy, as methodology at both theoretical and practical level for the analysis of cultural processes and products, aims at the analysis of the relationship between the different fields of human knowledge and actions, paying particular attention to those fields related to emerging cultural eco-systems.

Research topics should be related to:

- Cultural and linguistic diversity: research studies on historical linguistic minorities (ladin, cimbrian and mocheno) and new minorities (immigrants); multilingualism and cognitive mechanisms; language acquisition and learning processes; legislation, regulations and minorities conflict resolution; German language from the Middle Ages to today.
- Phenomenology of war in terms of impact on society.
- Valorization of cultural heritage: valorization of regional book collections (census, editing, study of manuscripts and early printed books); studies on art perception in complex social and cultural systems. Valorization of regional archaeological heritage.
- Philosophy of planning: philosophy and theology from the points of view of textual criticism, ethics and politics, history and culture; philosophy and mathematics; logic and language theory; philosophy and design and *human centred* aesthetics planning.



Sub-area of Legal sciences

Research objectives selected for this sub-area have been divided in the following two categories which also refer to the main themes identified by European Commission in Horizon 2020 Work Programme:

- comparative studies on sovereignty and citizenship transformation processes: legal status of individuals; migrations; multiculturalism; fundamental rights protection; freedom, security and justice in the European judicial area; re-articulation of public powers;
- law, science and technologies; biolaw, regulation and technology, welfare models, *life time contracts* in European private law, intellectual property, law and cognitive sciences, law and internet, law and environment, law and energy will be focus areas also in the future.

Sub-area of Mathematics

Actions to be pursued in the next triennium refer to research activities in some particular fields in which excellent results could be achieved at European level. These fields are:

- algebraic structures, computational algebra in coding theory and cryptography;
- algebraic geometry;
- calculus of variations;
- theory of nonlinear partial differential equations;
- interactions between mathematical physics and probability, mainly in the area of quantum information.

Sub-area of Physics and quantum technologies

The main objective is excellence also at international level and a significant impact on University's courses at Master's level, enhancing the international dimension and the opportunities of technology transfer to new or already existing companies.

Actions in this field should be related to:

- study and characterization of complex and optimized materials for applications in different sectors (mechanics, photonics, photovoltaics, sensors, catalysis, etc.);
- light-materia interaction in fundamental physics (ultracold atoms, complex systems, quantum optics) and its application in photonic devices and ultracold atomic gases;
- dynamic and elastic properties of materials with spectroscopic techniques, with the aim of predicting and then controlling such properties so to allow the design of optimized materials for specific applications;
- development of high performance calculus tools for research in few/many-body physics, biomolecular physics, structure of matter, numerical gravitation and space physics and in theoretical high energy physics;
- study of experimental astroparticle physics. Development of advanced detectors for astroparticle physics at ground and in space;
- study of physics of fundamental interactions, interferometric gravitational waves detectors and precision experiments with quantum-optics-mechanical devices.

Strategic macro-area: Population, welfare and economic development

Actions to be pursued in the next triennium refer to research activities in some significant fields concerning *welfare*, economic development, public policies and the complex issue of social services management both in private and public sector. One of the strengths should be the cooperation between expertise supporting *policy maker* and those supporting "private sector actors" so to involve transversely different skills which currently are developed in different departments, although being related to the same research macrotheme. The main objectives are excellence in research and the enhancement of the national and international visibility of the University's scientific production. At local level it could be useful to consistently increase knowledge transfer to society at large and to policy makers.

Research topics should be related to:

- analysis and identification of policy instruments and tasks available for local and national public entities for the improvement of economic growth, equity and *welfare* through the promotion of a shared responsibility between private and third sector organizations;
- analysis of the evolution of socio-economic contexts and of social entrepreneurship as a result from the evolution of *welfare* policies and lifestyles also in relation to demographic changes;
- analysis of young people life choices - from school to access to the labor market, to career development, to the transition to adulthood referring to different countries, generations and genders - and evaluation of the influence



of the family of origin on them, in order to better understand current social changes in today's market-based society with democratic governments;

- analysis aiming at better planning and empirically evaluating public policies for the reduction of intergenerational inequities and for the fight against youth unemployment;
- analysis of the conditions for new companies establishment, of productivity improvement and, in more general terms, of their level of competition;
- analysis of the relationship between economic development, territory and natural resources exploitation;
- analysis of the link between innovation and employment at different levels: creation of new job opportunities by innovative companies; *mismatch* of cognitive and non-cognitive *skills* and labor market; risk of segregation (between high and low skilled workers) also between genders;
- analysis aiming at the development of *job design* models which identify adequate mechanisms for job differentiation based on age;
- analysis of gender inequalities in the labour market, of gender representation through educational system, of gender roles in family life, of gender asymmetries in political participation and representation;
- analysis of legal and political instruments for a better regulation of migration (size and composition of flows, integration processes, evaluation of the effectiveness of migration legislation and policy measures);
- planning and evaluation of support and prevention socio-medical measures mainly focused on the promotion of networks based on the active involvement of citizens, public and private entities at local level;
- elaboration of methodologies and new concepts for the improvement of architectural planning of services, care assistance facilities for elderly, disabled, disadvantaged people (*aging in place, assisted living*, etc.);
- analysis of *welfare sustainability* (lifestyle, ageing, illness chronicity, multimorbidity, equity of access to health care regardless citizenship, patient mobility, welfare policies and related integration and management models);
- evaluation of the impact of public policies using also innovative econometric methodologies applied to counterfactual models of analysis.

Strategic macro-area: Life sciences

The pursued objectives aim at consolidating already achieved excellence by optimizing the potential of University human resources and working groups.

Research topics should be related to:

- characterization of fundamental life processes through the mechanistic high spatial and temporal resolution study and the modelling of cells processes and of pathological alterations. For instance: impact of genomic lesions and of microenvironment on onset, progression and dissemination of tumors and study of the role of transcriptional and post-transcriptional regulation of gene expression in such process;
- characterization of nervous system with multiple spatial and temporal scales and in different models of increasing organizational complexity, of the embryonic and postnatal development of central and peripheral nervous system, of neurobiological bases of cognitive-behavioral issues and their modelling;
- techniques and instruments for personalized healthcare (translational approach, precision medicine);
- characterization and mathematical modelling of the circulatory system and related transport phenomena, and their potential role in tumor growth, in neurovegetative and cardiocirculatory disorders and in ageing dysfunctions;
- techniques, instruments and technology platforms for diagnosis (for instance high sensitivity and specificity markers, functional neuro-imaging, mass spectrometry for proteomics and genomics, neurological diagnostic based on cognitive neurosciences, multimodal and molecular innovative imaging methodologies), therapy (for instance advanced radiotherapy also in association with co-treatments, robotic surgery, minimally invasive techniques, controlled released drug delivery systems, tissue engineering) and rehabilitation;
- eHealth and mHealth techniques and instruments for primary and secondary prevention, self-care and chronic diseases management (for instance telemedicine, teleassistance, electronic health record);
- techniques and instruments for the improvement of quality of life, for the primary prevention of physical, mental and social decline, for the safeguarding of autonomy of frail people and for promoting integration and social participation of disadvantaged people (for instance *assisted living technologies, ambient intelligence, domotics*, patient controlled devices, employment opportunities for people with psychiatric illness, technologies supporting mental and physical training);
- ethical, juridical and social implications in life sciences and biotechnologies (for instance: juridical and ethical implications in doctor-patient relationship; evaluation of healthcare sector professionals and public attitude



towards ill people, care and illness; social, cultural and psychological aspects of prevention and health education through life cycle).

This action, in line with the objectives Horizon 2020 Work Programme, requires a systematic involvement of healthcare structures, firstly at local level, through joint programmes for applied research which could be pursued even by joint research teams in joint laboratories.

Strategic macro-area: Sustainable development: environment, land and natural resources

Actions to be pursued in this field are related to research on urban and natural environment quality, improvement of quality of life, security and natural resources exploitation and environmental sustainability. The objective is excellence in research, by consolidating already achieved results and optimizing the potential of University human resources and working groups.

Research topics should be related to:

- comprehension and quantitative modeling of complex natural processes involved in environmental and natural resources dynamics;
- development of new monitoring and control systems, together with the study of vegetal and animal ecosystems dynamics with relation to development processes and particularly to a more efficient use of water resources (increased consumption of green water in agriculture);
- quantification of climate changes consequences on environment and resources, including ecosystems in natural and urban contexts;
- identification of instruments and reliable methodologies for the assessment of environmental and hydrogeological hazards, risks and security and development of devices and algorithms, also for civil protection, aiming at prevention and protection of environment, structures and human settlements against such risks;
- identification of possible solutions for the minimization of pollutant emissions (solids, liquids and gases) influencing climate changes;
- development of innovative environmentally compatible technologies for the reduction of the consequences of energy exploitation, with particular attention for renewable energy;
- cost-benefit analysis of new systems for renewable energy exploitation;
- green economy development and evaluation of environmental, economic and managerial sustainability of investments from both the macro and microeconomic point of view;
- analysis of measurement and reporting tools for managerial, economic and environmental issues;
- insurance and natural hazards;
- environmental and water law;
- social issues of natural resources exploitation and consensus on environmental actions;
- international doctoral training on cutting edge themes;
- lifelong learning actions on both specific and transversal and transdisciplinary themes.

Strategic macro-area: Technological innovation and productive development support

Actions to be pursued are related to research on technological innovation at both national and international levels, with special regard to local industry. The aim is excellence in research together with a significant enhancement of knowledge transfer to society and industry.

Main research themes in this field are:

- development and strengthening of the field of mechatronics;
- consolidation and enhancement of excellence in the fields of nanotechnologies and nanomechanics, innovative materials and mechanics of solids and structures;
- strengthening of research in the fields of sustainable energy production, energy saving, consequences of energy consumption in the building sector and industry;
- integration, renovation and modernization of scientific and technological research laboratories;
- establishment of technological laboratories in collaboration with industry;
- strengthening of interdisciplinary ICT issues for innovation;
- interaction between philosophy, law, society and business management economics and technological innovation at international level;
- technological applications in cryptography.