1. Excellence

Universitatea Transilvania din Brasov (UTBv), Romania, is the largest public university in the Centre Region of Romania, in one of the biggest cities in Romania. In addition, UTBv is the first university at national level to have a research and development institute (ICDT – see Figure 1), built with European structural funds, Romanian Government funds and university's own financial contribution. The institute consists of 12 buildings connected by a glass and steel corridor, with an atrium in the middle (the atrium being appropriate for dissemination activities with more than 500 participants). The campus is planned to include in the near future a hostel, a restaurant, a sport area, a field of photo-voltaic and other alternative energy sources for research activities etc. Between 2009 and 2017 UTBv managed over 300 national and international research projects and grants that cumulated more than 30 million euros.

Figure 1. ICDT – the R&D Institute of Transilvania University of Brasov, Romania – the entrance and the satellite top-view of the campus (Google Maps credit for the latter one).

1.2 *Quality and innovative aspects of the training programme*

The MIV (Machine Intelligence and Vision / Multisprectral Imaging and Vision) research laboratory at UTBv offers training on the following topics (we can develop more, according to the objectives of the proposal and the future ITN):

- FPGA programming
- ASIC design
- Image processing and analysis
- Machine learning and artificial intelligence

We can be very specific as well, for instance to propose training on front-end electronics for the detectors (NSW muon detectors) and indicate references to the Read-Out Controller (ROC) ASIC designed, implemented and tested by the UTBv MIV team:

http://iopscience.iop.org/article/10.1088/1748-0221/11/02/C02069

ATLAS experiment at LHC (2016-2018) contract no. 8/2016, (2014-2015) contract no. 7/2012, partner P5. In the context of the design of the New Small Wheel system for the

ATLAS experiment on the Large Hadron Collider at CERN, Geneva, our contribution is to the trigger and data acquisition system implemented on FPGA / ASIC. More precisely, we designed and implemented the Read-Out Controller (ROC) ASIC in CMOS IBM 130nm technology, for the front-end electronics of the muon detectors. Few pictures of ROC below are self-explanatory.
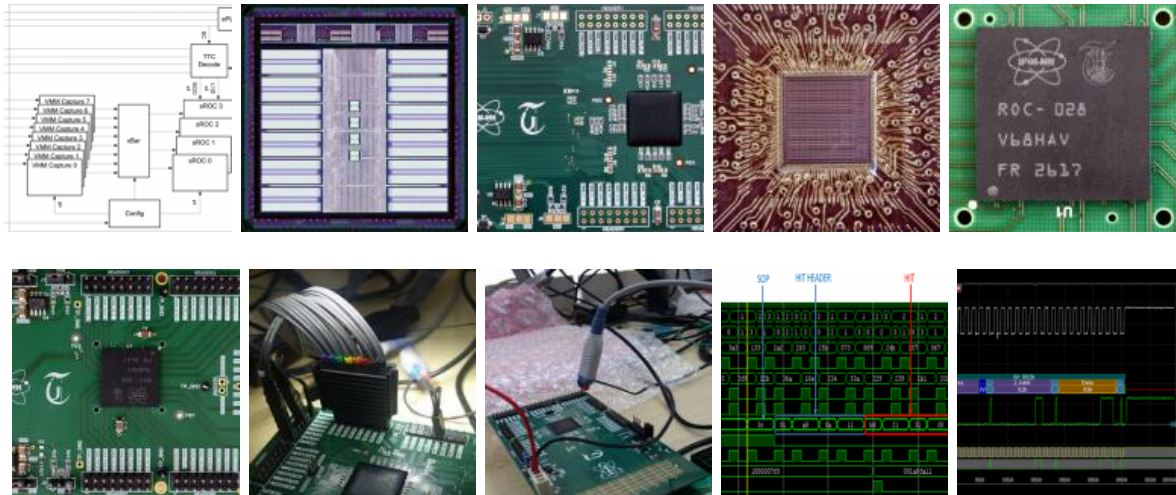
Training events and activities: UTBv can organize a summer school (every project year).

Since 2009 MIV organizes annually an international summer school in image processing (ISIP) which counts already 9 editions. Since 2014 MIV participates every year to the European Researchers' Night event, with a stand on image processing and analysis, communicating to the wide public (mainly kids and their parents) the research results obtained so far. MIV organized in 2016, 2017 and 2018 three educational and outreach events in the frame of World Space Week, the one in 2016 being specifically dedicated to Earth Observation and Copernicus[1]. In 2017 and 2018, MIV was the host and local organizer for EU Copernicus Climathon[2]. In 2017 UTBv organized the 1st edition of the summer school entitled "multivariate Signal Processing and Analysis for Remote Sensing Applications" – mSPARSA[3] 2017, where ESA and JRC representatives participated. In 2011 UTBv organized NETIS 2011 – an International School on Networking supported by ACEOLE[4] (Data Acquisition, Electronics, and Optoelectronics for LHC Experiments) – a Marie Curie ITN Project (http://www.miv.ro/?page_id=451). More information on MIV can be found here: http://miv.unitbv.ro

Antonio, please have a look at: http://www.cern.ch/aceole - to have some ideas about a past ITN project.

1.3   *Quality of the supervision*

[1] World Space Week 2016 in Brasov, Romania: http://www.worldspaceweek.org/events/event-details/?eventID=11087
[2] Copernicus Climathon 2017 in Brasov, Romania at UTBv: https://climathon.climate-kic.org/brasov
[3] http://www.unitbv.ro/Portals/0/Newsletter/Newsletter%20Septembrie%202017%20EN.pdf
[4] http://www.cern.ch/aceole

Dr. Mihai Ivanovici (male) – professor, holds a PhD in electronics from Politehnica University of Bucharest, Romania, based on the research conducted at CERN for 4 years. He is a full professor and has more than 10 years of experience in managing various research projects (funded by EU structural funds and the Romanian government, the Ministry of Education and Research or by Romanian private companies) and participating as researcher in national and international research projects (e.g. The ATLAS Experiment at LHC); he is the author of more than 50 scientific papers published in international conferences and journals. He is head of MIV Laboratory, within Department of Electronics and Computers, Transilvania University of Brașov, România and member of the IEEE Signal Processing and IEEE Geoscience and Remote Sensing societies. His research interest and expertise are in the field of colour, multispectral and hyperspectral image processing and analysis, FPGA programming and ASIC design, machine learning and artificial intelligcence. Currently he is supervising one PhD student who is member of the UTBv project team.

1.4 *Quality of the proposed interaction between the participating organisations*

UTBv (Transilvania University of Brasov), through MIV research laboratory, is a member of the ATLAS Collaboration at CERN.

This link and other links between the partners of the proposed ITN should be emphasized here, also in a Figure.

2. Impact

2.2 *Contribution to structuring doctoral/early-stage research training at the European level and to strengthening European innovation capacity, including the potential for:*

a)   Meaningful contribution of the non-academic sector to the doctoral / research training (as appropriate to the implementation mode and research field)

Depending on the topics of training at UTBv I can contact several local companies to ask them if they can support our project, by offering internship or other typers of training. They can be invited to join our summer schools or workshops as well:

eASIC Romania (eASIC is a US California based company for structured ASIC design which has an office in Brasov).

FotoNation can be involved as well – they do image processing in hardware (FPGA, ASIC) for major companies in Japan; also machine learning/artificial intelligence; I have a formed PhD student there.

SIEMENS Romania can be another option.

ATOS Romania as well.

Just let me know which should be the training tasks at Brasov.

Required sub-headings:

- Dissemination of the research results
- Exploitation of results and intellectual property

Table 4: Project key performance indicators (KPIs).

Key performance indicator	….. project's KPI value
Scientific papers in open-access peer-reviewed international journals	3 papers submitted for publication / under review / accepted / published (with a total cumulative impact factor > 3) on topics exposed by UTBv during the training sessions (but not limited to)
Scientific papers in peer-reviewed conference proceedings	3 papers (approx. 1 per year) on ASIC testing system / multispectral image acquisition system currently developed by UTBv, data processing / feature extraction.
Collaboration agreements with businesses	1 agreement (e.g. for services based on multispectral image acquisition)
New innovative products or services	Min. 1 application / product / service on …. Should we think of a patent proposal at project level? Or at partner level?
Summer schools	3 editions (in 2019, 2020, 2021)
Workshops	3 events (in 2019, 2020, 2021)
Networking	Min. 1 international conference panel with UTBv researchers
Outreach events	Should we have such events ??
Articles in the UTBv Newsletter	6 articles addressed to academia, collaborators and the general public (for outreach events and summer schools/workshops)
Press releases in local and national newspapers	3 press releases addressed to general public in Romania to increase the visibility and attractiveness of UTBv and the ITN project
National news coverage	1 TV news report (broadcasted at least 2 times, followed by publication online/on WEB on a YouTube channel)

2.4 *Quality of the proposed measures to communicate the activities to different target audiences*


Required sub-heading:

- Communication and public engagement strategy

Definitely we must have some outreach events for the general public, children with their parents (in order to attract them for a STEM-related careers – Science, Technology, Engineering and Mathematics). Can be in the frame of the European Researchers' Night (last Friday of September)

3. Quality and Efficiency of the Implementation

A proposed PERT diagram – can be adapted and developped further, just let me know if you need the Microsoft Visio source:
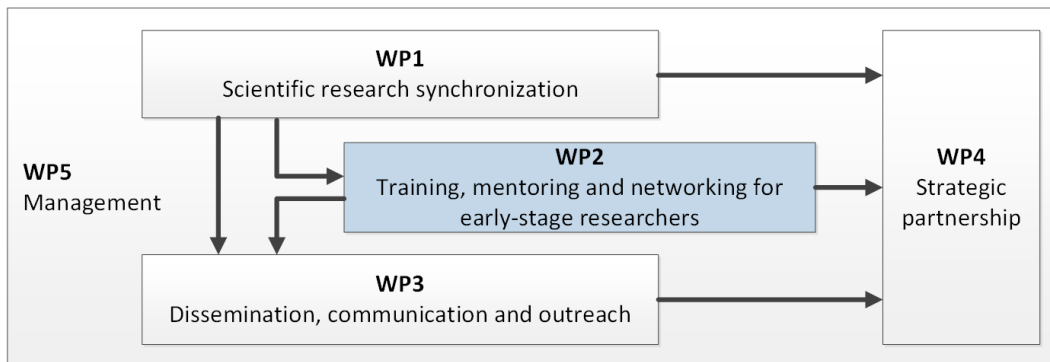
WP1 - can be focused on the research excellence, specific for the proposed ITN

WP4 – can be focused on the exploitation of the results of the ITN project

List of major deliverables

Summer schools lecture notes (could be published as well as a book by the end of the project, or can be MOOCs)

Reports on workshops and outreach events.

Number of connections with industry (internships, agreements for collaboration, contracts?)

Number of PhD defences: 1 for UTBv (I have a PhD student in his 2nd year, he could defend the thesis by the end of the ITN project, in 2-3 years).

Table 3.1 d Individual Research Projects

We definitely must gave some very clearly-defined projects for ESRs (or fellows?).

5. Participating Organisations

Partner Organisation Legal Name: Universitatea Transilvania din Brasov (UTBv)	
General description	UTBv is the largest university in the Centre Region of Romania. It was founded in 1948 and has now 18 faculties, offering bachelor, master and doctoral studies to more than 20.000 students. UTBv awards approximately 50 doctoral degrees annually. Advanced research is developed in 29 research centres focusing on major topics of sustainable development: Renewable Energy Systems, novel Energy Efficiency in processes, advanced solutions for Energy Saving products and processes, Natural Resources preservation and use, Health and Life Quality, and Education, Culture, Communication and Economic Development. The R&D Institute of the Transilvania University of Brasov gathers all the 29 research centres, along with the Integrated Doctoral School and the post-doctoral programs. The new location of the R&D Institute is in the GENIUS Campus (Green, Energy Independent University Campus) where 11 laboratory buildings are developed as low energy buildings and 68 integrated equipment lines are developed, complementary to the already existent infrastructure. The new location, infrastructure and software are part of the European Structural Funds project: *R&D Institute High-Tech products for sustainable development* that was finalized in 2013. The R&D centres have a very good experience in managing projects at national and international levels; during 2009- 2017, there were managed over 30 M€ in over 300 grants and contracts. The Multispectral Imaging and Vision (MIV) research laboratory has its roots in the former Image Processing Research Group, from the Research Institute of Computer Techniques (former "ITC"), Brasov. MIV is the result of combining two research groups currently acting in the C13 research centre of the R&D Institute of the Transilvania University of Brasov: the research group of colour image processing and analysis and group of machine learning and data-mining. MIV *project team* is currently composed of 1 full professor, 1 post-doctoral student and 1 PhD student. All the staff is involved in research in the domains required by the ITN project. For more details, the web site of MIV Laboratory is: http://miv.unitbv.ro/

Key Persons and Expertise	**Dr. Mihai L. Ivanovici (male) − professor,** holds a PhD in electronics from Politehnica University of Bucharest, Romania. He is a full professor and has more than 10 years of experience in managing various research projects (funded by EU structural funds and the Romanian government, the Ministry of Education and Research or by Romanian private companies) and participating as researcher in national and international research projects (e.g. The ATLAS Experiment at LHC); he is the author of more than 50 scientific papers published in international conferences and journals. He is head of MIV Laboratory, within Department of Electronics and Computers, Transilvania University of Brașov, România and member of the IEEE Signal Processing and IEEE Geoscience and Remote Sensing societies. His research interest and expertise are in the field of colour, multispectral and hyperspectral image processing and analysis. Currently he is supervising two PhD students who are both members of the ARIES UTBv team.
	Radu-Mihai Coliban (male) − post doc, holds a PhD degree from UTBv in electronics. His PhD thesis was entitled „Data acuisition and nonlinear processing − applications in imaging and complex experiments in physics". He is a student member of IEEE. His research interest include color and multispectral image processing, satellite image analysis, hardware design languages, FPGA programming and ASIC design.
	Stefan Popa (male) − PhD student; is a licensed engineer in electronics and holds a MSc degree in Integrated Electronics Systems from Transilvania University of Brasov. Starting with 2017 he is a PhD student at Transilvania University of Brasov, Departament of Electronics and Computers, and the topic of his PhD research is the signal acquisition and real-time processing systems. His research interests include hardware design languages (Verilog), FPGA programming and ASIC design.
Key Research Facilities, Infrastructure and Equipment	**Dell server for CAD software applications, including the licenced Cadence IC Full Design Suite** **High-definition 4GHz LeCroy HDO 9404-MS oscilloscope** I can provide more details and equipment if necessary
Previous and Current Involvement in Research and Training Programmes	**NETIS 2011 CERN ACEOLE project?** • Partner in the "ATLAS Experiment at LHC" national project as part of the Romanian contribution to the experiments at CERN − European Organization for Nuclear Research, Geneva,

	Switzerland, RO-CERN, funded by the Romanian Ministry of Research, contracts no. 8/2016 for 2016 – 2018 and no. 7/2012 for 2012 – 2015 (approx. 200k euros) • "IEEE SPS Summer School on Intensive Program on Computer Vision (IPCV 2014)", IEEE International LLC funding, contract no. 5860/21.05.2014, 2014 (5k euros) • Partner in "Analysis, Modelling and Simulation Techniques for Imagery, Bioinformatics and Complex Systems (ITEMS)" national project, funded by the European Social Fund and Romanian Government, contract no. POS-DRU/86/1.2/S/61756, 2010 – 2013 (approx. 200k euros)
Relevant Publications and/or Research / Innovation Product	*Max. 3* R. Coliban, S. Popa, T. Tulbure, D. Nicula, M. Ivanovici, S. Martoiu, L. Levinson, J. Vermeulen, "The Read Out Controller for the ATLAS New Small Wheel", Journal of Instrumentation, volume 11, February 2016, [article] *Product: the Read-Out Controller ASIC in the IBM 130nm CMOS technology, BGA packaging, radiation-hard*

7.   Letters of Commitment

Please use this section to insert scanned copies of the required **letters of commitment**.

Letters of commitment **from partner organisations** should be on headed paper and signed in order to demonstrate the credibility of the organisation's commitment to the ITN. There is no specific template for these letters.

Antonio, please provide us with the template when you have all the elements (project title, number of PhD students for joint thesis and so on), so we can sign and stamp such letters at the beginning of January 2019 (activity restarts on 7th of January in our university, so we have one week – enough – to do this).