# INESC-TEC Feedback

Dr. José Principe , Chair (U. of Florida, USA)
Dr. Leonardo Chiariglione (CEDEO, Italy)
Dr. Faramarz Farahi, (U. of North Carolina, USA)
Dr. Tomás Gomez (U. Pontificia Comillas, Spain)
Dr. José A. B. Fortes (U. of Florida, USA)
Dr. Volker Stich, (FIR AT Aachen RWTH U.Technology, Germany)
Dr. Maarten van Someren (Universiteit van Amsterdam, Netherlands)
Dr. José Luiz Fiadeiro, (U. of Leicester, UK)
Dr. Steven Nichols, (U. of Texas, Austin, USA)
Dr. Daniel Mossé (U. of Pittsburgh, USA)

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# Strong Points

- INESC-TEC LA had a meteoric expansion since the last visit!
- It matured a unique style of aggregating and leveraging scientific expertise and deploying it to address real world problems (“INESC DNA”)
- Board was very impressed with the general capability of the LA, its improved rate of productivity and its role in making research and technology socially relevant.

# Strong Points

- The Board was also very pleased with the implementation of the previous suggestions, namely:
- Silos → become clusters of competencies
- Creation of UITT unit for Tech Transfer activities which complements admirably the role of the other units.

# Strong Points

- People Assets – vibrant mature and young researchers
- Several Integrative and cutting edge research projects
- Improved scientific productivity
- Growing impact on improving Portuguese Industry Competitiveness
- Strategic vision for growth (inside and outside Portugal)
- Growth in Funding
  - Very Good multiplicative factor of base funding
- Improved International Visibility
  - Attracted international scholars, Ph.D. students
  - Reached international markets
- Established a successful technology transfer infrastructure
- Efficient Management + Support Services

# Weak Points

- Uneven quality of research. Some units need:
  - More (new) focus+ critical mass
  - Identification of strategic goals
- Articulation of Unit's SWOT analysis with Unit's vision and mission (when present).
- Structural approach to management:
  - Exploit diversity of expertise
  - Manage maturity of areas
  - Succession plan
- External visibility can still be improved
- No IPR policy in place

# SAB Wishlist

- Explicit SWOT Analysis for the overall Associate Laboratory
- How do the Units' mission and goals contribute to the overall LA strategy?
- The SAB is not generally a good body for management questions

# Recommendations 1

- Exponential growth should be followed by a period of maturation to solidify vision, mission and best practices.
- INESC-TEC units should aim at:
  - Vision Alignment
  - Mission Convergence
  - Compatible Cultures

# Recommendations 2

- “Clusters and Bubbles” are much better than the silos, but can still be improved.
- Create and maintain a portfolio of scientific and technology expertise.
  - Use it to pin point leadership and orchestrate the diversity of expertise across the INESC-TEC Units
  - And to foster inter-unit collaborations and improve efficiency.
- A reformulation of the Scientific Council could help accomplish this goal.

# Recommendations 3

- The current performance metrics for the LA investigators are insufficient to measure the multifaceted mission of INESC-TEC.
  - Metric break down
  - Mechanism for tracking the metrics
- Perhaps Scientific Council can be tasked to study this issue.

# Recommendations 4

- Enhance internal information exchange mechanisms amongst the Units, e.g. yearly an Open House.
- Raise the profile of INESC achievements internally and externally
  - e.g. best (student / senior) papers, INESC TEC project award, revamp the website, etc.

# Directors Help List

- Integration of new units
- Increase scientific productivity
- How to generate new leadership
- How to improve management

# Directors Help List

- The questions asked transcend the expertise of the SAB beyond the recommendations made!

# Unit Specific Recommendations: Telecommunications and Multimedia

Overarching Observations:

- The Unit includes activities that span the entire layered communications model :
  - Physical (Optical and electronics technology)
  - Network (Mobile and wireless, Internet Architectures)
  - Services (Multimedia Communications Technologies)
  - Applications (Information Processing and Pattern Recognition)
- The Unit is well prepared to deal with overall systems issues, by itself and in cooperation with other Units
- However, the benefits to the Unit and to INESC TEC from having disparate areas in the same organisation requires investigation

# Unit Specific Recommendations: Telecommunications and Multimedia

- Information Processing and Pattern Recognition
  - The area has a broad mandate
  - It has shown that it can rapidly develop expertise in new areas
  - The link between activities and projects should be well aligned with the expected needs of customers

# Unit Specific Recommendations: Telecommunications and Multimedia

- Multimedia Communications Technologies
  - The area retains its consolidated excellent command of relevant technologies
  - Even though major players dominate portions of the market, the area should step up the identification of niches of opportunity
  - Joint activities/projects with Information Processing and Pattern Recognition and Communications Networks are encouraged

# Unit Specific Recommendations: Telecommunications and Multimedia

- Communications Networks
  - A clear mission and well defined objectives
  - Plans laid down at previous SAB meeting properly executed
  - More attention to scientific contributions required

# Unit Specific Recommendations: Telecommunications and Multimedia

- Optical and Electronics Technologies
  - Excellent expertise that enables a broad range of potentially valuable projects with good results
  - Need to focus on promising activities to exploit the size of the group
  - The scope for synergy between the activities of the area with other areas is not clear

# Unit Specific Recommendations
## UESP -Manufacturing Systems Engineering

- The group is covering relevant topics in a very broad area of manufacturing
- Three dimensional approach…:
  - Collaborate and network
  - Optimize and decide
  - Operate and manage

  …Is very suitable for structuring and further development of the adherent scientific and industry relevant competencies
- Decide on/ develop the scientific approaches the unit is actually familiar with

# Unit Specific Recommendations
## UESP -Manufacturing Systems Engineering

- Clarify/ specify the target domains from enterprise to enterprise networks
  - Manufacturing and/ or
  - OEM and/ or
  - FMCG and/ or…

  And map technologies, techniques and industry application
- Define objectives for sustained growth as a Unit
  - Define the critical mass per field of expertise
- Priority should be to redefine boundaries/ gaps
  - Search for suitable partners like UGEI, ROBIS

# Unit Specific Recommendations
## UESP -Manufacturing Systems Engineering

- Take the companies “need for innovation” as starting point for commercial activities
- Develop/ create “new” expertise to demonstrate Unit’s agility
  - Smart objects
  - High resolution SC-Mngt
  - Result driven forecasting (instead of sales driven..)
- Coordinate PhD programs with UGEI

# Unit Specific Recommendations

- Optoelectronics and Electronic Systems

  Observation: This unit has continued to maintain its international reputation and has expanded its research areas. Long-term financial picture of the unit is unclear.

  - Consider exploiting unit's strengths in thin films, micro-fabrications, and sensors in the areas of "Energy", "Embedded Systems" and "Robotics" in collaboration with other units at INESC.
  - Consider exploiting interdisciplinary opportunities with other units in INESC.
  - Many projects have been developed in this unit. We would like to see more attention is being paid in reduction to practice.
  - Consider establishing organized relations with other research centres in the areas of life sciences and health to further explore the applications of technologies developed in the unit

# Unit Specific Recommendations
## UGEI-Industrial Engineering/ management Unit

- The group covers a very broad aerea of multidisciplinary/ industry relevant topics
- Shows a good combination from Service engineering (SE) with Decision support and performance management issues
- Provides a structured approach in Science and Technology transfer (see Matrix)
- But:
- Must intensify the „human power“ in SE to speed up the creation of a solid base for all corresponding activities

# Unit Specific Recommendations
## UGEI-Industrial Engineering/ management Unit

- Has to decide on „branches“ (health-manufacturing-mobility-retail) and needed critical awareness in Science and TT
- Therefore:
- Has to search for suitable corresponding expertise in INESC TEC like
  - UESP with decision support in NW, performance mngt, ...
  - USE with planning and forecasting
  - ROBIS with industrial and service robotics
- Should think of its relevance / expertise for
  - UITT-Innovation and technology transfer

# Unit Specific Recommendations
## UGEI-Industrial Engineering/ management Unit

- Could become a relevant player in Service science by EU-wide partnering
- Should aim for an „interdisciplinary management approach“:
  - align the broad vision and converge unit‘s mission through partnering

# Unit Specific Recommendations Power Systems

Observations

- Well consolidated and high scientific level
- In the last four years increase in funds from R&D activities and number of grantees
- Good balance between EU funds, national funds, and other R&D projects

# Unit Specific Recommendations
## Power Systems

Recommendations

- Define an integrated flagship vision of the different areas of activity, for instance around “Renewable energy and smart grids”
- Increase the number of publications in journals (stable in the last 4 years but still is low). Annual control of published papers by PhD students and define a target for PhD defense
- Consolidate the role of area leaders in the management of the unit (preparation for future unit leadership)
- Promoting training services in collaboration with UITT

# Unit Specific Recommendations
## Power Systems

Recommendations

- Establish a strategic plan for financial sustainability of the new Lab infrastructure (Unique Selling Proposition)
- Take advantage of the growth of technology transfer activities for allocating more funds for hiring senior researchers and post-doc staff (scientific production)
- Lead INESC TEC units in a collaborative vision for definition of initiatives and projects in the area of Smart Grids
- Continue with the internationalization through European programs and new projects in Brazil and USA

# Unit Specific Recommendations LIADD

Observations

- Sustained good scientific results
- Wide variety in scientific approaches to Machine Learning and Data Mining
- LIAAD integrates well into INESC; makes connections between other INESC units
- Transition to new / younger leaders
- Wide range of topics and approaches; risk of fragmentation
- Many different locations

# Unit Specific Recommendations LIADD

Recommendations

- Find more focus:
  - Identify a *small* number of *scientific* problems + *approaches* that will be important in future
  - Collaborate in addressing these
  - Selectively explore & evaluate opportunities in INESC; balance science and applications
- Try to reduce different locations (to INESC?)

# HASLab
## High-Assurance Software Laboratory

- Observations
  - Excellent credentials in fundamental research but also in its applications, which the team has explored in a number of EU or FCT-funded projects
  - The focus on Trustworthy Systems exploits the expertise developed by the team on formal methods, dependability and information security...
  - ... and responds well to socio-economic needs
  - Good mix of different levels of academic seniority and good involvement of young researchers
  - Excellent potential for developing synergies with other units

# HASLab
## High-Assurance Software Laboratory

- Recommendations
  - Refine and prioritise the domains of application to address in the short and medium term after having identified the opportunities for interdisciplinary R&D with the other units and for engagement with companies
  - Ditto for the expansion in human resources
  - Use the experience and support available at INESCTEC to increment the recruitment of international researchers
  - Consider a balanced approach to publishing that maximises the potential for networking through participation in conferences and impact through the submission of extended versions to journals

# UITT (Innovation and Technology Transfer) Unit Specific Observations

- UITT Clearly implemented recommendations from previous review
- Contributions (still a small group)
  - Technology and Innovation Management
  - Engineering Systems Design (Flexibility)
  - Technology Entrepreneurship
  - Technology Policy
- Significant Intellectual Contributions (publications)
- Achievable aspirations that reflect their abilities, perceived needs,  and interests

# Unit Specific Recommendations UITT

- UITT could assist in assessing INESC TEC commercialization potential
- Assist in the development of patent policy
  - University/INESC TECH
- Continue to strengthen and grow
  - Academic (Master in Innovation and Tech. Entrepreneurship),
  - Training (COTEC), and
  - Outreach programs

# Unit Specific Recommendations UITT

- Continue the combined approach of mutually supportive intellectual, service, project, outreach, and “inresearch” programs
- Document and publicize INESC TEC enabling capabilities/successes
  - “Except for the support of INESC TEC, we would not be here.”
- Build on existing international academic collaborations

# CISTER: Research Centre in Real-Time Computing Systems

- Strong points
  - Great potential/opportunity: "embedded" growing sector (14% growth per year; it's 98% of current processor; E$60B in 2006)
  - Good int'l visibility
  - 2000$m^2$ of space, good for work AND inviting scholars
  - Good critical mass/size (around 50--14PhDs)
  - Understands own limitation in Tech Transfer area
  - "Excellent" Center in 2002 and 2007
- Challenges
  - Need a clearly defined vision, mission, goals, and metrics
  - Say want to grow by 60% (feasible), but unsure of funding and retention at current levels: economic woes
  - Think about Centre's social/regional impact

# CISTER: Recommendations

- Identify vision, mission and goals
- Determine own ideal metrics to guide people
  - align metrics with INESC's metrics
  - tell people new expectations/metrics
- As it matures within INESC-TEC, CISTER should
  - Identify core competency overlap with other Units
  - Talk the same language (grantees, same slides template, ...)
  - Participate more fully of infrastructure
  - Take advantage of INESC services (TT, communication, and admin)
- Strategy: diversify sources of funding
  - more EU programs?
  - more grants and contracts

# Unit Specific Recommendations

## CRACS- Center for Research in Advanced Computing Systems

- Continue to excel in research, funding and scholarly work in the identified focus areas under F. Silva's leadership
- Develop a vision and a mission for the unit (in addition to identifying the focus areas of research) that also accounts for the INESC TEC context
- Address human resource limitations through partnerships with other INESC TEC units and/or creative administrative actions (when growth is not possible)
- Diversify funding sources to manage risks related to cuts in FCT and other typical funding sources for CRACS.

# Unit Specific Recommendations Robis

Observation: A new interdisciplinary, inter institution unit with very broad range of activities. Great growth potential. Many new contracts already in place.

Challenges

- Define focus areas
- Show unified voice/position of the entire Unit
- Improve inter-unit collaboration (e.g., CISTER, UOSE) and outside expertise (e.g., power/energy)
- Improve scientific output (paper and TT) of the unit
- Given the practical nature of projects being conducted in this unit more attention could be paid to commercialization of the projects (economical impact)
- Use INESC's services

# Unit Specific Recommendations

## USIG-Information and Computer Graphics Systems Unit

- Continue to improve quality and number of publications under the leadership of F. Silva and A. Gaspar
- Continue pursuing the identified technical domains of opportunity and their applications
- Reposition unit as software engineering of end-to-end information processing and visualization systems , integrating its three areas of activity and leveraging complementary expertise of other INESC TEC units as needed
- Further develop the vision and the mission of the unit (consider using system engineering strengths in collaborations with other INESC-TEC units).

Thank you for the hospitality

Very interesting (but heavy)
2 days!