



# EUCLiD

Strengthening EU-India  
collaboration in networked  
monitoring and control  
systems technologies

## The EUCLID project lays the foundation for enhanced EU-India collaboration in the field of monitoring and control of complex systems

The European Union and India share common concerns in complex systems engineering, which create a favorable environment for strategic R&D collaboration and help to respond to the broader societal challenges faced by both these continents.

The DG CONNECT Unit "Complex systems and Advanced computing" supported the EUCLID project (June 2010 – December 2012) with the aim of **stimulating EU-India cooperation in monitoring and control of complex systems**.

Over two and half years, the EUCLID project team – **inno, European Embedded Systems Institute, Indian Institute of Science Bangalore, and Honeywell Technology Solution Labs, supported by a dedicated expert group drawn from leading academic and industrial experts** from European Union, India and USA – developed a range of recommendations and concrete project initiatives. The project team also mobilised **100+ members of the European and Indian R&D community** with the goal to promote, support and lay the foundations for future EU-India R&D cooperation in monitoring and control of complex systems.

The major project achievements include:

- **Raised visibility** of EU-based activities in India, including insights into European Networks and Platforms regarding key research and technological challenges for 2020.
- **Mapping of 50+ Indian R&D monitoring and control teams from 34 organisations**, and preparation of a promotional guide with an overview of their core competences.
- **Overview of societal and industrial needs** in India for monitoring and control, with focus on transportation, energy management, industrial automation, clean water and healthcare.
- **6 EU-India collaborative events with participation of 100+ specialists:**
  - "India-EU collaboration meeting – Monitoring and control systems technologies: towards closer India-EU R&D cooperation", Mumbai and Bangalore, April 2011
  - "Energy and Environmental Challenges in Emerging Regions – Opportunities for Control and Monitoring Technologies", IFAC Milan, August 2011
  - Round table discussion "Cooperation perspectives between EU and India on monitoring, systems & control science", IFAC Milan, August 2011
  - "Foundations and future perspectives to cooperate in control and monitoring with India" at the IEEE CDC-ECC European Control Conference, Orlando, December 2011
  - "From Data to Information – methods and technology for monitoring, control and estimation", Bangalore, February 2012
  - "The present and Future of Complex Systems Engineering", Bangalore, August 2012.
- **Technology Foresight report** "The present and future of Monitoring and Control of Complex Systems with potential for international (EU-Indian) collaborations".
- **Strategy and Action Report** "EU-Indian collaboration in networked monitoring and control systems technologies: next steps", summarising expectations from the EU-Indian community.



### EUCLID CONTRIBUTES TO ICT POLICY DIALOGUE BETWEEN EU AND INDIA

The project team proposed a topic on monitoring and control of complex systems for an EU-India ICT coordinated call: **Smart components and systems for sustainable development and inclusion**, and suggested that projects may address topics such as clean water, health care, transportation system, protection of the environment, efficient and sustainable food production, sustainable energy etc.



### EUCLID INVOLVES EUROPEAN AND INDIAN INDUSTRIALS TO EXPLORE COLLABORATION OPPORTUNITIES

R&D industrial specialists from Honeywell, EDF Group, Schindler, Honeywell, SAP, Alstom, Reliance, TCS, ABB Research Labs Bangalore, IBM, CDAC, GE-India took part in the project events. Follow up activities include, for example, a visit of a representative of an industrial company from India to the University of Trento, Italy, to continue collaboration discussions with different research groups.



- **Proposal for a theme** “Smart components and systems for sustainable development and inclusion” for a Coordinated ICT Call EU-India, resulting from consultation process.
- **Initiation of concrete R&D EU-India collaboration activities and projects** – the technical discussions have been started and some initiatives are well advanced.
- **Organisation of training and individual support** to increase the skills of the Indian research community in European opportunities, partner search, FP7 project set up. . .

In addition, EUCLID has generated many indirect, but nevertheless, important outcomes laying the foundations for long term collaboration and enhancing the competitiveness of actors in both communities. The project:

- **Contributed to initiation and execution of Indian-based projects** in control and monitoring.
- **Helped European specialists** to understand the “way R&D works in India” as a basis for future R&D collaborations.
- **Highlighted the strong match** of R&D interests in Europe and India in monitoring and control of complex systems.
- **Created an atmosphere of trust between future collaboration partners.**
- **Contributed to raise awareness regarding** the topic in academic and industry organisations in India due to the growth of new fields linking monitoring and control with communications and computing.

International collaboration plays an important part in driving forward research excellence and the competitiveness of industrial actors. It is also a long term process but EUCLID has already prepared the way forward and a number of important next steps have been identified. These include:

- **Launching a joint funding scheme** between EU and India.
- **Creating** technology platform in complex systems engineering in India
- **Linking** European and Indian R&D knowledge networks working on similar topics, and encourage local consortia with industrial participation
- **Reinforcing** two-way collaboration, young researcher mobility and co-supervision of thesis, and attract EU young specialists to India
- **Making** visible the community in the EU-Indian ICT policy dialogue
- **Building** on the work of EUCLID and continuing to jointly support EU-Indian initiatives encouraging EU-Indian R&D collaboration

[www.euclid-india.eu](http://www.euclid-india.eu)

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### EUCLID PROMOTES TWO WAYS COLLABORATION BETWEEN INDIA AND EUROPE

*“India needs to gain from the process. It should be an exchange in both directions. Major source of cooperation are graduate students – the only option is joint co-supervision of thesis.” (Indian Professor).*

### EUCLID HELPS TO RAISE AWARENESS OF INDIAN RESEARCH POTENTIAL

*“I regret I did not come to India five years ago. It’s a great group here, we could have done good work together earlier” (EU Professor).*



### EUCLID SUPPORTS DEVELOPMENT OF NEW JOINT EU-INDIAN INITIATIVES

*Following the EU-Indian collaboration meeting organised by EUCLID, an initiative has been started between India (IIT Bombay) and Germany (TU Dortmund) towards the creation of an International Research Training School “Pharmaceutical Systems Engineering”.*



### EUCLID HELPS INITIATION OF COLLABORATIVE R&D PROJECTS

*During the delegation tour in India, the idea of a joint R&D project on decision support for farming in regions of India that are strongly affected by the variability of the monsoon emerged. The project is planned to include model-based decision making under uncertainty based on real-time measurements of ground moisture, and communication with the farming communities employing novel user interaction concepts.*



### EUCLID ENCOURAGES SET UP OF EXPERIMENTAL TEST BED IN INDIA

*There are on-going efforts in developing large scale wireless sensor networks to function as experimental test beds in two broad market areas: healthcare and automation. It is expected that these test beds can serve to validate current theoretical concepts in monitoring and control, as well as provide a platform for developing new products. These efforts are being led by research groups at MSRTI-Bangalore and IISc-Bangalore.*

### EUCLID NOTICES GROWING INTEREST FROM INDIAN STUDENTS IN EUROPEAN MASTERS

*As an example, the Master programme “Automation and Robotics” at TU Dortmund, Germany, has experienced an increased interest from Indian students. In 2009, there were 62 Indian applicants, in 2011 – 261 Indian applicants, and in 2012 – 312 Indian applicants. From 95 admitted students from India, 44 were enrolled. In 2012 over 50% of the new students in this Master programme are from India!*



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