madrid institute
for advances studies

institute
iMdea networks

Developing the Science of Networks

Presentation Structure

1. Introduction to Institute IMDEA Networks

2. Research Areas & Team

3. Scientific Activities and Technology Transfer

4. Attracting Excellent Researchers

5. Providing a Centre for World-Class Research

institute
iMdea
networks

Section 1

INTRODUCTION TO INSTITUTE IMDEA NETWORKS

An Introduction to Institute IMDEA Networks

- IMDEA initiative launched by Regional Government of Madrid (CM) in June 2006

- Not-for-profit research centre legally constituted in 2007 in Leganés, Madrid as a foundation

- Founded by Dr. Arturo Azcorra, Director until October 2009, now Director General for Centro para el Desarrollo Tecnológico Industrial (CDTI)

- Financially supported by grants from CM as well as by funded research and researcher funding from various sources including European Commission and MICINN

Introduction: Goals

- Strategic objectives as defined in *IV Plan Regional de Investigación Científica e Innovación Tecnológica (PRICIT) de la Comunidad de Madrid*:

  - Transfer of technology to companies in our region and our sector, to improve their capacity for innovation and competitiveness

  - Transfer of technology to start-ups to launch new products and services in the global marketplace

  - Research of Excellence in the field of Networks and Telematic Services

  - The attraction of excellent human capital with the objective of internationalisation of research activities in the Madrid region

institute
iMdea
networks

Mission

- To create value by leading research in protocol, algorithm and systems that enable developing the science of networks

- We do this by conducting research and developing innovative and useful scientific and technical advances in protocols, algorithms and systems while actively promoting their successful transfer to market

- The Institute provides the best working conditions and the most attractive and best-equipped environment in which researchers can focus on this process of innovation and scientific advance

Our Credo

- We believe in group discussion and in bright individual ideas

- We do not believe in voting and committees. We believe in running code and rough consensus

- Demo or die (in addition to publish or perish)

- Genius is 1% inspiration and 99% perspiration (T.A. Edison)

institute
iMdea
networks

Section 2

RESEARCH AREAS & TEAM

institute
iMdea
networks

Institute IMDEA Networks' Research Areas

Internet Protocols & Algorithms

Wireless based Networking

Energy Efficient Networking

Current Research Team

- 1 x Deputy Director: Dr. Albert Banchs

- 2 x Chief Researchers

  – Dr. Nicholas Maxemchuk and Dr. Marco Ajmone Marsan

- 4 x Senior Researchers

  – Dr. Antonio Fernández Anta, Dr. Sergey Gorinsky, Dr. José Felix Kukielka, Dr. Joerg Widmer

- 1 x Visiting Researcher

  – Dr. Jun Li

- 4 x Staff Researchers

  – Dr. Vincenzo Mancuso, Dr. Balaji Rengarajan, Dr. Gianluca Rizzo, Dr. Rade Stanojevic

- 24 x Research Assistants

  – 3 of them to join by January 2011

Organisation by Line of Research from Sept 2010

Network Protocols & Algorithms

- **Group Leader: Dr. Sergey Gorinsky**
- Dr. Rade Stanojevic
- Dr. Jun Li

Research Assistants:
- Peter Iljitsch Van Beijnum
- Alexandru Bikfalvi
- Michal Kryczka
- Andra Lutu
- Syed Anwar Ul Hasan
- Ignacio De Castro
- Juan Camilo Cardona

Wireless –based Networking

- **Group Leader: Dr. Joerg Widmer**
- Dr Nicholas Maxemchuk
- Dr. José Félix Kukielka
- Dr. Vicenzo Mancuso

Research Assistants:
- Paul Patras
- Marco Gramaglia
- Pradeep Bangera
- Andrea Manocci
- Syed Asfandyar Gilani
- José Pablo Salvador
- Lucas Eznarriaga
- Fabio Giust
- Afshan Amin
- Yufei Wang

Energy-efficient Networking

- **Group Leader: Dr. Antonio Fernandez Anta**
- Dr. Marco Ajmone Marsan
- Dr. Gianluca Rizzo
- Dr. Balaji Rengarajan

Research Assistants:
- Kshitiz Verma
- Jorge Arjona
- Ali Shahzad
- Hamid Karimi
- Israel Gutiérrez Rojas
- Andrea Capalbo
- Maria Isabel Sanchez Bueno

Dr. Joerg Widmer

Senior Researcher

- Wide experience in academy and industry
  - ICSI (Berkeley), EPFL, NTT DoCoMo
- Outstanding research record
  - Publications at major venues (SIGCOMM, INFOCOM, ToN)
  - Several best paper awards (NGC 2001, IEEE Communications Society Best Tutorial Paper Award 2008, ICC 2009, MediaWiN 2009, ICST WICON 2010)
  - 15 patents and patent applications, 3 RFCs
- High impact researcher
  - H-Index of 25
  - SIGCOMM 2000 paper with more than 1500 citations
  - Impact in several areas (congestion control, UWB, network coding)

institute iMdea networks

Dr. Antonio Fernández Anta

Senior Researcher

- Wide experience in academia and research centres
  - Previously Full Professor at U. Rey Juan Carlos I
  - PhD from U. of Louisiana at Lafayette
  - Postdoc at MIT and Visiting researcher at Bell Labs
- Excellent research record
  - Organization of leading conferences in distributed systems
  - 35 publications in leading journals in the area (*IEEE Transactions on Computers, IEEE Transactions on Parallel and Distributed Systems, Journal of the ACM*)
- Awards
  - UPM prize to the young professor with the best research trajectory
  - Fulbright Scholarship to complete the degree of Ph.D. degree

Dr. Sergey Gorinsky

Senior Researcher

- Joined June 2009

- PhD degree from Univ. of Texas at Austin

- 6 years on faculty at Washington University

- High impact researcher, published and cited extensively

- Has served on the TPCs (Technical Program Committees) of IEEE INFOCOM (2006-2011), IEEE ICNP (2008, 2010) and other networking conferences

- Serving as Publications Chair 2010 ACM SIGCOMM

Background of Research Team

- Dr. Albert Banchs: University Carlos III of Madrid, NEC Network Laboratories, Telefonica

- Dr. Nicholas Maxemchuk: Columbia University, AT&T Research Laboratories

- Dr. Marco Ajmone Marsan: Politecnico di Torino

- Dr. Antonio Fernández Anta: Universidad Rey Juan Carlos I, Universidad Politécnica de Madrid, Massachusetts Institute of Technology

- Dr. Sergey Gorinsky: Washington University in St. Louis, University of Texas at Austin

- Dr. José Felix Kukielka: Alcatel, Philips Consumer Communications, University of California, Berkeley

- Dr. Joerg Widmer: NTT Docomo, Ecole Polytechnique Federale de Lausanne (EPFL)

- Dr. Jun Li: University of Oregon, University of California, Los Angeles

- Dr. Vincenzo Mancuso: University of Palermo, INRIA Sophia Antipolis, Rice University, Houston, Texas

- Dr. Balaji Rengarajan: University of Texas at Austin, Bell Labs, Intel

- Dr. Gianluca Rizzo: Ecole Polytechnique Federale de Lausanne (EPFL), ABB, Telecom Italia

- Dr. Rade Stanojevic: Hamilton Institute, Ireland, Telefonica Research

Background of Research Team

- Dr. Albert Banchs: University Carlos III of Madrid, NEC Network Laboratories, Telefonica

- Dr. Nicholas Maxemchuk: Columbia University, AT&T Research Laboratories

- Dr. Marco Ajmone Marsan: Politecnico di Torino

- Dr. Antonio Fernández Anta: Universidad Rey Juan Carlos I, Universidad Politécnica de Madrid, Massachusetts Institute of Technology

- Dr. Sergey Gorinsky: Washington University in St. Louis, University of Texas at Austin

- Dr. José Felix Kukielka: Alcatel, Philips Consumer Communications, University of California, Berkeley

- Dr. Joerg Widmer: NTT Docomo, Ecole Polytechnique Federale de Lausanne (EPFL)

- Dr. Jun Li: University of Oregon, University of California, Los Angeles

- Dr. Vincenzo Mancuso: University of Palermo, INRIA Sophia Antipolis, Rice University, Houston, Texas

- Dr. Balaji Rengarajan: University of Texas at Austin, Bell Labs, Intel

- Dr. Gianluca Rizzo: Ecole Polytechnique Federale de Lausanne (EPFL), ABB, Telecom Italia

- Dr. Rade Stanojevic: Hamilton Institute, Ireland, Telefonica Research

Background of Research Team

- Dr. Albert Banchs: University Carlos III of Madrid, NEC Network Laboratories, Telefonica

- Dr. Nicholas Maxemchuk: Columbia University, AT&T Research Laboratories

- Dr. Marco Ajmone Marsan: Politecnico di Torino

- Dr. Antonio Fernández Anta: Universidad Rey Juan Carlos I, Universidad Politécnica de Madrid, Massachusetts Institute of Technology

- Dr. Sergey Gorinsky: Washington University in St. Louis, University of Texas at Austin

- Dr. José Felix Kukielka: Alcatel, Philips Consumer Communications, University of California, Berkeley

- Dr. Joerg Widmer: NTT Docomo, Ecole Polytechnique Federale de Lausanne (EPFL)

- Dr. Jun Li: University of Oregon, University of California, Los Angeles

- Dr. Vincenzo Mancuso: University of Palermo, INRIA Sophia Antipolis, Rice University, Houston, Texas

- Dr. Balaji Rengarajan: University of Texas at Austin, Bell Labs, Intel

- Dr. Gianluca Rizzo: Ecole Polytechnique Federale de Lausanne (EPFL), ABB, Telecom Italia

- Dr. Rade Stanojevic: Hamilton Institute, Ireland, Telefonica Research

Background of Research Team

- Young Team
  - 3 researchers joined in 2007
  - 6 researchers joined in 2008
  - 13 researchers joined in 2009
  - 19 researchers joined in 2010
- International Team
  - 36 researchers coming from 15 different countries

institute
iMdea
networks

Research Team: Grants and Scholarships^{20}

- Ramon y Cajal Grant (MICINN – Spanish Ministry of Science and Innovation)

  - Dr. Sergey Gorinsky (Senior Researcher)

- I3 Subvention (Comunidad de Madrid)

  - José Félix Kukielka (Senior Researcher)

- AMAROUT Fellowships (European Commission Marie Curie COFUND)

  - Dr. Joerg Widmer (Senior Researcher)

  - Dr. Sergey Gorinsky (Senior Researcher)

  - Dr. Balaji Rengarajan (Staff Researcher)

  - Dr. Gianluca Rizzo (Staff Researcher)

  - Dr. Vincenzo Mancuso (Staff Researcher)

- Catedra de Excelencia UC3M

  - Prof. Jun Li (Visiting Researcher)

- FPU Scholarships (Spanish Ministry of Education)

  - Granted 4 out of 26 (15%) scholarships awarded nationally
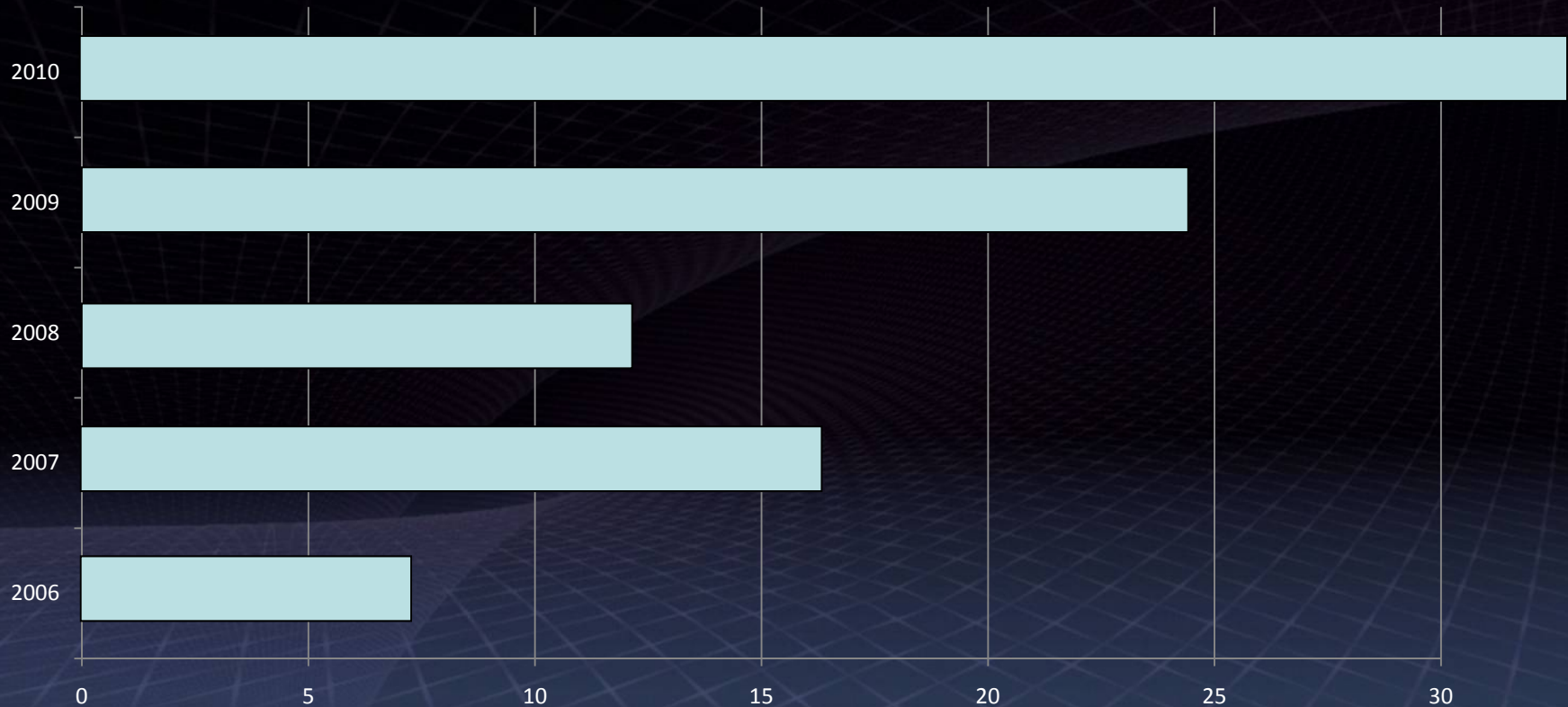
institute
iMdea
networks

Section 4

SCIENTIFIC ACTIVITIES AND TECHNOLOGY TRANSFER

Scientific and Technology Transfer Activities

- Publications

- Organization and TPC of Conferences

- Research Projects

- Collaboration with Industry

- Support for Spin-offs

- Register and License Patents

- Participation on Standardisation Bodies

Publications by Institute IMDEA Researchers

Publications by IMDEA Networks Researchers to 10 November 2010

www.networks.imdea.org

Organization & Participation Conferences

- Participation in the TPC and Editorial Board of leading conferences and journals in the field

- Organization of ACM CoNEXT 2009

- Organization of e-Energy 2011

- Publicity chair for IEEE INFOCOM'10

- Publications chair for ACM SIGCOMM'10

- TPC Vice-Chair of ICCCN 2009

- Vice-Chair of the IEEE Communications Society (ComSoc) Technical Committee on High-Speed Networking (TCHSN)

- TPC chair for European Wireless'10

European Research Projects

- GEONET
  - EU ICT STREP
  - January 2008 - Feburary 2010
- AMAROUT
  - Marie Curie COFUND
- FLAVIA
  - EU ICT STREP
  - Started in July 2010
- MEDIEVAL
  - EU ICT STREP
  - Started in July 2010

Other Research Projects

- ## NSF China
  - Project on Energy Efficiency in Networks with Chinese Academy of Sciences, Bell Labs, URJC - invitation under discussion

- ## Regional projects
  - BIOGRIDNET - terminated in December 2009
  - MEDIANET - started in January 2010
  - CLOUDS - invitation under discussion

- ## National projects
  - PASITO

Collaboration with Industry

Collaboration with Industry

- Collaboration agreement recently signed between Institute IMDEA Networks, NEC Europe and the Technical University of Darmstadt:
  - Network Laboratories of NEC Europe Ltd. (based in Germany)
  - A provisional application for a patent has been approved and is in the process of being filed jointly with NEC:
    - Method for reducing energy consumption of a network by minimizing the number of active nodes
    - Allows for reducing energy consumed by wireless and wired networks by 20% or more
    - NEC Europe intends to file a patent and transfer it to NEC Japan for exploitation

Collaboration with Industry

- Collaboration agreement currently being discussed with Albentia

  - WiMAX equipment manufacturer located in Madrid

  - Agreement includes the funding of one of our Research Assistants who is going to work on problems of common interests

  - Problems currently under discussion include scheduling algorithms and queue management mechanisms

institute
iMdea
networks

Support for Spin-offs

- Institute IMDEA Networks provides support in different forms
  - Use of patented technologies to provide sound basis for business plan
  - Continued collaboration with Institute IMDEA Networks researchers
  - Participation on research projects
  - Assistance in finding suitable sources of capital
  - Use of facilities
  - Administrative support
  - Young researchers, having obtained their Ph.D., are not offered employment – encouraging them to create spin-offs

Register and License Patents

- Important steps in the process of transfering technology to marketplace

  - First step – Innovate and create competitive advantage

  - Second step – register and protect competitive advantage

  - Third step – Exploit competitive advantage – spin-offs, licensing and sale of IP

- This third step must include substantial reward for the inventor

- Institute IMDEA Networks shares a very high percentage of financial proceeds with inventors (our researchers) as reward for their excellence and hard work

institute
iMdea
networks

Participation on Standardisation Bodies

IETF

- RFC 5534
- draft-ietf-behave-dns64-02
- draft-ietf-behave-v6v4-xlate-stateful-03
- draft-van-beijnum-idr-iac-02
- draft-van-beijnum-behave-ftp64-06
- draft-van-beijnum-shim6-shim6to4-01
- draft-van-beijnum-1e-mp-tcp-00
- draft-van-beijnum-behave-frag64-00
- FTP64 presentation
- NAT64 fragmentation presentation
- Router buffer sizing presentation

IEEE

- 19 contributions to IEEE 802.21 (Novembre 2010)
- Study Group created to analyze Heterogeneous Wireless Backhaul Networks
- Major contribution accepted to IEEE 802.21b draft v2 (Media Independent Radio Configuration)
- Innovation leadership by participating in the Future Projects planning sessions
- Undergoing effort in IEEE 802.19.1 Coexistence of Wireless Networks in the TV White Space
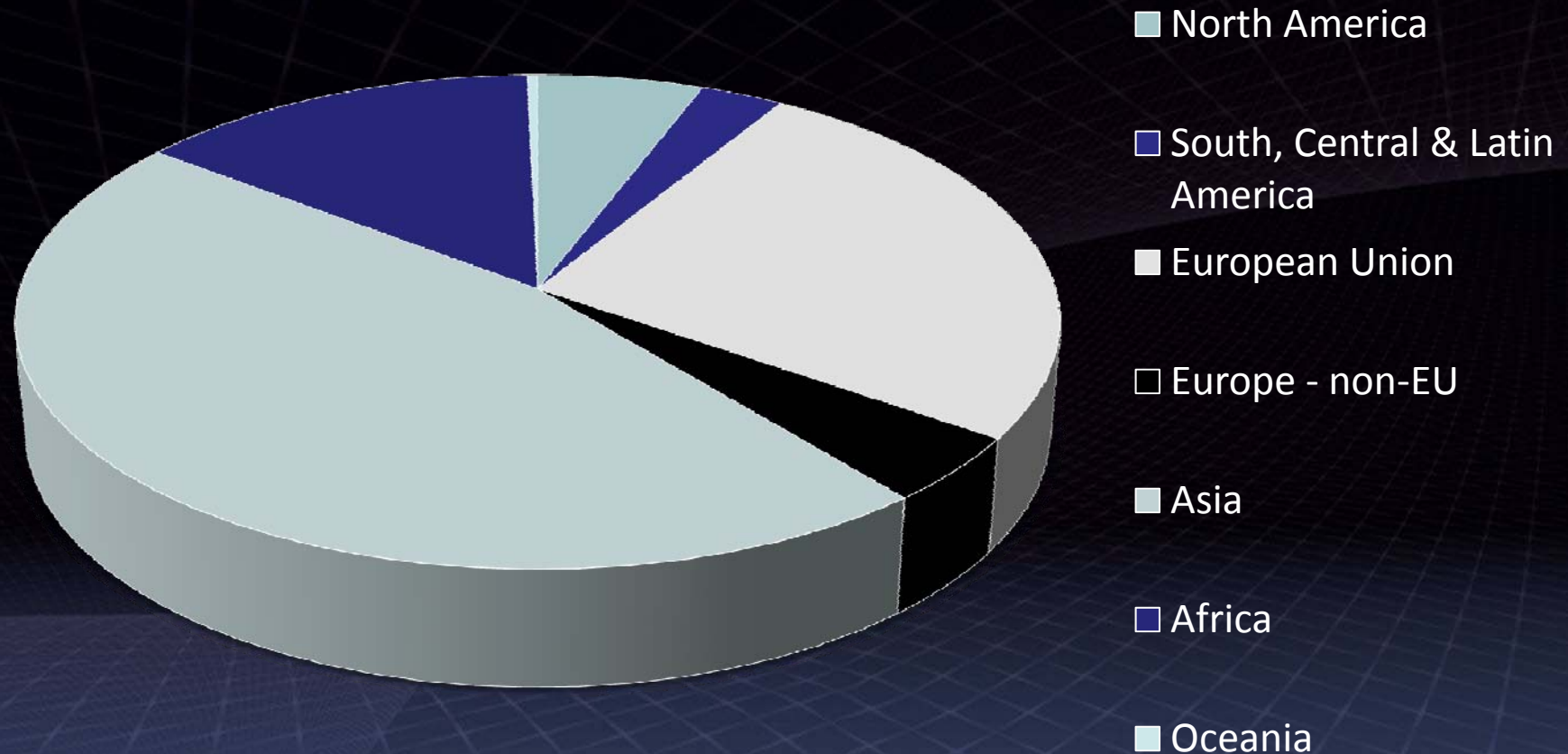
Section 5

ATTRACTING EXCELLENT RESEARCHERS

Attracting Excellent Researchers

- 2010 Call for Researchers
  - Opened October 2009, closed February 2010
  - Call for all categories of researcher
  - 274 applications received
  - 4 Researchers hired

- 2010 Call for Research Assistants
  - Opened September 2009, closed September 2010
  - Received 504 applications
  - … from 55 different countries
  - 14 Research Assistants hired

Researcher Applications by Nationality

- North America
- South, Central & Latin America
- European Union
- Europe - non-EU
- Asia
- Africa
- Oceania

Section 6

PROVIDING A CENTRE FOR WORLD-CLASS RESEARCH

Providing a Centre for World-Class Research

- Physical presence on park critical to fulfilling Institute IMDEA Networks' role in international research arena and especially in respect to technology transfer

- A meeting place for public and private sector researchers

- Designed to provide high quality working environment for researchers

- Research centre to be built in 2 phases – comprising of two adjacent and integrated buildings

Phase 1 of Building a World Class Centre

- Phase 1
  - Approximately 3000m^2
  - 3 floors above ground level
  - Objective – to be available for occupation mid of 2013
  - Budget for Phase 1: 8m€

- Supported through collaboration with UC3M and LEGATEC
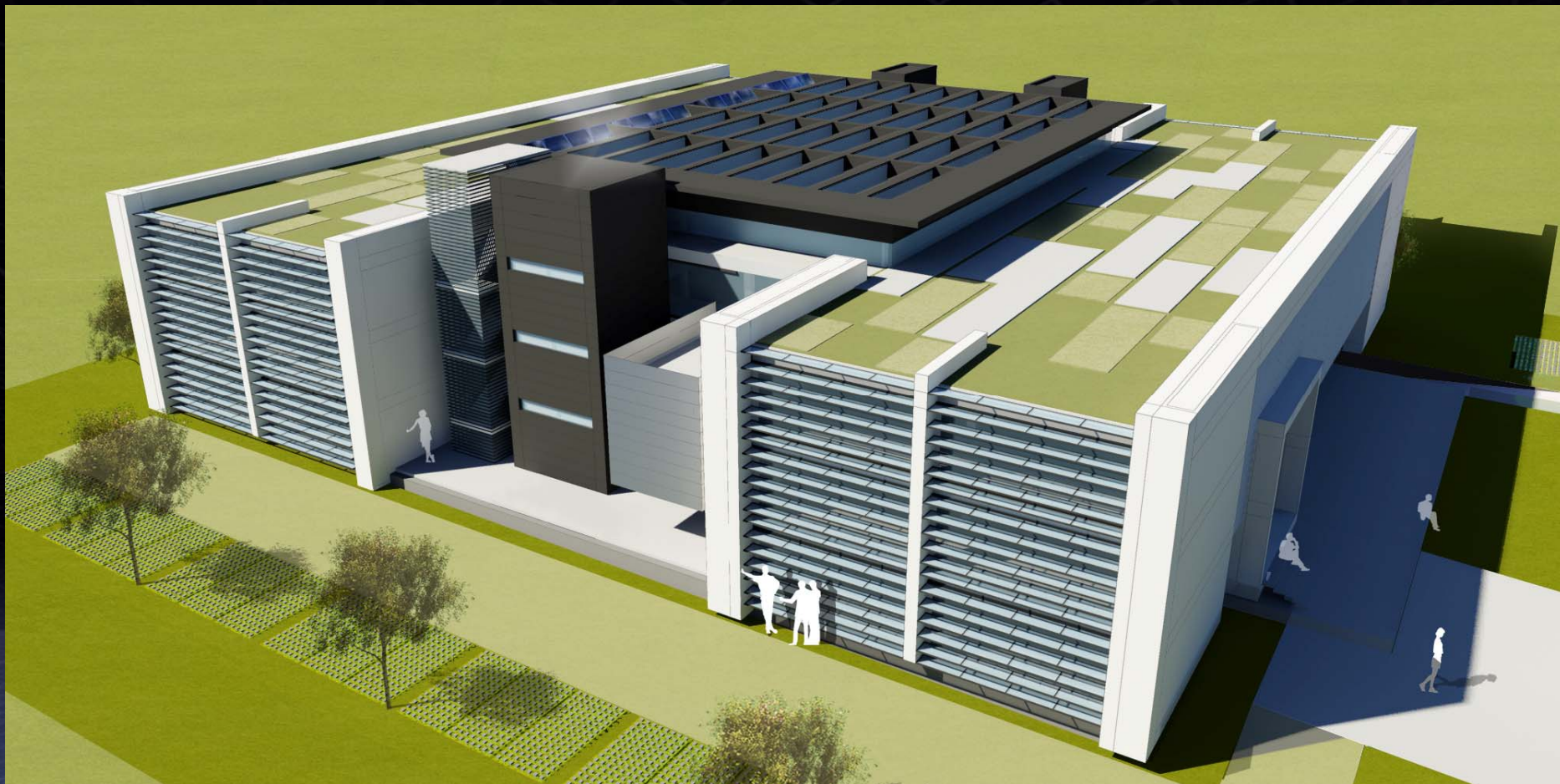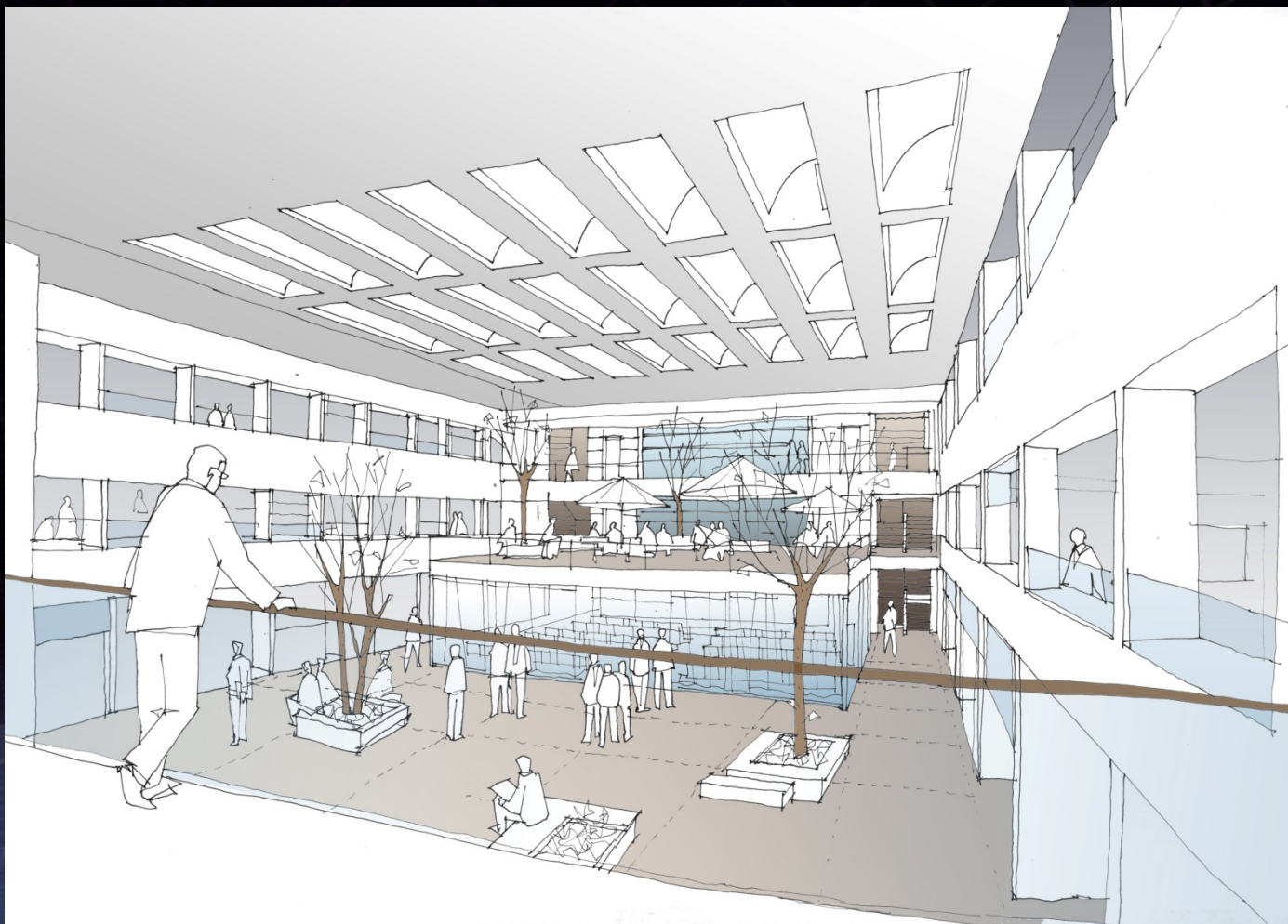
Parcel of Land on Legatec

Basic Project

VISTA SUDESTE

www.networks.imdea.org

Milestones in Building Process

- ~~Topographic Survey: January 2010~~

- ~~Adjudication and signing of contract for Basic Project: April 2010~~

- ~~Geotechnical Survey: 13 July 2010~~

- ~~Delivery of Basic Project: 21 July 2010~~

- Application for Building Licence: Q4 2010

- Public Tender Process for Execution Project: Q4 2010

- Public Tender Process for Construction Project: Q2 2011

- Start Construction Works: Q3 2011

- Final Works Certificate: Q2 2013

- Obtain Licences and Permits for Building: Q2 2013

Thank You

www.networks.imdea.org