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# Research Capacity and Challenges in Rwanda

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# Outline

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- ▶ **ICT Development Activities in Rwanda**
  - ▶ **Infrastructure**
  - ▶ **Education and Research**
    - ▶ **Universities in Rwanda**
  - ▶ **Community Development**
- ▶ **Research Capacity at KIST**
- ▶ **Challenges**
- ▶ **Possible interventions**



# ICT Development Activities in Rwanda

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## Infrastructure

- **National Fiber Backbone (2300 Km connecting 30 districts extending to borders)**
- **Access Networks (connecting 700 Gov institutions and Educational institutions)**
- **Bulk BW (through submarine cable)**
- **KALISIMBI PROJECT**



# Infrastructure

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The Kalisimbi Project comprises of the following:

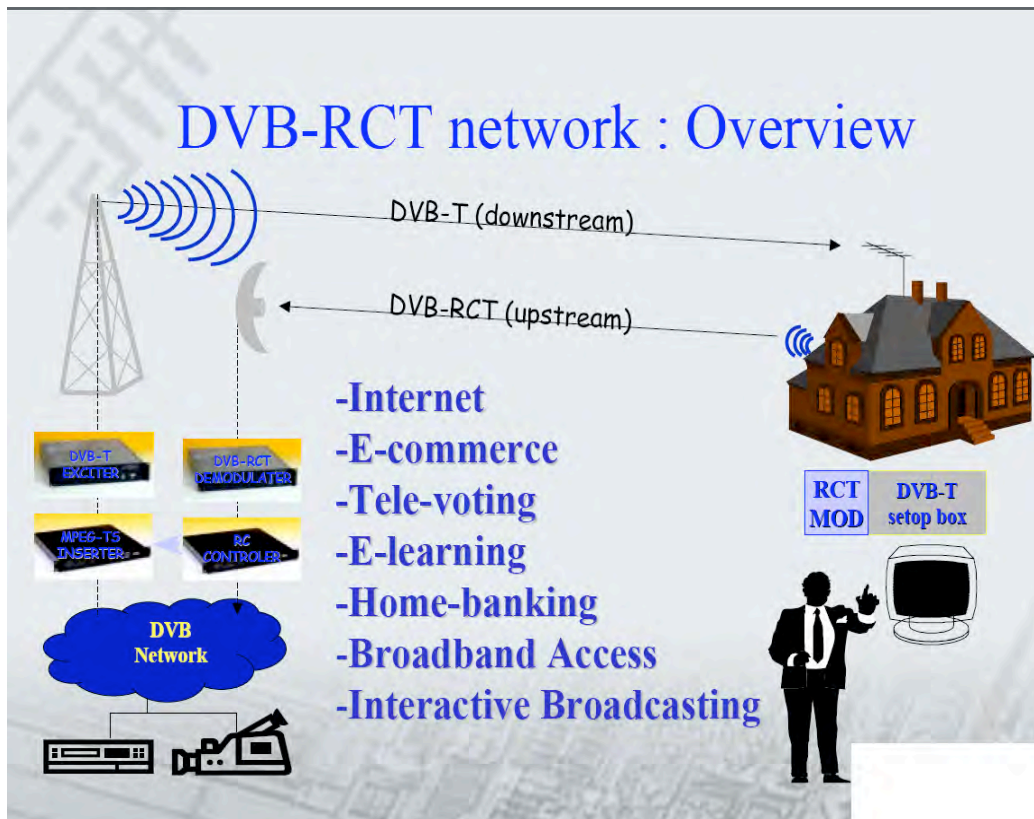
- Infrastructure
- Digitization
- CNS-ATM (Communication Navigation Surveillance- Air Traffic Management)
- DVB-RCT (Digital Video Broadcasting- Return Channel Terrestrial)



# Infrastructure



## DVB-RCT network : Overview



➤ DVB-RCT is designed to efficiently support interactive services (internet, e-mail, target advertising, e-commerce, e-learning, tele-banking etc.) on the TV.

➤ DVB-RCT is very spectrum efficient

➤ DVB-RCT can serve large cells, up to 65kms radius

➤ DVB-RCT back channel is even more robust than DVB-T forward channel.

## **Education and Research**

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- 1) Rwanda Education Network (RwEdNet)**
- 2) One Laptop Per Child (OLPC)**
- 3) Subsidized BW (500 USD/mb)**
- 4) UBUNTUNET**



## Universities in Rwanda

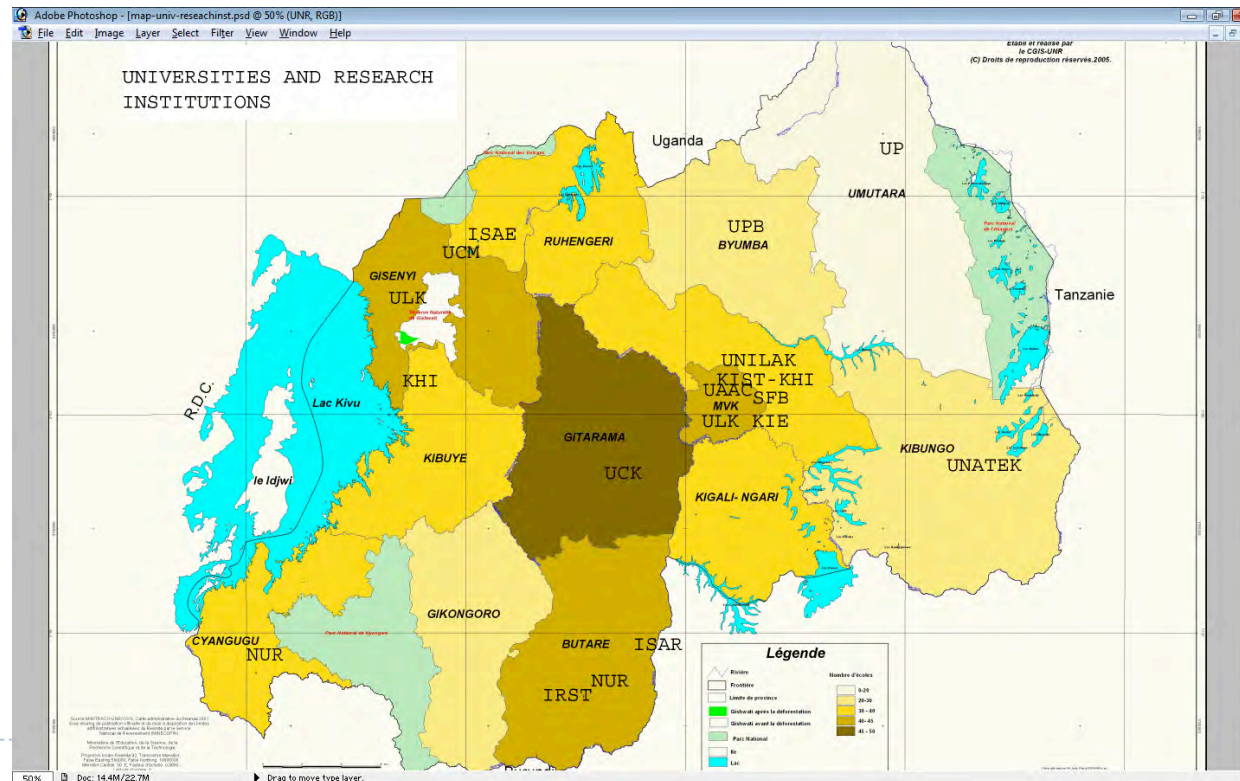


UNIVERSITIES AND RESEARCH CENTERS	LOCATIONS	
	PROVINCE	DISTRICT
Kigali Institute of Science and Technology (KIST)	KIGALI CITY	Nyarugenge
Kigali Institute of Education (KIE)	KIGALI CITY	Gasabo
School of Finance and Banking (SFB)	KIGALI CITY	Kicukiro
Kigali Health Institute (KHI)	KIGALI CITY	Nyarugenge
Independent University of Kigali (ULK)	KIGALI CITY	Gasabo
Adventist University of the Great Lakes region (UNILAK)	KIGALI CITY	Kicukiro
Université Adventiste de Mudende	KIGALI CITY	Gasabo
Universite catholique de Musanze	NORTHERN	Musanze
Institute of Agriculture and Husbandary (ISAE)	NORTHERN	Musanze
Universite Polytechnique de Byumba	NORTHERN	Gicumbi
ETO-TUMBA	NORTHERN	Rulindo
National University of Rwanda (NUR)	SOUTHERN	Huye
Universite Catholique de Kabgayi	SOUTHERN	Muhanga
ISAR	SOUTHERN	Nyanza
IRST	SOUTHERN	Huye
UNATEK	EASTERN	Ngoma
Umutara Polytechnique	EASTERN	Nyagatare
NUR-RUSIZI	WESTERN	Rusizi
▶ ULK – RUBAVU	WESTERN	Rubavu
KHI - KARONGI	WESTERN	Karongi

# Universities in Rwanda



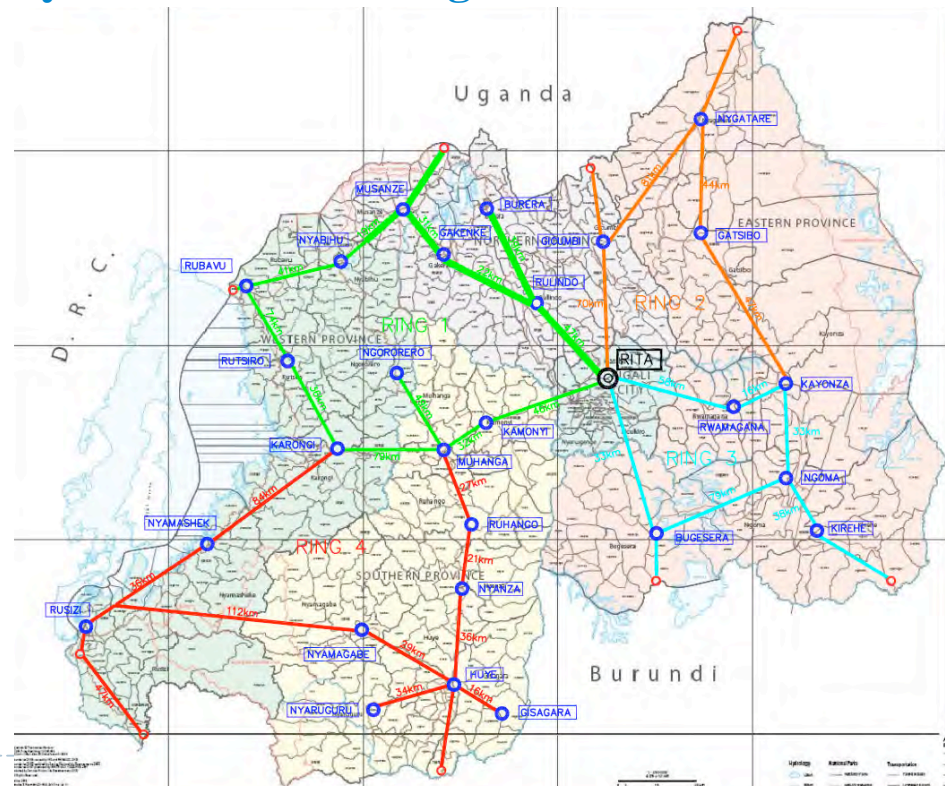
## Universities and Research centers location



# Universities in Rwanda



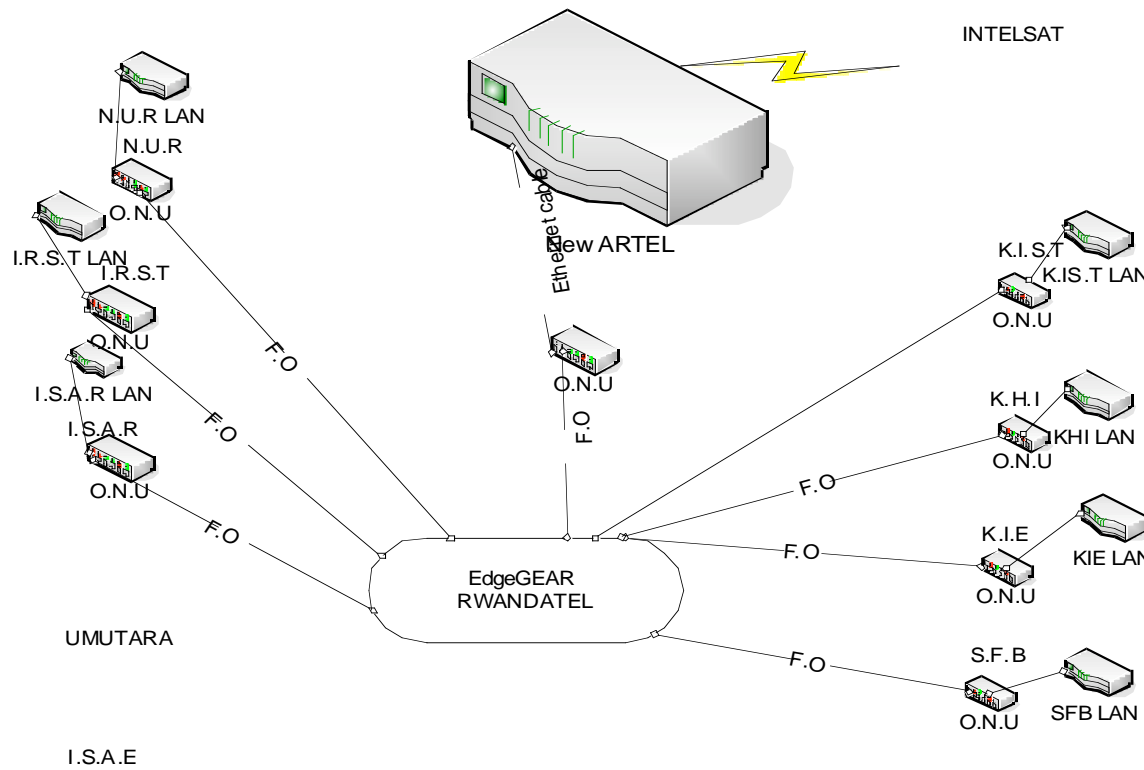
## Physical Network Design –Backbone Network



# Education and Research



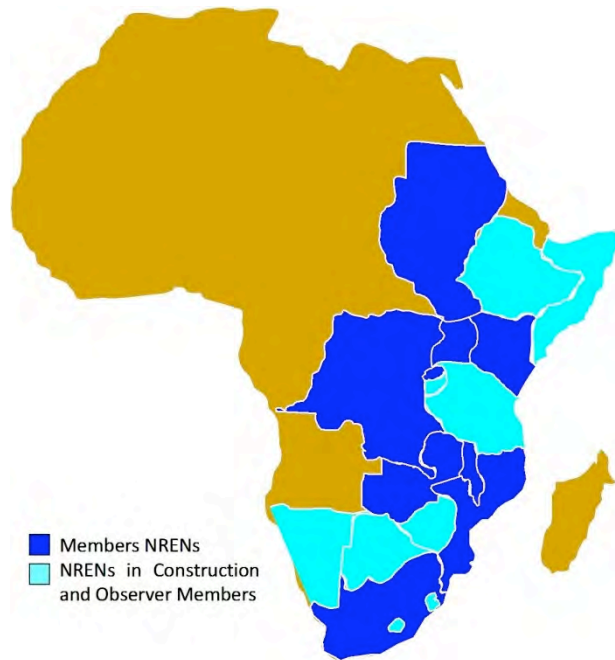
## RwEdNet



- **Genesis:** Enhanced quality education and research to facilitate the attainment of the 2020 Vision and the UN MDG's
- **Based on three following pillars:** Infrastructure, Capacity Building and Value (Applications, services)
- **Output:** Development and promotion of Research and Education, networking communities in and outside the country

## Education and Research

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### UbuntuNet Alliance

- **RwEdNet Rwanda, Member**
- **Feasibility study by FP7**
- **ISABEL Software by EU**



## **Community Development**

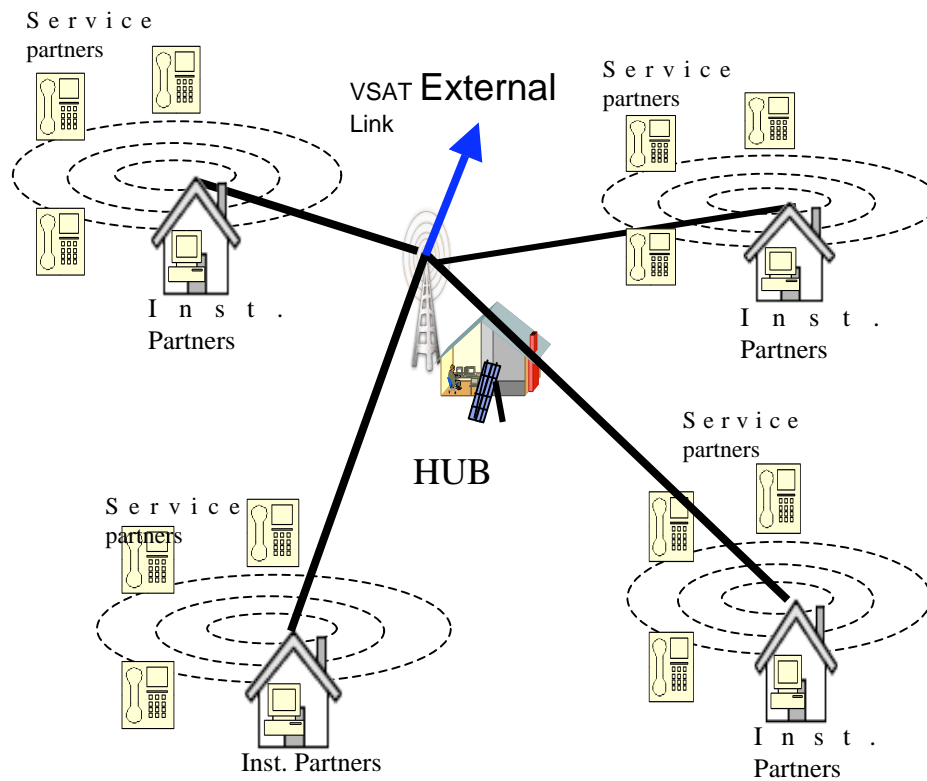
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- 1) Community Driven Networks (CDN)**
- 2) ICT Park**
- 3) E-Rwanda**
- 4) Telemedicine**
- 5) Household Africa (by ICT Africa a social research)**



# Community Development



## Community Driven Networks

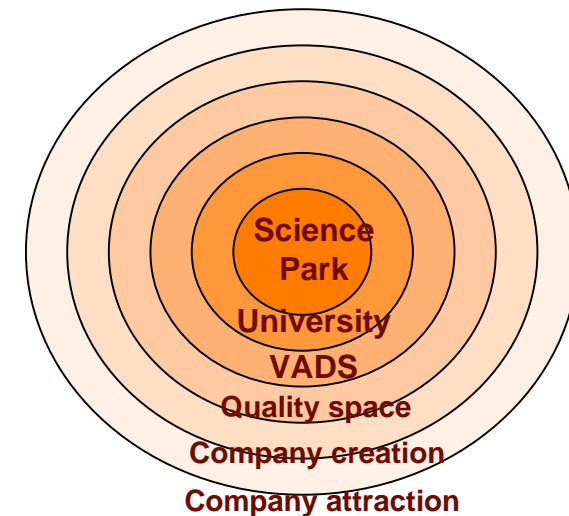
### Sample Features:

- A network and Enterprise Hub
- Multiple institutional partners
- Facilitate network of small 'service partner' resellers
- Internal wireless broadband, external Gateway access

## Community Development



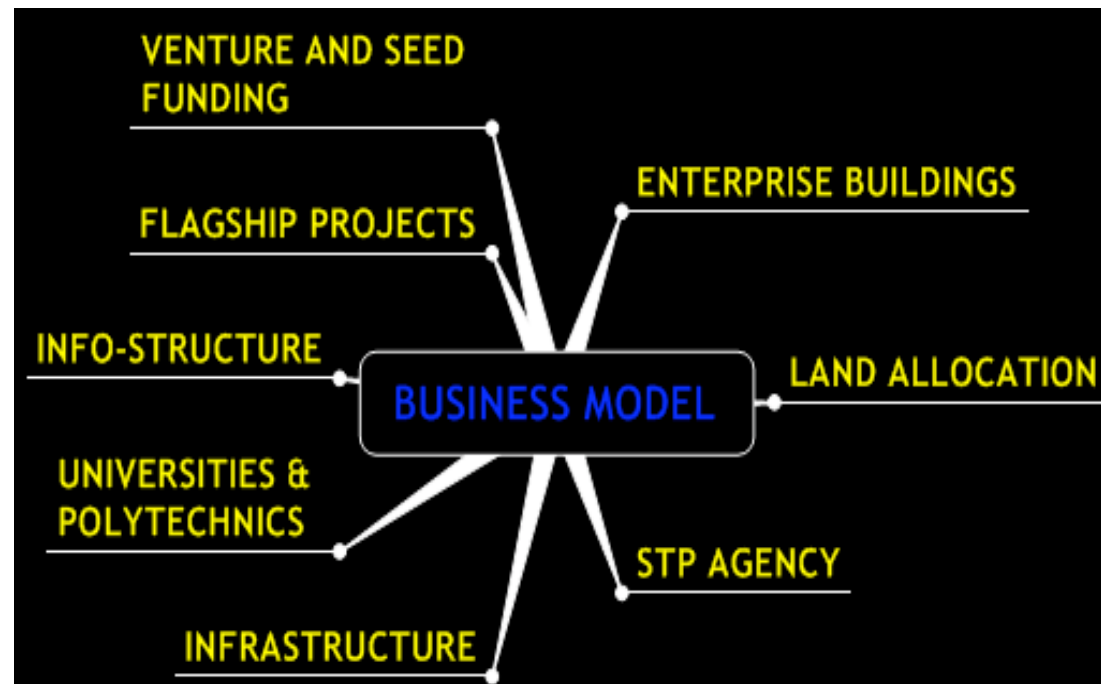
- ICT Park are closely associated with Universities.
- ICT Park has been a key enabler for the development of knowledge Economy, where it has enabled industries to move from:
  - Solid economy → liquid economy
  - Locally rooted → global / unrooted
  - Labour intense → knowledge intense
- ICT Parks are more focused by adopting specialized clusters.
- ICT Parks coupled with technology clusters have resulted in accelerated economic and employment growth.



# Community Development



## Building Block of ICT Park



## Community Development

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### E-Rwanda

- ICT training needs assessment and training plan
- National e-Government portal
- Market price information System(eSoKo)
- Develop e-Grades system(eNota)
- Simple rehabilitation of public offices
- Training for rural based communities on basic computing/Telecenter usage
- Capacity building
- Assessment of EAC submarine cable project
- ICT bus project
- M&E of ICT projects



# ICT Research Capacity , KIST



Faculty and Centers	
Faculty of Engineering	<p>Dept. of CEIT</p> <ul style="list-style-type: none"><li>➤ Computer Engineering</li><li>➤ Computer Science</li><li>➤ Information Technology</li></ul> <p>Dept. of EEE</p> <ul style="list-style-type: none"><li>➤ Electronics and Communications Engineering</li></ul>
Centers	<ul style="list-style-type: none"><li>➤ ICT Center- ICT Technician Training under DFID</li><li>➤ Regional Training and Research Centre(RITC) under the World Bank Development Gateway Foundation</li><li>➤ Satellite Centers</li><li>➤ Center for innovation and Technology Transfer(CITT)</li></ul>



# ICT Research Capacity , KIST

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- ▶ **Graduate programs (BSc. Engg and MSc)**
  - ▶ **Masters in Communications Management**
  - ▶ **Masters in Operational Communication**
- ▶ **Partnership with ICT Departments in HE institutions**
- ▶ **Capacity building/enhancement initiatives**
- ▶ **External collaborations, Publications, Community outreach, etc**



# ICT Research Capacity, KIST

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## Faculty of Engineering: Research Groups

### Department of Computer Engineering and IT

1. ICT for Sustainable Development
2. ICT in Education
3. Intelligent System and Pattern Recognition
4. Bio informatics
5. GIS
6. Mobile Computing

### Department of EEE

1. mD Signal Processing
  2. Embedded system control
  3. Chip level security systems
  4. Radio Planning and Optimization
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# ICT Research Capacity, KIST

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## Research Collaborations

**SRM University, VIT University , India**

**Coventry University, UK**

**Curtin University Australia,**

**RMIT University, Australia**

## Publications

- **Number of publications for 2007/2008 = 41 papers (16 journals/25 conferences)**
  - **1<sup>st</sup> Regional Conference on Scientific Research, Development and Innovations (SREDI2008)**
  - **KIST Journal of Scientific Research and Innovation (KIJOSRI).**
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# Research Challenges

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- **Lack of trained and experienced personnel**
- **Brain Drain**
- **Lack of local catalyst, appreciation, and support**
- **Lack of research culture**
- **Lack of enough qualified researchers**
- **High Teaching/Supervision load**
- **Poor access to ICT**
- **Low R&D investment**
- **Lack of funding, equipments, etc**



## Possible interventions

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- ▶ **Support in accelerated training of S&T Personnel**
- ▶ **Adequate funding for S&T Training and Research institutions**
- ▶ **Increase efforts to provide better access to ICT**
- ▶ **Consider proper retention schemes for best talents**
- ▶ **Facilitate Virtual Networks of Researchers and Scientists between developed and developing countries.**





Thank you!

