

# SCIENTIFIC RESEARCH AND DEVELOPMENT ACTIVITIES IN THE SOUTH OF VIETNAM

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This report introduces the scientific research and development activities of SIU (CHE), ThuyLoi Uni., VAST in Vietnam.

A. e-Science activities in the field of the Geology such as Detecting and Searching for causes of landslides in the Central Highlands region; Coastal erosion in the coastal area of the Mekong Delta.

B. Artificial Intelligence (AI) and applications such as Deep learning in Medicine, Detecting Cancer, Monitoring the development or reduction of Cancer during treatment (Health). AI in Air Environment treatment, Detecting waste on the sea surface (Enviroment).

## **A. Introduce the scientific research and development activities in the South of Vietnam**

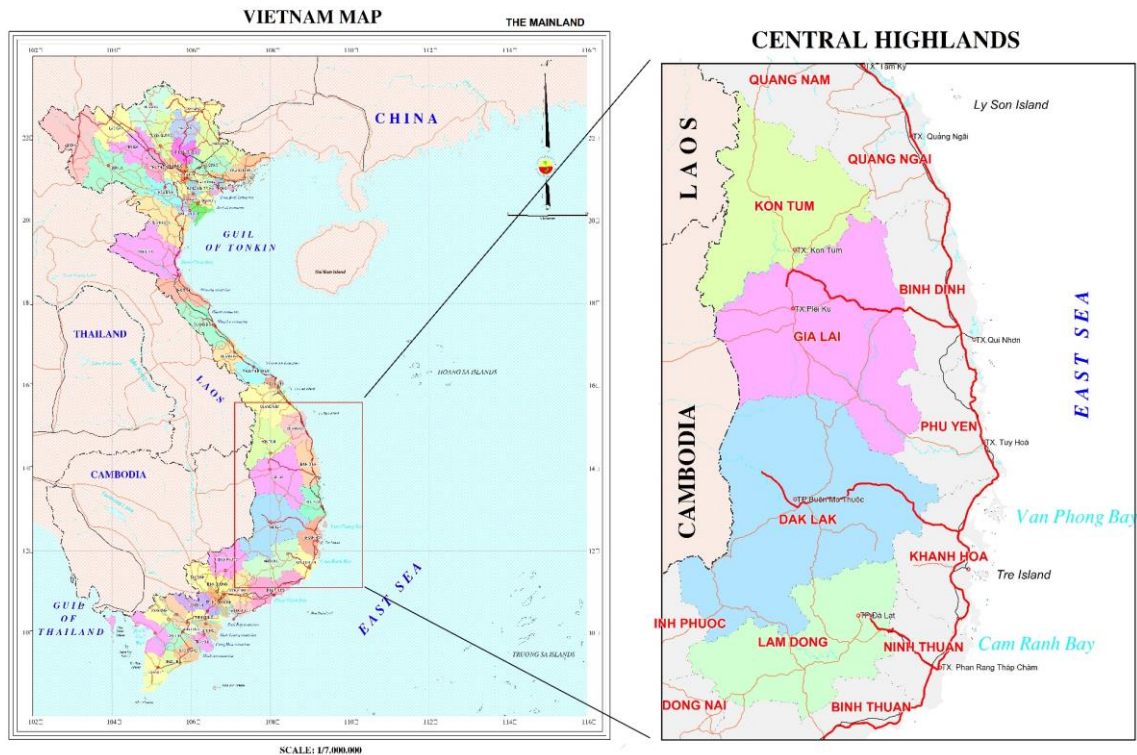
- Vietnam stretches from North to South so **the natural conditions and resources are diversity**. However, there are several challenges in sustainable development.
- The southern territory includes:
  - Central Highlands,
  - South Central region,
  - Southeast region and
  - Mekong Delta

### **1. Central Highlands**

There are 5 provinces: Gia Lai, Kon Tum, Đắk Lắk, Lâm Đồng và Đắk Nông.

These are the mountainous provinces. The research to focus on:

- Geological disasters (landslide, earthquake, Flood, etc.)
- Biodiversity
- Types of tourism (adventure, health, geoscience...).
- Hightech Agriculture

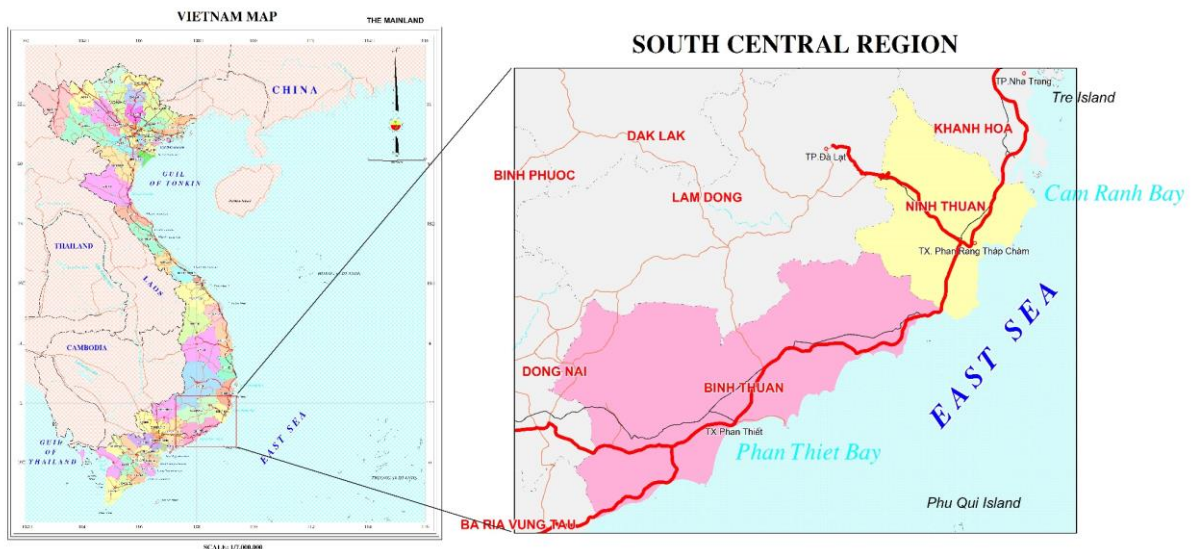


## 2. South Middle region

There are 2 provinces: Ninh Thuận and Bình Thuận.

These are the coastal provinces. The research to focus on:

- Coastal erosion – seawater intrusion
- Drought – water resources
- Types of tourism (adventure, health, geoscience...).
- High-tech Agriculture

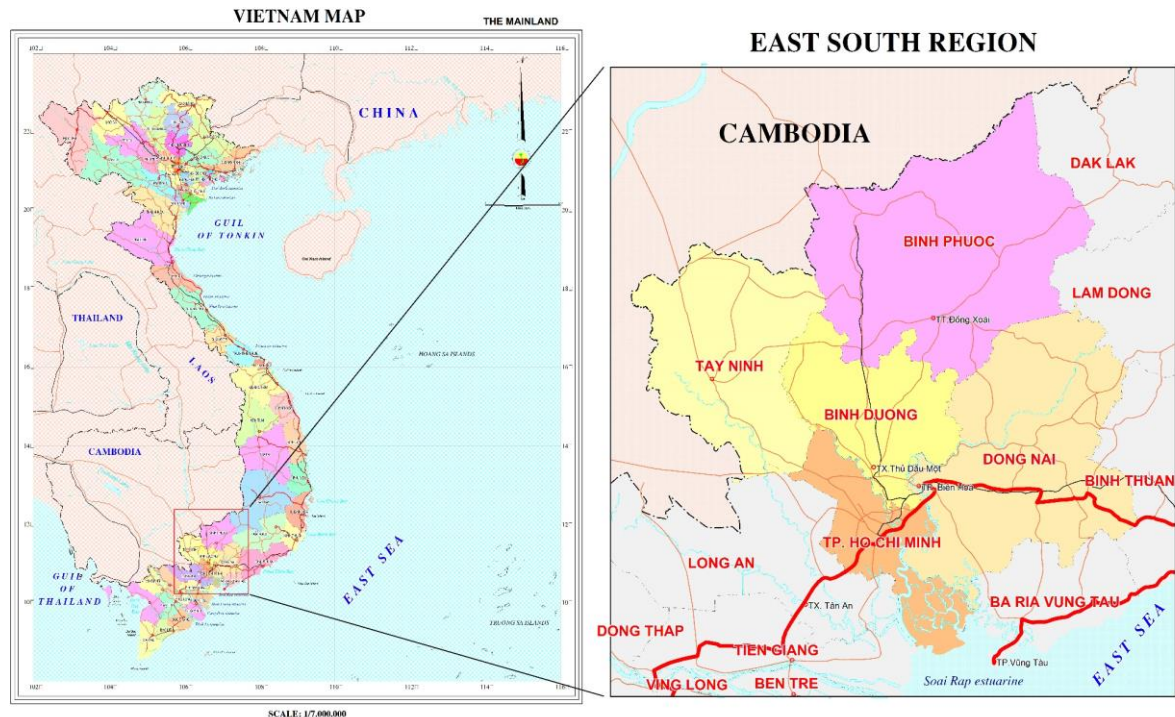


## 3. South East region

There are 5 provinces: Đồng Nai, Bình Dương, Bình Phước, Tây Ninh và Hồ Chí Minh City.

These are the transition zones between highlands and plains. The research to focus on:

- Geological disasters (landslide, earthquake, Flood, etc.)
- Biodiversity
- Types of tourism (adventure, health, geoscience...).
- High-tech Agriculture

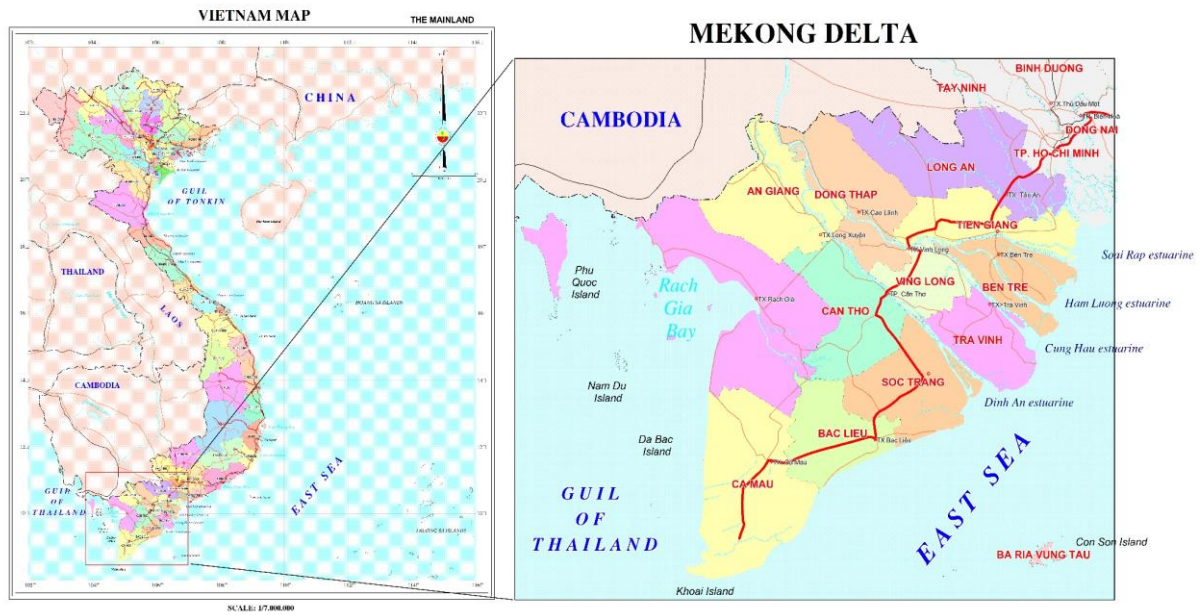


#### 4. Mekong Delta

There are 13 provinces and cities.

These delta areas formed by the Mekong River system. The research to focus on:

- Coastal erosion – seawater intrusion
- Water security
- Types of tourism (adventure, health, geoscience...).
- High-tech Agriculture



## B. Artificial Intelligence (AI) and Applications

- Artificial Intelligence (AI) and applications such as Deep learning in Medicine, Detecting Cancer, Monitoring the development or reduction of Cancer during treatment (Health).  
AI in Air Environment treatment, Detecting waste on the sea surface (Environment).

www.subsiagrid.eu  
 Institute of Applied Mechanics and Informatics (IAM) Vietnamese Academy of Science and Technology (VAST)

### GRID ENABLED BIOMEDICINE AND SOME SUPPORTED ACTIVITY FOR RESEARCH LAB AT IAM

**Abstract**  
 Research lab of IAM in order to strengthen the computing power and upgrade the new computing technology in research of some domain such as medicine, biology, chemistry and Geophysics at some research lab of some institution of VAST in Vietnam. This paper presents solution to minimize a problem that normally arises from the huge amount of images that radiologist usually has to interpret. HOPE telemedicine platform has been developed at LPC Clement Feraud and introduced to the medical doctors of some hospitals in the Vietnam. GVSS has been deployed by ASGC and introduced to the researcher at Arbovirus Lab of Pasteur Institute HCMC for docking with the ligand of Dengue virus. Gromacs application has been deployed for using at laboratory of organic chemistry at institute of chemistry technology. This new computing technology should be expanded to the research community in Vietnam and some learned lesson extracted during the deployment of grid site will be presented.

**Resources and Results**

Service deployment on sites of grid computing

The application HOPE for eye diseases at HCMC University Medical Center

**Conclusion & Future Plan**

- HOPE platform is now available for accessing to do research on the CNRS node site at IAM in Vietnam via the VinaREN network infrastructure. (<http://ul.iain.vast.vn:8080/gridstg/here>)
- In the near future, with the medical images from some hospitals in Vietnam (Binh Duong General Hospital, HCMC University Medical Center, ...) the HOPE platform will be useful for physicians to share the patient information and patient personal data, diagnosis, results for analysis and investigation, medical images are stored anonymously and encrypted on the grid which their metadata are stored in the local AMGA server.



Hình 3. Tổ chức Hội thảo khoa học với National Central University, Taiwan và xét cấp học bổng cho Giảng viên trẻ

**FORMATION OF HOSPITAL MANAGEMENT INFORMATION SYSTEM IN VIETNAM CONDITION**

Hospital management information systems (HMIS) have developed around the world for a long time. In recent years, many hospitals in Vietnam are in need and looking for appropriate systems, unfortunately no such fully met systems exist. The reasons may be in part due to the complexity of the systems themselves but are also of each of the software developers. They may also come from the mismatch between the foreign systems and the business processes used in Vietnam hospitals.

With the problems in mind, we identify healthcare processes in common with many hospitals and implement them in a hospital management information system. This underlying system was tested in general hospitals that are small or medium in size.

The system is developed from practical survey and test through a close quality control process with two four group developer groups, quality control group, medical consultant group and multiple user at hospitals.

HMIS-HEC is applying in some hospitals in Vietnam with high evaluation.

HMIS - Hospital Management Information System (HMIS - HEC) Biomedical Informatics Center (BMIC)

**BIH DUONG UNIVERSITY (BDU) BIOMEDICAL INFORMATICS CENTER (BMIC)**  
504 Đại lộ Bình Dương - P. Hiệp Thành TP. Thủ Dầu Một - Bình Dương

**MODELING FOR PICTURE ARCHIVING AND COMMUNICATION SYSTEM AT A HOSPITAL - TRADITIONAL AND MULTIMEDIA MEDICAL DATABASE APPROACH**  
IOTIS & BMIC/BDU

**Overview**

In the medical domain, in the diagnosis, treatment and research processes, traditional alphanumerical information (patient personal data, diagnosis, results for the analysis and investigations) and a large quantity of digital images modalities are accumulated. Medical Image management plays now an important role in designing and implementing medical information systems. It is needed to introduce a new methods for representation, manipulation and search for multimedia information. The development of PACS created a unified structure for management of acquisition, storing, communication and display of image data, but they don't provide enough flexibility in sharing and utilization of information associated to image. The solution to all these problem is the development of database management systems that enhance the management and complex querying of medical multimedia information. Managing and querying these large collections of medical images and alphanumerical information should be considered to find out a best solution.

**Result:**

- BMIC-PACS/ RIS was built and deployed successfully at Medical Informatics Lab of BMIC VAST, Binh Duong and Dong Thap General Hospital.
- BMIC-PACS/ RIS provides all necessary functions to enhance performance in the diagnostics and treatment task relative to radiology services: data storage and management, diagnosis, consultation, medical video communication and training, teleradiology,...
- The Content - Based Visual Query in MMD will be completed in the end of 2014.

BMIC - Picture Archiving and Communication System (BMIC - PACS) Department for Computational and Knowledge Engineering

INTERNATIONAL SYMPOSIUM ON GRIDS AND CLOUDS 2024

## II. Related work

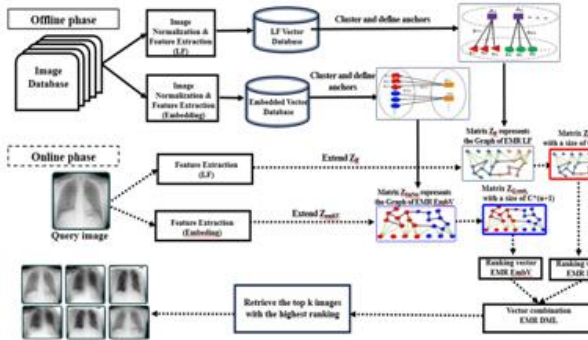
### 2.2. Efficient manifold ranking

$$EMR_q(r) = \frac{1}{2} \sum_{i,j} w_{ij} \left\| \frac{r_i}{\sqrt{D_i}} - \frac{r_j}{\sqrt{D_j}} \right\|^2 + \mu \sum_i \|r_i - r_{a_i}\|^2 \rightarrow \min$$

Anchor points  
Data  
Weight matrix  
Adjacent matrix

### Software Support Diagnostic

File list:  
 1\_2\_201408191353281  
 1\_2\_2014081914023198  
 1\_2\_2014081914123196  
 1\_2\_2014081914123282  
 1\_2\_2014081914230328



### Decision Support System in Med-Diagnosis

### Health GIS

Institute of Information Technology  
Institute of Applied Mathematics and Informatics

#### Warning and Monitoring Epidemic Disease System

Vietnam is a country locating in the tropics with complex climate and diverse environment. Under the impact of climate change, this lead to potential risks of outbreak and rapid spread of various dangerous diseases. The spread of disease is always a major problem to public health and it causes a lot of damages to people. Therefore, monitoring, informing and early warning the spread of infectious diseases to the community is very important to control disease situations and reduce the harmful effects of diseases under the complex changes of the climate.

Warning and Monitoring Disease System

Overview of System Architecture

Web Geographic Information System (Web GIS) Technology

Geospatial Data Gathering    SensorML    Principle of Mapping

Web GIS Server    Query by pointing    Web Processing Service

The combination between internet and web technology offers an enabling environment for informing and early warning of diseases. Along with the dominance of digital map technology, the Warning and Monitoring Disease System will be a powerful tool for analyzing, evaluating, responding and controlling of disease situation. It will be also an effective mean to support for health experts in monitoring and early warning of epidemics to the community.

IAMI Medical Informatics Lab is intended to use WebGIS deployed on Grid/ Cloud Computing through collaborative research program between VAST (Vietnam) and AIST (Japan) to implement HealthGIS system on Cloud Computing and integrate into World Map Diseases to control and limit the spreading of diseases between countries.

Warning and Monitoring Epidemic Disease System    Department for Computational and Knowledge Engineering  
 Website: www.dck.kami.ac.vn  
 Tel: (84-8) 822 2047 - ex. 232    Fax: (84-8) 2822 2871

## CONCLUSION

- AI has been developed in the fields of Medicine, Environment management and Geoscience in Vietnam generally and South Vietnam in particular.
- It is necessary to the international collaboration in research and development in these fields.