# Research on Tangible Virtual Museum

**Yong-Moo Kwon**

Oct. 19th, 2006

Imaging Media Research Center

**Korea Institute of Science & Technology**

Korea Institute of Science and Technology

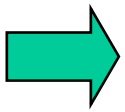
한국과학기술연구원

# Introduction

- Technology in the 21st Century
  - IT (Information Tech.), BT (Bio Tech.), NT (Nano Tech.)
  - CT (Culture Technology)
    - New Technology for Human in the 21st Century

# Virtual Heritage Technology

- Fusion: Technology + Technology
  - IT + BT (Bio-Informatics)
  - IT + NT (Nano-Informatics) etc.
- Fusion: Technology + Culture
  - IT + Heritage



Virtual Heritage Technology

# Research Issues

- *How to Model VH*
- *How to Manage VH*
- *How to Present VH*

- *How to use Network*

*for the Share and Exchange of VH*

# Outline of Talking

- Virtual Heritage Modeling
- Virtual Museum Service
- DHX (Digital Heritage Exchange)

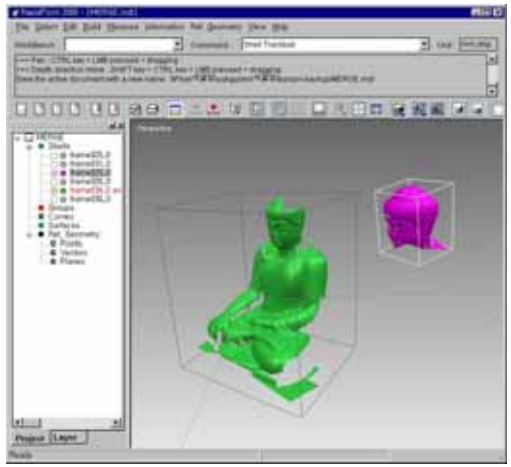
# Virtual Heritage Modeling

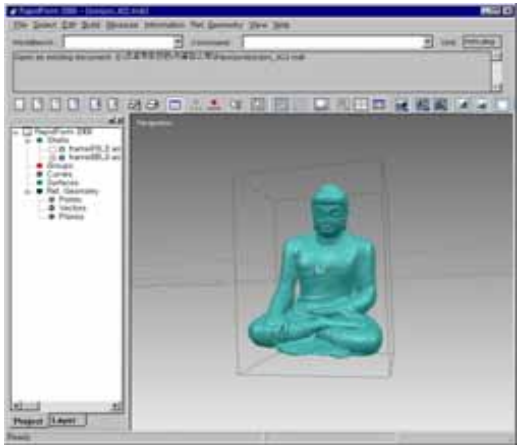
Korea Institute of Science and Technology
한국과학기술연구원

# Virtual Heritage Modeling

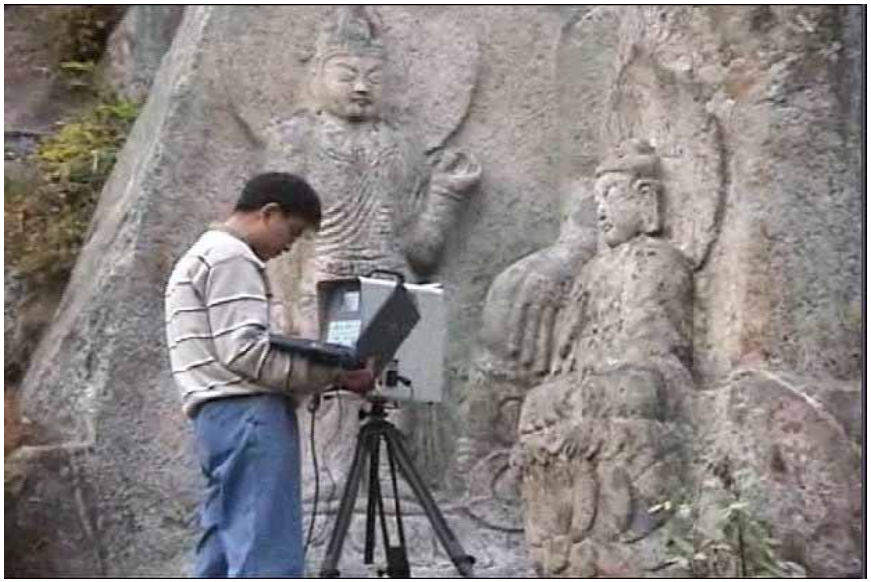
- **3D Modeling**
  - Image-based 3D Modeling (IBM) Approach
  - 3D Laser Scanning Approach
- **Camera Imaging**
  - Infrared Reflectography: Mural Painting
  - X-Ray Imaging: Old Sword
  - Digital Camera: Panorama, TIP

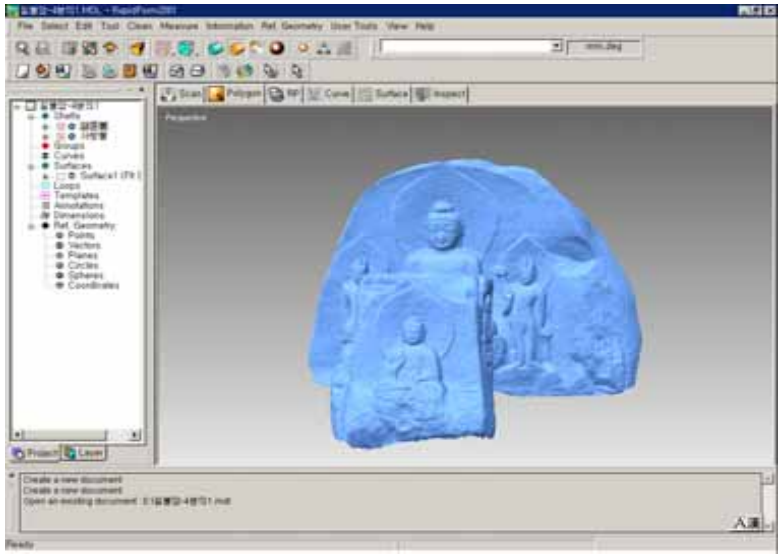
# UNESCO World Heritage
# 新羅 (BC57 - AD935) SukGulAhm



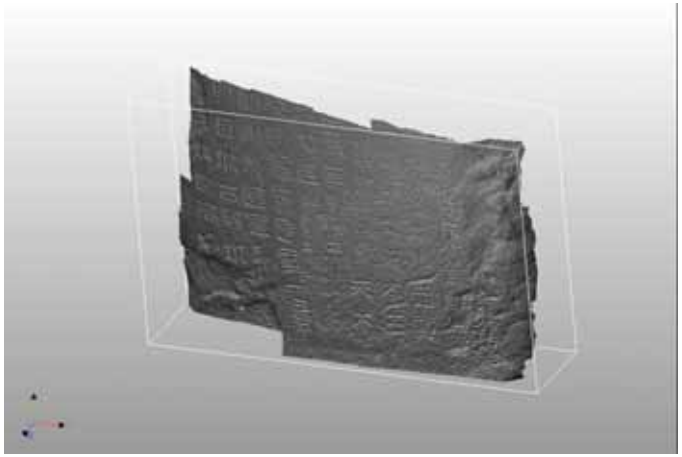


# UNESCO World Heritage
## 新羅 (BC57- AD935) Gyeongju South Mountain Seven Buddhas



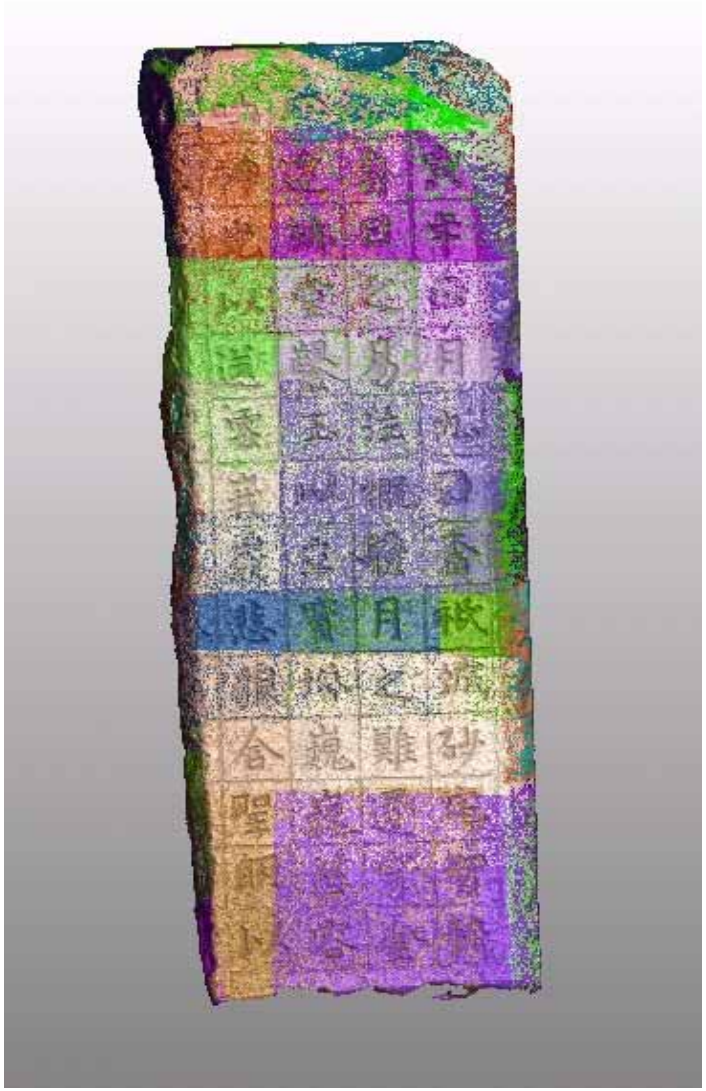


# 高句麗 (BC37 ~ AD668) Stone Monument (廣開土大王碑 Replica)



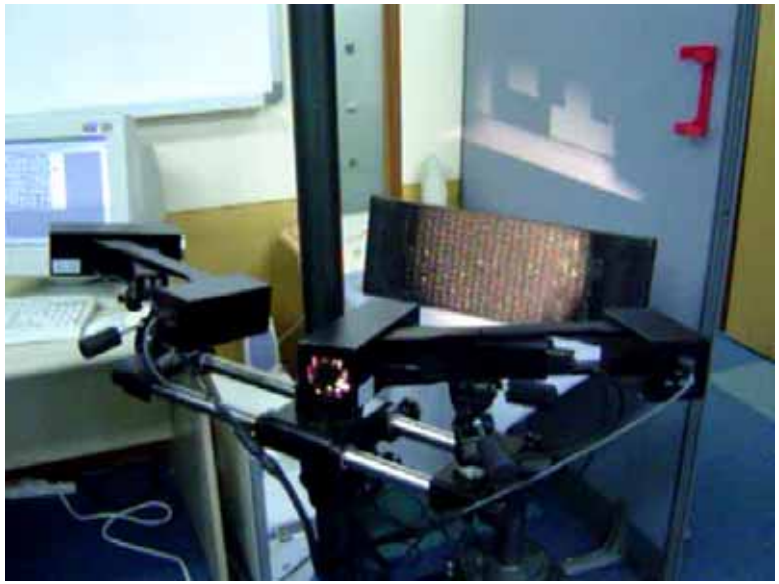
KIST, Solutionix Co., & Inus Technology Inc.

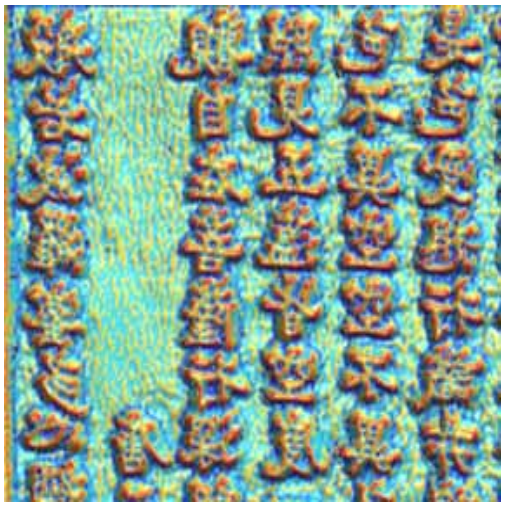
# 百濟 (BC18 ~ AD660) Stone Monument (砂宅智積碑, Original)

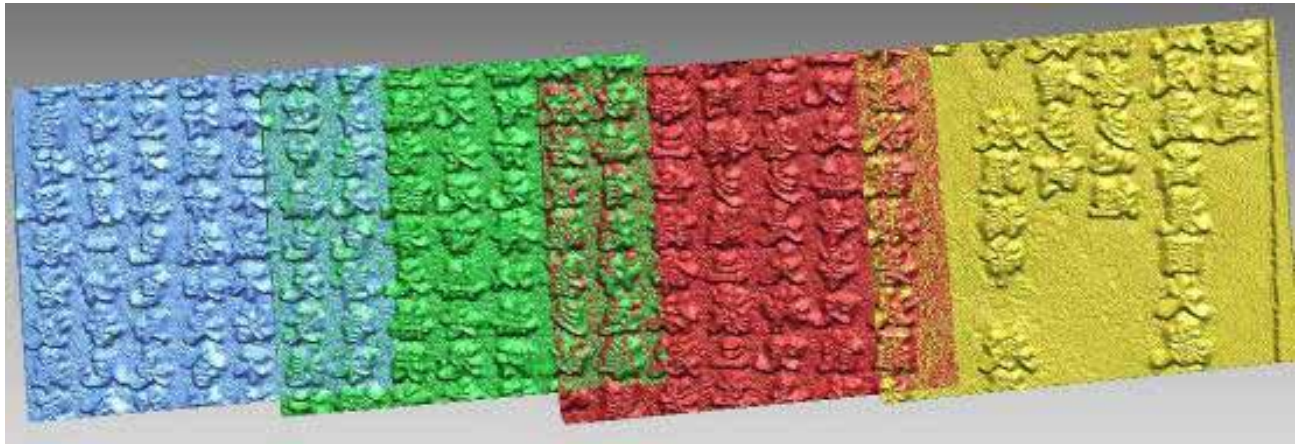


KIST, Solutionix Co., & Inus Technology Inc.

# 高麗 (AD918- AD1392) Wooden Block Monument
# The Tripitaka Koreana consisting over eighty thousand blocks
# (八萬大藏經 Replica)

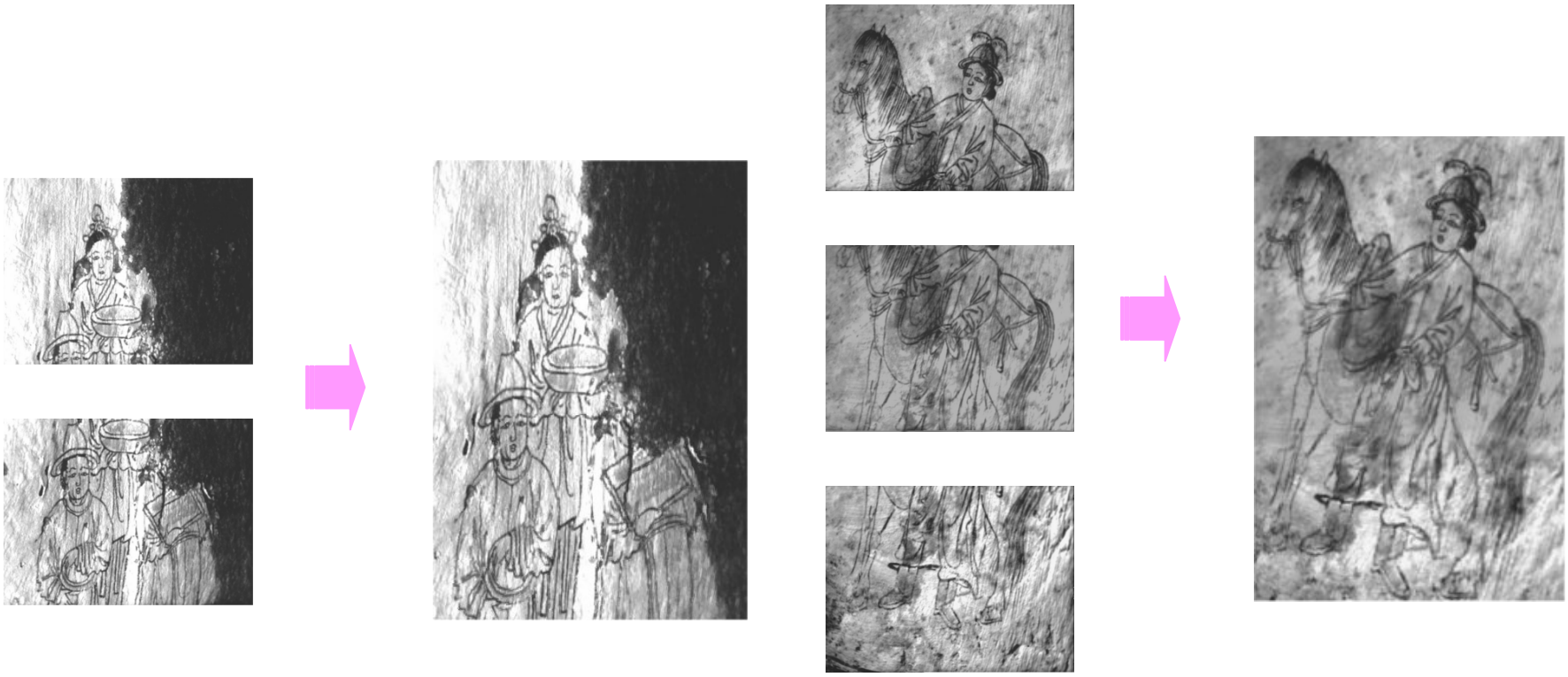




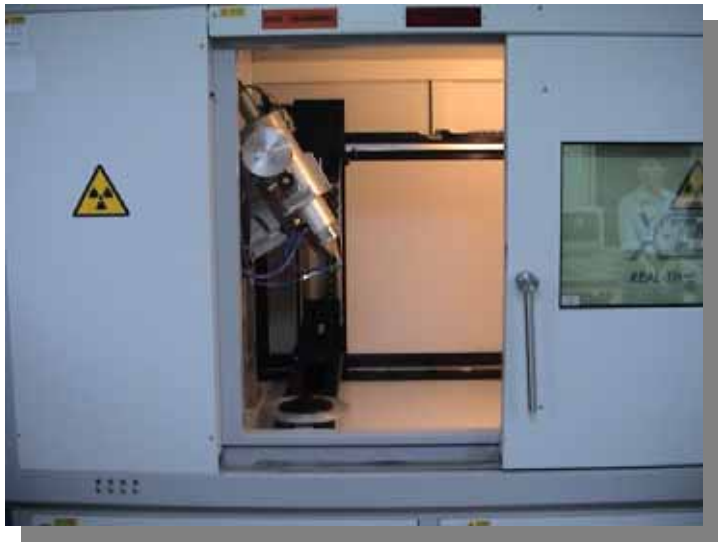


KIST, Solutionix Co., & Inus Technology Inc.

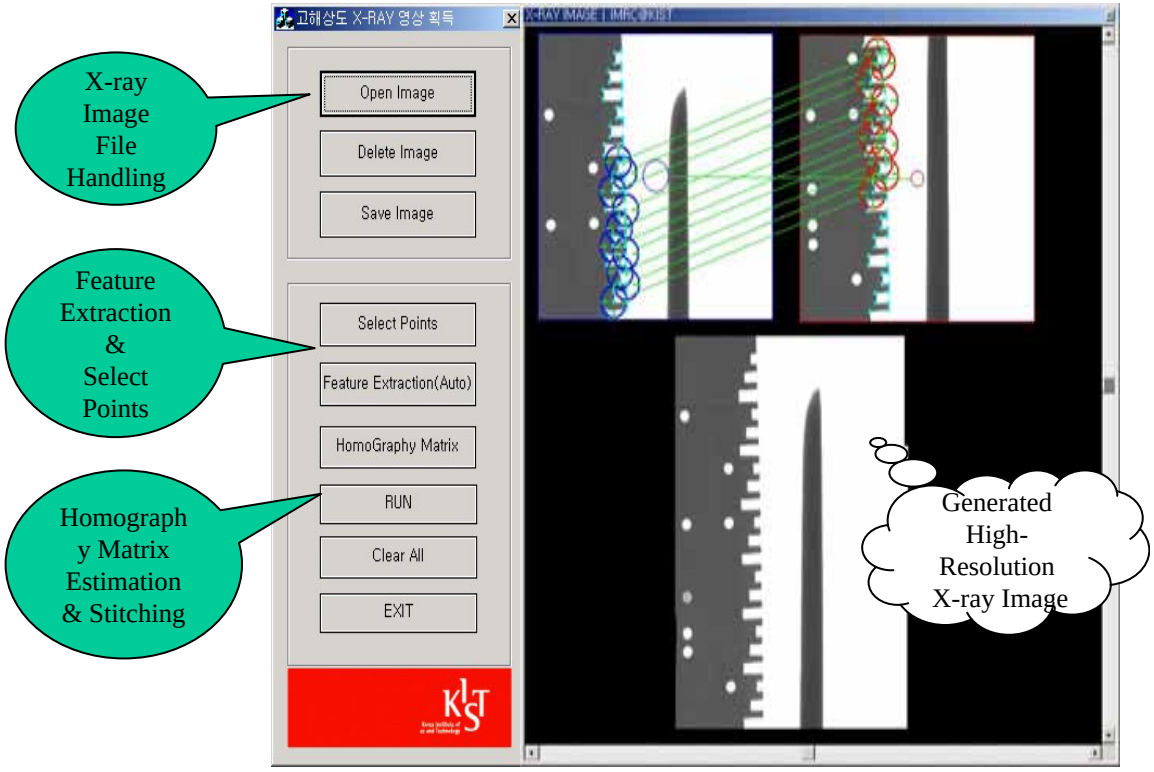
# 李朝 (AD1392~ AD1910) Mural Underdrawings



# X-RAY Image Capture & Synthesis



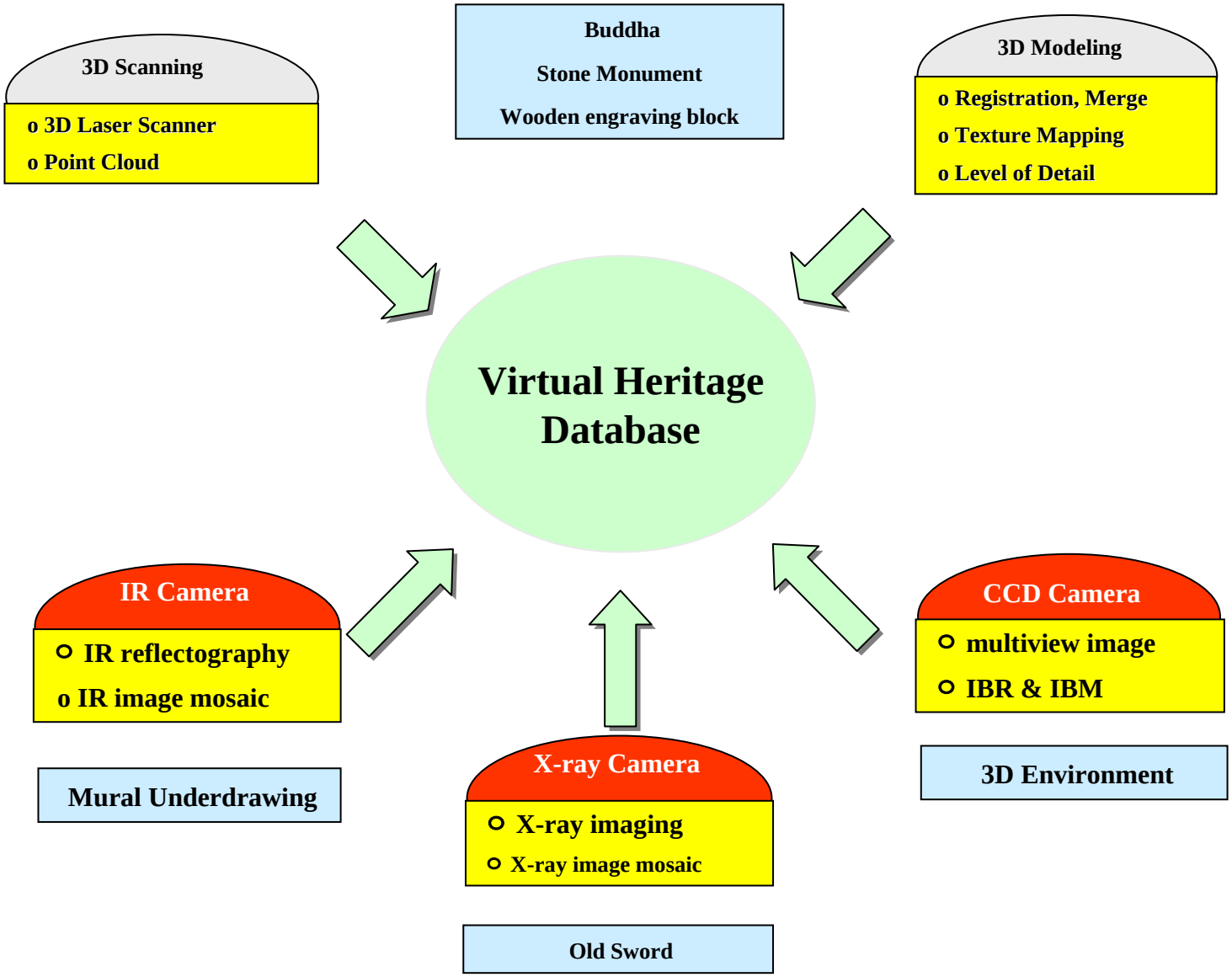
X-TEK X-Ray System



# Tour Into the Picture, 申潤福 (廳琴賞蓮)

Listen to Gayakeum (twelve-stringed Korean Harp), Look over  Lotus Flower

# Virtual Heritage Database



# Virtual Museum Service

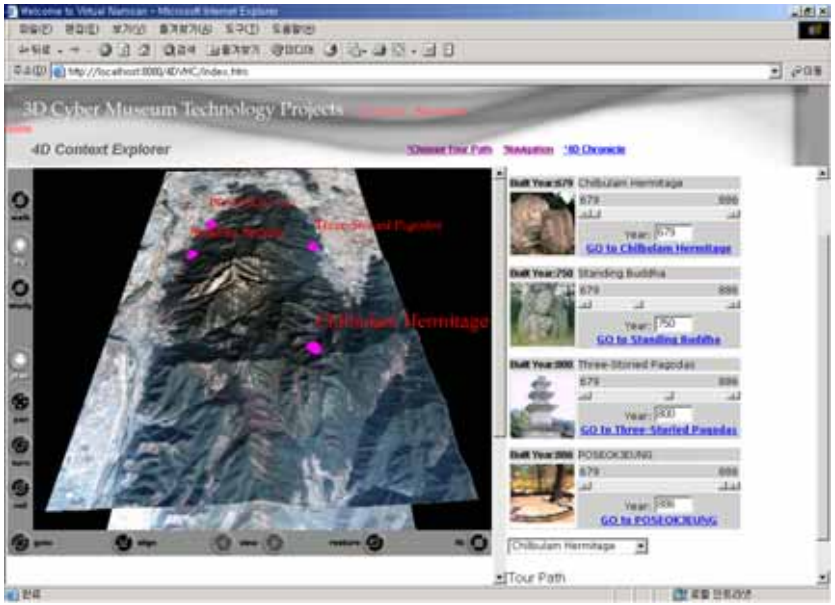
Korea Institute of Science and Technology

한국과학기술연구원

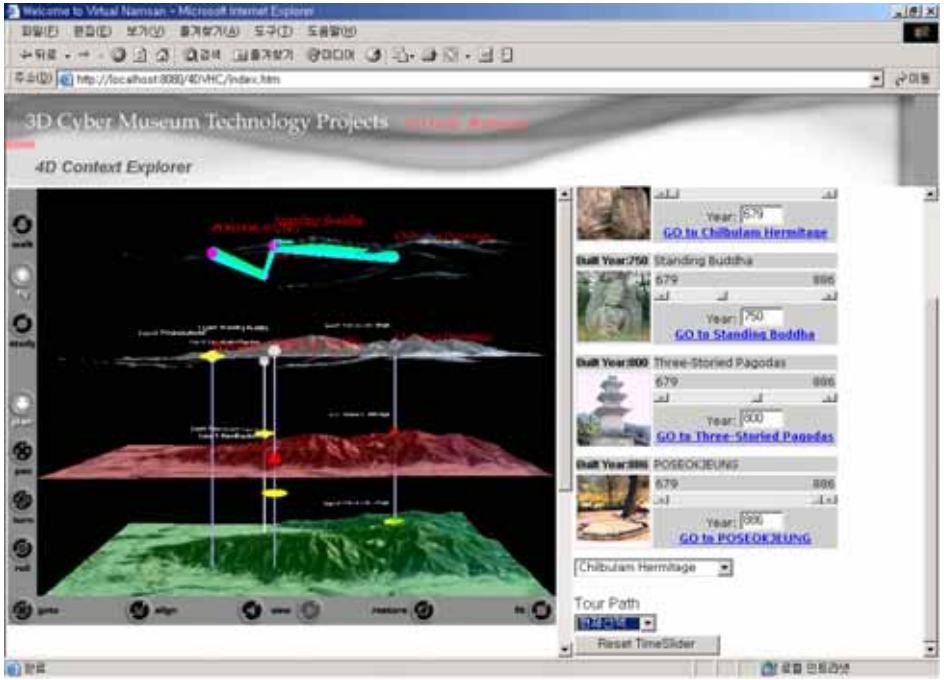
# Our Researches for Virtual Museum

- Web-based VM
- CAVE-based VM
- VR Theater-based VM

# Web-based Museum




3D Mountain + 3D Heritage



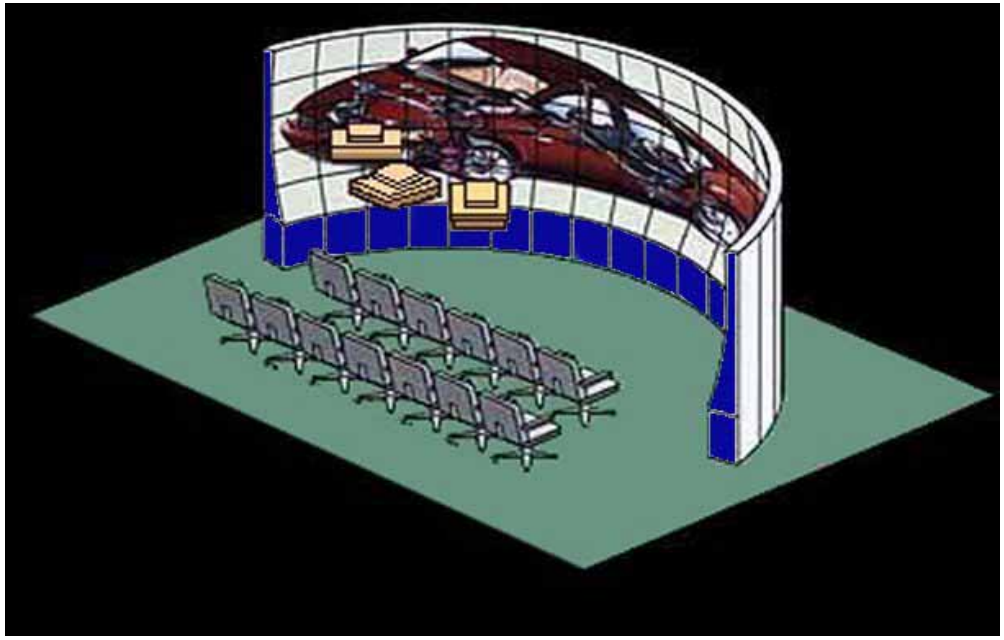

3D Model + Time Chronicles

# CAVE-based Museum

4-Sided CAVE System: Left, Front, Right, and Bottom

4 PCs,  Linux Redhat, Open GL Performer

# VR Theater based Museum



# DHX (Digital Heritage Exchange)

Korea Institute of Science and Technology
한국과학기술연구원

# DHX

digital artistic and ecological heritage exchange

transcontinental Guidance and Exploration in globally shared cultural heritage

Presentation

KIST
Korea Institute of Science and Technology

IST-2001-333476

# DHX

## Digital Artistic and Ecological Heritage Exchange: transcontinental Guidance and Exploration in globally shared cultural heritage

IST Key Action III – Multimedia Contents & Tools

Action Line III.5.1 x - Contents futures

(Shared - cost RTD)

**KIST Matching Project**

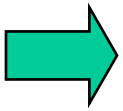
2001-2002: 3D Cyber Museum Technology, MIC

2003-2005: Tangible Space Initiative (TSI), KIST

IMK
Fraunhofer Institut Medienkommunikation
[rmh]2
new media gmbh
KIST 한국과학기술연구원
BARCO
Università degli Studi di Milano
Dipartimento di Scienze dell'Informazione
CNUCE
UNIVERSITY OF CRETE

# Research Direction

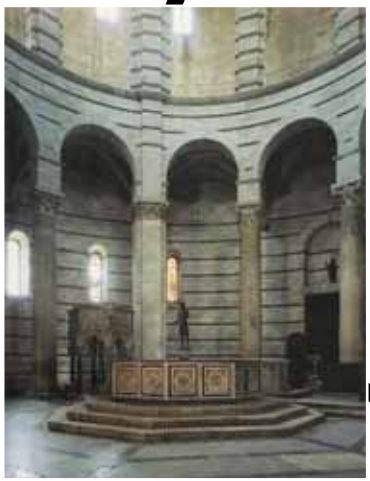
- Cultural Heritage (traditional)
  - Single site
  - Limited knowledge/heritage sharing and discussion
  - Multimedia animations / terminals



- Virtual Reality
  - Multiple site, distributed
  - Highly collaborative and interactive knowledge / heritage sharing and discussion
  - New era of museum applications
  - Added value for industry

Digital Beethoven (Bonn)

Shilla Culture



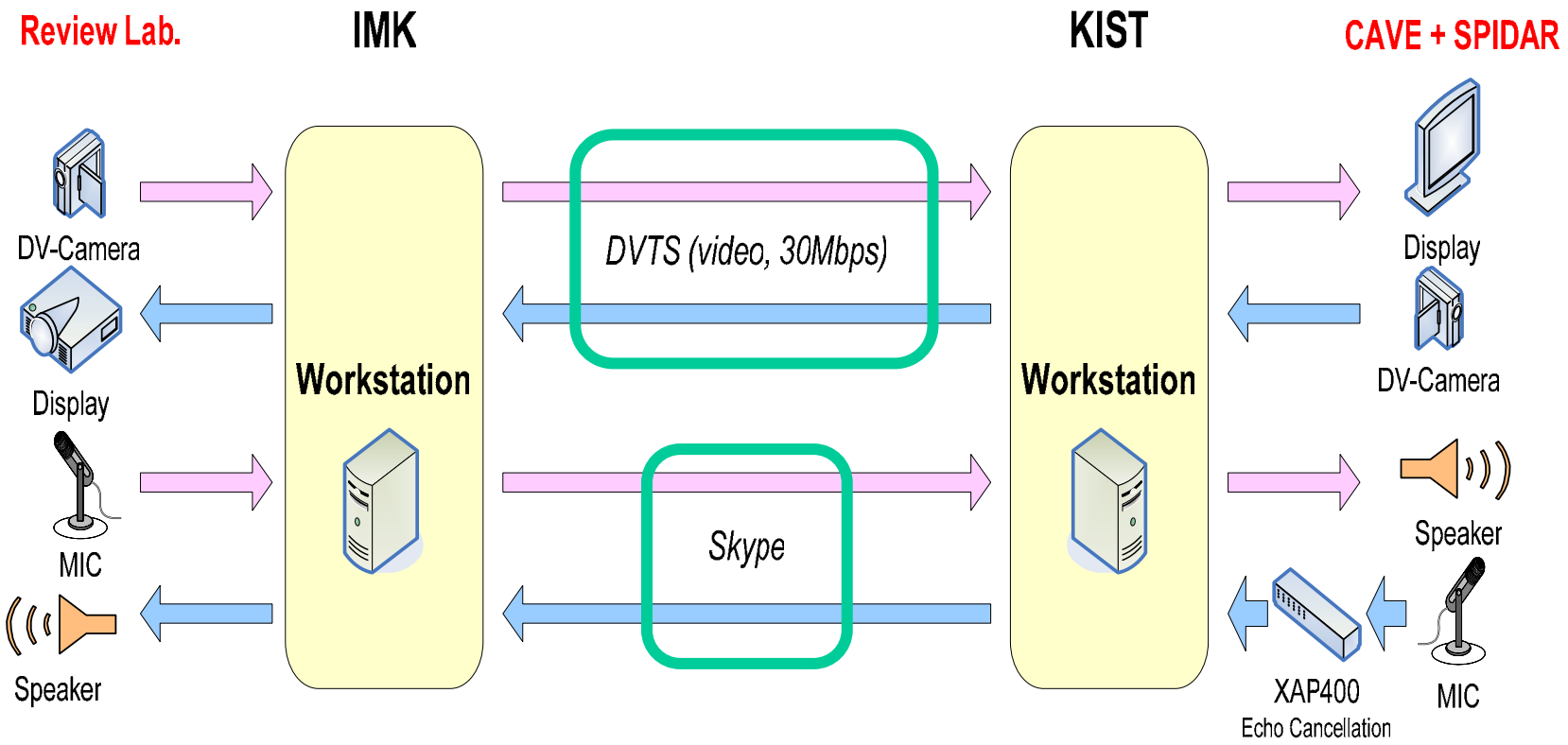
Baptistery of Pisa

Milano Theatre

Samaria Gorge (Crete)

# Virtual Experience of Shilla Culture

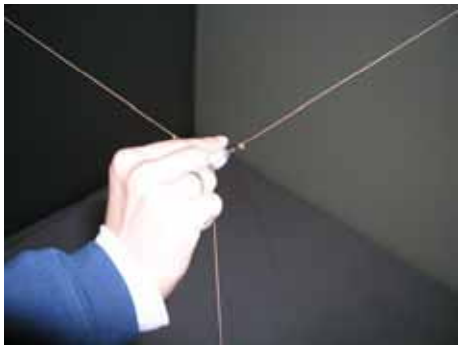
- Immersive Display + Haptic



# CAVE (KIST, Korea) + SPIDAR (TIT, Japan)

Immersive Display

+



Haptic Display

# Virtual Force Exp. with SPIDAR

Hit Bell

Feel
Shape of Pagoda

Open
Wooden Door

# Summary

- Introduction of Our Researches on Virtual Heritage Modeling
- Virtual Museum Services
- DHX (Digital Heritage Exchange) Research

# Thank you

ymk@kist.re.kr