

T
Taiwan
B
Building
T
Technology
C
Center



臺灣
建築
科技
中心

Leading The Future of Building Technology

**TAIWAN
TECH**
NATIONAL TAIWAN UNIVERSITY OF
SCIENCE AND TECHNOLOGY

Taiwan Building Technology Center

No.43, Sec. 4, Keelung Rd., Da'an Dist.,
Taipei 106, Taiwan (R.O.C.)
<http://www.tbtc.ntust.edu.tw>



BACKGROUND

Taiwan Building Technology Center (TBTC) was established in 2007 with special funding granted by the Ministry of Education under its Top Universities and Elite Research Centers Development Plan. The research funding TBTC received from MoE was around NT\$50 million annually.

VISION

- Establishing cross borders and cross disciplinary research teams
- Driving development of sustainable, smart and energy efficient buildings to help enhance competitiveness of industry



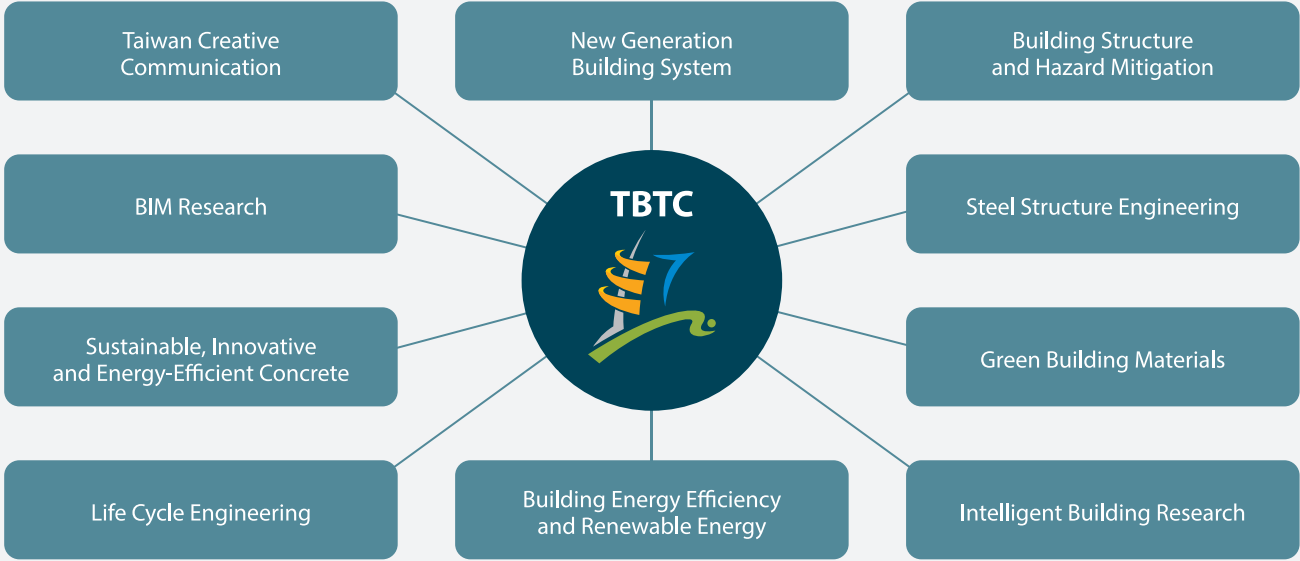
ORGANIZATION



Prof. Shi-Shuenn Chen
Director of TBTC



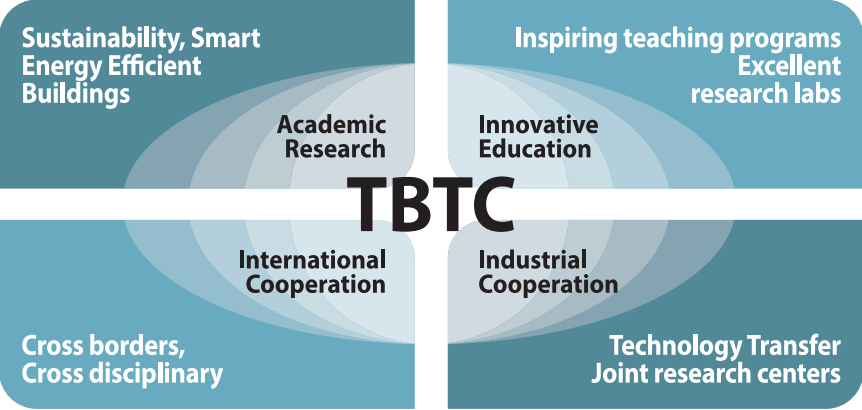
Prof. Wei-Hwa Chiang
CEO of TBTC



OBJECTIVES AND STRATEGY

- Breakthrough technologies
- Paper publication on top 40% journals

- Establishing regional alliance
- Establishing international joint research center



- Cultivating talented young researchers and students

- Establishing academic-industrial joint research center
- Increasing Impact on industry

FIGURES AND ACHIEVEMENTS

- Funding**
 - Academic-industry cooperation: Around NT\$200 million/year
 - MoE: Around NT\$50 million
- Research Teams**
 - 2007-2017: Around 15-20 teams with 100 professors
 - 2018~: Around 8-10 teams with 50 professors
- Academic Research**
 - The number of SCI and SSCI papers has increased 60%
- International Cooperation**
 - 9 EU FP7/H2020 Projects
 - The number of international cooperation projects has increased 63%

- Industrial Cooperation**
 - 4 Strategic Alliance Centers
 - The amount of industrial cooperation has 3-fold growth
 - The research outcome applied on buildings has 2.2-fold growth
- Intellectual Property**
 - The number of grant patents has 4.7-fold growth
 - The number of patent licensing has 5.5-fold growth
 - The revenue generated by IPR has 3-fold growth
- Cultivation of Talent**
 - Cultivating 28 young Post Doc/PhD students from 2015-2017 by conducting research works in top universities worldwide

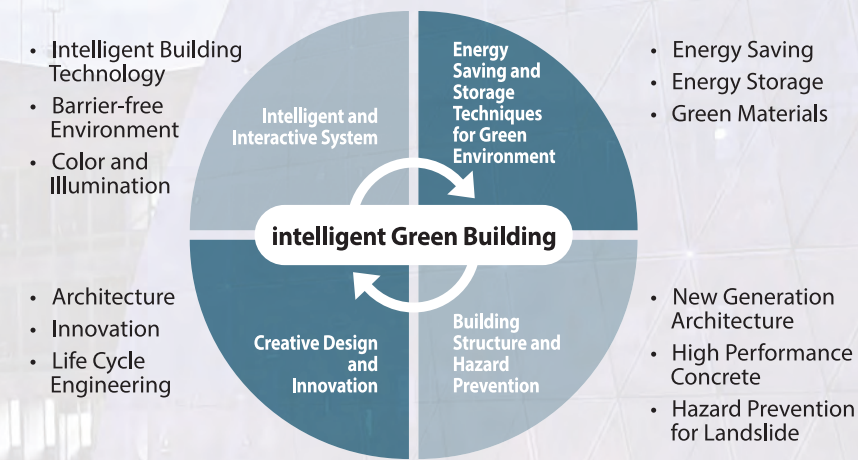
Cultivating Young Researchers



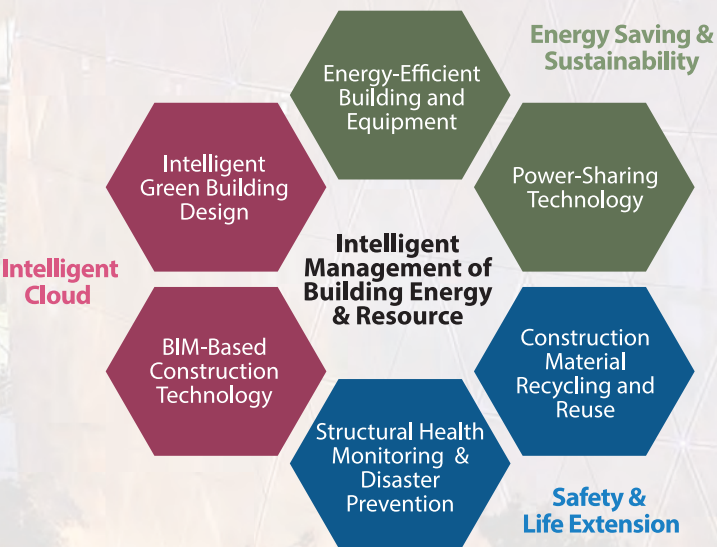
FIRST PHASE (2007-2011)

Intelligent Buildings Research Group	<ul style="list-style-type: none">• Intelligent Building Telecommunications Platforms• Color and Illumination• Energy Conservation and Ventilation
Life-Cycle System Design for Buildings Research Group	<ul style="list-style-type: none">• Building System Reliability• Structural Performance• Structure and Facility Performance

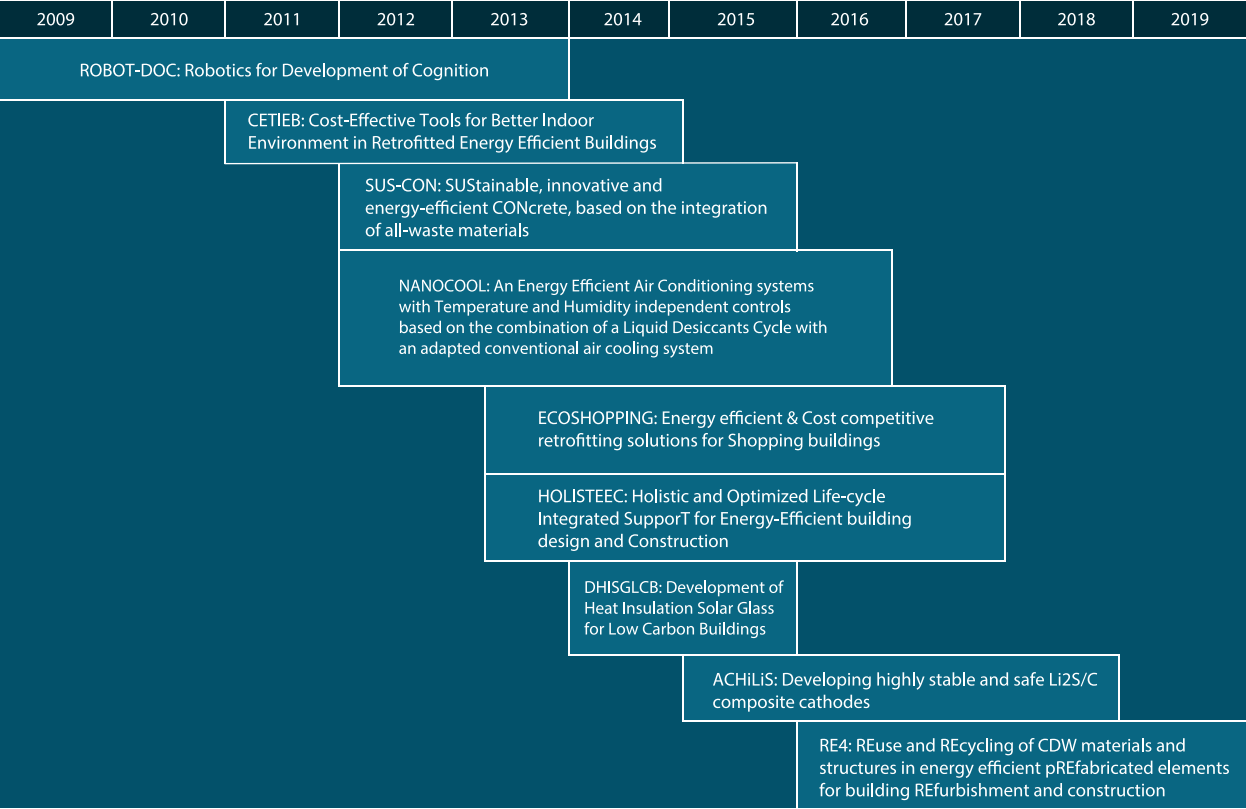
SECOND PHASE (2012-2017)



THIRD PHASE (2018-2022)

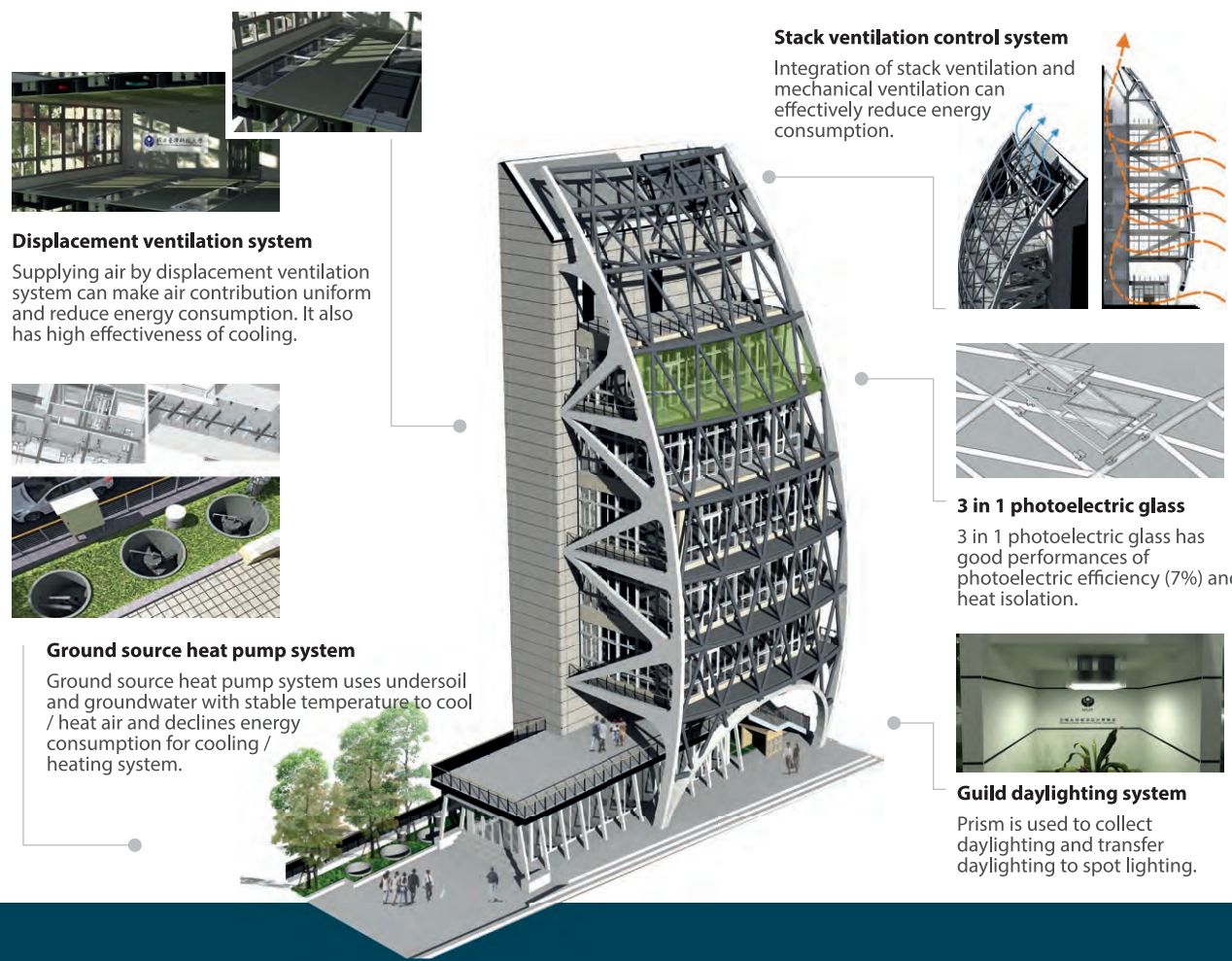


TBTC PARTICIPATING IN EU FP7 & H2020 EeB PROJECTS



EXPERIMENTAL SITE – THE TBTC BUILDING

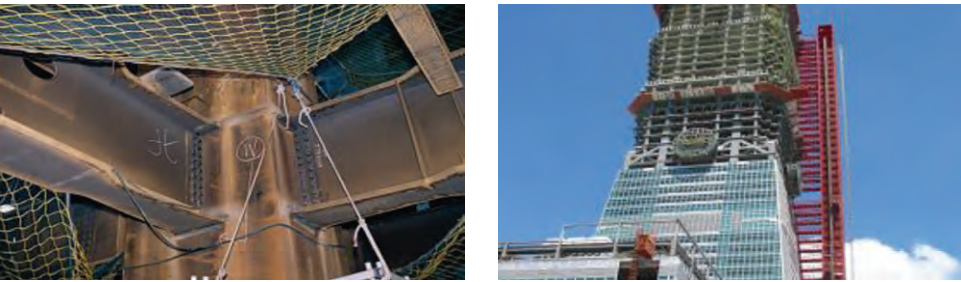
The TBTC building provides a real laboratory for testing and exhibiting the ideas and results of the TBTC’s projects.



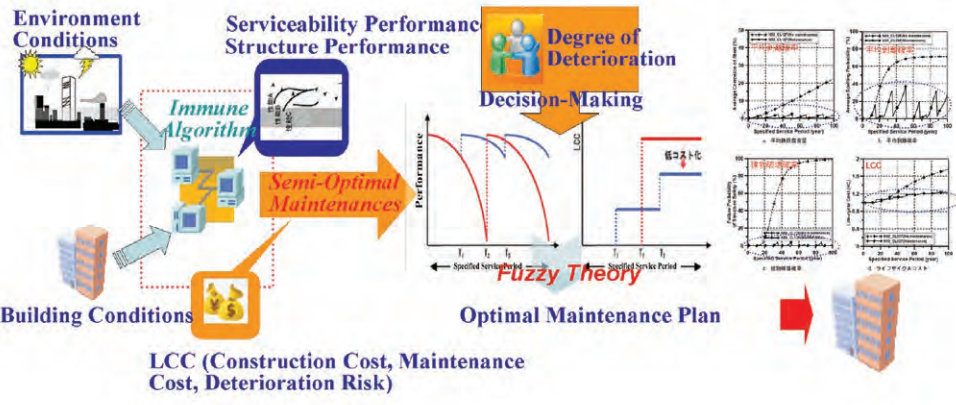
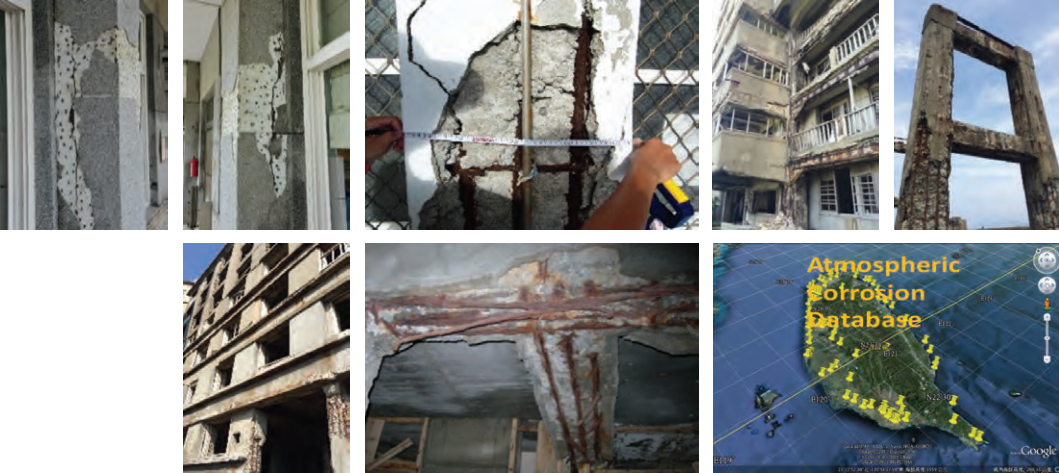
CROSS DISCIPLINARY RESEARCH AND TECHNOLOGY

DEVELOPMENT OF NEW GENERATION STRUCTURES

- By the studies of high performance structural materials, structural components, and structural systems, the efficiency of the structural materials can be enhanced.
- Research focus of high performance materials has been on high performance steels, which possess such characteristics as high strength, fire resistance, high ductility, and/or high weld ability.
- High performance concrete has also received considerable attention for its high strength, light weight, and ease of recycling.
- High-rise building Earthquake-Resistant Beam Patent used in at least 200 buildings and in the Taipei 101.



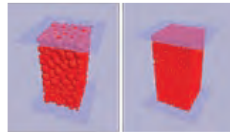
LIFE-CYCLE PERFORMANCE EVALUATIONS AND DECISION SUPPORT SYSTEMS



APPLICATIONS OF IT FOR ADVANCING CIVIL AND CONSTRUCTION ENGINEERING

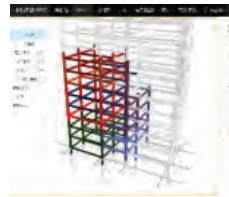
Superior Design

High-speed/High-fidelity simulation, Parameter estimation, Construction site risk assessment with BIM-based presentation

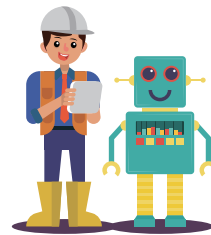


Better Construction

BIM-based steel structure erection scheduling and communication platform

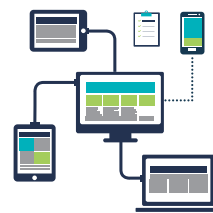
**Safer World**

Slope/structure safety
monitoring, visual
inspection assistance,
smart smoke detector



Enabled by IT

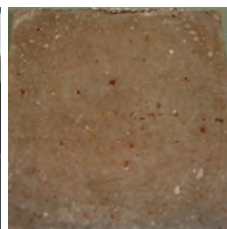
MCU, SBC, Mobile,
Multicore PC, GPU, PC
clusters, Internet-Scale
Computing



SUSTAINABLE, INNOVATIVE AND ENERGY-EFFICIENT CONCRETE, BASED ON THE INTEGRATION OF ALL-WASTE MATERIALS (SUS-CON)



Concrete products manufactured from secondary raw materials could help the building sector improve its environmental performance and cut waste.



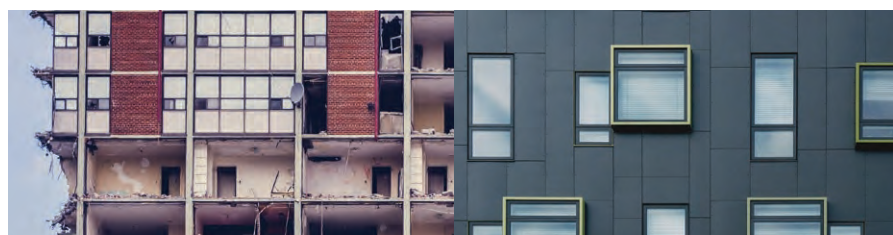
Lightweight heat insulated concrete

pavement

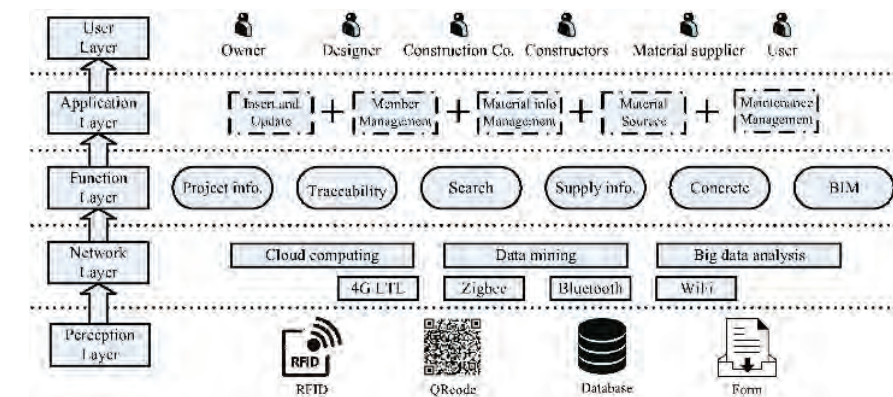
REUSE AND RECYCLING OF CDW MATERIALS AND STRUCTURES IN ENERGY EFFICIENT PREFABRICATED ELEMENTS FOR BUILDING REFURBISHMENT AND CONSTRUCTION



RE4 aims to develop an innovative concept of pre-fabricated energy-efficient buildings that can be easily assembled for future reuse.

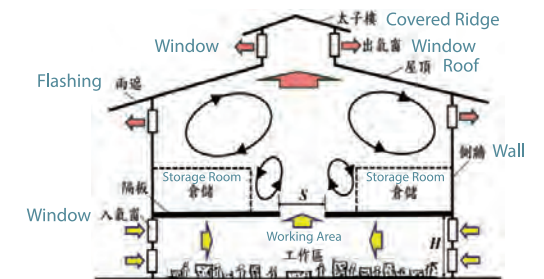
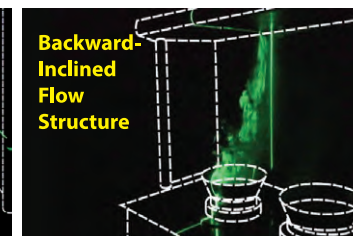
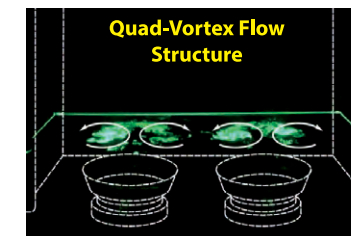


CLOUD-BASED PRODUCTION TRACING AND MAINTENANCE SYSTEM FOR CONSTRUCTION INDUSTRY



INTELLIGENT TECHNIQUES FOR VENTILATION AND ENERGY SAVING OF BUILDING

Through the natural mechanisms that produce heat in an indoor environment, this project developed advanced technologies and apparatus that make advanced ventilation strategy and energy conservation feasible in buildings. The leakage level can remain almost 0 and the system can save 50% energy and reduce 20% manufacturing cost and the technology has been transferred to manufacturers of Taiwan, Japan and China.



NANOCOOL: AN AIR-CONDITIONING SYSTEM INDEPENDENTLY CONTROLLING HUMIDITY AND TEMPERATURE



The nanoCOOL system is a hybrid liquid desiccant system (HLDS) and absorbs the moisture by using LiCl solution. It can not only independently control the humidity and the temperature, but save 30% of electric power consumption.

The whole system has been shipped from Spain to Taiwan and installed next to the swimming pool of our campus.



CROSS DISCIPLINARY RESEARCH AND TECHNOLOGY

DEVELOPMENT OF CYBER PHYSICAL INTEGRATION TECHNOLOGIES AND APPLICATION FOR BUILDINGS

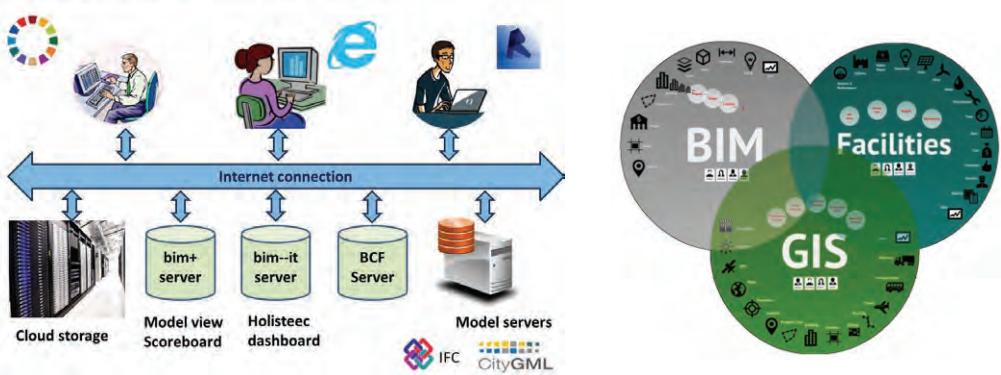
The developments of cyber physical technology are being implemented in certain application toward Smart Building, including Time-shared Parking System, Personal Information Dashboard, Energy Analytics System, and UHF RFID Chamber. Basically, all applications are aim to create better environment for people to live and to solve some problematic things as well.



INTEGRATED APPLICATION OF BUILDING INFORMATION MODELING (BIM) AND SUSTAINABLE BUILDING

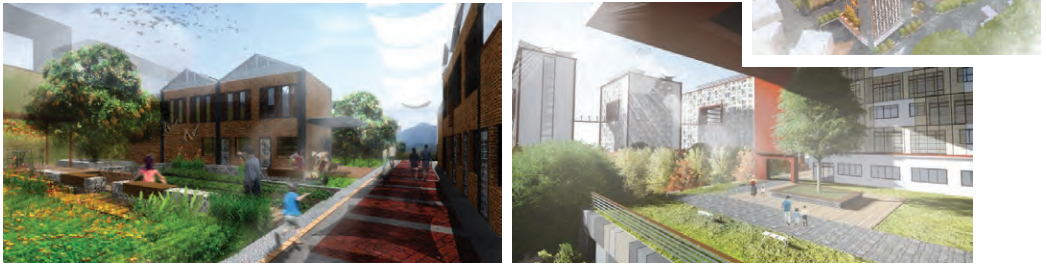


The framework of the 'HOLISTEEC platform', which provides a communication platform and evaluation results for project team members during seven phases of a project to achieve optimal project decisions. Demonstration case of the 'HOLISTEEC Platform': NTUST Student dormitory.



INTEGRATION OF BUILDING TECHNOLOGY AND CREATIVE DESIGN

- Congregate housing design
- Sustainable community planning
- Urban regeneration



FUTURE DEVELOPMENT

Cultivating researchers and research teams for cross disciplinary cooperation with industry

Conducting integrated research and transferring academic outcome to industrial applications to increase competitiveness