

건축시공 및 건설관리 개요 (산업/정의/개념)

건축시공 및 건설관리 입문 Introduction to Building Construction Engineering & Management

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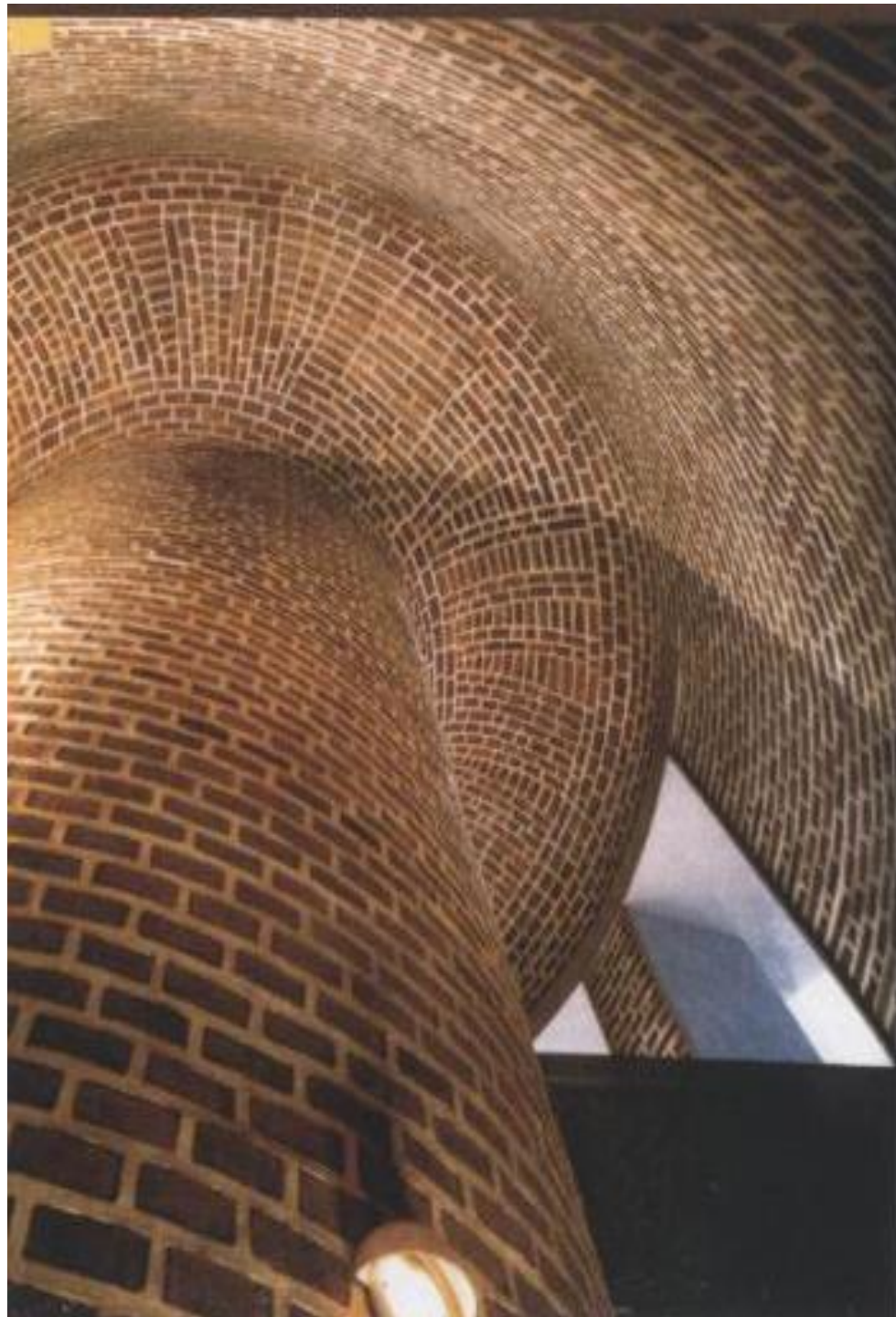
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Seoul National University



Built Environment

- Shelter
- Infrastructure vs. 복지
- 보존 vs. 개발
- Green Building



Beyond functionality



Definitions

Engineers

A photograph of a traditional Korean courtyard. In the foreground, a wide, paved stone path leads towards a central wooden gate. To the left, there are green bushes and a wooden fence. To the right, a large wooden building with a tiled roof is visible. In the background, there are misty, green mountains under a clear sky.

“Engineers put things together to make things that haven’t been around before. To accomplish this, they must work with people, resources & policies, & they must consider social needs.”

-Joe Bordogna
NSF Assistant Director

건축이란?

- 건축이라는 것은 미(美), 구조(構造), 기능(機能) 의 세 요소로서 파악된다.
- 건축은 일면 미학의 대상이며 동시에 공학의 대상이다.
- 건축공학은 이른바 기술과 과학과 미술의 결합으로 이루어지는 학문이다.



건축



토목



What is Construction (시공)?

■ Construction

- Defined as the **process** of constructing a building or infrastructure.
- Consists of Form + Structure + Function
- Engineering and Aesthetics



Burj Khalifa



Opera House

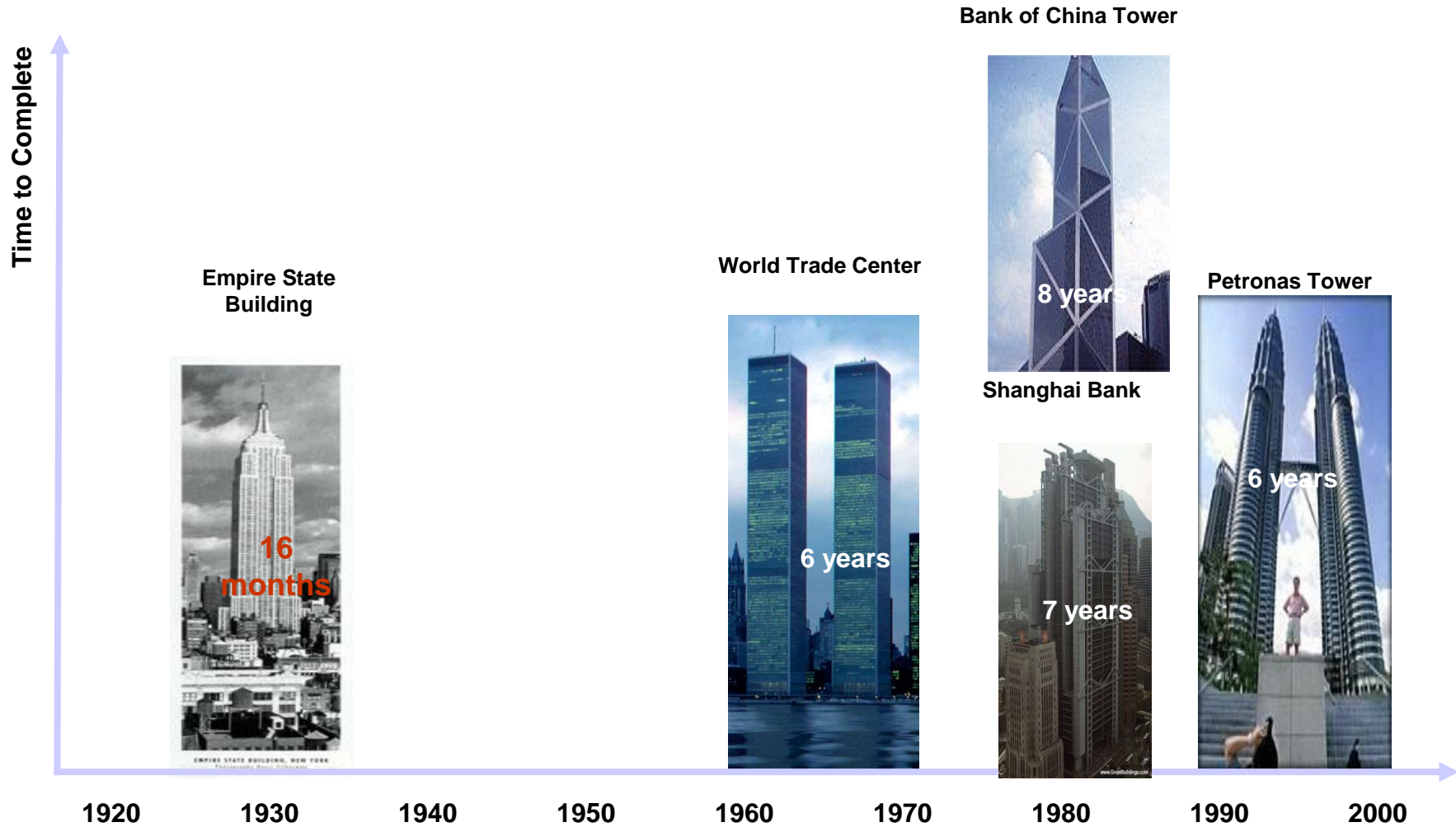


Metropol Parasol

인간의 작품 vs. 신의 작품



건설은 사람이다



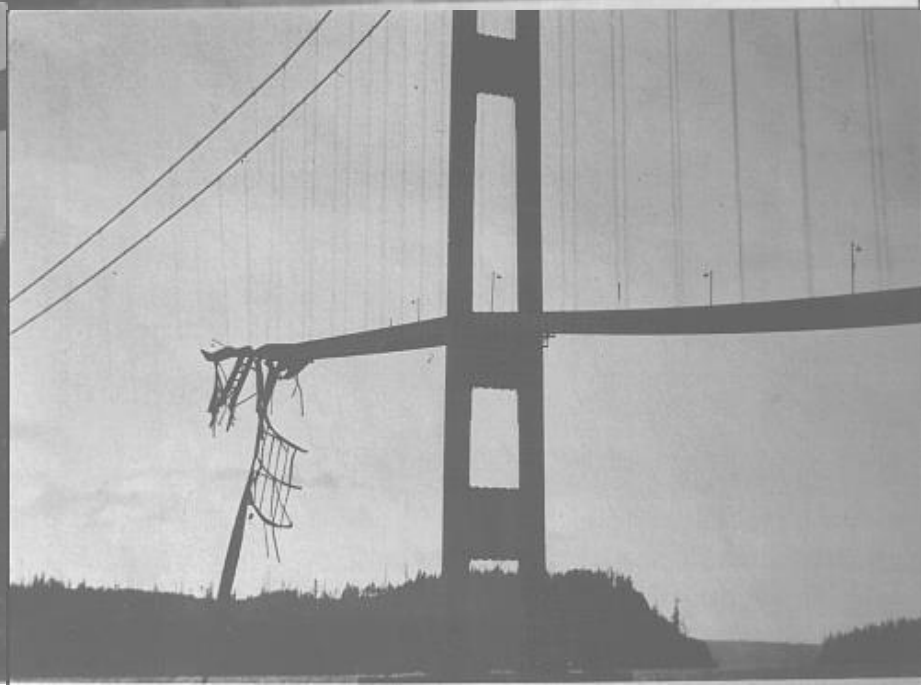
설계와 시공...



김중엽의 프랑스대사관

Lessons Learned?





건축시공

Building Construction Engineering

건설관리

Construction Management

CE as an Academic Aspect (시공학)



- Broad Definition: A study that includes pre-construction and construction processes such as Material, Equipment, Construction Method, Trade, Procurement, Management
- Narrow Definition: Defined as “technical methods, materials, equipment to build a building”

건설산업 및 건설의 특징

The Construction Industry

- Highly segmented
- 6 to 12% of GDP in most countries
- Deals with a single, unique end product
- Labor intensive industry
- Mainly for domestic consumption
- Sustainable development
- Sensitive to short-term economic conditions: social, political context

Features of construction

- Provides products and services
- No fixed assets or means: process-based, in the framework of a project
- Learning rarely happens across projects: implemented by temporary alliance among different organizations in different places

- Highly dynamic complexities: an interdependent system that continuously changes over time under open environment
- Longevity: low failure threshold, durability
- Social & Political Context: benefits from continuing demands

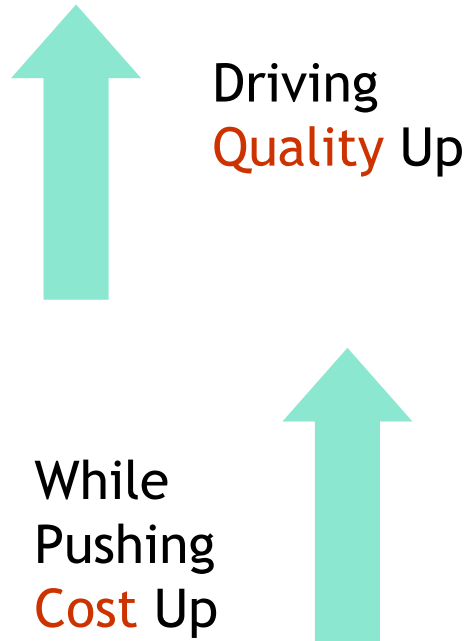
패러다임의 변화

Rethinking construction...

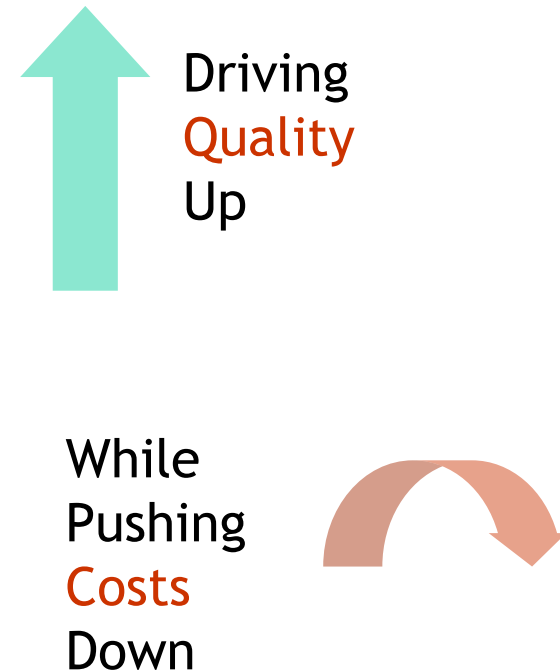
- What is construction?
- What is the objective of the whole process of construction?
- What is the aim of any project?



The “Old” Paradigm



The “New” Paradigm



4차 산업혁명에 따른 국토교통의 미래모습



최신 및 미래
기술

BIM (Building Information Model)

▪ 3D to 7D BIM

3D

- Existing Conditions Models
 - Laser scanning
 - Ground Penetration Radar (GPR) conversions
- Safety & Logistics Models
- Animations, renderings, walkthroughs
- BIM driven prefabrication
- Laser accurate BIM driven field layout

4D

SCHEDULING

- Project Phasing Simulations
- Lean Scheduling
 - Last Planner
 - Just In Time (JIT) Equipment Deliveries
- Detailed Simulation Installation
- Visual Validation for Payment Approval

5D

ESTIMATING

- Real time conceptual modeling and cost planning (DProfiler)
- Quantity extraction to support detailed cost estimates
- Trade Verifications from Fabrication Models
 - Structural Steel
 - Rebar
 - Mechanical/Plumbing
 - Electrical
- Value Engineering
 - What-if scenarios
 - Visualizations
 - Quantity Extractions
- Prefabrication Solutions
 - Equipment rooms
 - MEP systems
 - Multi-Trade Prefabrication
 - Unique architectural and structural elements

6D

SUSTAINABILITY

- Conceptual energy analysis via DProfiler
- Detailed energy analysis via EcoTech
- Sustainable element tracking
- LEED tracking

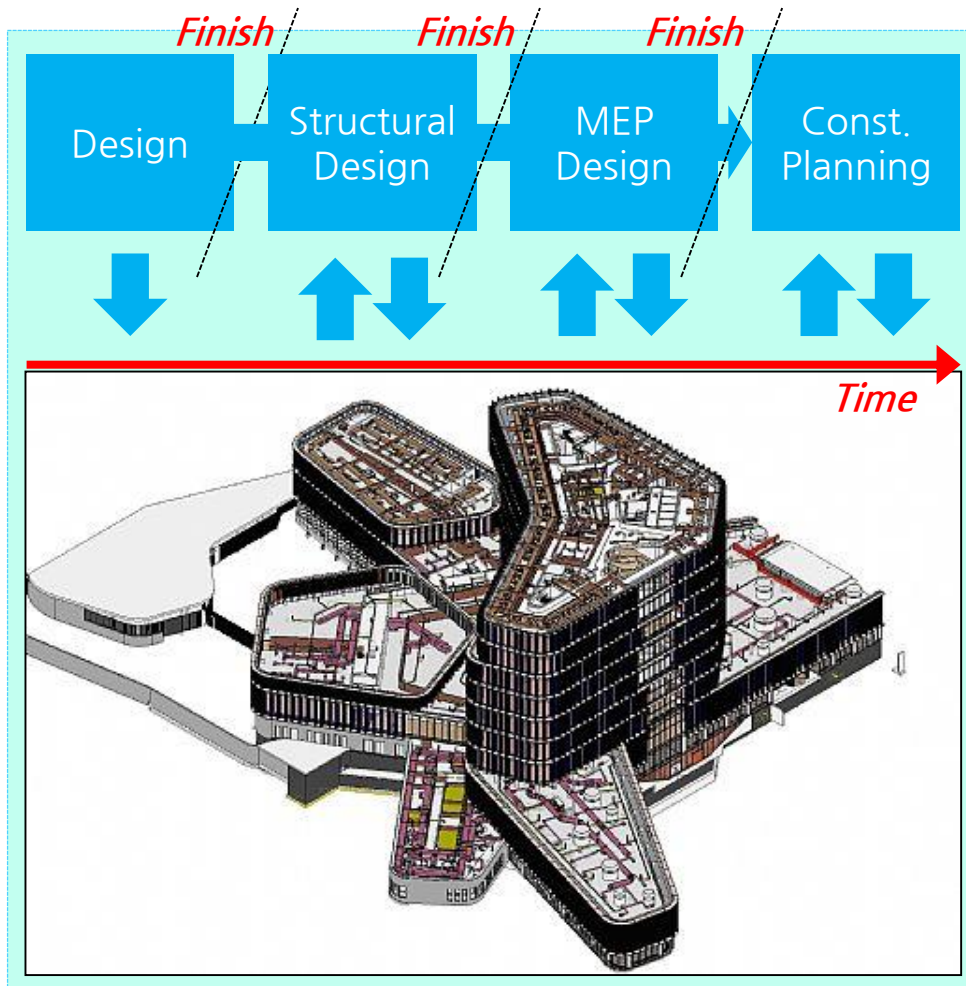
7D

FACILITY MANAGEMENT APPLICATIONS

- Life Cycle BIM Strategies
- BIM As-Builts
- BIM embedded O&M manuals
- COBie data population and extraction
- BIM Maintenance Plans and Technical Support
- BIM file hosting on Lend Lease's Digital Exchange System

Require More Participants 

Current BIM Co-Work Process



Difficult to Perform Concurrent Works with other Participants

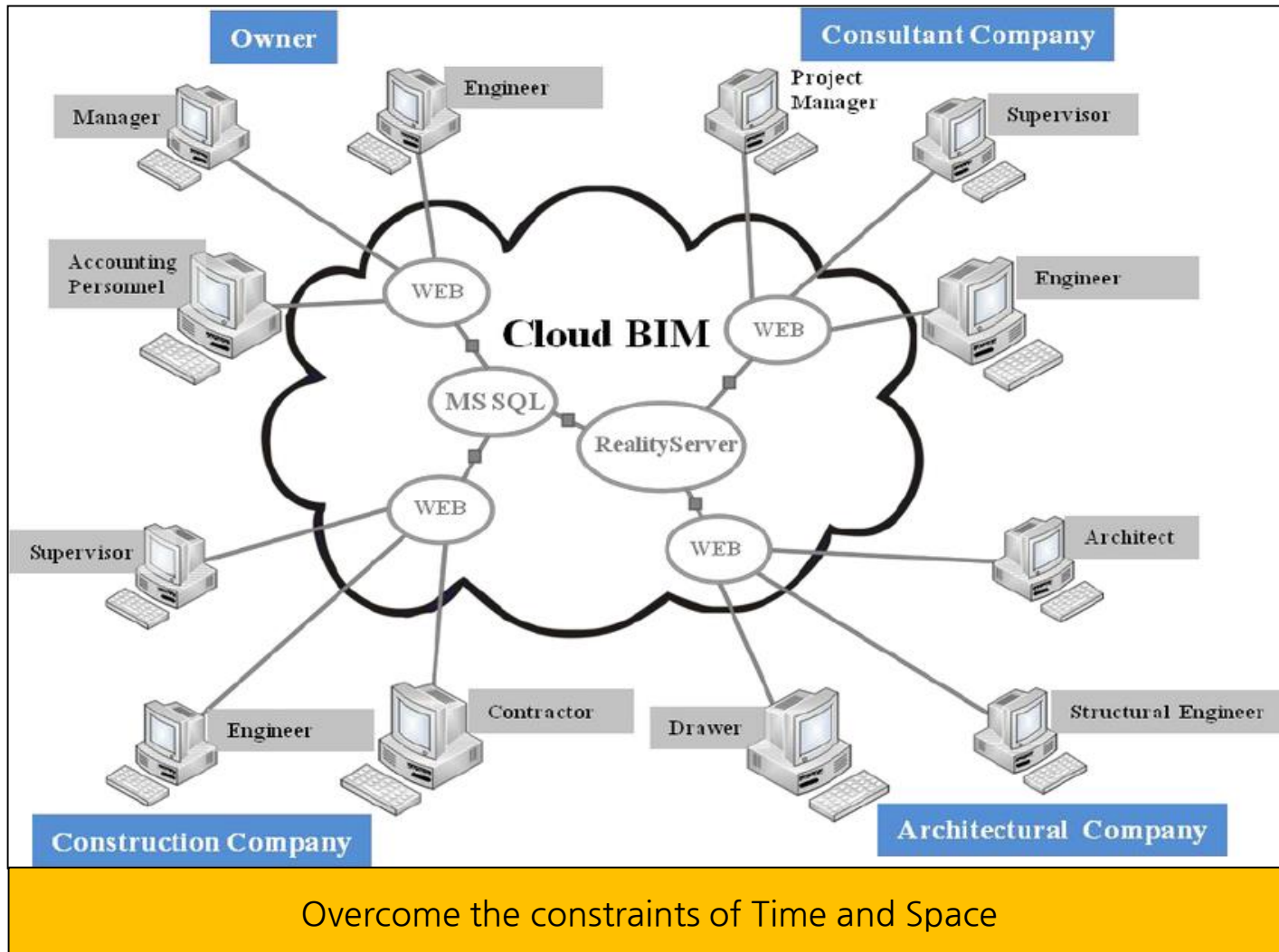


Needs for Concurrent Works



Development of **Cloud BIM**

Cloud BIM



3D Scanning

- 3D Laser Scanning is a means of rapidly collecting detailed and accurate as-built data
- A 3D Laser Scanner emits a laser beam that “sweep across” a target object gathering millions of measurement



- 3D Scanning integrated with As-built Data



Point Cloud with
Color Image Overlay



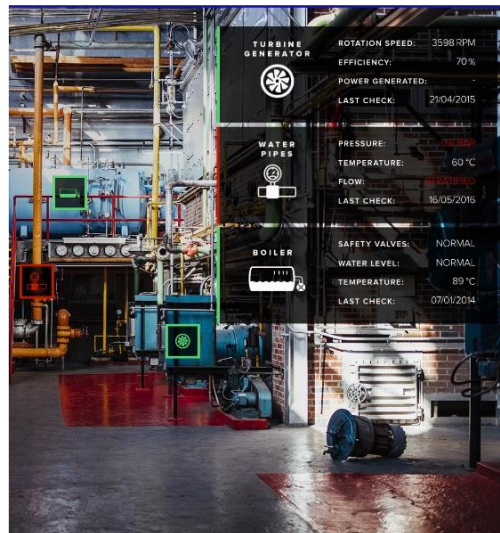
3D Systems
Coordination

AR (Augmented Reality)

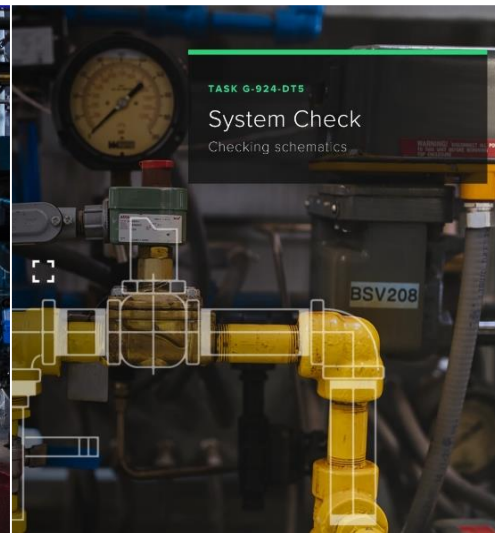
- Unlike virtual reality, AR allows the user to maintain full awareness of the real world, but superimposes additional information onto the user's surroundings



Data Visualization



Guided Work Instruction



Thermal Vision



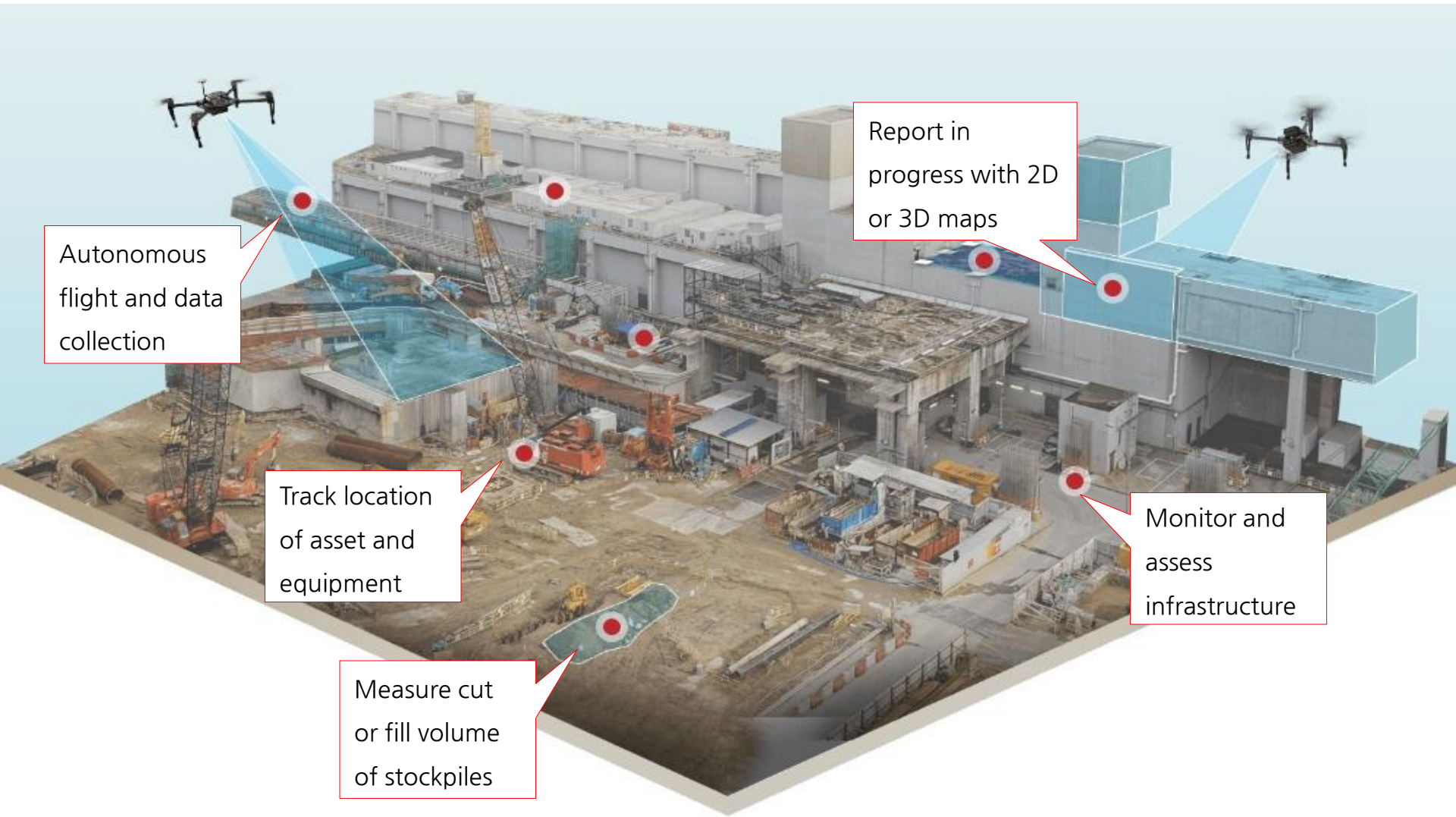
DAQRI's Smart Helmet

Unmanned Aerial Vehicles (Drone)

- Used for collecting and analyzing Data in Construction
 - ✓ Autonomous flight and data collection
 - ✓ Track location of asset and equipment
 - ✓ Measure cut or fill volume of stockpiles
 - ✓ Monitor and assess infrastructure
 - ✓ Report in progress with 2D or 3D maps

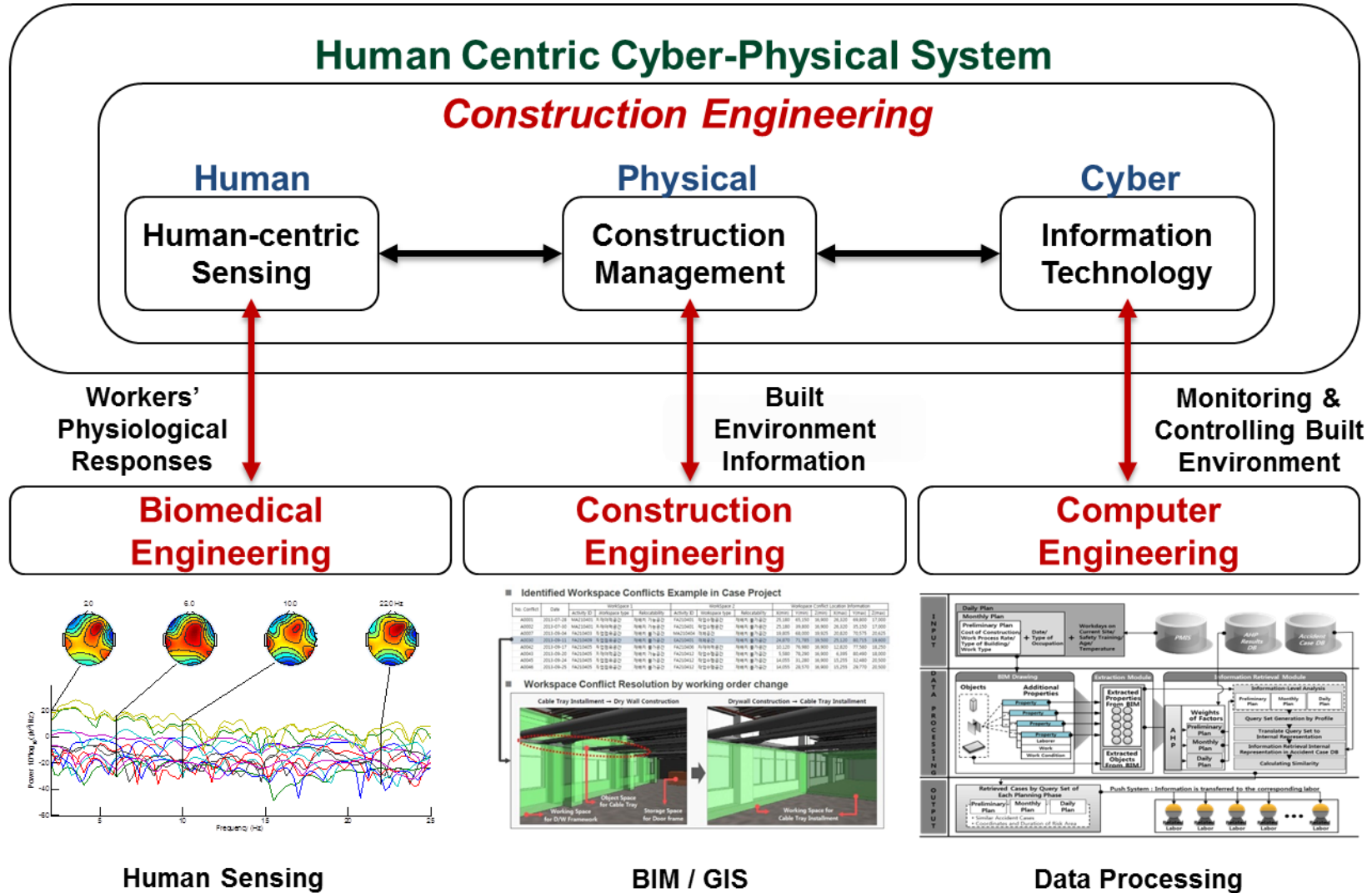


Example of UAV Uses

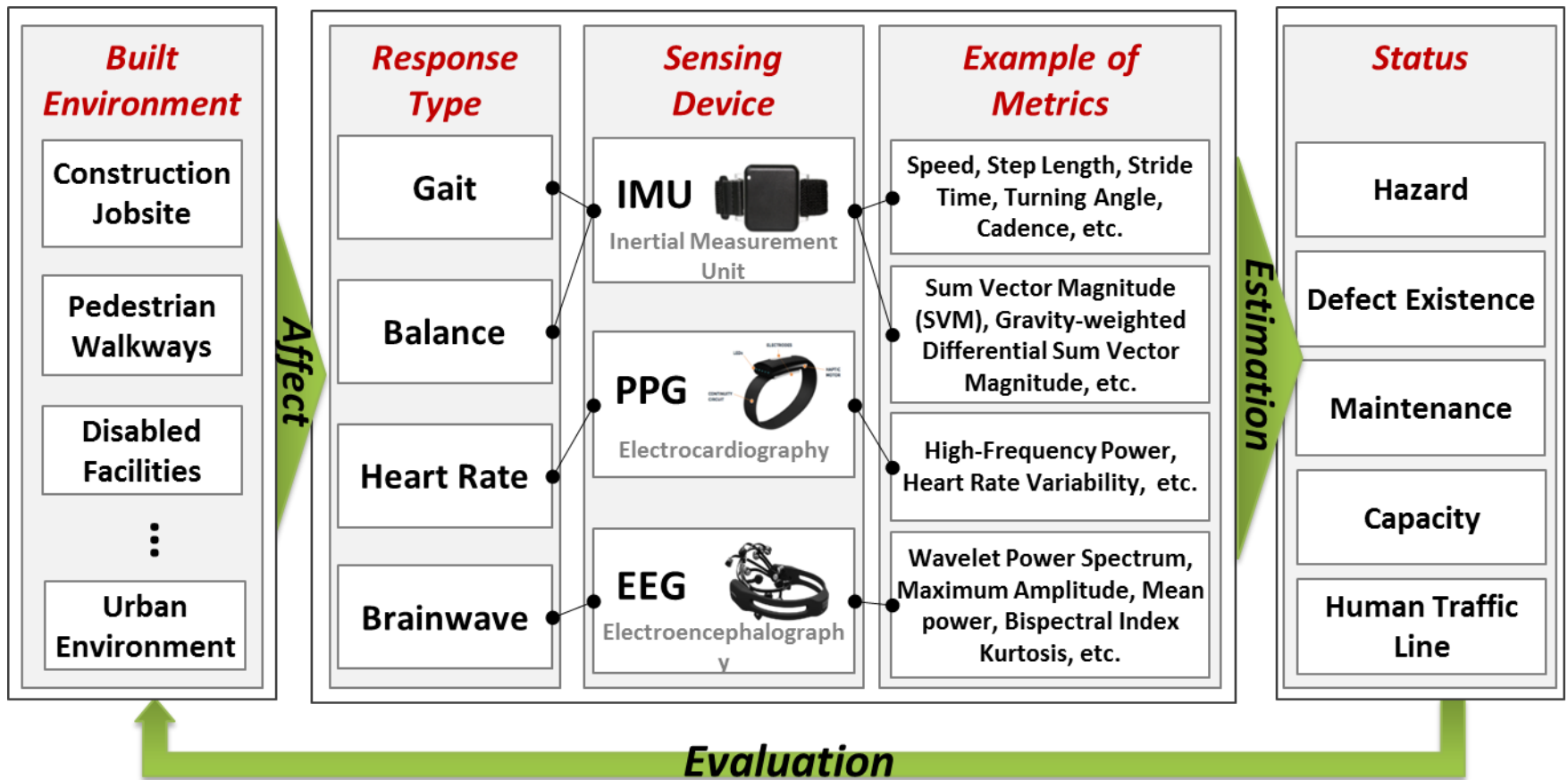


Sensing Technologies

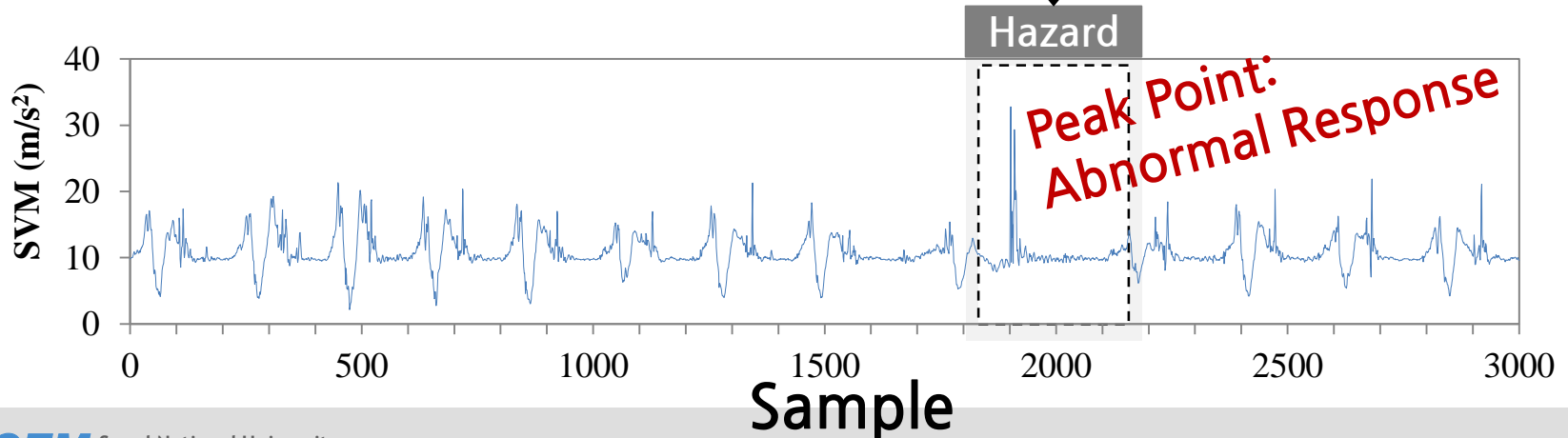
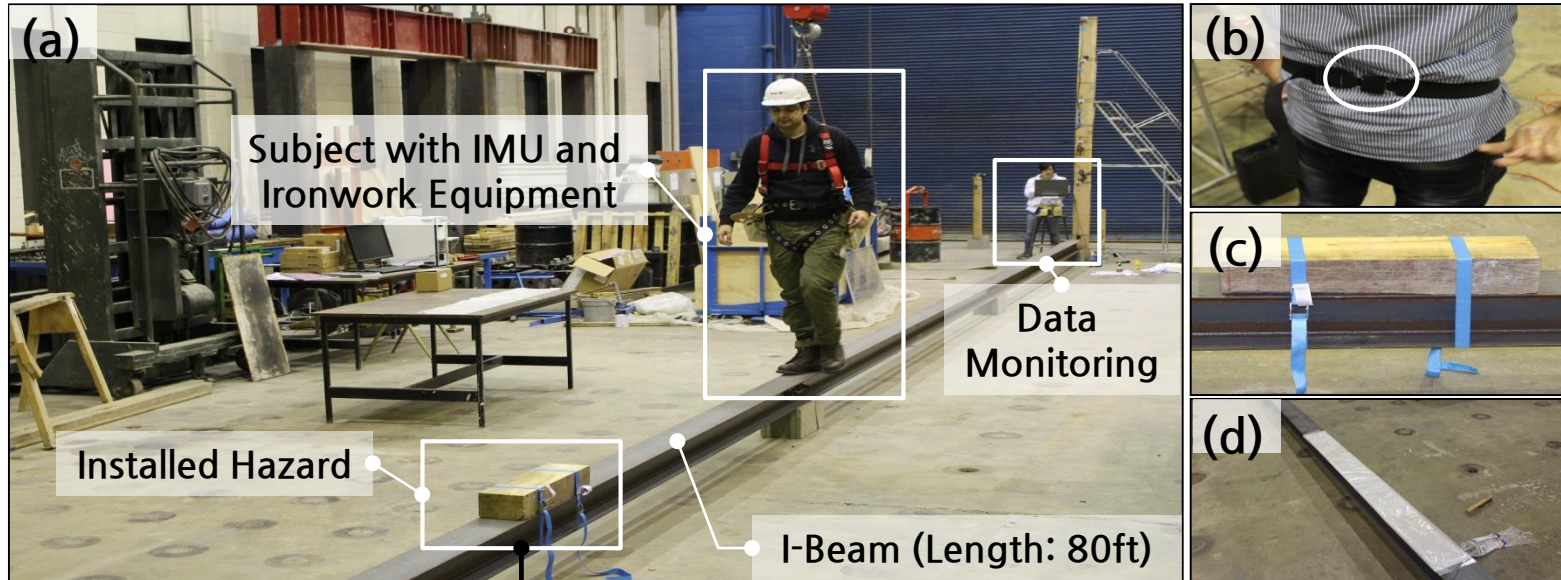
- Cyber-Physical System



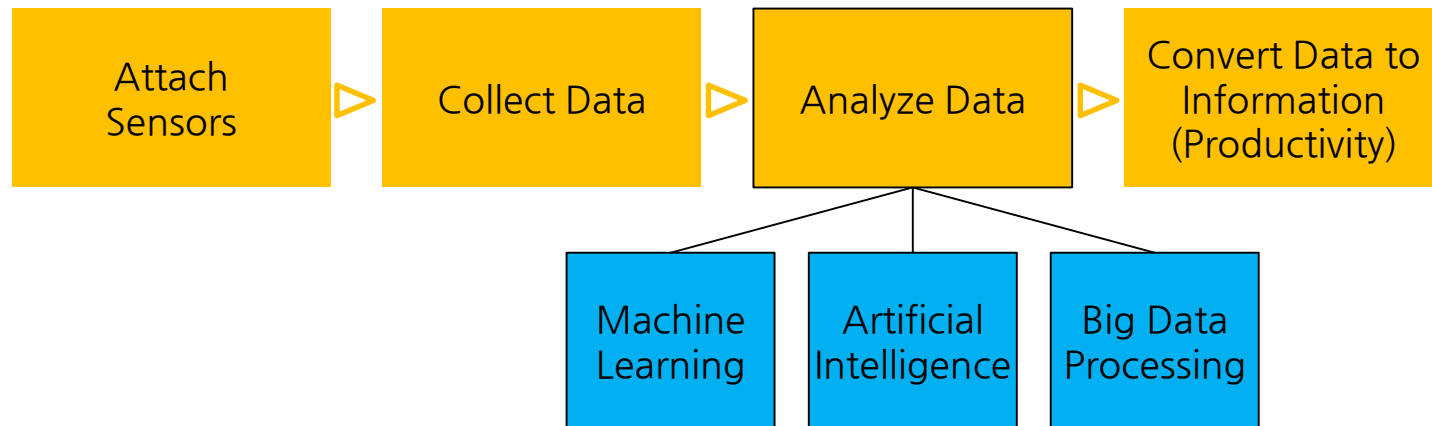
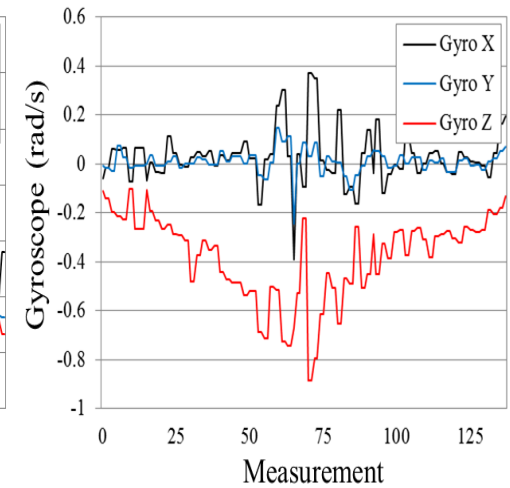
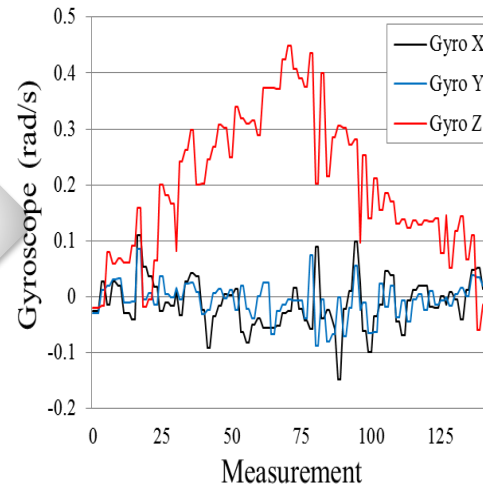
Sensing Data into Built Environment



Example 1: Hazard Identification



Example 2: Productivity Monitoring (Equipment)



3D Printer

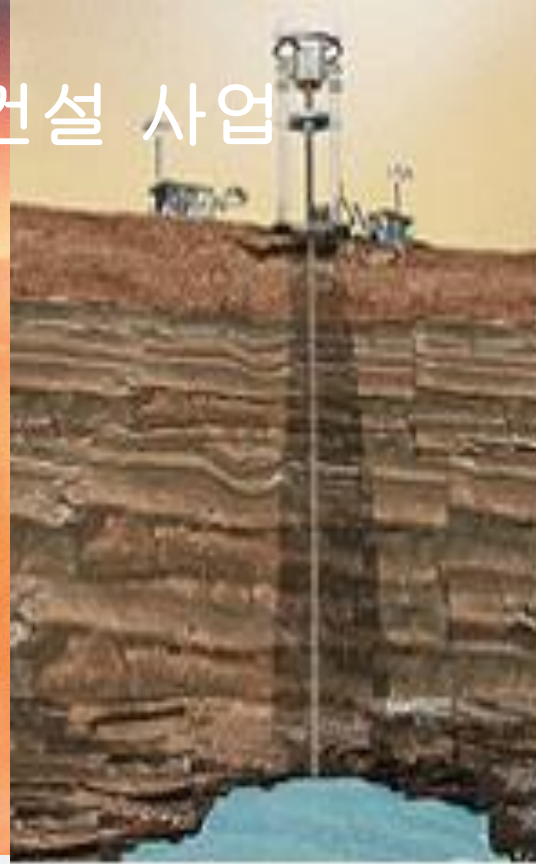


자동화와 초고성능 로봇의 등장





화성 탐사와 화성 건설 사업



Syllabus

주	강의	발표	과제
1	건축시공 및 관리 개요 (산업/정의/개념)	팀구성	
2	건축생산시스템 (사업구성/조직/주체/계획 및 관리)		조사발표 과제 out
3	건설발주시스템 (발주유형 및 특성, DBB/DB/TK/PPP 등)		발주시스템 out
4	공정관리 1 (원리/요소 /CPM/PDM/PERT)	발주시스템	발주시스템 in
5	공정관리 2 (LOB/TACT/LEAN), 원가관리 (구성/적산/견적)		물량산출 out
6	품질관리 (절차/종류), 안전관리	물량산출	물량산출 in
7	가설공사		
8	중간고사		
9	토공사 및 기초공사	가설공사	조사발표 과제 in
10	철근콘크리트공사	토공사 및 기초공사	
11	조적 및 석공사/커튼월	철근콘크리트공사	
12	미장공사/도장/ 방수공사	조적 및 석공사/커튼월	
13		방수공사/미장공사/도장	
14	기말고사		

Grading

출석 5%

중간고사 30%

기말고사 30%

과제 $10\% * 3 = 30\%$

기타(수업태도 및 참여 등) 5%

Lecturer

181 cm, 83kg

Full Prof.

PhD from MIT

E-mail: mspark@snu.ac.kr



A sunset over a body of water with a path leading towards the horizon. The sky is a mix of orange, red, and purple, and the water reflects the colors. A path or road leads from the foreground towards the horizon, where the sun is setting. The overall mood is serene and inspiring.

Self-Confidence

***Challenging
Attitude***

Grouping

현장조사 공종		
가설		
토공사 및 기초공사		
철근콘크리트공사		
조적 및 석공사		
커튼월		
방수공사		
미장공사		
도장		