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Envisioning the Design of Airports Holistically

Resilient Infrastructure through Digitalization: Enabling Viksit Bharat

Digital Solutions for Sustainable Airport Infrastructure Development

Digital Technology Leap

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Resilient Infrastructure Through Digitalization

Terminology

Resilient Infrastructure refers to systems with ability to

(i) Anticipate and absorb disturbances
(ii) Adapt/Transform in response to changes/Recover
(iii) Learn from prior unforeseen events.

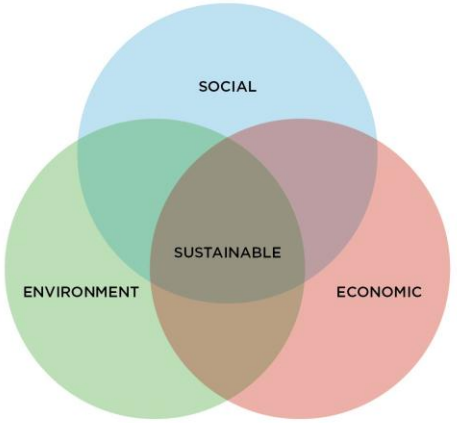
Digitalization refers to

i. Adaptation of a system, process, etc to be operated with the use of computers and the internet.

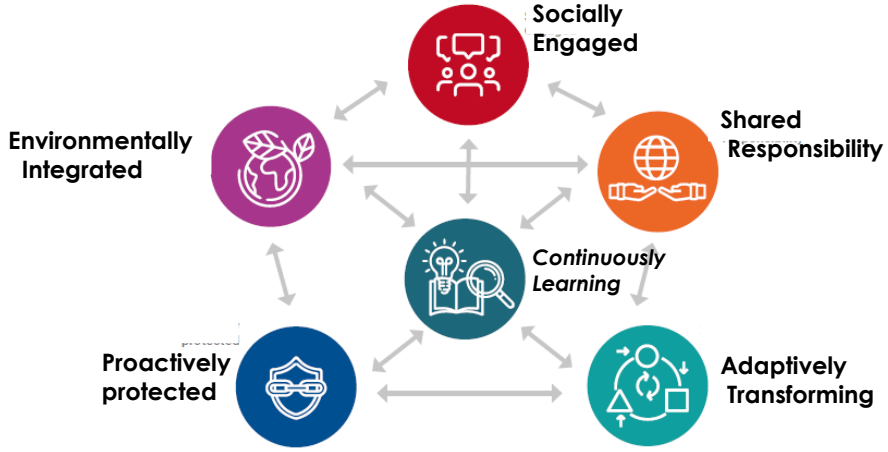
Sustainable Infrastructure caters to following factors

a. Social
b. Economic
c. Environment

Sustainable Infrastructure



Resilient Infrastructure



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Viksit Bharat

Terminology

Viksit Bharat' means 'Developed India.'

Viksit Bharat is the Government's vision to drive the mission of making India a Completely Developed Nation .

VIKSIT BHARAT

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Resilient Infrastructure Through Digitalization

Usage at all Stages of Airport Infrastructure projects

- Land Acquisition
- Approvals
- Design
- Execution/Construction
- Operations
- Commissioning
- Decommissioning
- Expansion

(Restart the Cycle)

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Airport Infrastructure Planning & Design

- Complex process /Hierarchy
- Multidisciplinary specialists and stakeholders.
- All stages of Design, Planning ,Construction, Execution ,Operations & Maintenance (Decommissioning)
- Integrated Geospatial and BIM solutions refers to its usage right from the **start till the whole life cycle** of the project.

Resilient Infrastructure Through Digitalization

GIS Technology

- Geographic Information System (**GIS**) has mapping features and geographical databases
- Large assets
- 2D & 3D representations of geospatial shapes
- Natural and built environmental assets
- **Collects, creates, integrates, manages, analyzes, and visualizes spatial data using maps.**

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BIM Technology

Building information Modelling **(BIM**)Software links multiple disciplines to a **Single Design model**.

- BIM is a resource of information that is shared and that supports
  - document management,
  - trade coordination,
  - team collaboration,
  - 4D construction sequencing.

- Structural, MEP, BHS,ICT, Landscape, Façade & Roof, Sustainability, Traffic, Acoustics , Lighting, etc and many more are to be coordinated closely.

- BIM is trusted platform --- Data **precision** and **maximum efficiency**

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GIS Technology

The process of merging BIM and GIS data is referred to as BIM and GIS Integration.

Once merged, BIM and GIS data provides a **Geospatial element** that can be used in Infrastructure design, which

- Allows for more efficient workflows
- Consistent data
- Helps in reducing the data loss

Planning → Design → Construction → Operation → Maintenance

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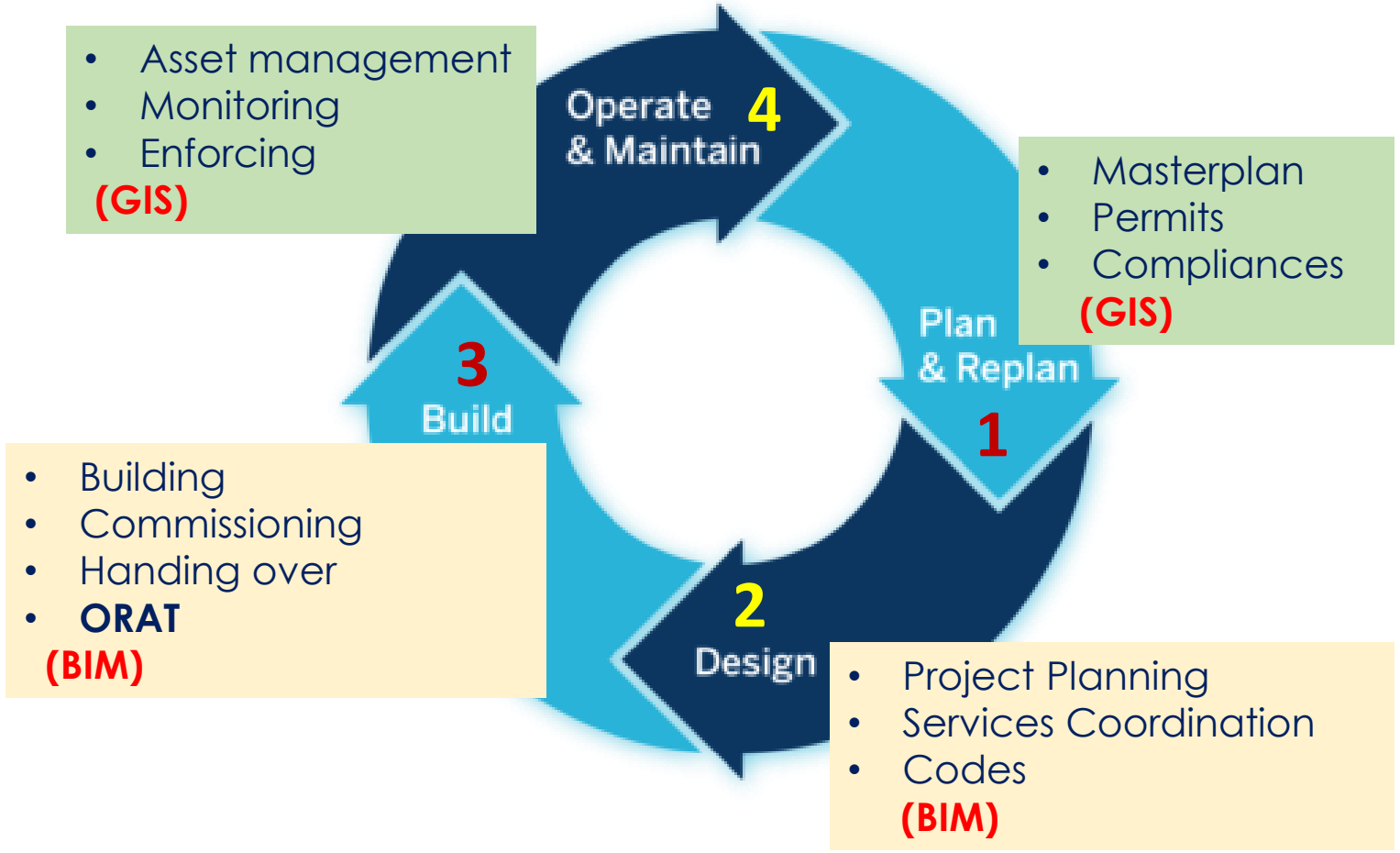
Project Cycle

- Data Driven Approach
- SME s inputs
- Stakeholders inputs
- Sustainable outcomes



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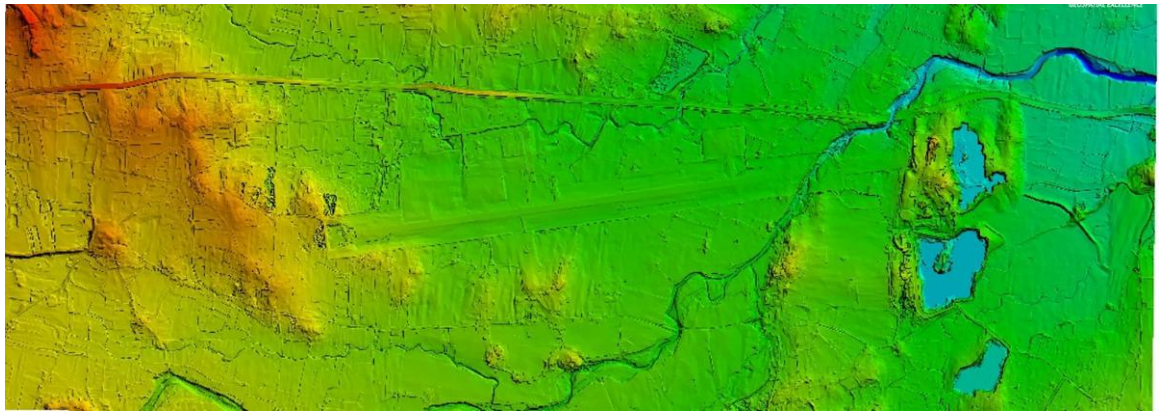
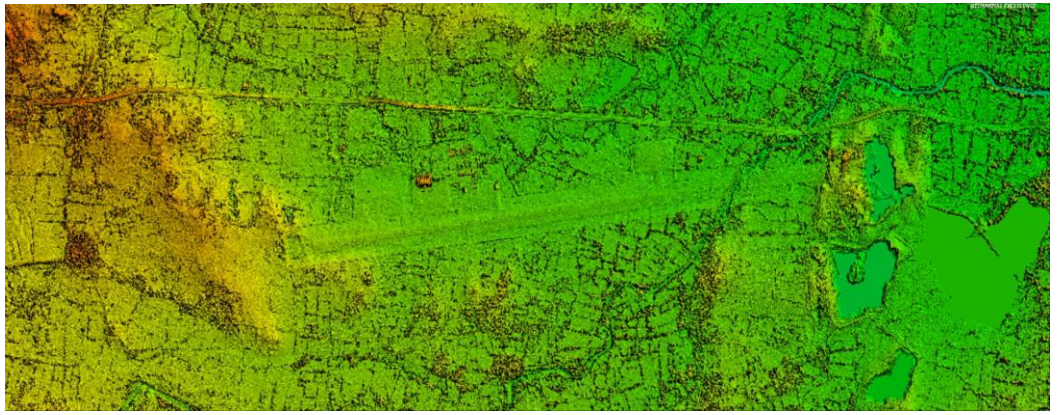
Land Acquisition/Land Use

DSM- Digital Surface Model
DTM-Digital Terrain Model

- DSM = (earth) surface including objects on it
- DTM = (earth) surface without any objects



DTM



DSM

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Digitalization –Codes & Compliances

Addressing policy requirements for Environmental clearances, Carbon neutrality, and Sustainable Aviation practices.

Examples -

a. NOCAS
b. Online processes
c. Height Restrictions etc
d. PARIVESH portal for Environmental Clearances (MoEFCC)
   Proactive And Responsive facilitation by Interactive and Virtuous Environmental Singlewindow Hub

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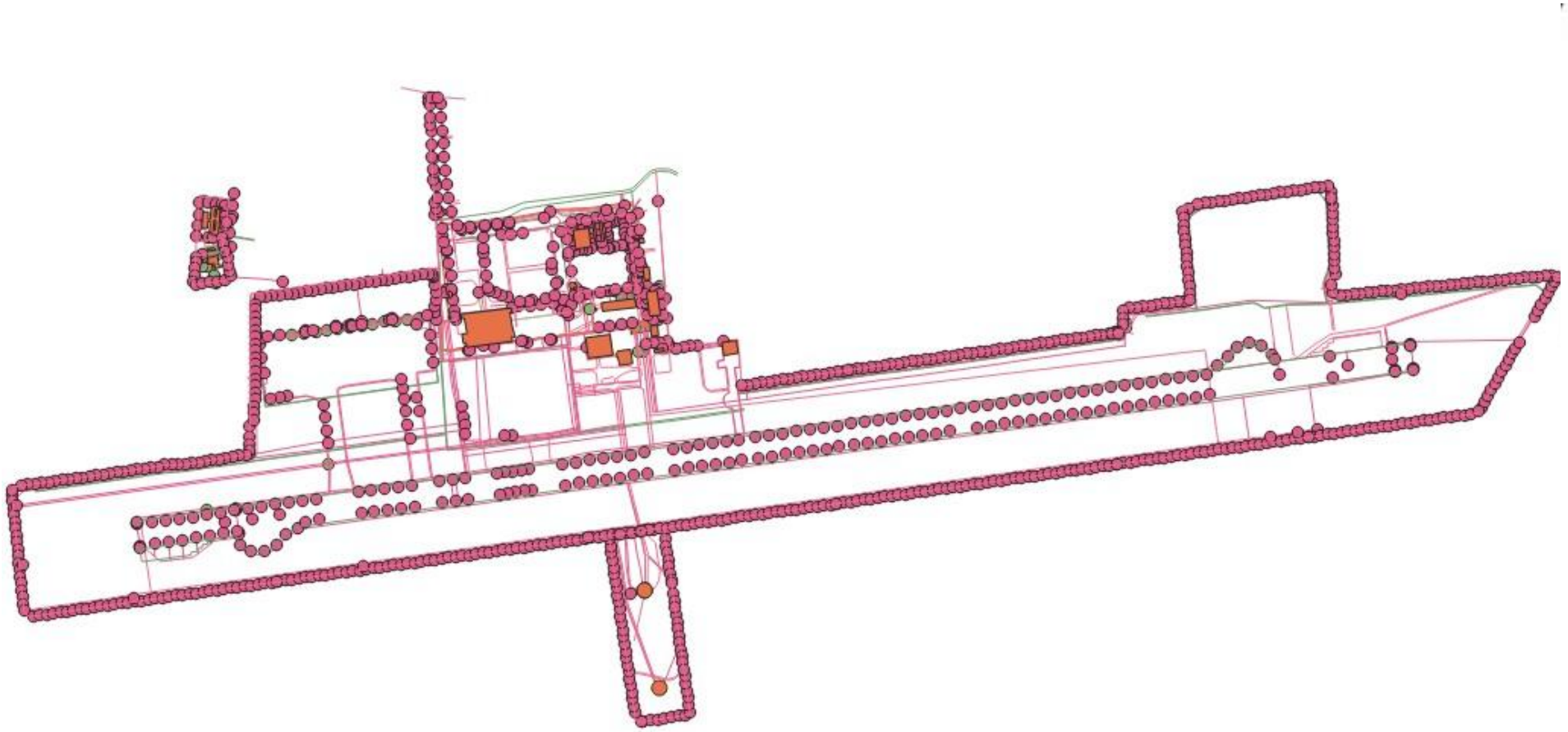
Digitalization –Mapping of Services



- ✓ BUILDINGS
- ✓ BOUNDARY
- ✓ AIRSTRIP_ROAD
- ✓ WATER-VALVE
- ✓ WATER_TANK
- ✓ UTILITY_BLOCKS
- ✓ UG-WATER LINE
- ✓ UG-TELECOM LINES
- ✓ UG-STORM WATER
- ✓ UG-SEWER LINE
- ✓ UG-FIRE PIPE
- ✓ UG-ELECTRIC LINE
- ✓ SUMP
- ✓ ROADS
- ✓ DRAINS
- ✓ CHAMBER_BLOCK
- ✓ CABLE_TRENCH

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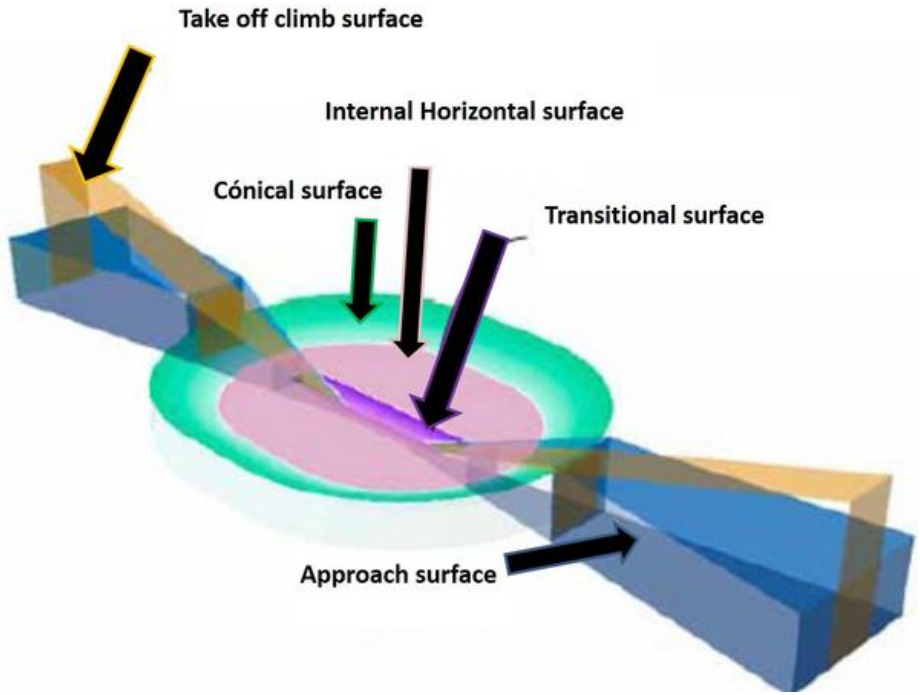
GPS

Obstacle Limitation Surfaces



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Terminal

T2

Source: google

T3

Source: google

- Simulations/Calculations/MDP/Reports/Etc
- **BIM**

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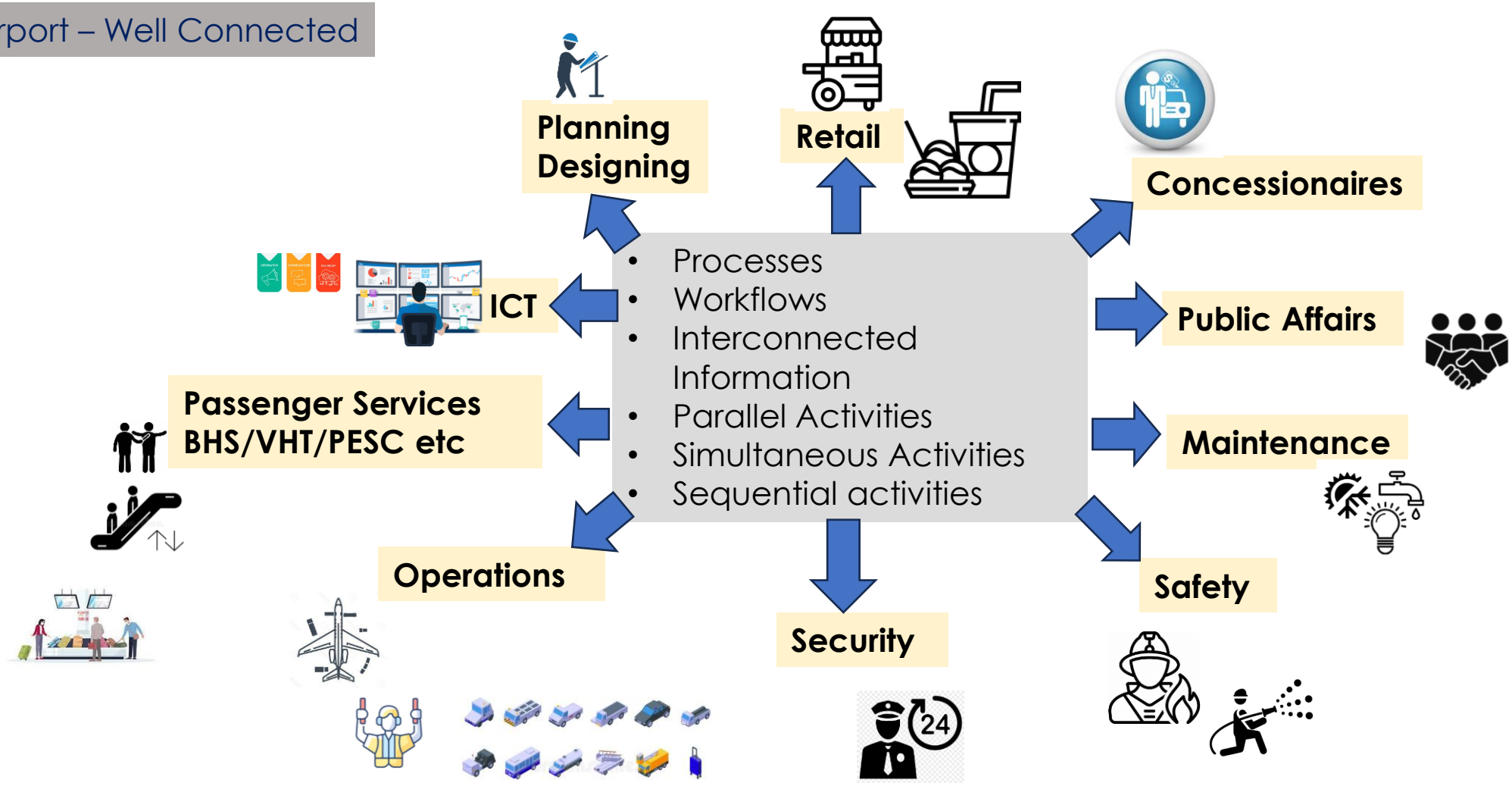
Smart Airport – Well Connected



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Services Integration

1. Electrical
2. Mechanical
3. PHE
4. Fire
5. ICT
6. Landscape/Horticulture
7. BHS
8. V/H/I transportation
9. Control Centre
10. Security
11. Ground Handling Services
12. Sustainability (special mention)
13. Etc

Source: google

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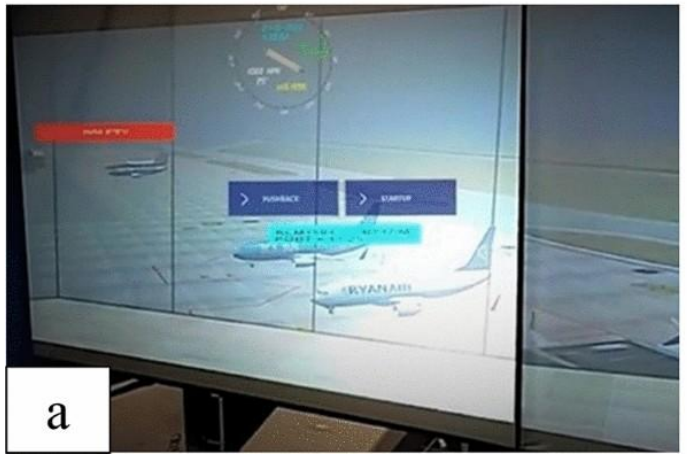
AR/VR

- Immersive Experience
- Finishes
- Decision Making



Source: google

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OPERATIONS

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Leveraging- Indoors positioning System

- Passenger Touchpoints
- Indoor Navigation
- Retail Outlets
- Assets Management

- Wireless fidelity-WIFI
- Radio Frequency Identification-RFID
- Bluetooth low Energy –BLE
- Global Positioning System-GPS
- Visible Light Communication –VLC

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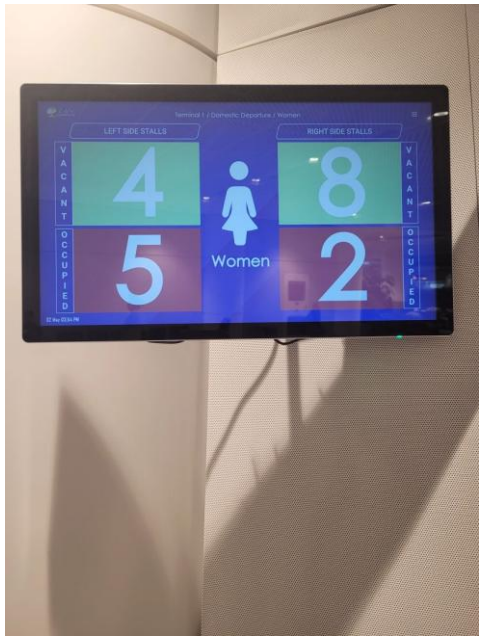
Smart Airport -Toilet



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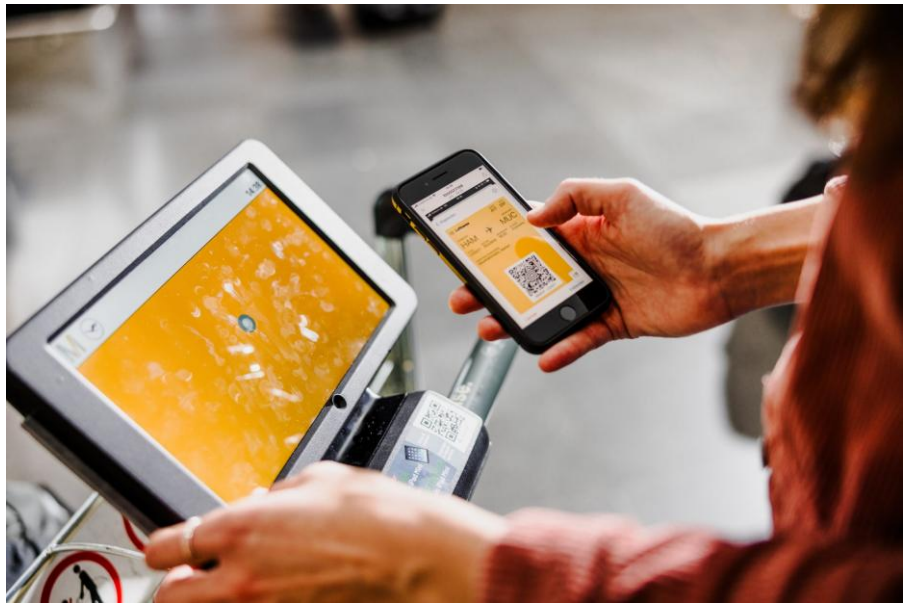
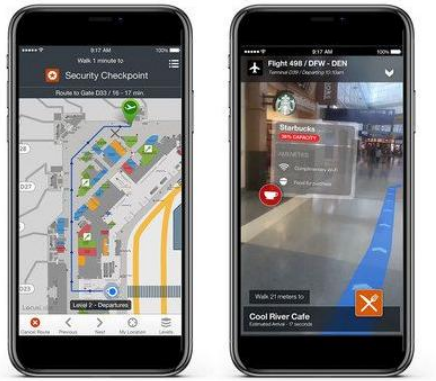
Smart Airport



SMART TROLLEYS

SMART NAVIGATION



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Robotics in Airport

Incheon Airport

Source: google

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Smart Trolleys

- Asper IATA Norms there should be at least 160 trolleys available for 1 million passengers at any airport.

- With LoRa (Long Range**)** **IOT platform** for the Airport Baggage Trolley system ,the entire fleet of baggage trolleys can be enabled with IoT technology.

- With this technology in place, there will be a substantial reduction in the waiting time of passengers for baggage trolleys and will ensure its availability in sufficient numbers in real time.

Source:Google

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Airport Digital Art for Pax Engagement

Changi Airport

Helsinki Airport

Source: google

Resilient Infrastructure Through Digitalization

Airport Digital Art for Pax Engagement

Changi Airport

Source: google

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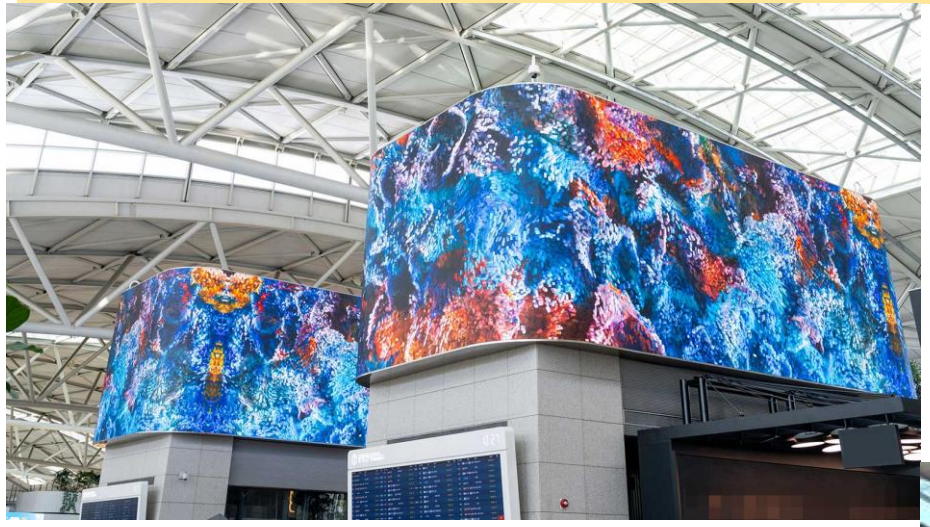
Airport Digital Art for Pax Engagement



Changi Airport

Source: google

MAINTENANCE

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SCADA

- Digital SCADA (Supervisory Control and Data Acquisition)
- Predictive Maintenance
- **Digital Twin**
- Monitor/Control/BMS

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Airport Infrastructure Planning & Design

SERVICES MAINTENANCE

ASSET MANAGEMENT
CARGO TERMINAL

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Is used at all Stages of Airport Infrastructure projects

- Land Acquisition
- Design
- Code Compliances/Approvals
- Execution/Construction
- Operations
- Commissioning
- Decommissioning
- Refurbishment

Digital Technology Leap

THANK YOU