AI-based Telecom against Natural Disaster

2021. 03.15 | **Hans (Hyugnsoo) KIM**, hans9@kt.com

Natural Disaster, main threat of Outside Plant

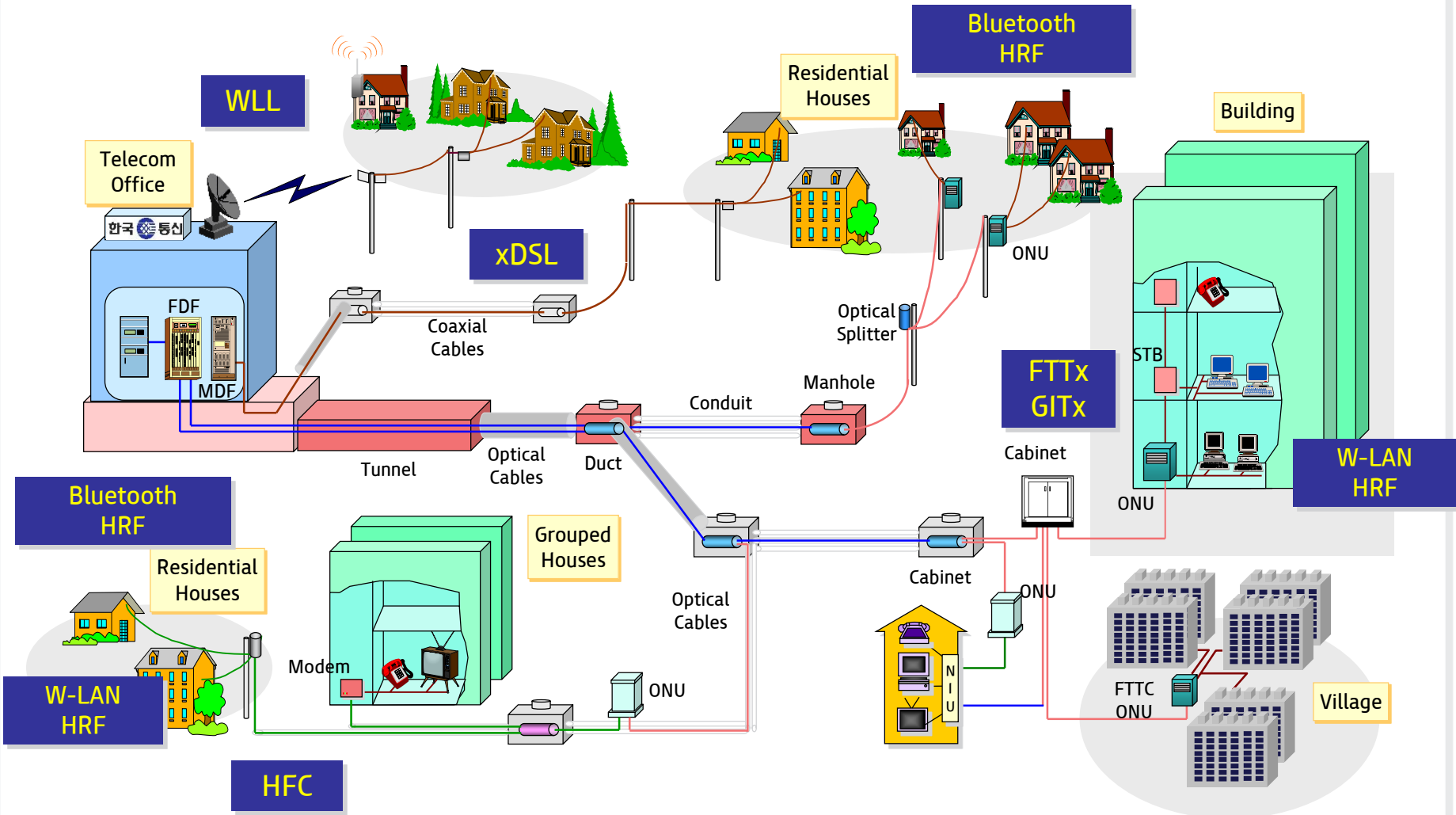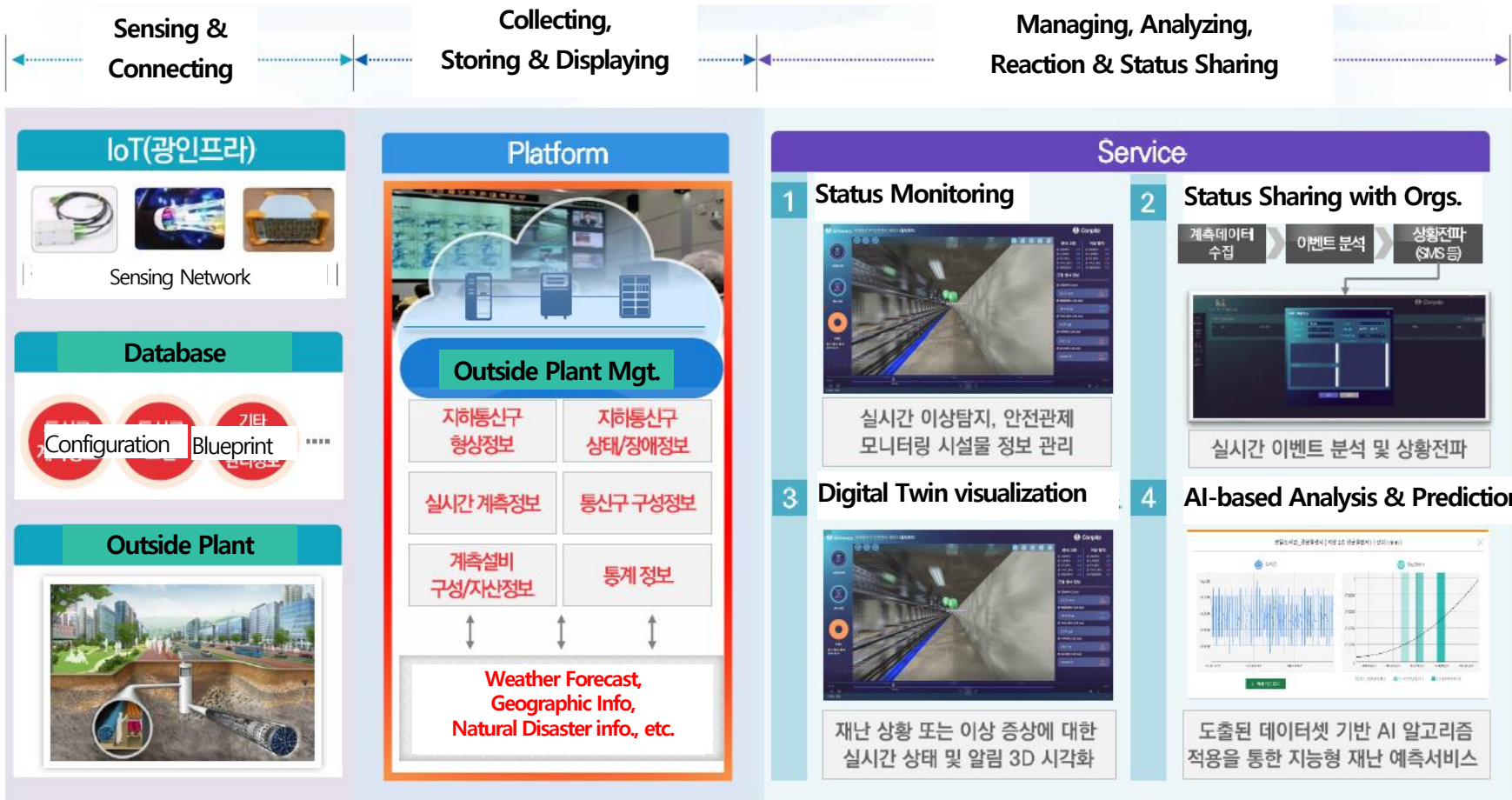| Wildfires	Floods

전선 밑 '찰랑' 물방울 '뚝뚝'··물난리 난 통신구

Outside Plant of Telco.

Various types of Tunnels, Conduits and Cabinets for telecommunications to be protected

24 hours monitoring of Outside Plant

Sensing & Connecting

Collecting, Storing & Displaying

Managing, Analyzing, Reaction & Status Sharing

IoT(광인프라)

Sensing Network

Database

Configuration | Blueprint | ....

Outside Plant

Platform

Outside Plant Mgt.

지하통신구 형상정보	지하통신구 상태/장애정보
실시간 계측정보	통신구 구성정보
계측설비 구성/자산정보	통계 정보

Weather Forecast, Geographic Info, Natural Disaster info., etc.

Service

1 Status Monitoring

실시간 이상탐지, 안전관제 모니터링 시설물 정보 관리

2 Status Sharing with Orgs.

계측데이터 수집 → 이벤트 분석 → 상황전파 (SMS 등)

실시간 이벤트 분석 및 상황전파

3 Digital Twin visualization

재난 상황 또는 이상 증상에 대한 실시간 상태 및 알림 3D 시각화

4 AI-based Analysis & Prediction

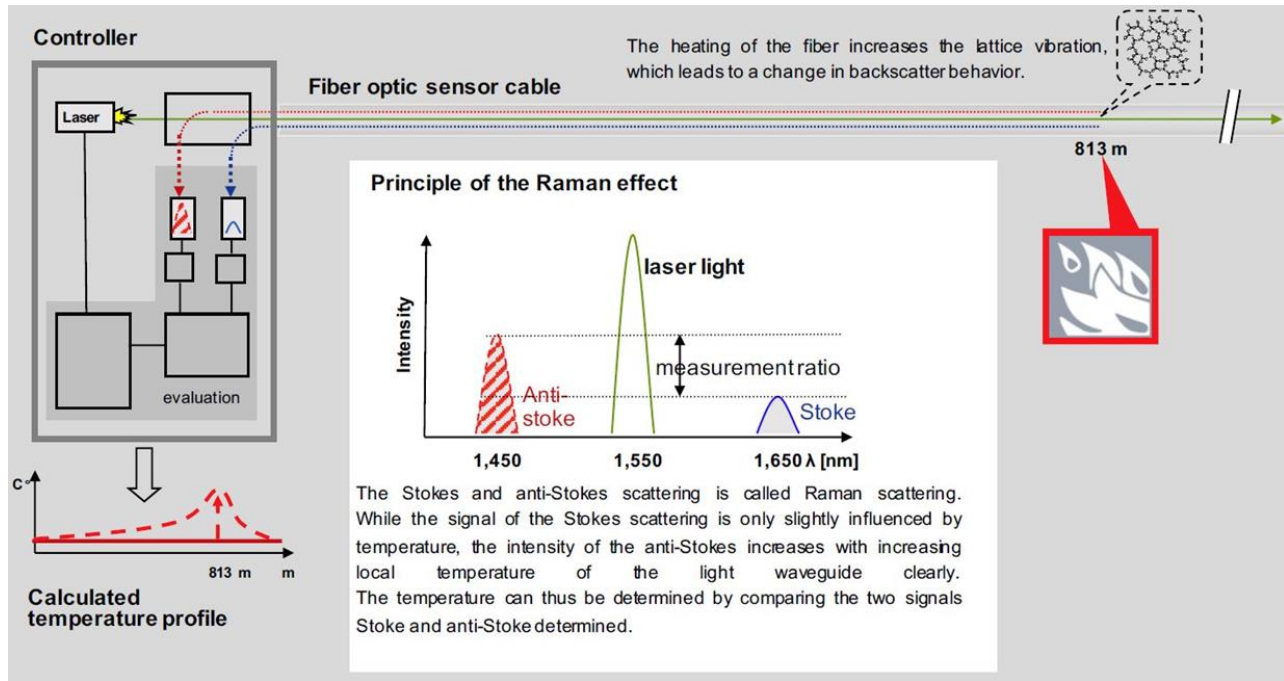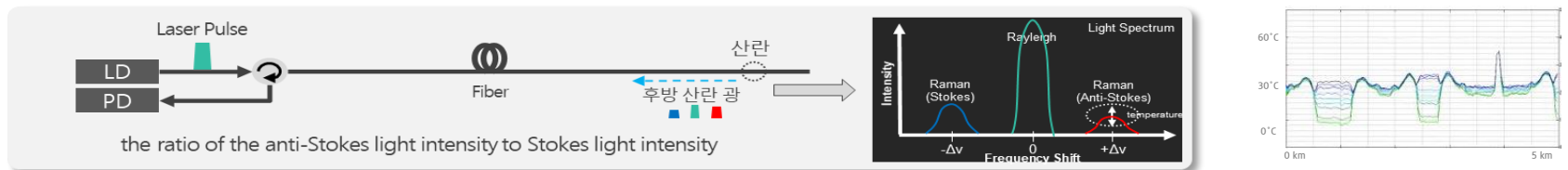도출된 데이터셋 기반 AI 알고리즘 적용을 통한 지능형 재난 예측서비스

DTS Monitoring for fire monitoring in Tunnel

DTS-based Temperature monitoring & AI-based Pattern perception

DTS (Distributed Temperature Sensing) technology

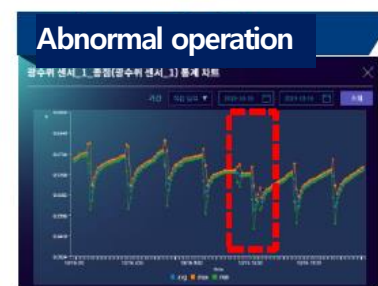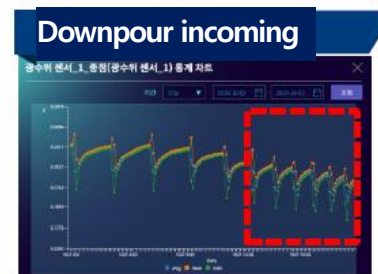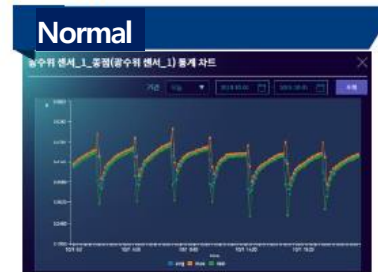- Raman Scattering effect in Optics is used

the ratio of the anti-Stokes light intensity to Stokes light intensity

Controller

Fiber optic sensor cable

The heating of the fiber increases the lattice vibration, which leads to a change in backscatter behavior.

813 m

Principle of the Raman effect

measurement ratio

Anti-stoke

Stoke

laser light

1,450   1,550   1,650 λ [nm]

Calculated temperature profile

813 m   m

The Stokes and anti-Stokes scattering is called Raman scattering. While the signal of the Stokes scattering is only slightly influenced by temperature, the intensity of the anti-Stokes increases with increasing local temperature of the light waveguide clearly. The temperature can thus be determined by comparing the two signals Stoke and anti-Stoke determined.

AI-based Water Pump operation in Tunnel

Water pump operation monitoring & AI-based Pattern perception

<Weather Forecast>
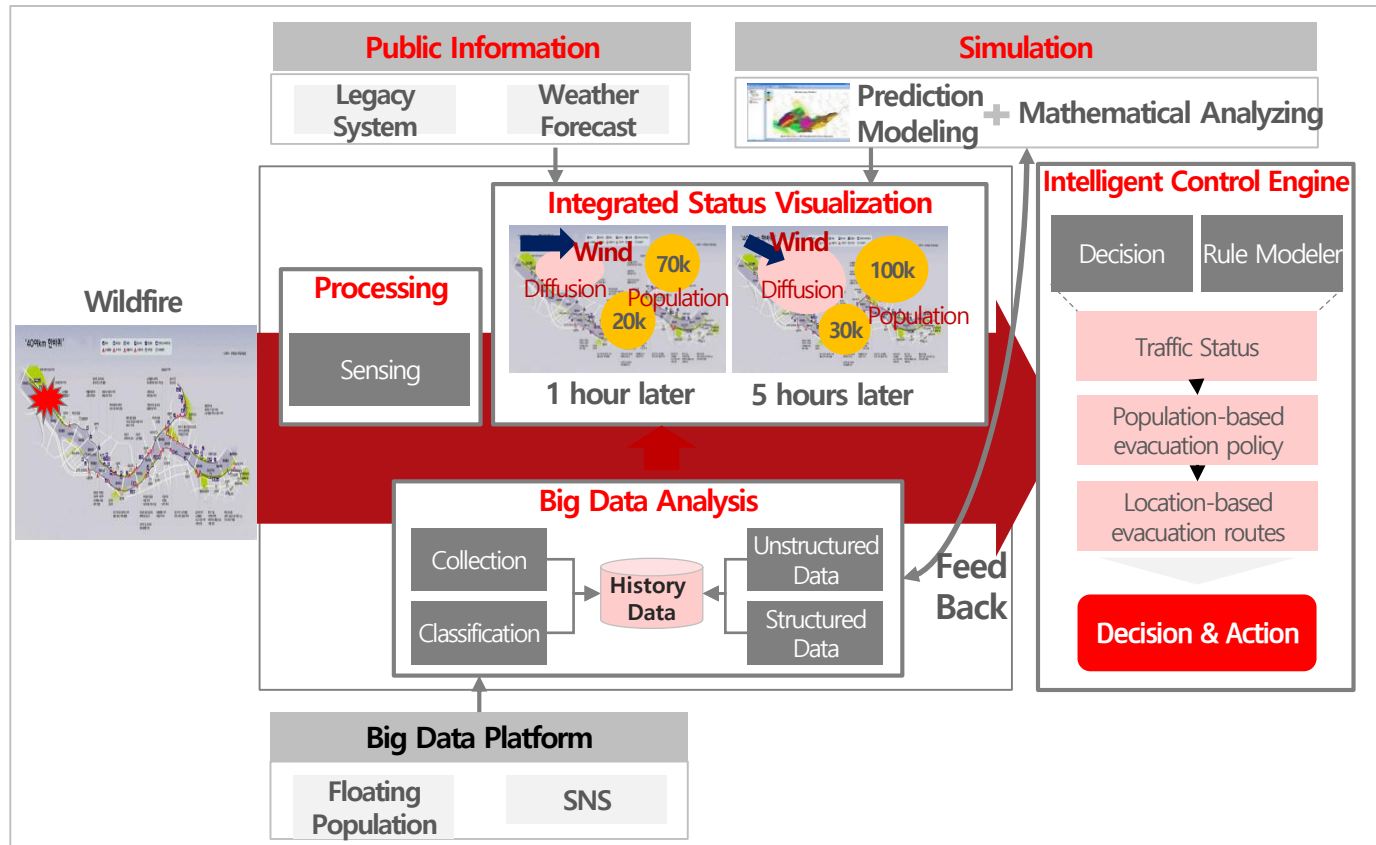
AI-based National Disaster Countermeasure Platform (1)

Structure; Analyzing, Simulating, Decision and Intelligent Control

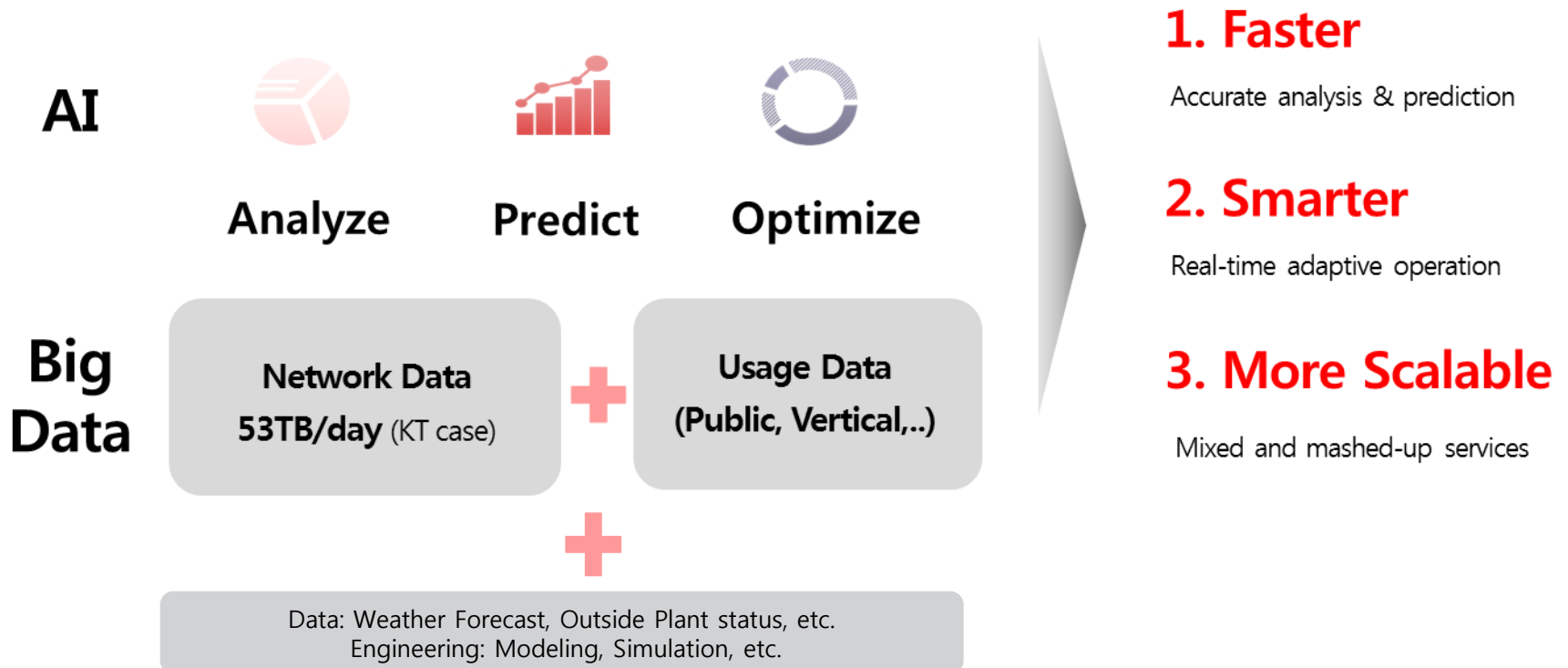# AI-based National Disaster Countermeasure Platform (2)

Ocean Disaster Detection

Natural Disaster Countermeasure, a reservoir of data

AI technology; faster, smarter and more scalable analysis, prediction & decision

AI

Analyze   Predict   Optimize

Big Data

| Network Data **53TB/day** (KT case) | ✚ | Usage Data (Public, Vertical,..) |

✚

Data: Weather Forecast, Outside Plant status, etc.
Engineering: Modeling, Simulation, etc.

1. Faster
Accurate analysis & prediction

2. Smarter
Real-time adaptive operation

3. More Scalable
Mixed and mashed-up services

The gaps related to the implementation/application of AI within the domain of natural disaster management

Data Standardization

- **Issues**
  - Proprietary use of Data by major vertical players hinders development of applications and reduces the usefulness of data-based insight
  - Upcoming more complicated correlations among vertical sectors against NDM
- **Considerable solution**
  - Single common standard **"Data Format"** is required for AI

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