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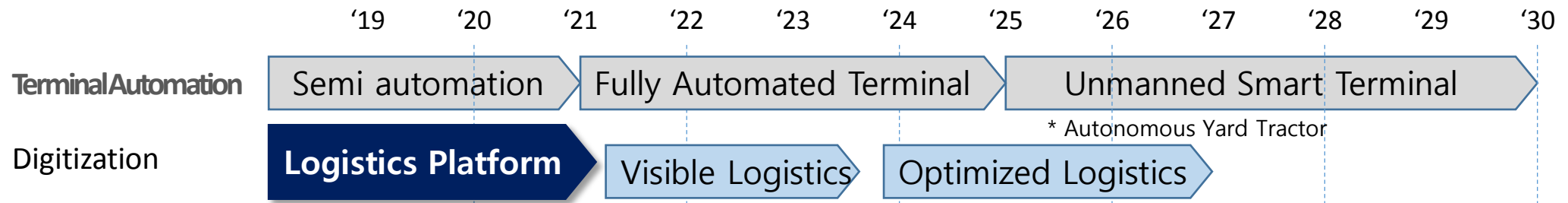
The Challenges of new and Disruptive Technologies to Ports and People

Current Status of Smart Port Progress in Busan Port

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Introduction

Smart port project utilizing the 4th IR technologies, including blockchain, big data, and IoT, is being implemented.



Background

▪ Continued increase in throughputs

- Year 2018: 21,663,000 TEU, T/S 11,429 TEU
- Avg. annual throughput growth of 4%

▪ Complex information sharing structure

- New Port: 6 terminals, North Port: 3 terminals
- 300 trucking companies and 60 carriers

▪ Different methods and insufficiency for information sharing

- email, EDI, mobile radio, phone, etc.

Corresponding Projects

Throughput prediction system based on big data

Block chain-based ITT service

Cloud-based port & logistics platform

Standardizing vessel-port information-sharing

Throughput Prediction System Based on Big Data

Throughput trend and cause of fluctuation by each country and carrier can be easily identified through big data analysis.

Used for Policy and Decision-Making

(Marketing, port operation, berth development, etc.)



ARIMA (artificial neural network prediction model)



Major results of big data analysis

■ Prediction of throughputs

- Trend by country & carrier
- Causes of fluctuation, abnormal change
- Medium to long-term prediction

■ Vessel delay status

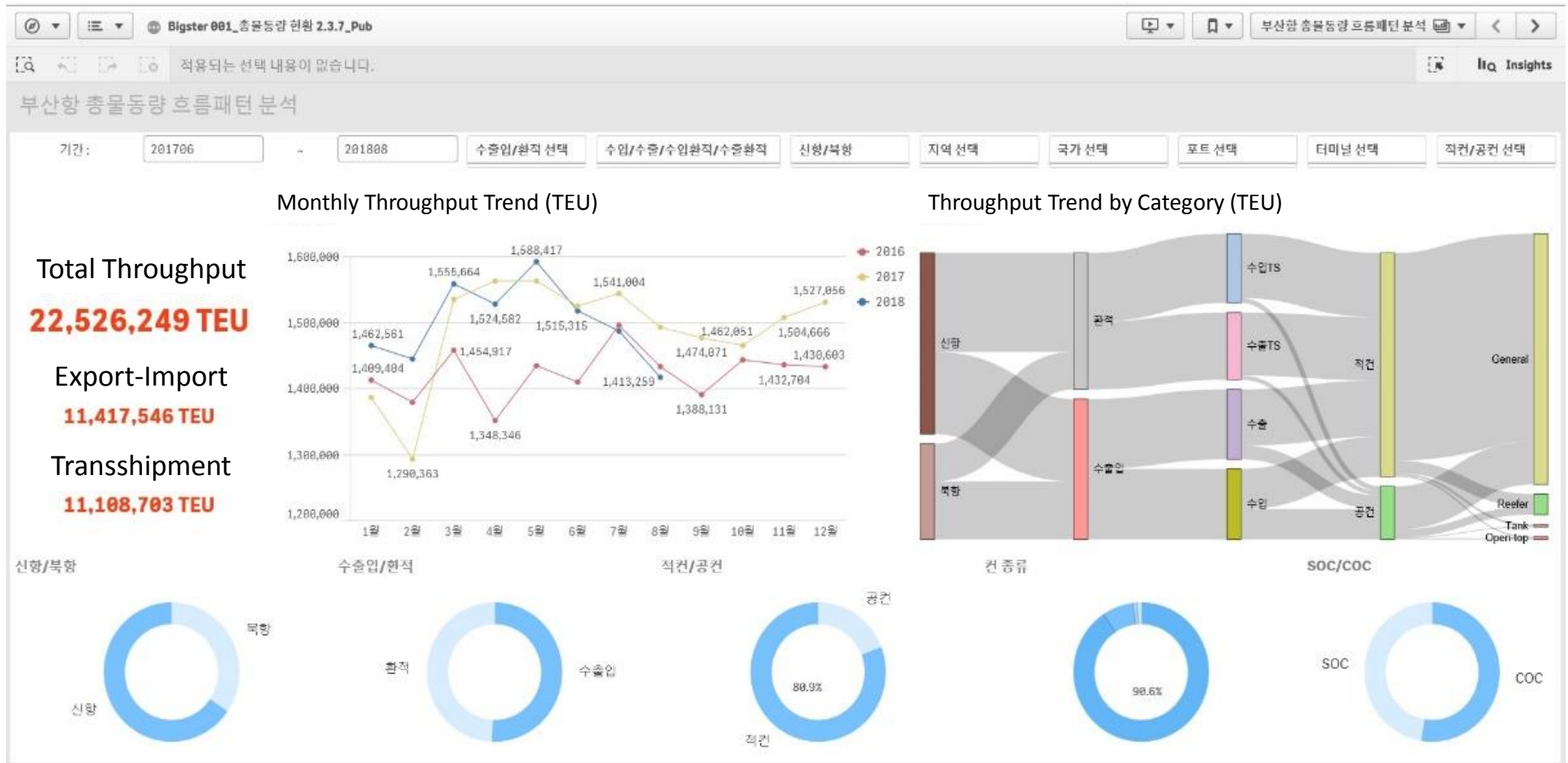
- Berth occupancy and availability status

■ Productivity

- Yard congestion by block
- Productivity by vessel and voyage

Throughput Prediction System Based on Big Data

Example of throughput trend



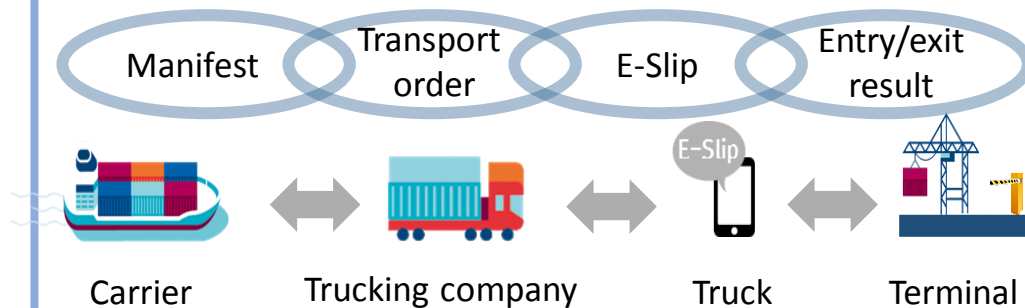
ITT(Inter-terminal transit) with Blockchain-Based Information Sharing

Blockchain technology is used to increase the efficiency of ITT cargo volume over 3 million TEUs. Information-sharing system among carriers, trucking companies, trucks, and terminals as well as the service for vehicle booking system(VBS) are being developed.

✓ Launched pilot service in 2018

- 1 trucking company, 1 carrier, and 3 terminals are participating.

Real-time exchange of information based on blockchain



- ✓ Expected decrease in truck waiting time and increase in back-haul rate
- ✓ Expected cost reduction resulting from free EDI document transmission

Phase 3

▪ Connecting inland and overseas ports

- Real-time tracking of logistics flow by connecting land transportation and overseas ports

Phase 2

▪ Developing vehicle booking system(VBS)

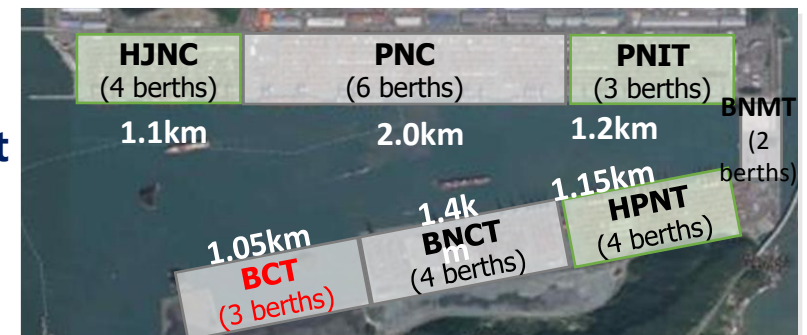
- Decreasing terminal congestion and improving transport efficiency

Phase 1

▪ Expanding participants

- 6 TMLs, 16 trucking companies, and 12 carriers

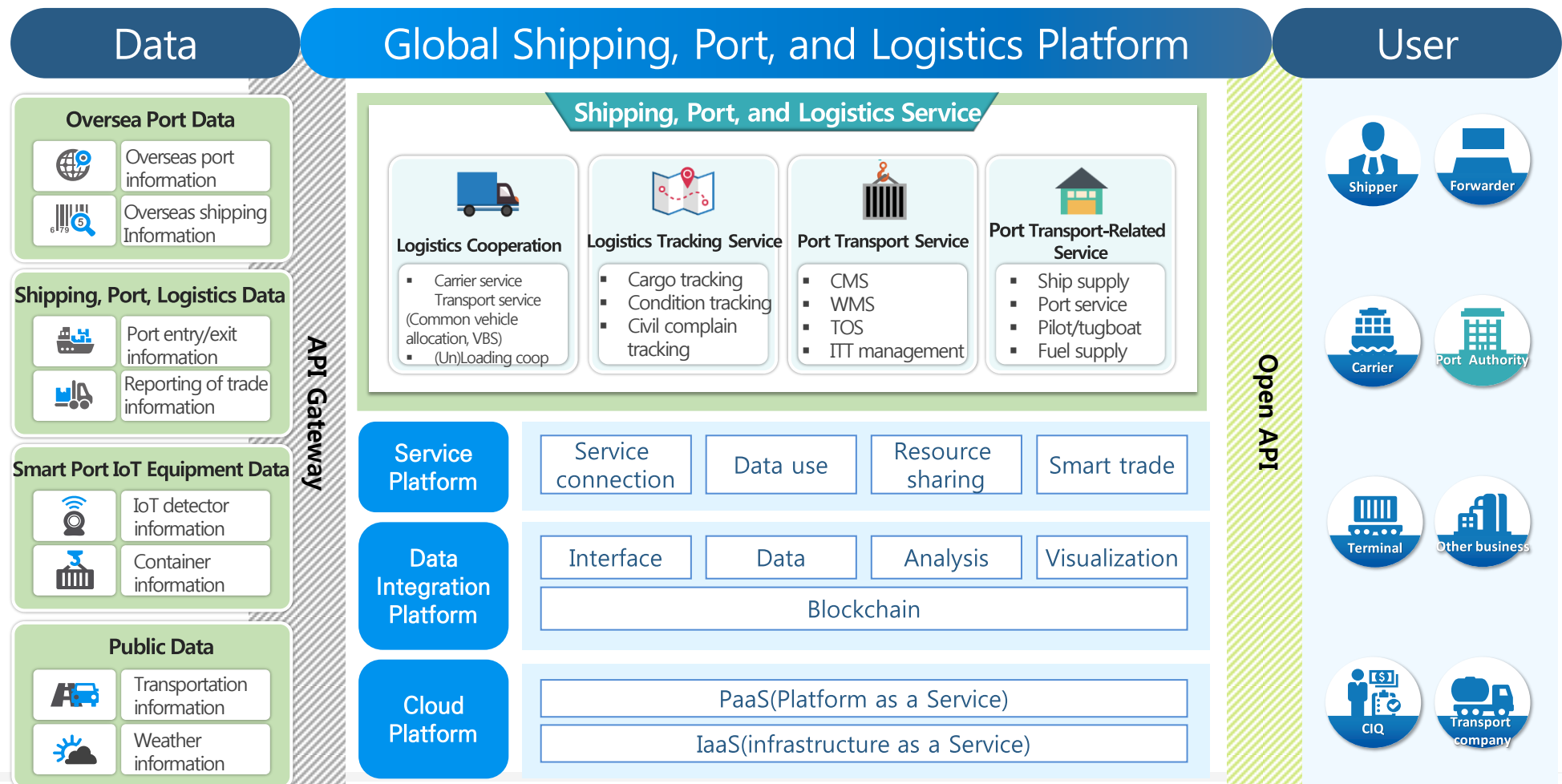
New Port Terminal



Establishment of Cloud-Based Port Logistics Platform

Establishing a platform for sharing information among ports and related parties and for providing services, such as cargo location tracking and ship supply market.

ISP for the Platform ('19) → Develop Platform and Related-Service ('20) → Connect Port and Land ('21)



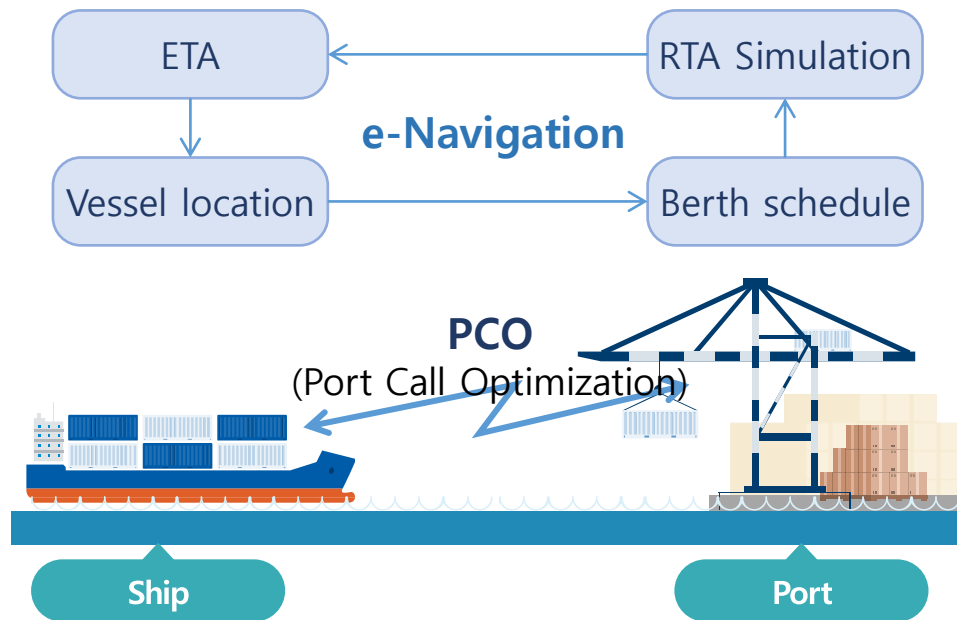
Vessel-Port Data Connection Simulation Based on PCO

* PCO : Port Call Optimization

Research project on optimizing berth operation and vessel arrival by connecting vessel-port information is being conducted as a part of e-Navigation system.

- ✓ Optimizing RTA and ETA
- ✓ Minimizing vessel waiting time

* RTA : Required Time of Arrival, ETA : Estimated Time of Arrival



Major Contents of Implementation

- **Participating to standardize global port terminologies (PCO)**
 - 7 Port Authorities, led by the Port of Rotterdam Authority, are participating
- **Optimization simulation through vessel-port data sharing**
 - Optimization of berth operation by utilizing vessel location information

Issues for Smart Port



Information connection among ports and related parties will grow in the future.

To this end, cooperation in standardization, security, related infrastructure, and policy changes among port authorities is getting more important than ever before.

Standardization

Defining standard terminologies, criteria, and codes are essential for information sharing among concerned parties (PCO, PortCDM, etc.)

* PortCDM : Port Collaborative Decision Making

Cyber Security

Protection against cyber hacking becomes more crucial task for the concerned parties

Infrastructure

Establishing port communication infrastructure, such as 5G and Lora, for IoT connection and high volume data transmission becomes a burden to PAs

Policy

Reviewing port policy of other ports for data connection and cooperation is necessary