



ASTM Committee F49 on Digital Information in the Supply Chain

Seminar: Bridging the Gaps

Date: November 1, 2023

Location: Washington Hilton, 1919 Connecticut Ave NW, Washington, DC,
District of Columbia





Meet F49: Our History, Scope, Mission and Stakeholder

9:15 am – 9:45 am



Supply Chain State Issues- Perspectives from the Surface Transportation Board- Patrick Fuchs

10:15 am – 11:00 am



Interactive Table Sessions- Small Group Discussions and Share Out

11:00 am – 11:30 am



Maritime Data System Requirements- Perspective from the Federal Maritime Commission- Carl Bentzel

11:30 am – 12:15 pm



Committee F49 on
Digital Information in
the Supply Chain



Meet F49: Our History, Scope, Mission and Stakeholder

Committee F49 on Digital Information in the Supply Chain

- F49 Video- https://youtu.be/4_TrGVIMJ0g
- History- Formed in October 2022.
- Officers:

Chair	Weiss, Jeffrey G	Supply Chain Optimization and Resilience Coalition
Sub Vice-Chair	Crumbly, Jack B	Tuskegee University
Recording Secretary	Handfield, Robert	North Carolina State University
Sub Membership Secretary	Zabrocki, Drew	Semios
- F49 Main Scope- The promotion of knowledge, stimulation of research, and the development of standards and specifications, formulation of definitions and terminology, and development of recommended practices and guides related to the sharing and use of digital information in the supply chain. The Committee will coordinate with any other ASTM Technical Committees and other standards development organizations (SDO) with related interests and ensure that the standards are technology and vendor neutral, and the standards development process is consistent with WTO principles.



Meet F49: Our History, Scope, Mission and Stakeholders

Committee F49 on Digital Information in the Supply Chain- Subcommittees

- F49.01 Terminology
- F49.02 Interoperability
- F49.03 Minimum Data Set for a National Freight Data Portal
- F49.04 Recommended Practices, Guides, and Specifications
- F49.05 Enabling Technology
- F49.06 Measurement
- F49.91 Long Range Planning

- F49 Mission

- <https://www.astm.org/get-involved/technical-committees/committee-F49>



Supply Chain Data Issues – Perspective from the Surface Transportation Board - Patrick Fuchs, Member, Surface Transportation Board



[Surface Transportation Board \(stb.gov\)](https://stb.gov)

The Surface Transportation Board is an independent federal agency that is charged with the economic regulation of various modes of surface transportation, primarily freight rail. The STB exercises its statutory authority and resolves disputes in support of an efficient, competitive, and economically viable surface transportation network that meets the needs of its users.



Interactive Table Session- Small Group Discussion and Share Out

Key Takeaways / Big Ideas

What stood out for you this morning?

What is something you learned/found interesting?

Why does it matter?

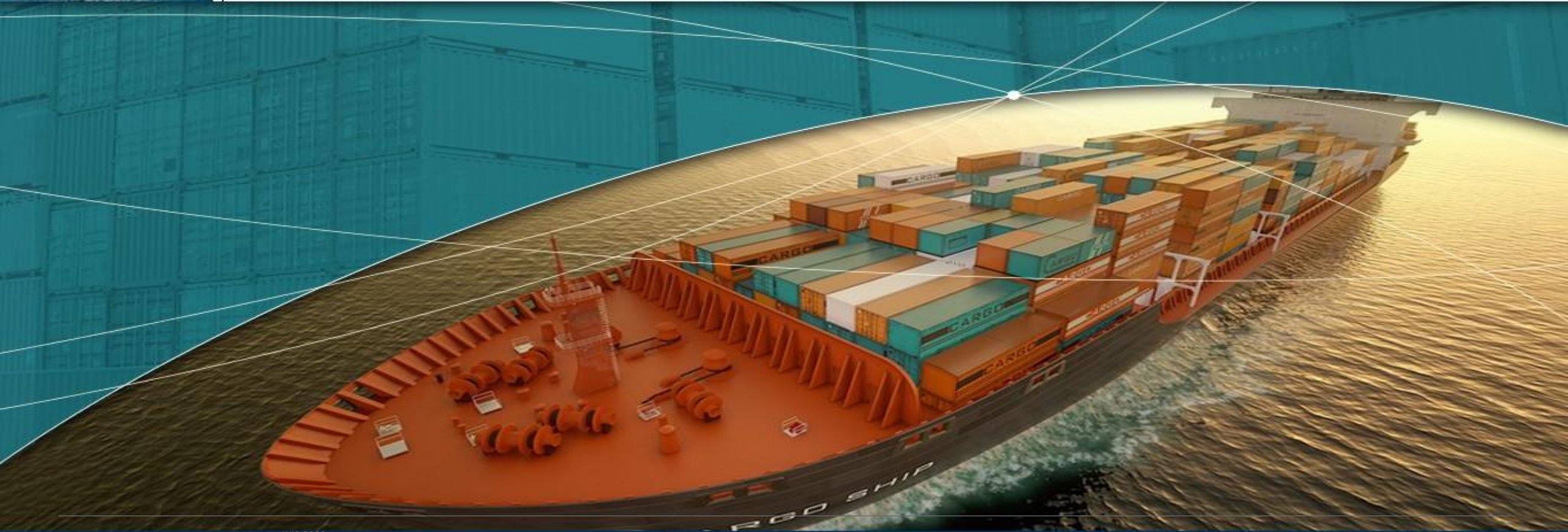
Call To Action / Paint the Vision

What are the most important next steps for F.49?

One year from now how will we have made a difference?



Maritime Transportation Data Initiative (MTDI) Preliminary Recommendations and Next Steps Commissioner Carl W. Bentzel





Motivation and Goals

Role of FMC:

46 U.S.C § 40101, the FMC is tasked with, “provid[ing] an efficient and economic transportation system in the ocean commerce of the United States that is, insofar as possible, in harmony with, and responsive to, international shipping practices.”

46 U.S.C. § 41102, “A common carrier, marine terminal operator, or ocean transportation intermediary may not fail to establish, observe, and enforce just and reasonable regulations and practices relating to or connected with receiving, handling, storing, or delivering property.”

Outputs:

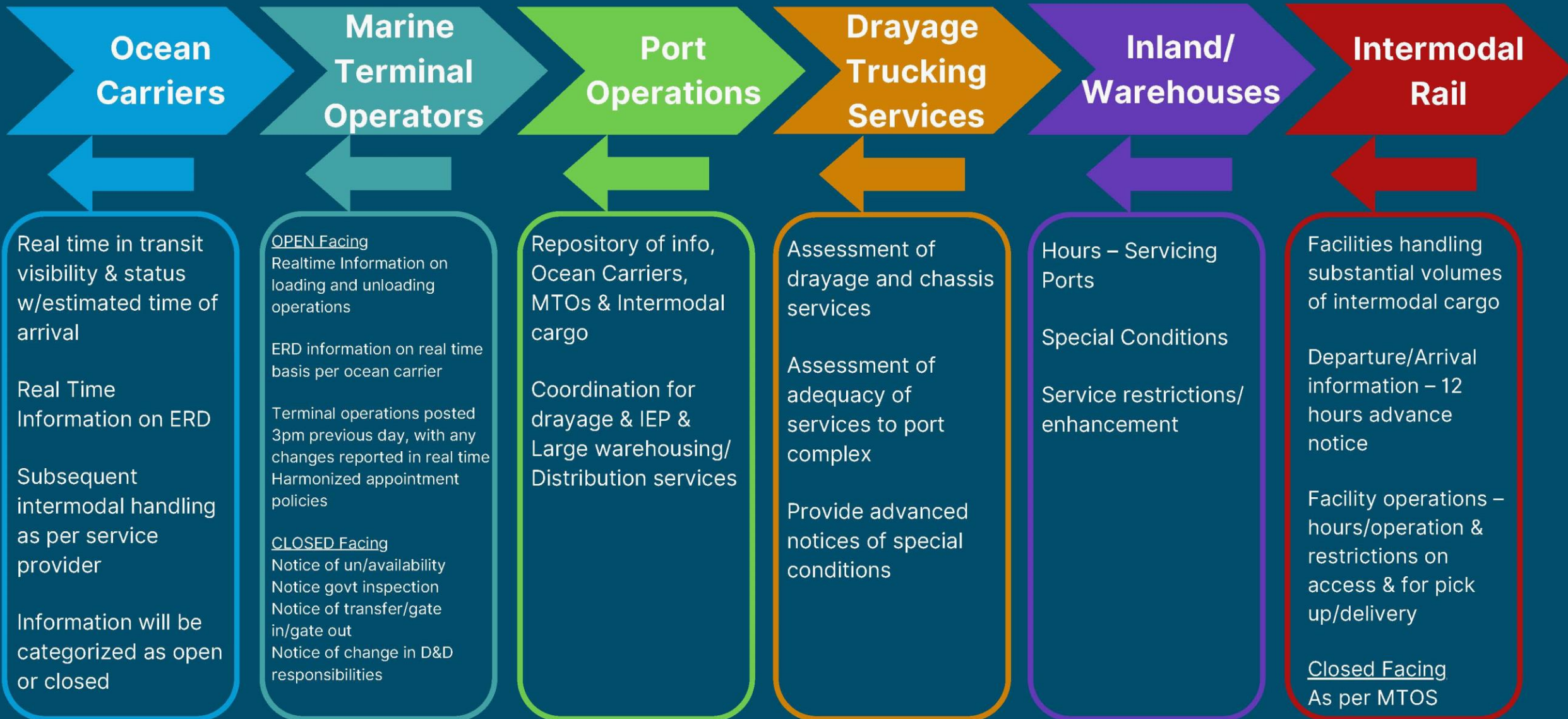
- Comprehensive and well-documented data dictionary
- Recommended data structures/standards and Reporting Requirements



December 2021-June 2022

- **18 meetings and over 80 presenters**
 - Live sessions and Recorded and saved on FMC YouTube Channel:
https://www.youtube.com/channel/UCwKTAIGGHIA0xcN3bDt_Uqg
- **Covered the entire maritime supply chain**
- **Maritime Data Summit Held June 1st – Initial Feedback Provided**
- **Continue Working Closely with Federal Partners:**
 - **CBP**
 - **USDOT**
 - **Commerce Department**
 - **USDA**
 - **State Department**
 - **Census**
- **Outreach and Feedback with Industry Continues w/Draft Recommendations**

Maritime Transportation Data Initiative Flow



****Information will be categorized as open or closed****



Expanded Engagement and Next Steps

- Releasing two Request for Information (RFI) to further refine recommendations
 - First RFI (released August 16th) focused on Data Visibility (received 45 comments)
 - Second RFI is being finalized and will be released shortly. This RFI will focus on Data Accuracy.
 - A third RFI is a possibility.....

We are compiling and reviewing these comments with FMC staff and will be issuing revised proposed recommendations.



Refresh / Welcome Back
1:00 pm – 1:15 pm



**Update on the White House FLOW Initiative -
Supply Chain Advisor Andrew Petrisin,
Department of Transportation**
1:15 pm – 2:00 pm



**Where's my stuff, when will it get there and
who knows about it? Shared perspectives
from Shippers, Industry and Tech
stakeholders**
2:00 pm – 2:45 pm



**Interactive Panel Conversation w/ Industry
Stakeholders and Subcommittee Leads**
3:15 pm – 4:15 pm



F49- Wrap-up
4:15 pm – 4:30 pm

Committee F49 on Digital Information in the Supply Chain





F49- Refresh / Welcome Back



FLOW

Freight Logistics Optimization Works

Update on the White House
FLOW Initiative –
Supply Chain Advisor
Andrew Petrisin,
Department of Transportation



U.S. Department of Transportation
Office of the Secretary of Transportation

Fall 2023

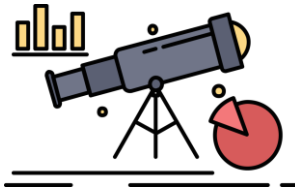


The Goal of FLOW is to help industry:



Be Descriptive

- Visualize logistics flows and throughput



Be Predictive

- Improve ETA predictions (port arrival, terminal dwell)



Be Prescriptive

- Optimize inventory stocking levels
- Optimize carrier resourcing levels and costs
- Reduce drayage dwell times



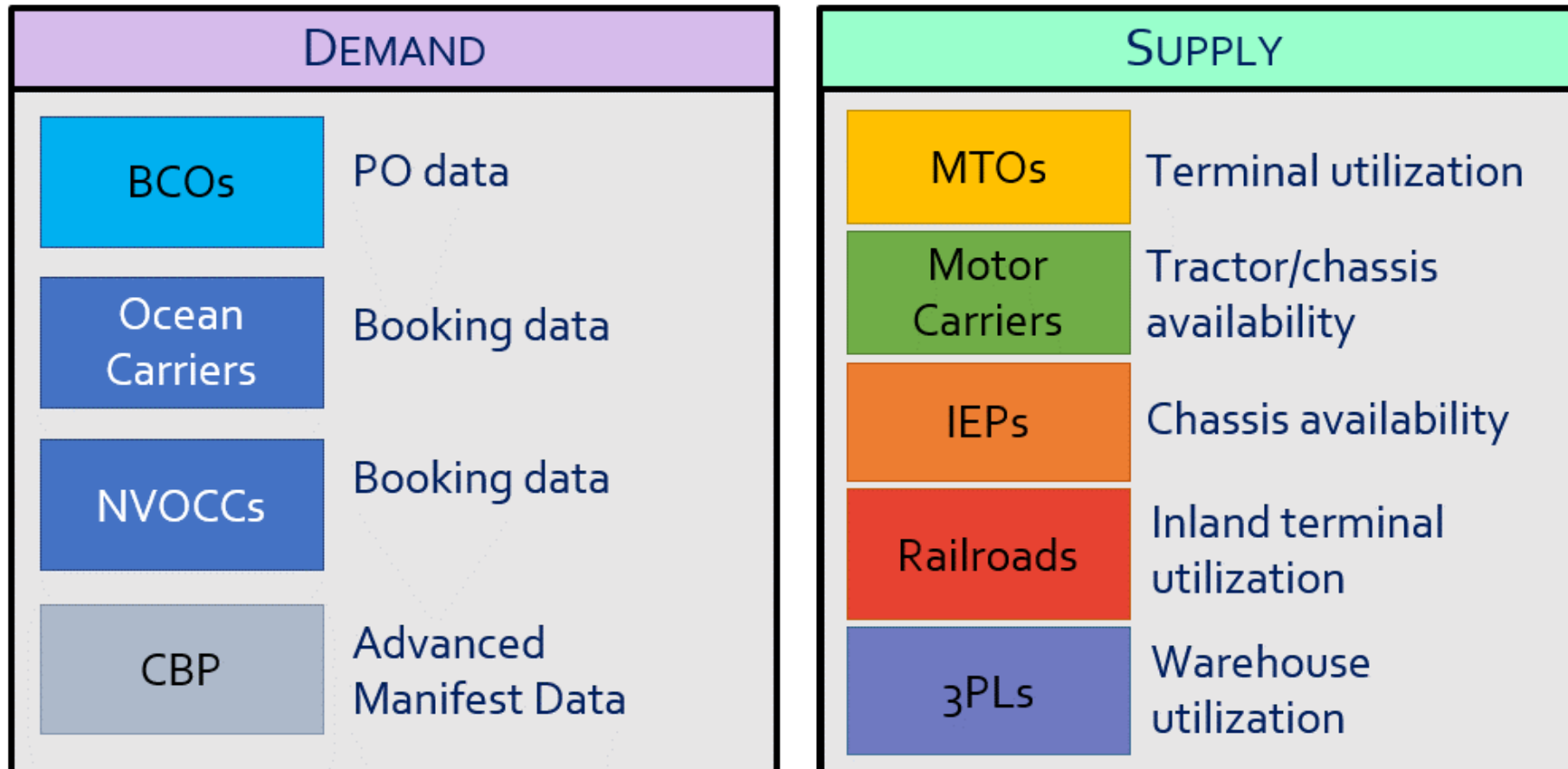
Who participates in FLOW?

FLOW makes future logistics demand and current logistics supply transparent across the supply chain.





What data is shared?





How does FLOW work?

1. Companies confidentially submit freight activity information to USDOT
2. USDOT checks data for quality control, then adds to FLOW database
3. USDOT aggregates FLOW partner data to show total incoming freight demand, throughput, and regional capacity
4. FLOW participants access FLOW data for their planning efforts



A shared data utility for supply chain context

(synthetic data)

Online Portal



User ID

Password

[Forgot password?](#)



A shared data utility for supply chain context

(synthetic data)

Manual Upload

SFTP

API

A screenshot of the 'Upload Data File' page on the Bureau of Transportation Statistics FLOW Data Portal. The page header includes the United States Department of Transportation logo and the text 'Bureau of Transportation Statistics FLOW Data Portal'. The navigation menu contains 'Upload Data File', 'Uploaded Files', 'Dashboard', 'Data Download', 'Announcements', 'About', 'Andrew Petrisin', and 'Log out'. The main content area has a heading 'Upload Data File' and a section for 'Data File Description' with a text input field containing the placeholder text 'Please provide a brief description of the data file.' Below the input field is a green button labeled '+ Select Data File'. At the bottom right of the page is a dark blue button labeled 'Done'.



A shared data utility for supply chain context

(synthetic data)

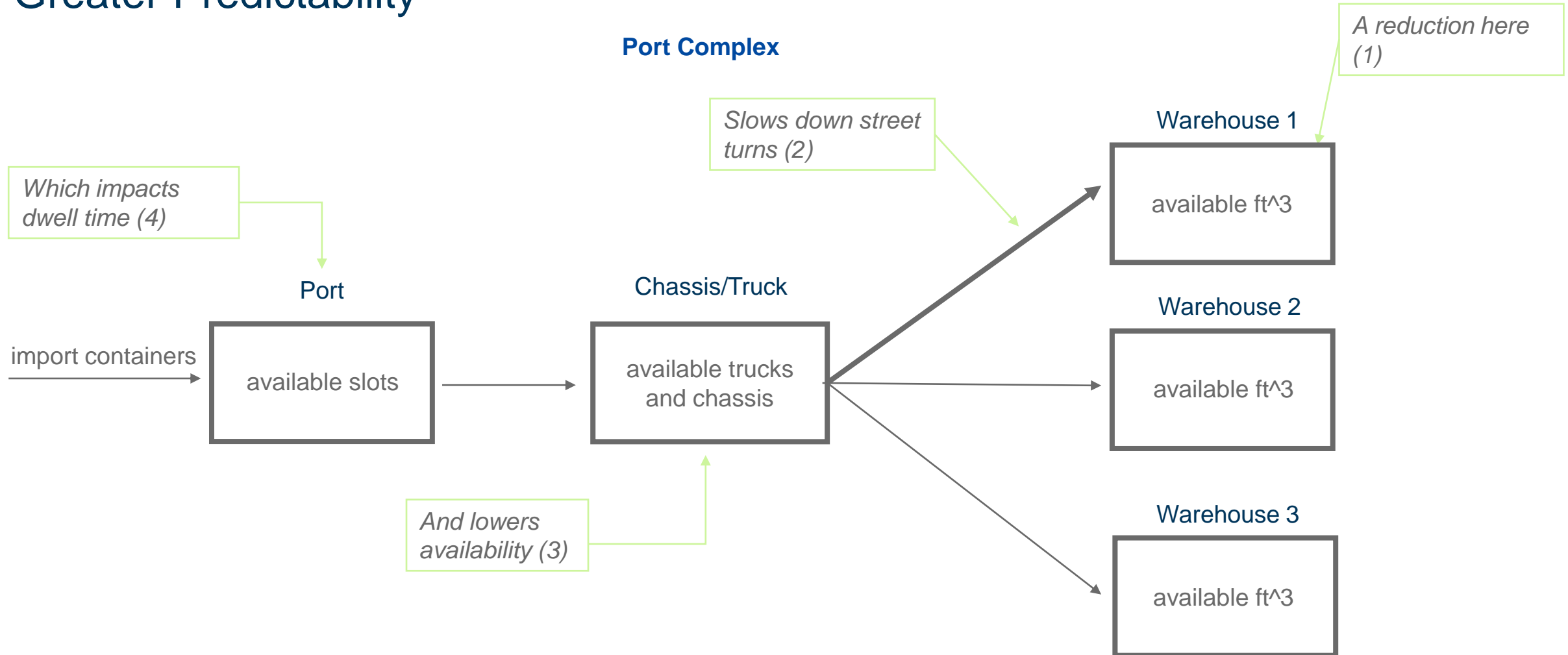
Dashboard

Data Download





A More Reliable Freight Network – Greater Predictability





FLOW Principles

1. Voluntary
 - FLOW is a voluntary, market-based public-private partnership
2. Participatory
 - Access to aggregated FLOW data requires providing qualified data
3. Commercially Valuable
 - A shared, common view of the international intermodal freight system



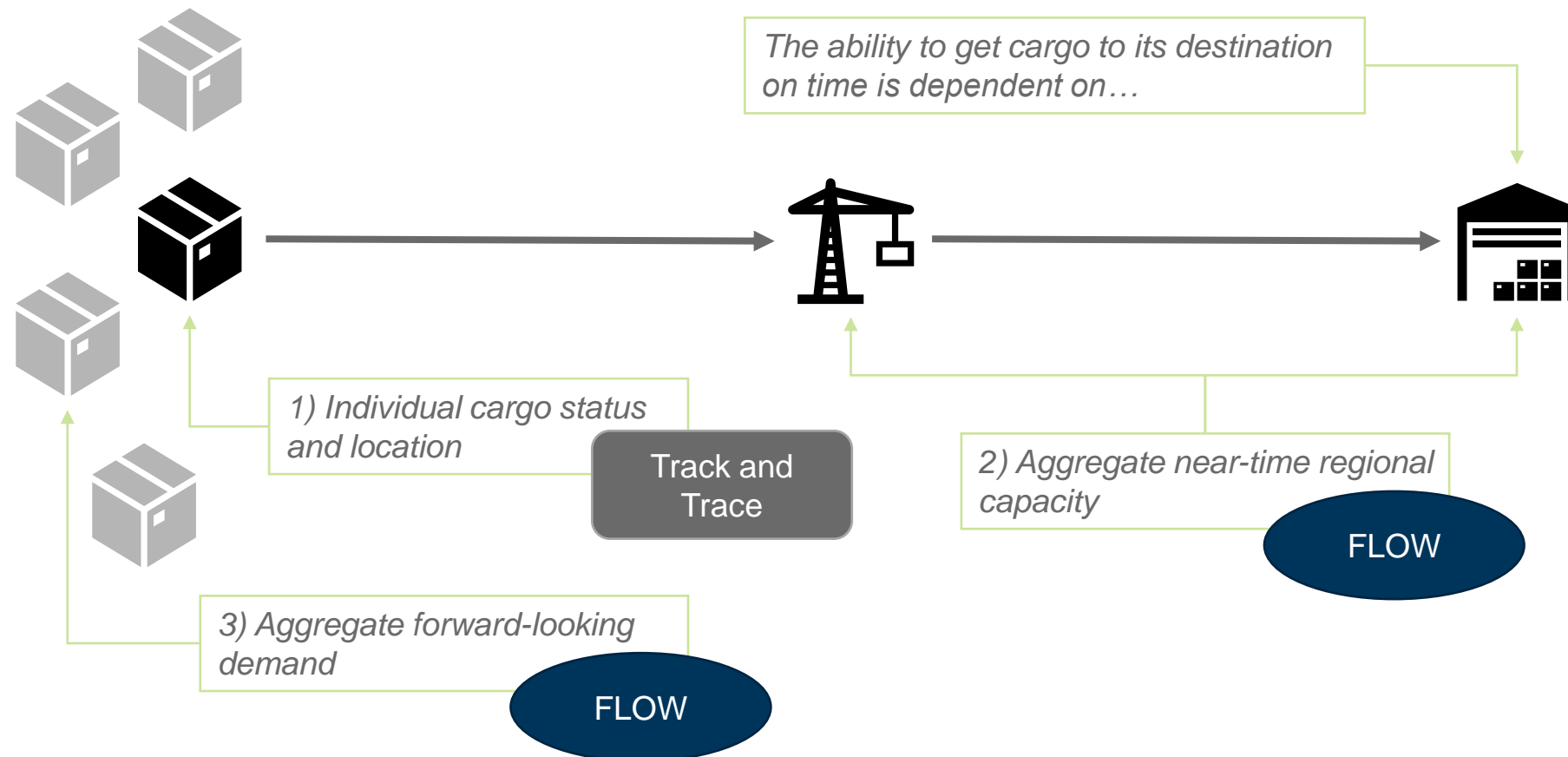
How does FLOW Protect your Data?

1. Partnership with the Bureau of Transportation Statistics (BTS)
2. BTS utilizes federal data privacy law, “CIPSEA”
 - Per CIPSEA, participant data not subject to:
 - FOIA
 - Subpoena/legal discovery
 - Regulatory use



FAQ: Is FLOW Track and Trace?

No, FLOW does not track individual containers through the lifecycle of a shipment.





How to join?

1. Reach out to FLOW@dot.gov.
2. Identify information you can contribute to the exchange.
3. Review and sign Memorandum of Agreement.
4. Set up FLOW account and begin exchange.
5. Receive data and join regular FLOW meetings.



Where's my stuff, when will it get there and who knows about it? Shared perspectives from Shippers, Industry and Tech stakeholders

Speakers:

- **James Swanson-** (Retired) Director, Cargo Security and Controls at US Customs and Border Protection, Independent Consultant
- **Chris Adderton-** Senior Vice President, Council of Supply Chain Management
- **Paul Walter-** Strategy Director Digitization, Port of Rotterdam
- **Benoit Montreuil-** Professor, Georgia Institute of Technology



Interoperability Requires a Language

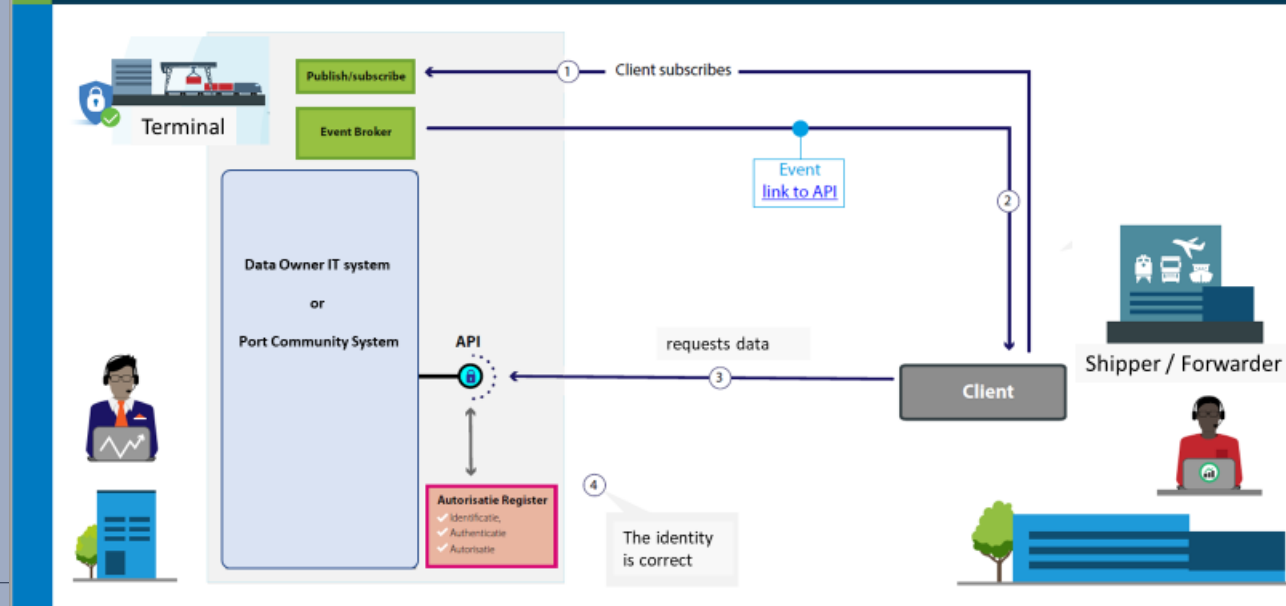
Paul R.N. Walter – Port of Rotterdam



Time & Trust
Contracts & Compliance



A governments supported language





Physical Internet Center

Supply Chain & Logistics Institute

**On the Emerging Physical Internet:
Progress and Challenges Toward Resilient, Sustainable,
Hyperconnected Freight Transportation & Logistic Ecosystems**

Benoit Montreuil

Director, Physical Internet Center
Director, Supply Chain & Logistics Institute
Professor, School of Industrial & Systems Engineering
Coca-Cola Chair in Material Handling & Distribution
Georgia Institute of Technology

CREATING THE NEXT®

Plenary Presentation, WCTR 2023
2023/07/18

The Physical Internet Journey

Hyperconnected global logistics system

enabling seamless open asset sharing and flow consolidation

through standardized encapsulation, modularization, protocols and interfaces

**to improve the capability, efficiency, resiliency and sustainability
of fulfilling humanity's needs for physical object services**



Image source: clyderathbone.com

**Hyperconnected:
Components and actors intensely
interconnected on multiple layers,
ultimately anytime, anywhere**

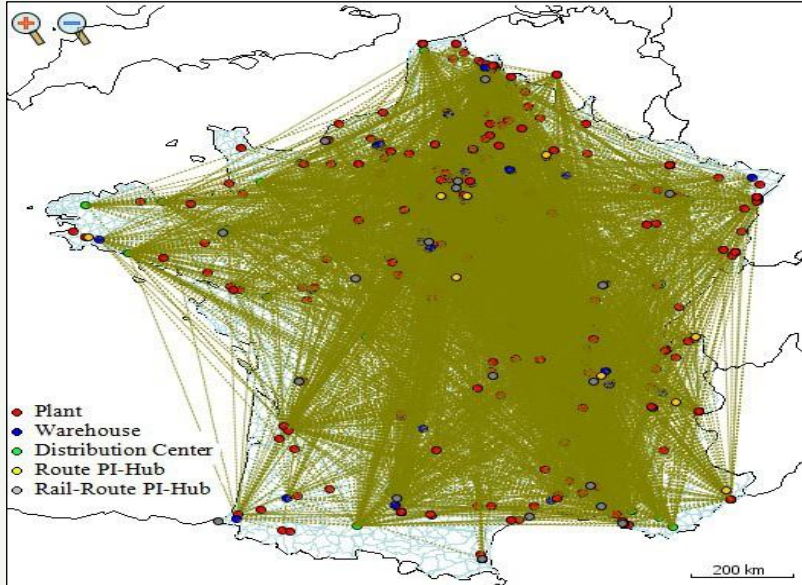
**Interconnectivity layers:
digital, physical, operational,
business, legal and personal**

Hyperconnected system definition by B. Montreuil, International Physical Internet Conference, Keynote Presentation, July 2015; PI definition adapted by Montreuil B, R.D. Meller & E. Ballot, June 2015 from Montreuil B., R.D. Meller & E. Ballot (2012). Physical Internet Foundations, In: Service Orientation in Holonic and Multi Agent Manufacturing and Robotics, edited by T. Borangiu et al., Springer.

Hyperconnected Transportation: Large Scale Experiment in France

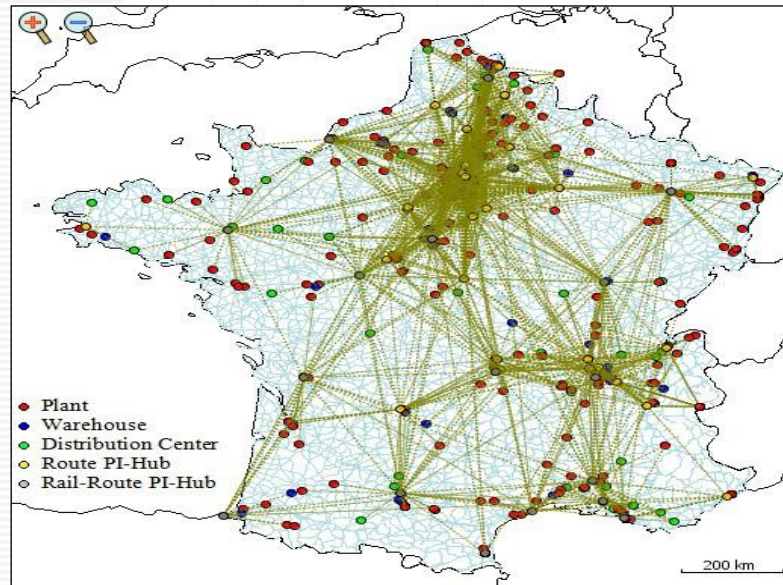
Simulation Experiment with Top Retailers Carrefour & Casino and their top 100 suppliers

Modular Containers; Open Crossdocking Hubs; Multimodal, Multi-Party, Inter-Hub Routing
Three simple distributed protocols: container packing, routing and consolidation protocols



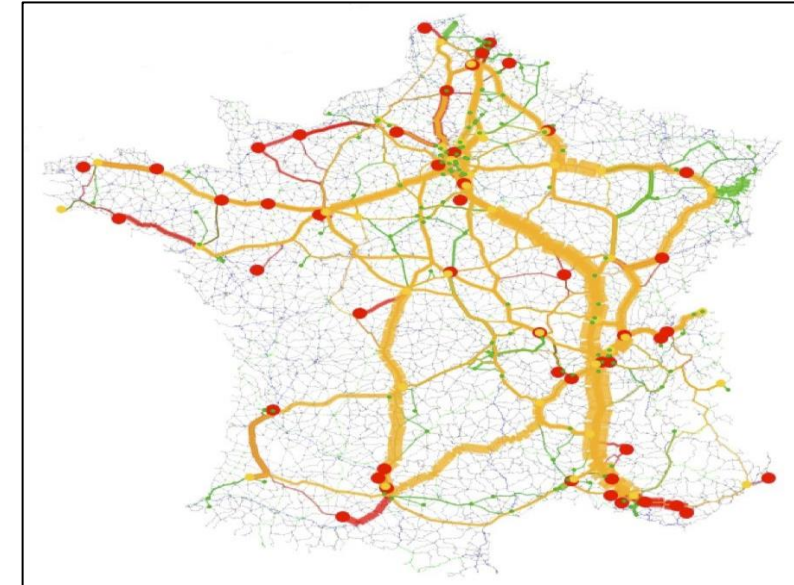
Current flows

Respects delivery service
Higher vehicle fill rates
Decouples goods flow from legal truck/driver constraints



Hyperconnected flows

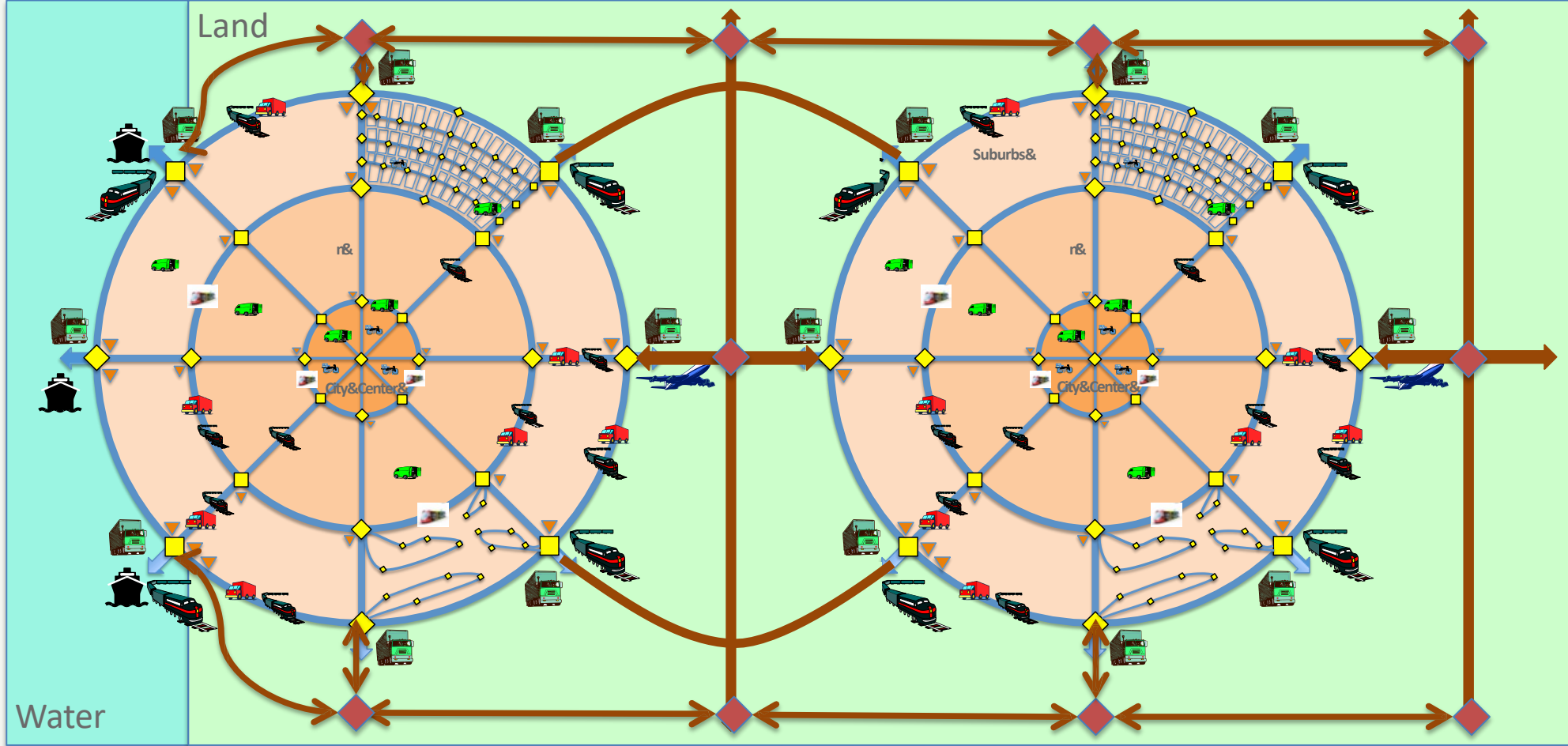
Economical: Up to 32% overall cost saving
Environmental: About 60% reduction of greenhouse gas emissions
Social: Truckers switch from long haul to short haul, returning home each day













Current: Trucks
Hyperconnected: Trucks & Rail

Illustrating the Physical Internet Concept

Two cities in a region, one being a port city



-  Bicycle, scooter, drone
-  Urban transporter, personal vehicle
-  Urban truck
-  Long-distance vehicle
-  Tramway, light rail, metrobus, barge
-  Train
-  Ship
-  Plane, airship
-  Open-access urban logistic hub
-  Open-access distribution and/or fulfillment center

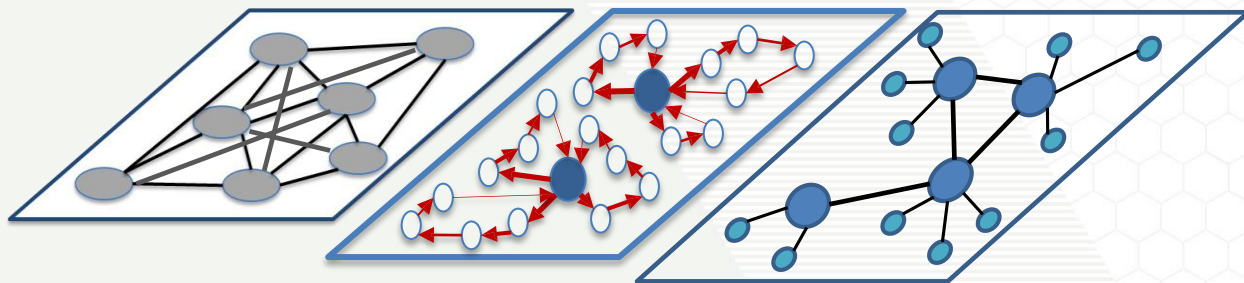
Exploiting existing logistic and distribution facilities and infrastructures, adapted to open sharing and consolidation

(airport, subway, tramway, highways, nearby ports), gradually developing innovative hyperconnected infrastructures

1. T. G. Crainic and B. Montreuil, "Physical internet enabled Hyperconnected City logistics," Transportation Research Procedia, vol. 12, pp. 383-398., 2016.
 2. B. Montreuil et al., "Urban Parcel Logistics Hub and Network Design: The Impact of Modularity and Hyperconnectivity", Proceedings of IMHRC 2018

Contrasting Traditional Transportation & Logistics With the Physical Internet

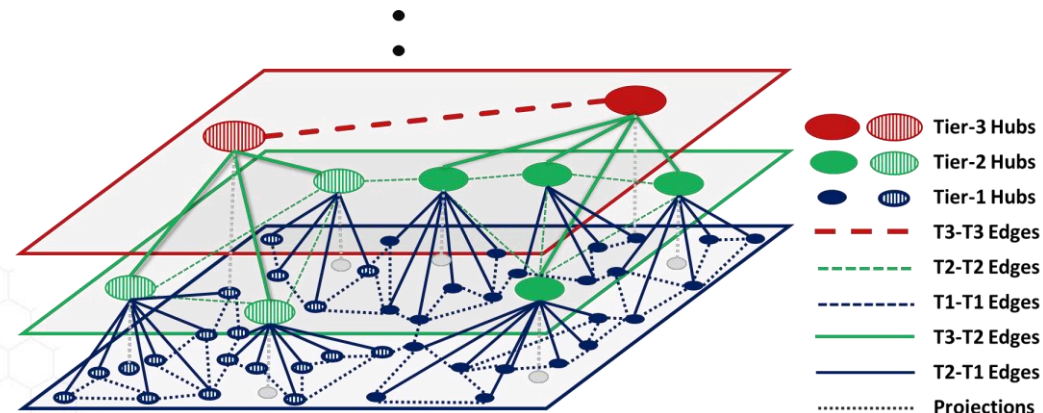
Point-to-Point &/or Vehicle-Routes &/or Hub-&-Spoke



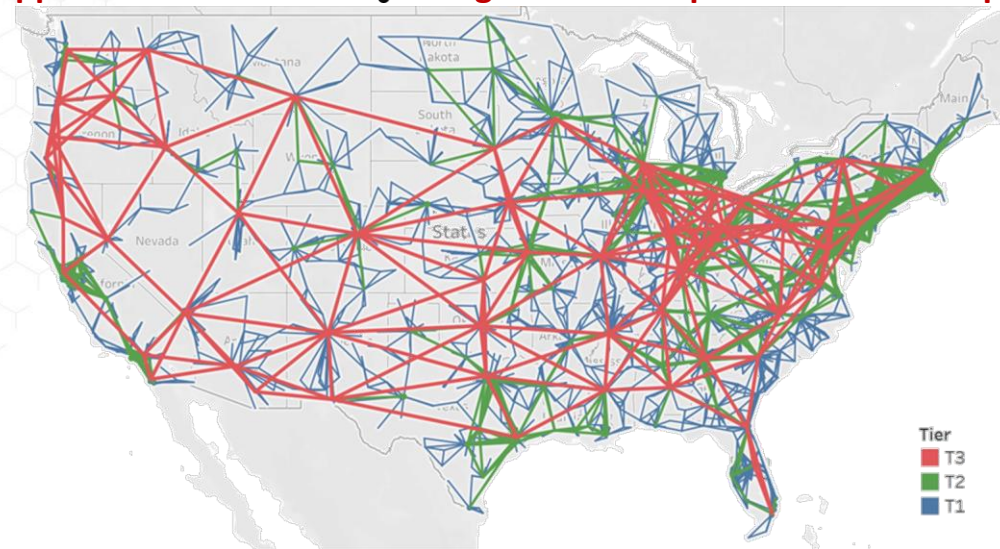
Shipper Dedicated Flows and/or Service Provider Dedicated Flows



Typical flows in traditional logistics & transportation network



Multi-shipper flow consolidation through multi transport & hub service providers

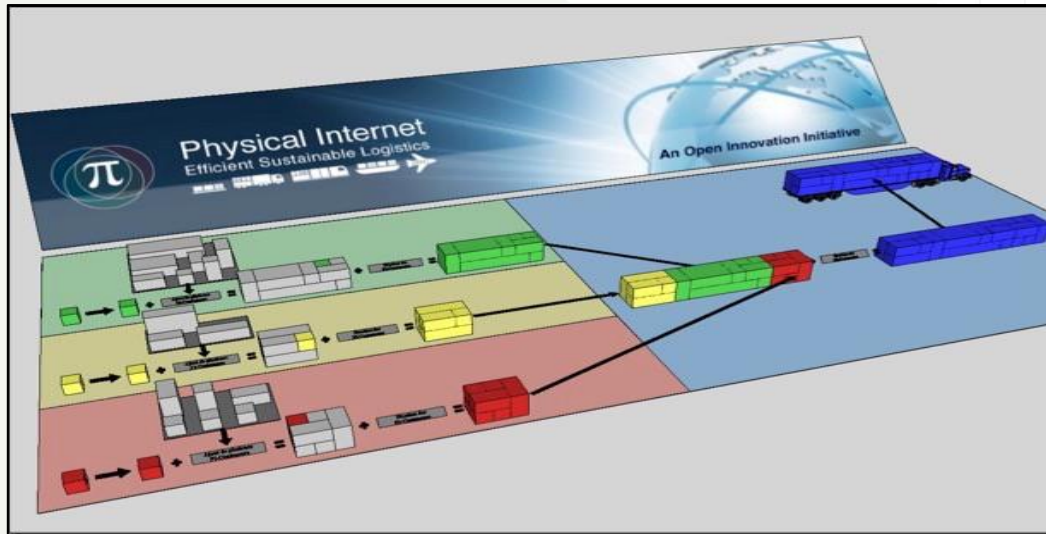


Typical flows in transport & logistic web of multi-tier mesh networks

Industry leaders such as Amazon, La Poste, SF Express, and UPS have started gradually transforming to shape a Physical Intranet toward the Physical Internet

Physical Internet Building Blocks: Standardization Targets

Enabling hyperconnected transport & logistic infrastructure and services



B. Montreuil & C. Thivierge, 2011

Enabling Efficient, Sustainable, Smart, Agile,
Adaptable, Scalable, Resilient,
Hyperconnected Supply Chains

Certified Open Logistics Service Providers

Smart Data-Driven Analytics, Optimization & Simulation

Open Logistics Decisional & Transactional Platforms

Global Logistics Monitoring System

Certified Open Logistics Facilities and Ways

Standard Logistics Protocols

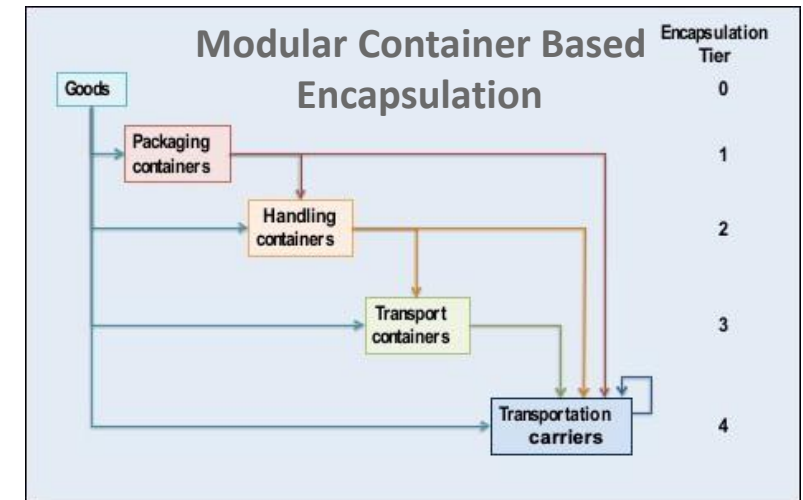
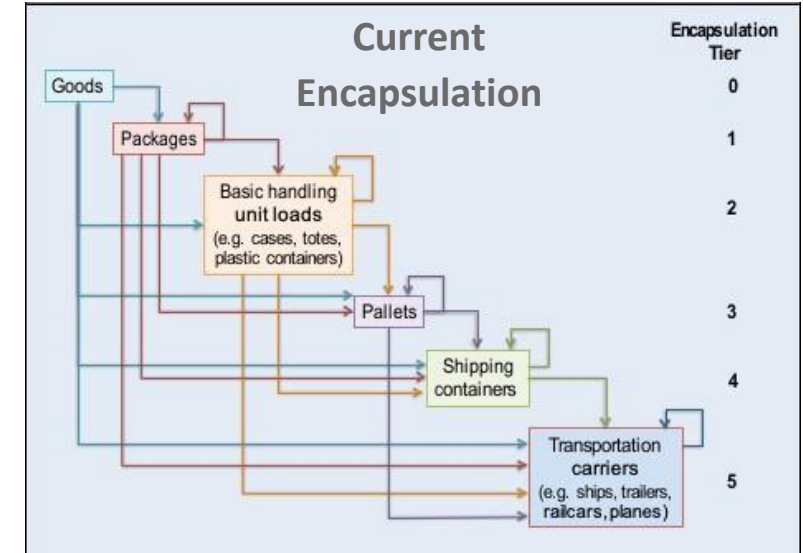
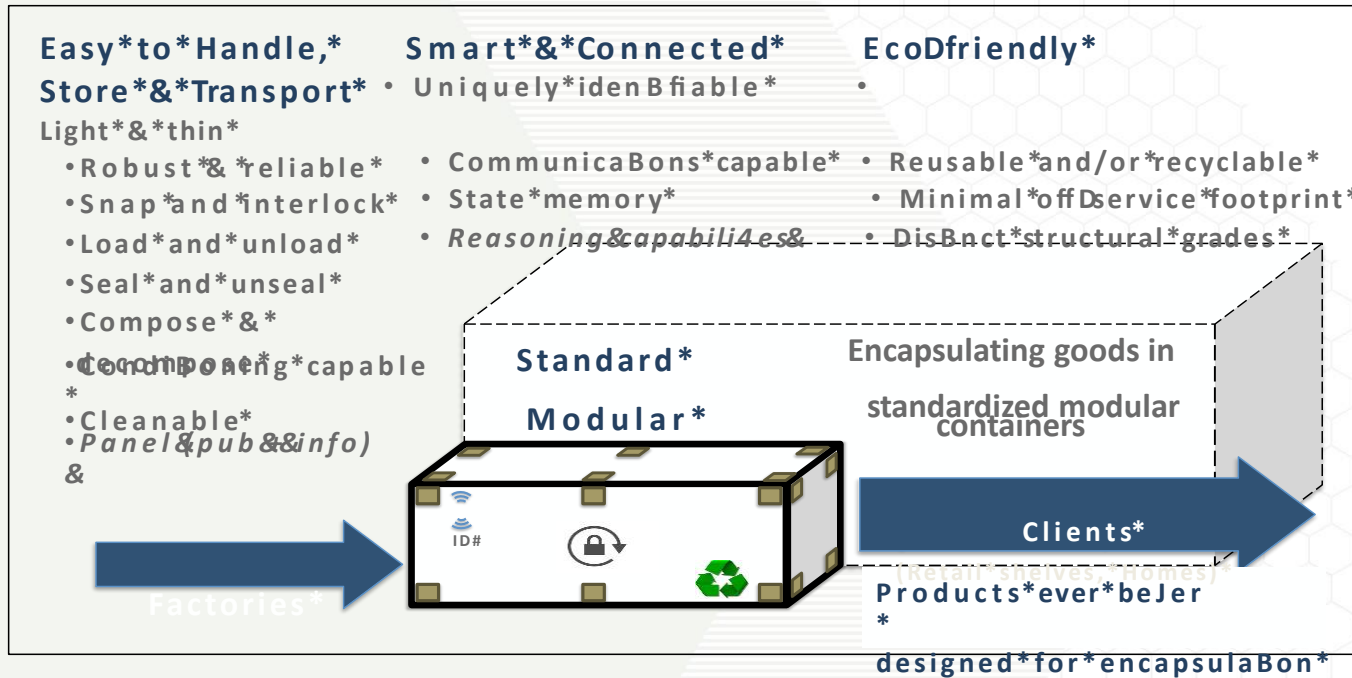
Containerized Logistics Equipment and Technology

Unified Set of Standard Modular Logistics Containers

Logistics Infrastructure: Shared assets enabling logistics to support supply chains

Physical Internet: Aim for Worldwide Standardized Modular Containerization

Open Flowing Across Multi-Party Supply Chains, Industries & Territories

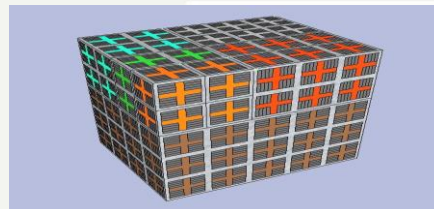


Packaging Containers (Packs)



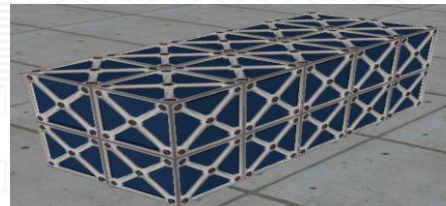
Modular fit in Boxes
 1,2; 0,8; 0,6; 0,4; 0,3; 0,2; 0,1
 – ε - δ meters

Handling Containers (Totes, Boxes)



Modular fit in Pods
 1,2; 0,8; 0,6; 0,4; 0,3; 0,2; 0,1 – ε meters

Transport Containers (Pods)



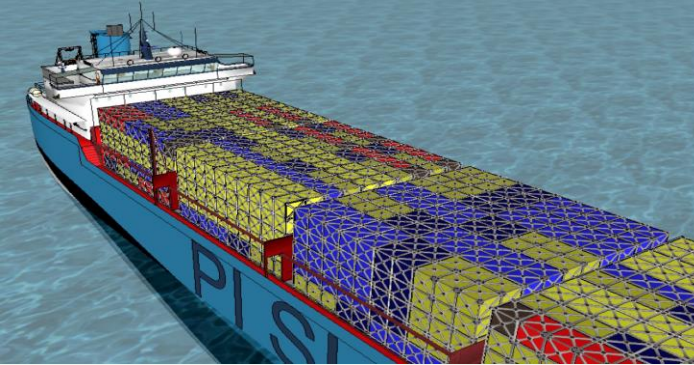
Modular fit in certified vehicles-carriers
 12; 6; 4,8; 3,6; 2,4; 1,2 meters

Modular containers metaphorically play the role of the Digital Internet data packets

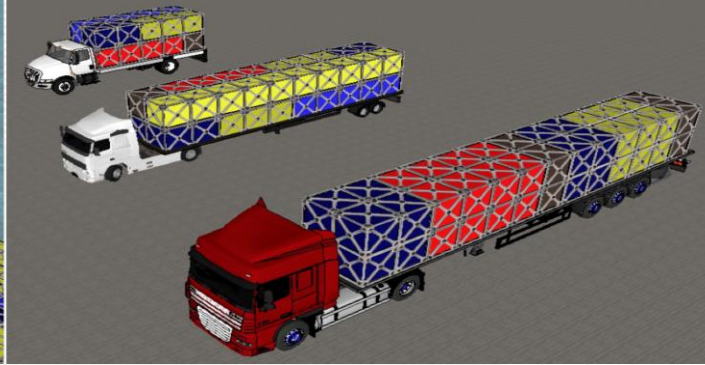
Towards Modular Container Logistics Technologies, Vehicles, and Facilities

Enabling seamless, fast, cheap, safe, reliable, distributed, multimodal flow of objects in modular containers across the Physical Internet

Ships



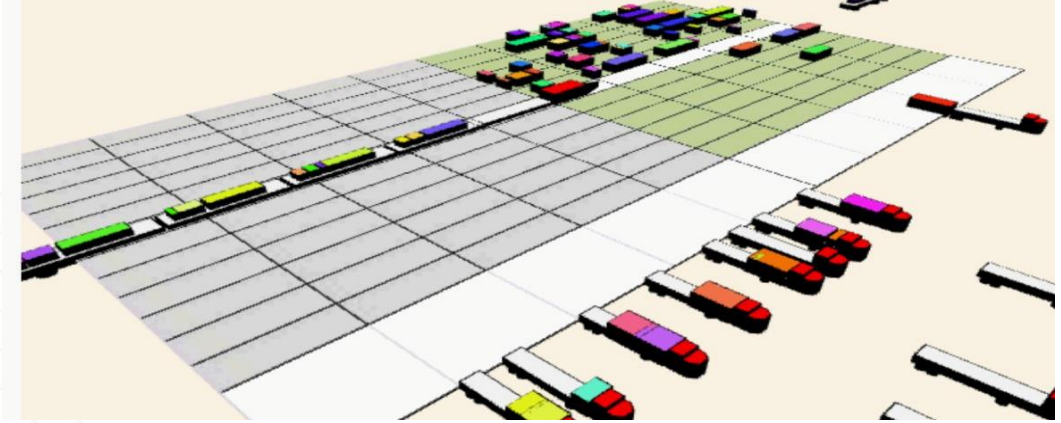
Trucks, tractors, trailers



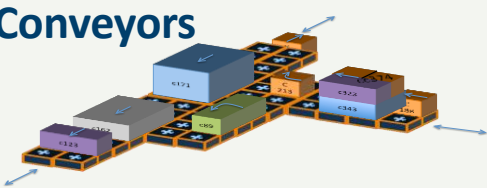
Internet Physique : Hub Rail-Route

Conception : B. Montreuil, O. Labarthe, M.A. Soussi

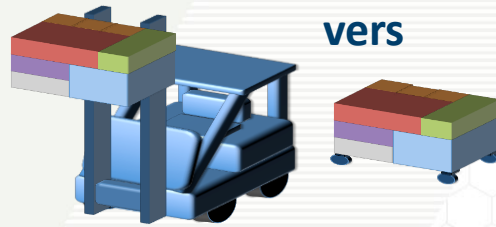
3D Statistiques



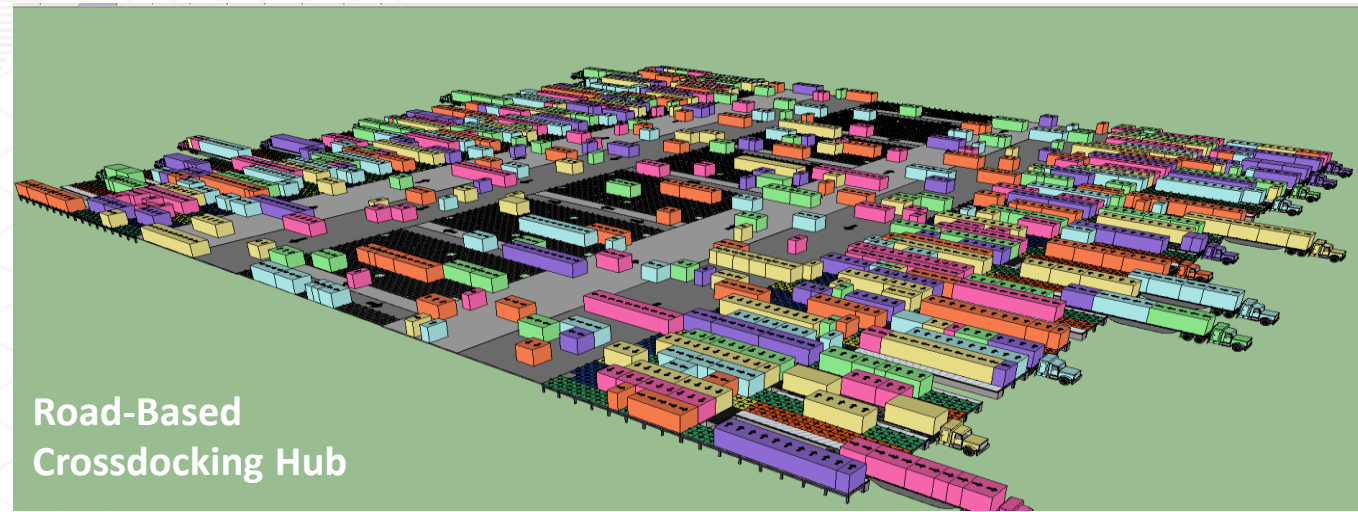
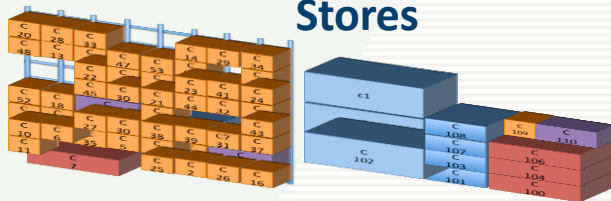
Conveyors



vers



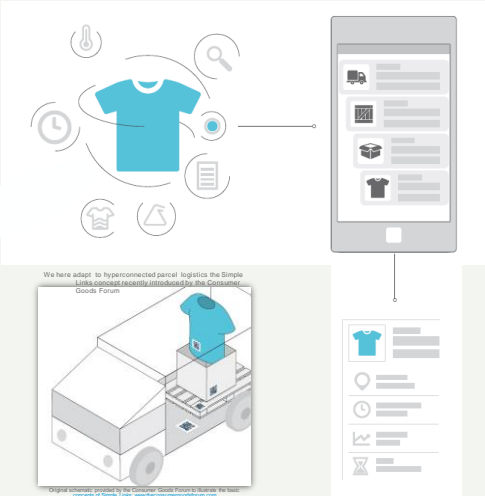
Stores



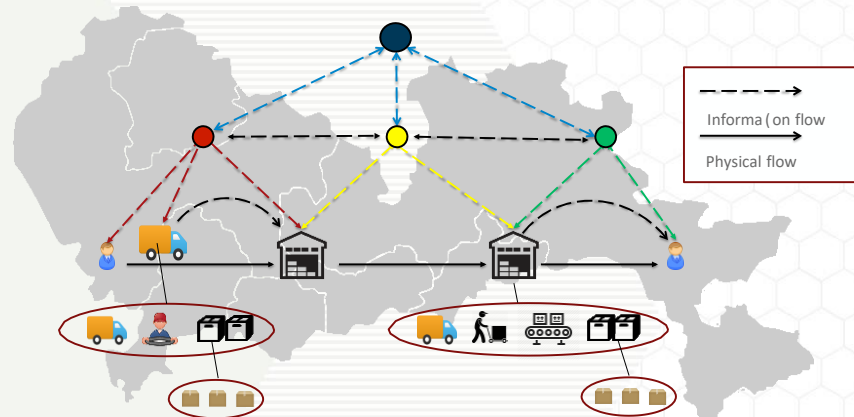
Road-Based Crossdocking Hub

Montreuil, B., R.D. Meller, E. Ballot (2010) *Towards a physical internet: the impact on logistics facilities and material handling systems design and innovation*, in Progress in Material Handling Research, Edited by K. Gue et al., Material Handling Industry of America, 23 p., 2010.

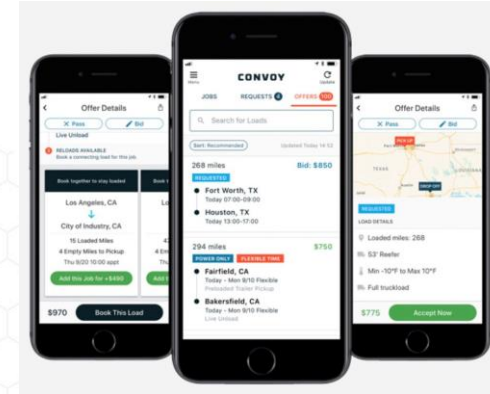
Towards Standard-Enabled Digital Supply Chain, Logistics, and Transportation Interconnectivity Platforms



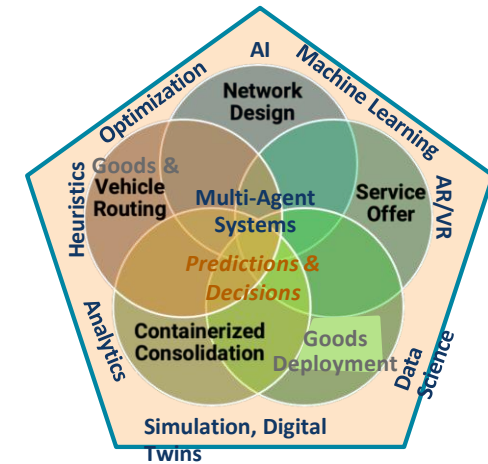
Schematics provided by the Consumer Goods Forum www.theconsumergoodsforum.com



---> (on flow)
Physical flow



Example: <https://convoy.com/>



Simple Links
Exploitation of industry-wide supply chain monitoring concepts from Consumer Forum Group

Internet-of-Things
Widespread exploitation of smart connected devices, and of sensor-actuator networks

BlockChain
Exploitation of emerging distributed ledger technology for SC trust insuring platform

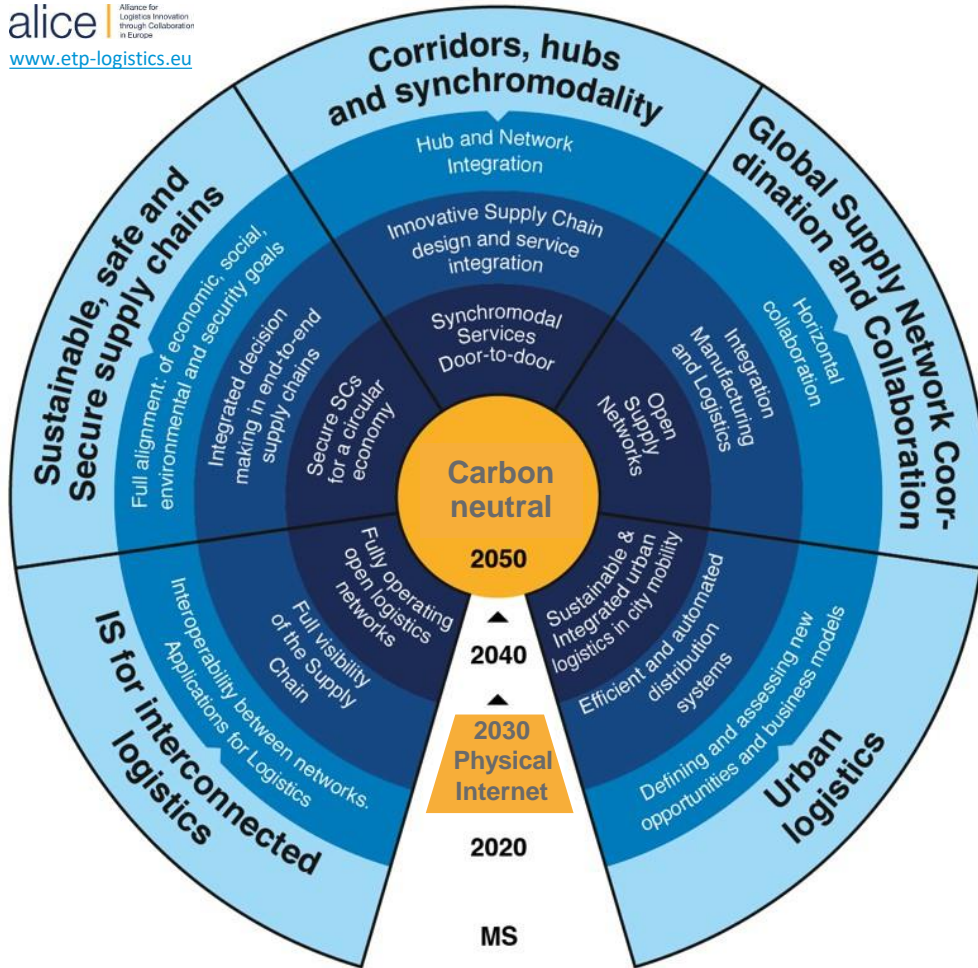
Platforms + Marketplaces
Match, orchestrate & optimize supply & demand for fast, seamless & fair contracts

Digital Intelligence
Enabling smart, live, highly automated predictions & decisions across actors, nodes & networks

Seamless, smart, trustworthy and ubiquitous transparency, tracking, traceability, cybersecurity, contracts, predictions & decisions

Worldwide Innovation and Standardization Driven Physical Internet Journey

alice | Alliance for Logistics Innovation through Collaboration in Europe
www.etp-logistics.eu



European Roadmap for Logistics, Supply Chain, & Freight Transportation
with 2030-2040 Physical Internet Maturity Target
and 2050 Carbon Neutrality

Japanese Physical Internet Roadmap

Item	Year	2025	2026~2030	2031~2035	2036~2040
	Current situation	Preparation	Take off	Acceleration	Completion
Governance	Different rules exist between different industries and players	Logistics spots development By 2024, truck driver overtime limitation will apply	Have a plan to establish sharing regulations, intra-region	Inter-industry, inter-region, international	What PI goals look like 1. Efficiency <i>Most efficient supply chain in the world</i> • Maximize resource utilization, optimized efficiency • Carbon neutral (2050) Zero waste loss • Expand production in consumption areas 2. Robustness <i>A supply chain that does not stop</i> • Diversify production bases and transportation methods and storage space • Close collaboration among companies and regions • Prompt information collection and sharing rapidly 3. Good Employment <i>A supply chain that can keep growing</i> • Improve work environment • Create new employment from equipment/service innovation • Make sure small businesses benefit from 'economy of scale' • International adoption of business model 4. Universal Service <i>A supply chain that is a social influence</i> • Open, unbiased data platform • Eliminate regional shortage • Eliminate regional disparities
Logistics/ Commercial Data Platform (PF)	Different platforms exist: how to make them connect and communicate is key	Data platform business advancement SIP Smart logistics Services	PF self-regulation Supply chain visualization Alignment between PF	Cross-industry platform that manages data going beyond logistics and commerce	
Horizontal Alignment Standardization & sharing	Unalignment of different factors place burden on supply chain, requiring process standardization	Standardization of logistics EDI*, palletization and PI containerization	e.g., business development, sharing, intra-region	Inter-industry, inter-region, international	
Vertical Consolidation B2B2C SCM	SCM** is not considered in business strategy, logistics is outsourced, data is not shared: ultimately can't achieve global optimum given logistics constraints	Revise standardization and business practice (have different plans for different industries) Thorough Palletization	Pivot to logistics/SCM** based business strategy Update/digitize core system	Demand Web (B2B/B2C) Optimize the entire supply chain, including the placement of manufacturing centers, based on customer information and demand forecasts: sharing not only vehicles and warehouses, but also manufacturing facilities	
Logistics Hubs automation & mechanization	Key challenges: to promote automated equipment and to improve productivity through business process innovation	Intensive investment period on logistics digitalization Build a robotized environment	Equipment industrialization	Achieve full autonomy	
Transportation Equipment automation & mechanization	Technology is still at testing stage and not yet implementable, while there is a growing issue of driver shortage	Unmanned truck platooning system is commercialized	Automated trucks transportation on highway is realized	Begin service	
		Auto-driving services in limited areas	Begin service	Begin service	
		Autonomous delivery robots	Begin service	Begin service	
		Promote drone delivery	Begin service	Begin service	

Loose preliminary Japanese to English translation by Jiachen Shi upon request from and edited by Benoit Montreuil (2022/09)

*: Electric trucks
**: supply chain management

https://www.meti.go.jp/shingikai/mono_info_service/physical_internet/pdf/20220308_1.pdf

p : Physical Internet

CREATING THE NEXT®

Questions, comments, ideas are most welcome
Questions, commentaires et idées sont les bienvenus

Thanks!

Benoit Montreuil

Director, Physical Internet Center
Director, Supply Chain & Logistics Institute
Coca-Cola Chair in Material Handling & Distribution
Professor, School of Industrial & Systems Engineering
Georgia Institute of Technology, Atlanta, U.S.A.

Benoit.Montreuil@isye.gatech.edu

<https://www.scl.gatech.edu/>
<https://www.picenter.gatech.edu/>
<https://netzero.scl.gatech.edu/>



Interactive Panel Conversation w/ Industry Stakeholders and Subcommittee Leads



Small Group Discussion

Self organize with the people around you
Share your thoughts
Appoint One person to take notes and share



Share With The Room

Volunteer to share your group's thoughts with the room
2-3 minutes - Please be brief :)





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Thank you!

<https://www.astm.org/get-involved/technical-committees/committee-F49>

