

The background of the slide is a photograph of a city skyline, likely Copenhagen, featuring a prominent church spire and colorful buildings along a waterfront.

# *Physical internet*

a necessary intermediate step in the roadmap towards zero carbon footprint logistics by 2050.

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Research Fellow P&G



## ALICE membership per type of organization

| Type of Organization   | Members  | EU/International Associations   |
|--|--|---|
| Shippers & Retail  |          |     |
| Logistics Service Providers, Courier and Postal operators & Freight Forwarders |           |     |
| Ports, Hubs, Intermodal terminals & Transport Infrastructure                   |          |     |
| Vehicle Manufacturers & Logistics operations, handling (modular units)         |      |    |
| Information and Communication Technologies & Consultancy                       |                             |     |
| Regional & National Logistics Clusters & Associations                          |              |    |
| Research and technology Centers  |                          |     |
| European Technology Platforms / PPPs   |        |   |
| Member States and innovation Funding*  |               |   |

\* Involved in ALICE Mirror Group

# **WHY DO WE NEED THE PHYSICAL INTERNET?**



## •Michelangelo Lesson



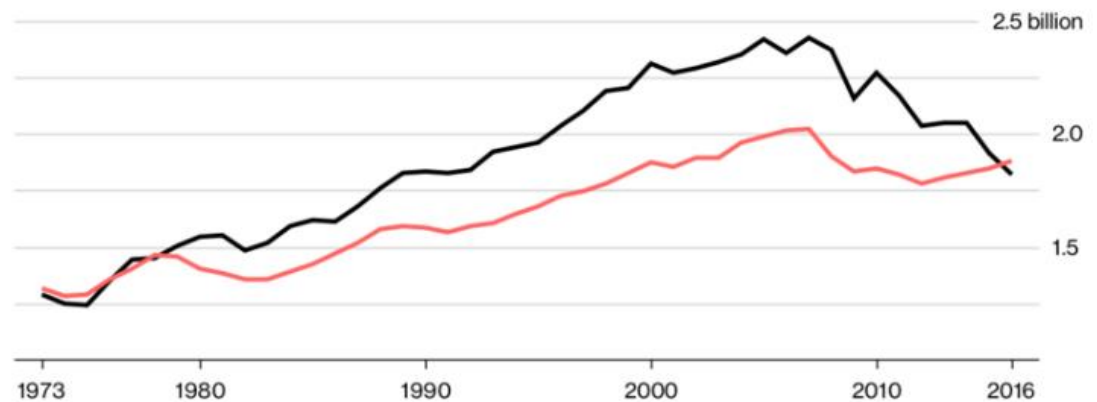


Transportation  
industry  
becomes The  
biggest CO2  
contributor In  
The United  
States

## America's New Pollution King

Transportation emissions have surpassed electricity emissions for the first time since 1978

■ Electricity emissions (metric tons of CO2) ■ Transportation emissions

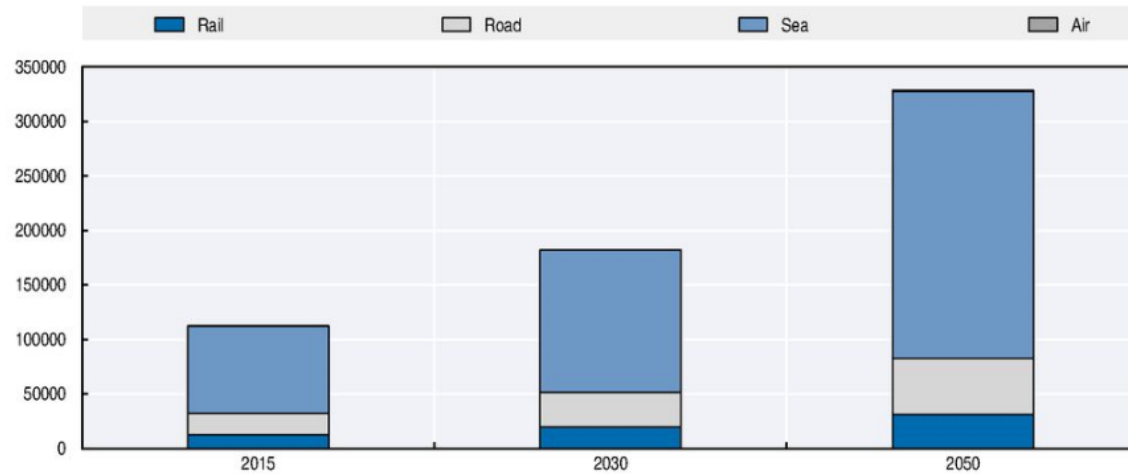



U.S. Energy Information Administration

Bloomberg

Figure 2.7. **Freight transport demand by mode**

Baseline scenario, billion tonne-kilometres



StatLink  <http://dx.doi.org/10.1787/888933442458>

# OECD PROJECTIONS (ITF 2017)

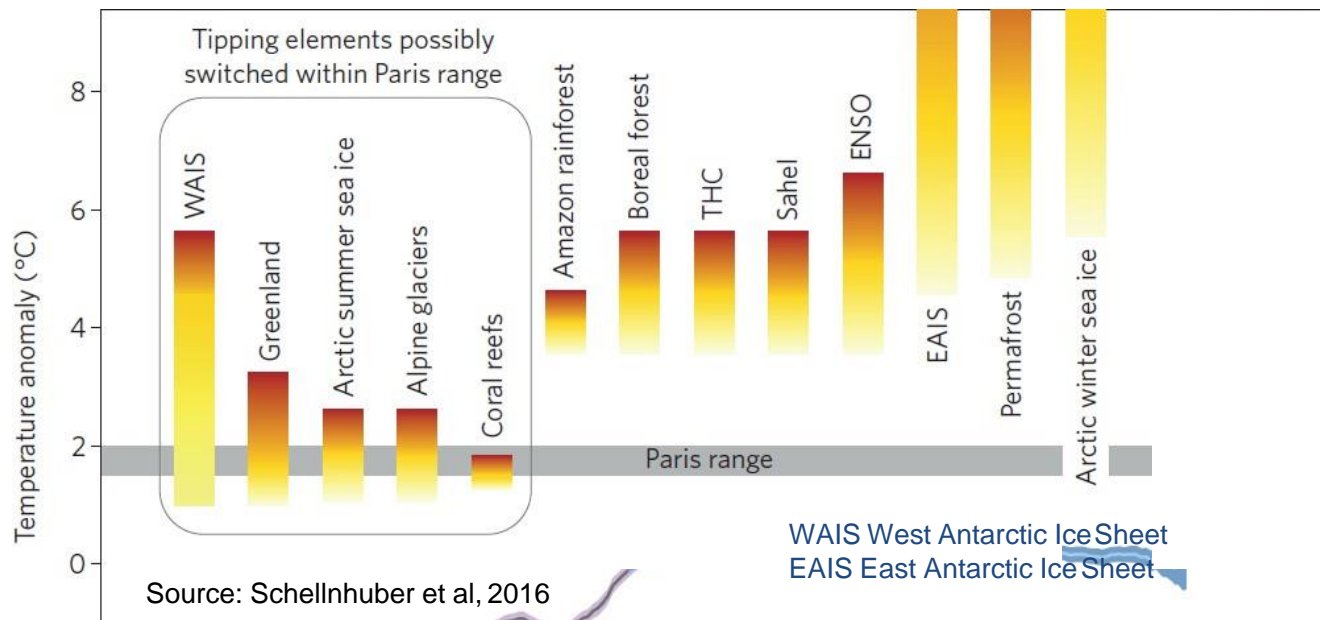
Total Freight Transport

UNFCC COP 21 Conference on Climate Change  
December 2015



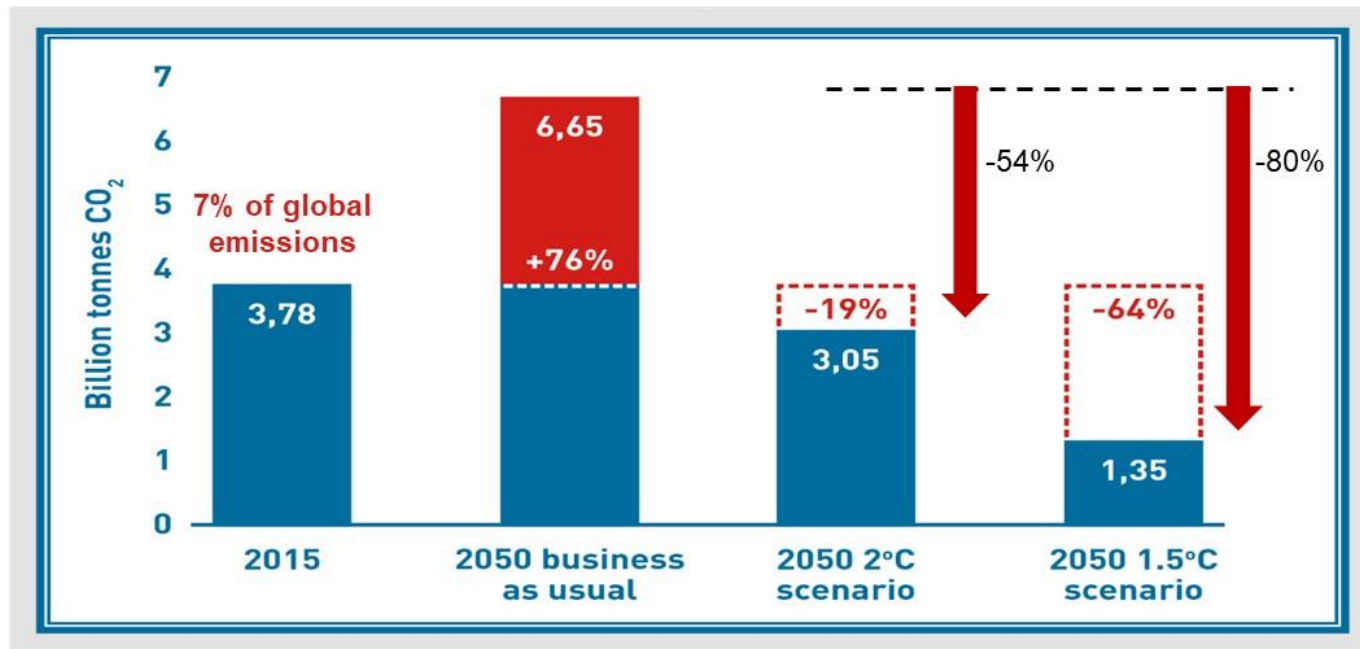
International agreement to keep average global temperature *'well below'* 2°C above pre-industrial times and *'endeavor to limit'* it to 1.5°C – **but already 1°C above 1850 temperature**

Risk of crossing climatic, geophysical and ecological tipping points as average global temperature increases



# Logistics emissions on the rise but must come down

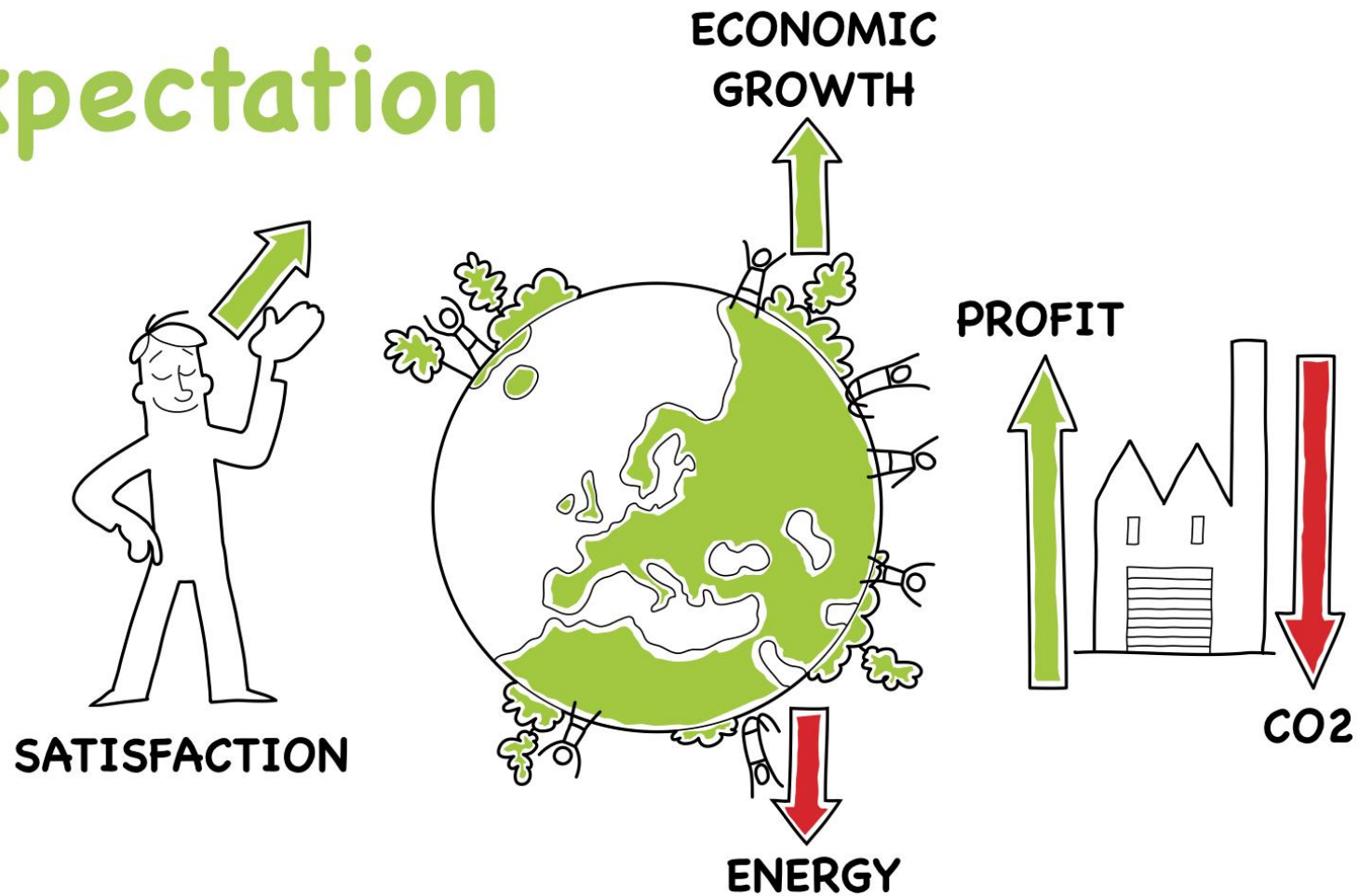
UNFCCC COP 21 Conference on Climate Change  
December 2015



Smart Freight Centre (2017). Smart Freight Leadership, based on data from ITF Transport Outlook 2017 and SLoCaT 2016



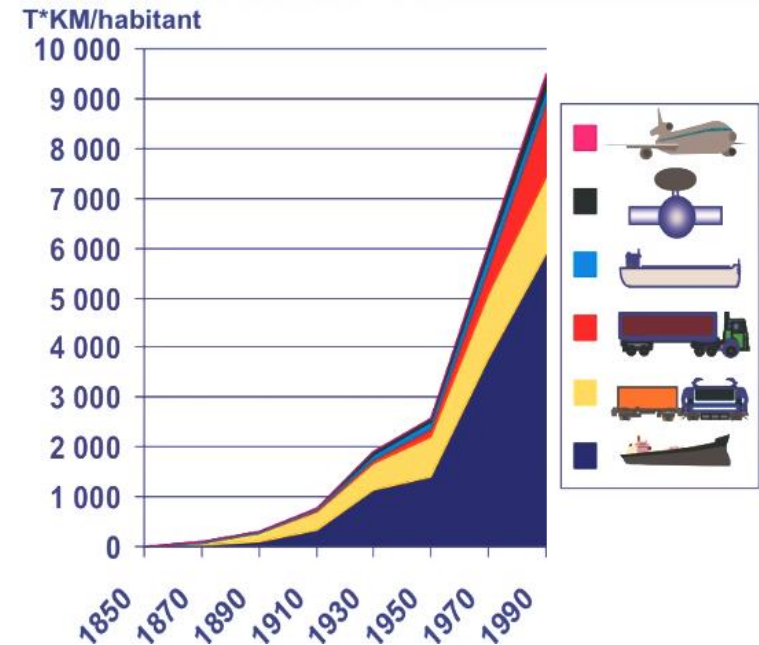
# Expectation



# CHALLENGE 1

## GROWTH AND FRAGMENTATION OF TRANSPORT

- Exponential growth of flows
- Shipment median weight divided by 4,5 from 160 kg in 1988 to 30 kg in 2004 (Source : IFSTTAR 2013)
- At no cost illusion for the consumers



Source:  
Centre for  
sustainable  
transportation  
Canada

How to take advantage of economy of scale when each shipment are going smaller?

How to mitigate the environmental effects? Decoupling / economic activity?

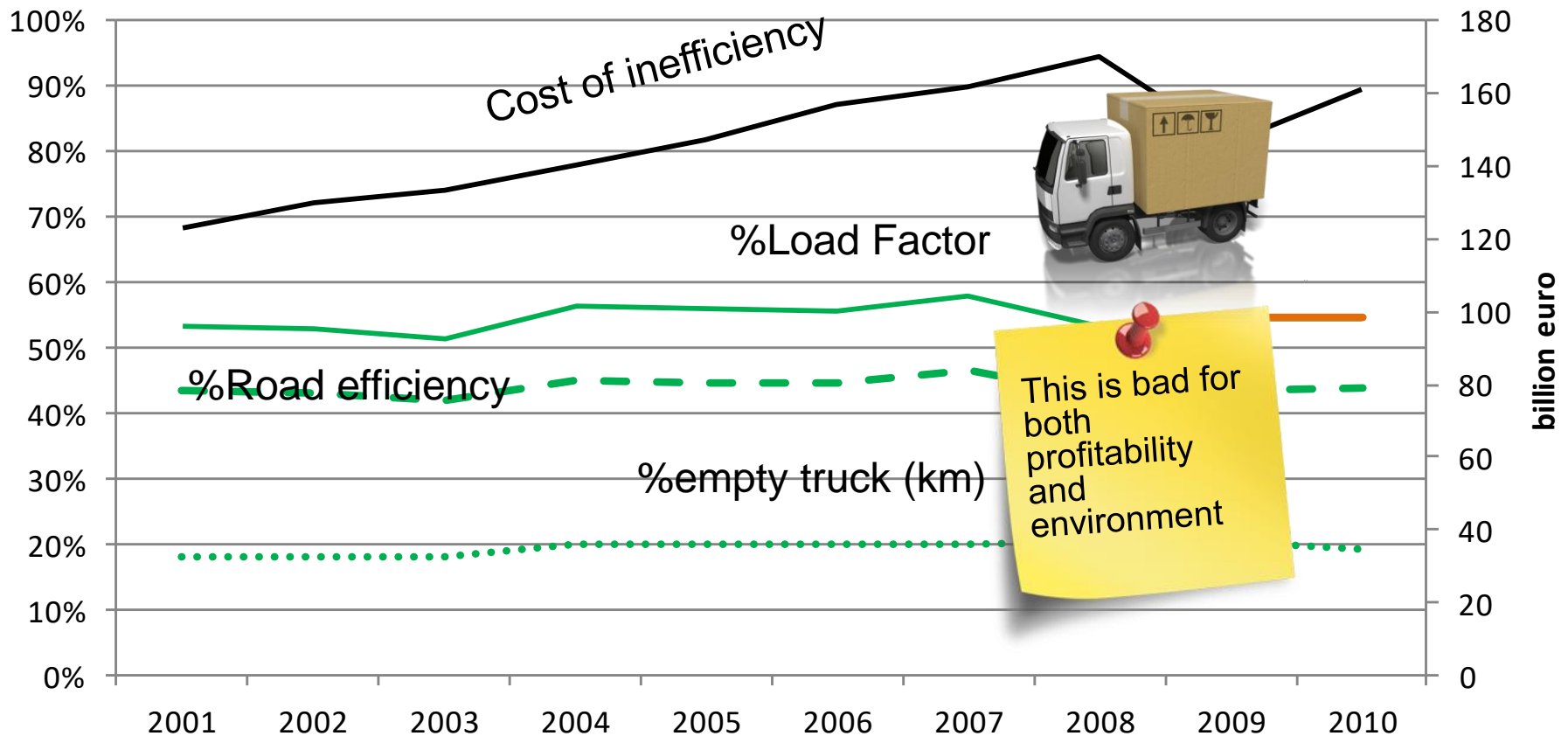
How to cope with the demand and without a new physical infrastructure?

# CHALLENGE 2

## ASSET UTILIZATION

Transport inefficiency is a €160 Billions loss and 1.3% of EU27 CO2 footprint!!!

### 10 YEARS: ZERO IMPROVEMENT ON LOAD FACTORS



# CHALLENGE 2

## ASSET UTILIZATION



**100 % Full**  
**But only 25% of weight limit**



**60% Full**  
**But at 100% weight limit**

This is bad for  
both  
profitability  
and  
environment

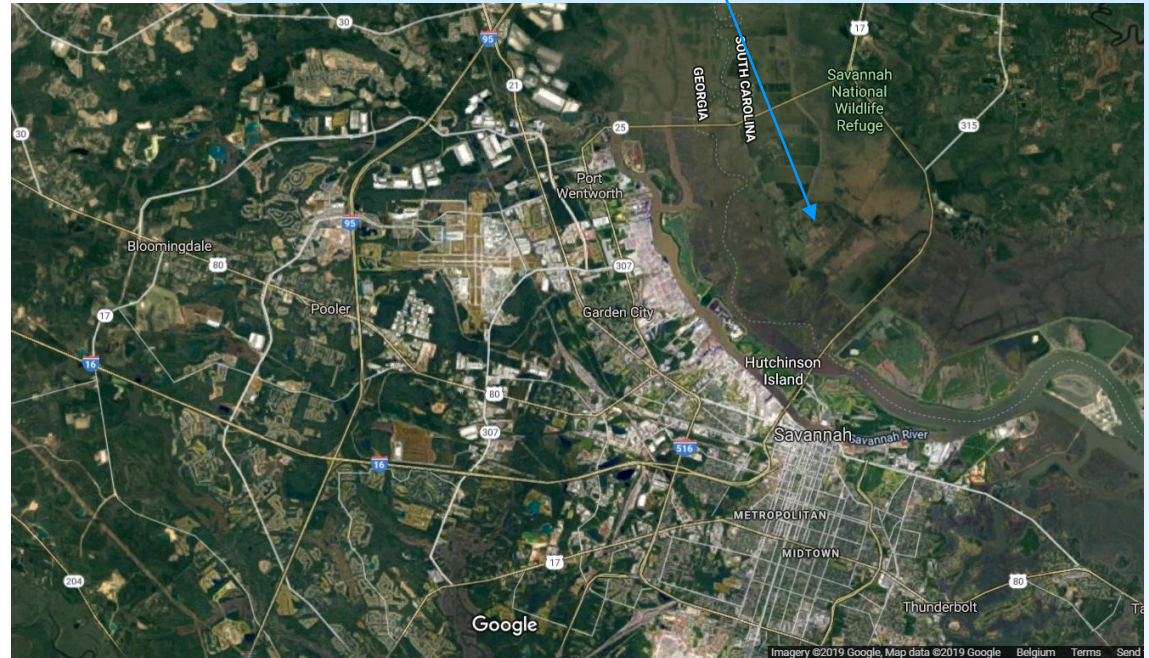
# CHALLENGE 2

## Infrastructure UTILIZATION

(South Carolina)

Savannah  
Port, USA.

Difficult  
expansion?





# CHALLENGE 4

## THE LAST MILE - BUT NOT THE LEAST

### CO2 emitted by supermarket shopping



Source: LCA study, P. van Loon, J. Dewaele, L. Deketele - Heriot-Watt University / P&G  
30 items/shopping basket - UK B&M supermarket - typical (average) travel behavior (distance, transport mode)

# CHALLENGE 5

## WASTE IN THE SUPPLY CHAIN

### Food Waste Hotspots

We have established the waste profile for 25 of the most frequently purchased products so that we can identify those areas where we should prioritise our activity. This infographic shows some of the key insights from five of the products we analysed and what we are doing to tackle waste across the supply chain.



#### Grapes

- Trialling new varieties of grapes with a longer life
- New techniques to protect the grapes e.g. plastic covers in many geographies
- Flavour orders to get more fruit direct from our growers to our depots to ensure fresher products for our customers
- Consistent messaging around storage information on pack, online and integrated in customer communication



#### Apples

- Growers involved in trials to reduce pest/disease in orchards by using natural predators
- Increased crop utilisation through different product ranges
- Consistent messaging around storage information on pack, online and integrated in customer communication



#### Bananas

- We make use of all our supply chain to reduce waste on farm
- State of the art data logger to optimise conditions for banana transport
- More effective sorting of stock leading to waste reduction at the opening stage
- 'Love bananas' campaign teaching colleagues, partners to handle bananas with care
- Banana farmers to to provide them on display



#### Bagged Salad

- We will not offer multi-buys on larger packs and are developing an intelligent promotion strategy to allow customers to 'mix and match' products
- Introducing an 'expiry date' across the range following a trial on 'best before' expiry date
- New packs offer 'best before' and 'use by' dates



#### Bakery

- Supplies from milling sent for animal feed
- Less bread displayed in our in-store bakeries in 600 larger stores
- Building more accurate IT systems for debiting stock and planning daily production in-store
- Training bakery managers on new systems to reduce waste without reducing quality and availability
- Real-time website provides tips and hints on how to use surplus bread and bakery products



Total food waste along the value chain:



Agriculture & supply



Retailer



Consumer



# CONCLUSION

## BIG AND UNSUSTAINABLE SUPPLY CHAINS

Whilst logistics is the backbone sustaining our life, global logistics are inefficient and unsustainable



Non standard load  
size & dimensions



Full, but only 25% of  
weight limit



60% empty, but at  
weight limit



24% of trucks  
run empty



Network congestion  
& emissions



Inefficient  
networks



Poorly used  
storage facilities



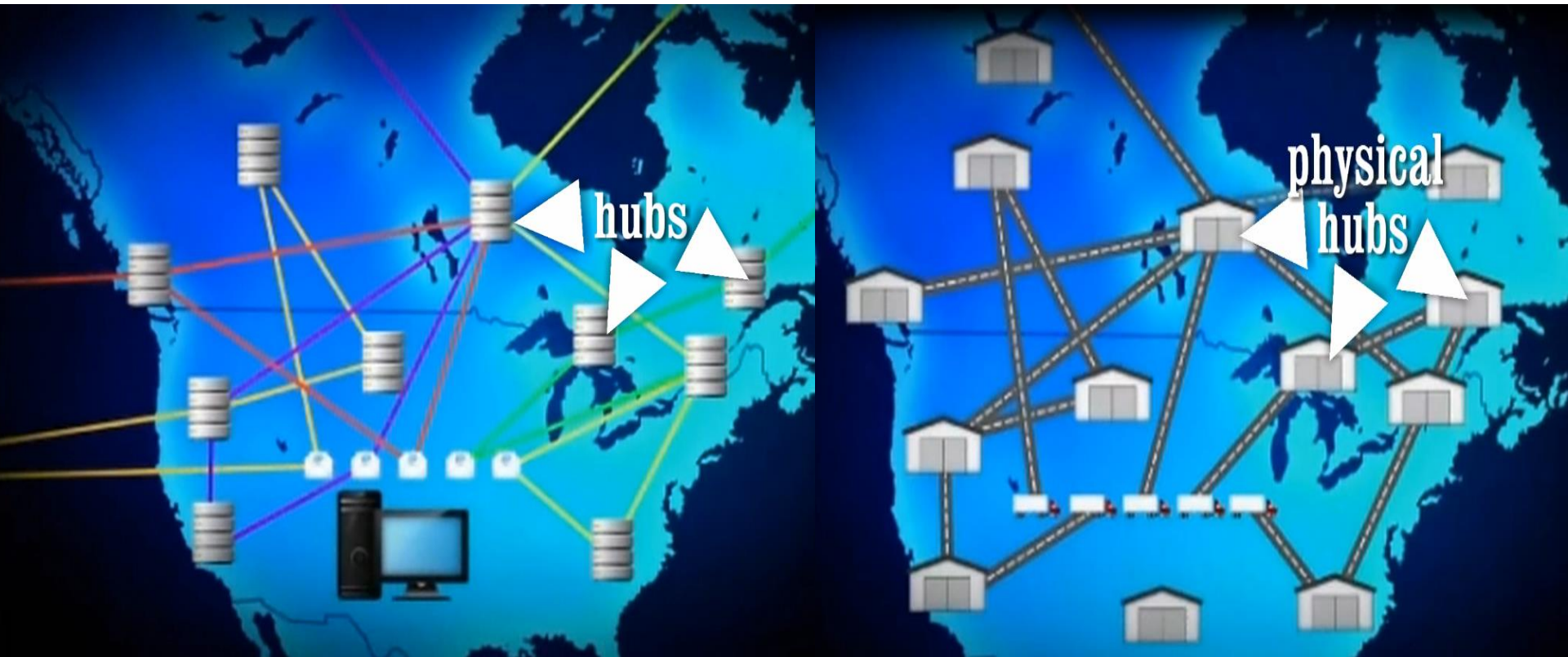
25% wastage  
of retail produce



- Fast & reliable multimodal transport remains an aspiration
- Networks are neither secure nor robust
- Innovation is constrained



# A NEW PARADIGM - THE PHYSICAL INTERNET



# alice | Alliance for Logistics Innovation through Collaboration in Europe



**Disclaimer: The content of this video reflects only the author's view. Neither the European Commission nor the INEA are responsible for any use that may be made of the information it contains.**

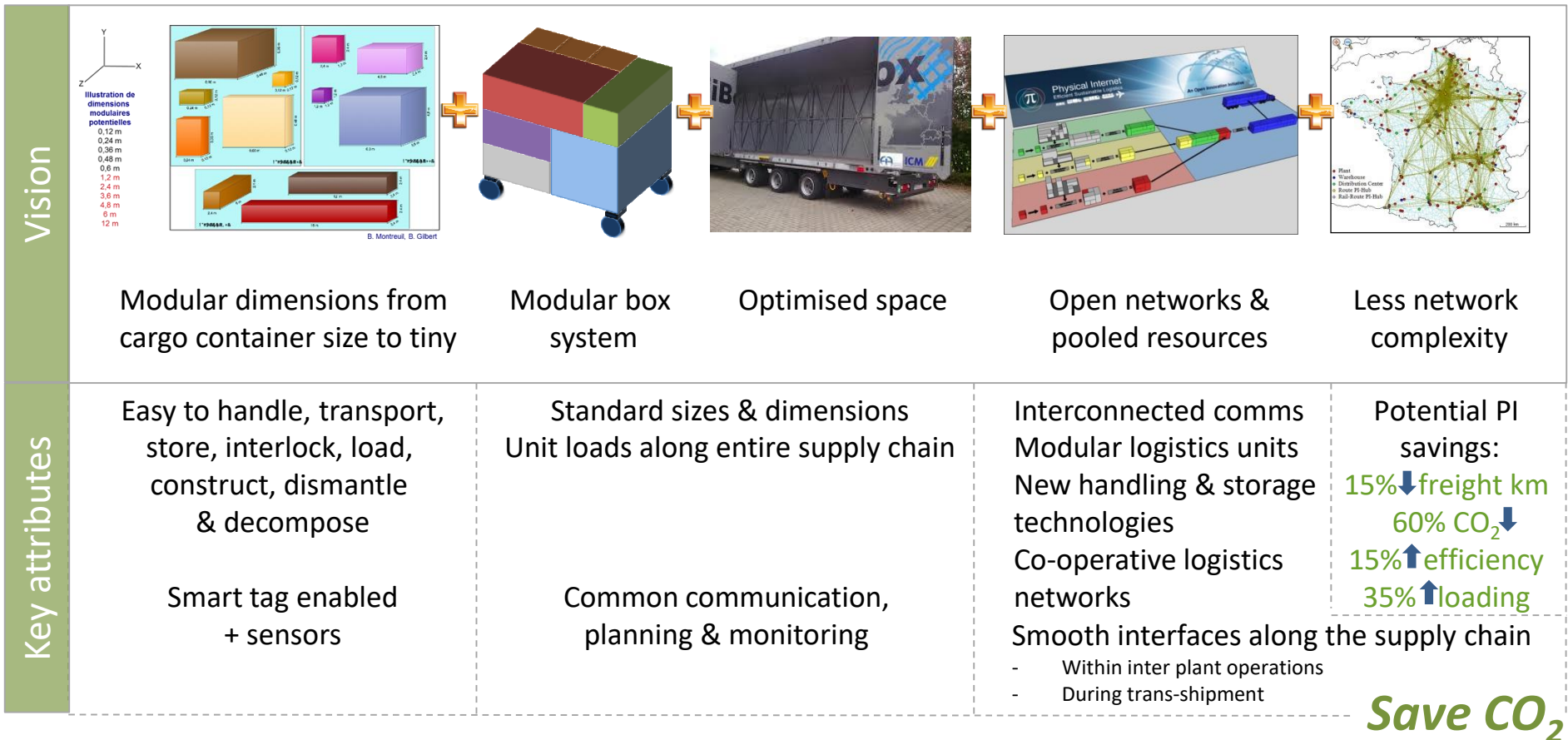


# THE PHYSICAL INTERNET BUILDING BLOCKS

– create a more efficient, sustainable supply chain by using new modular load units & smoother supply chain interfaces

## New modular load unit concept

## Smoother interfaces along the supply chain



# MODULARIZATION - THE EXPECTED IMPACT

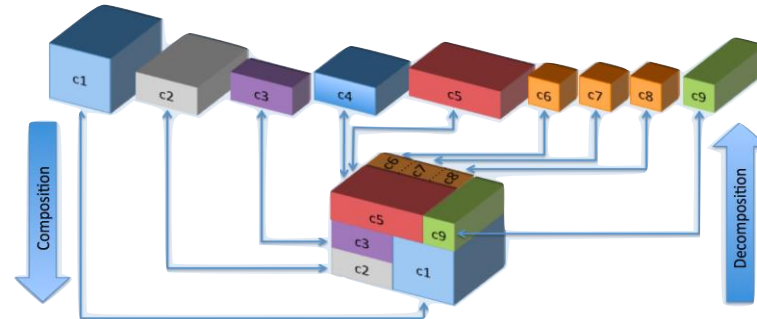
The Box (2006) Marc Levinson, Princeton Press

Cost Port = 2xOcean shipping=2xInland



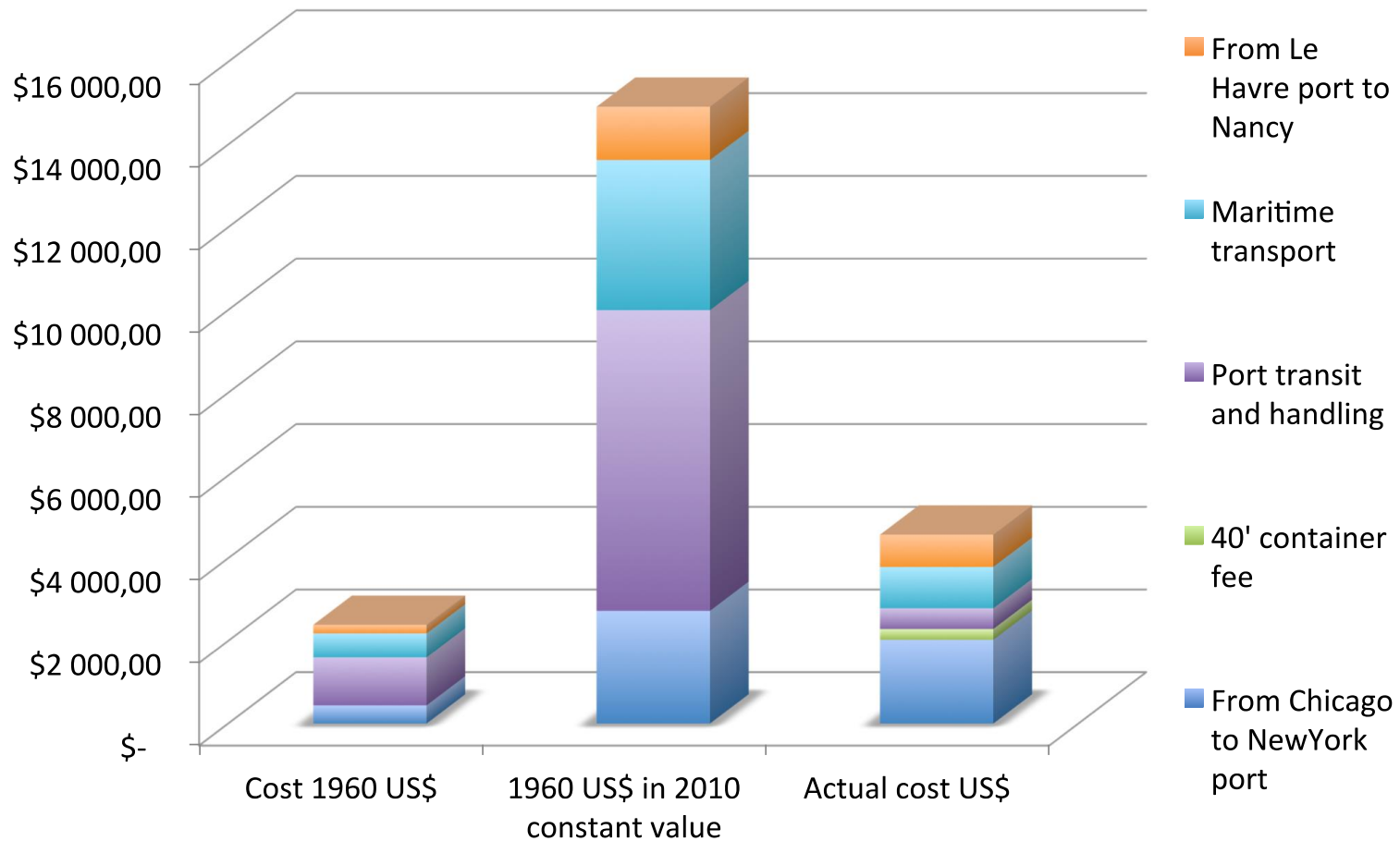
>>

Cost Port = 0.4xOcean = 0.8xInland



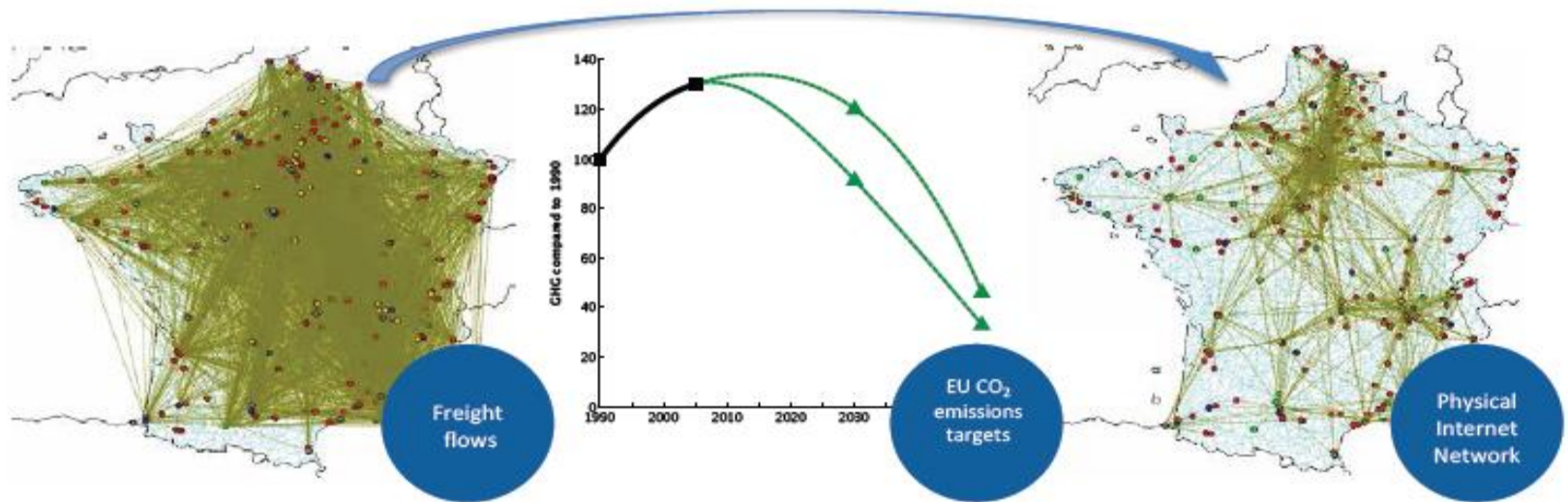
Montreuil, B., Meller, R. D. and Ballot, E. (2010). Towards a Physical Internet : the impact on logistics facilities and material handling systems design and innovation. In: AL., K. G. E. (ed.) *Progress in Material Handling Research. Material Handling Industry of America*

# MODULARIZATION - THE EXPECTED IMPACT



Cost evolution  
Source The  
Box, HAROPA  
& JB Hunt

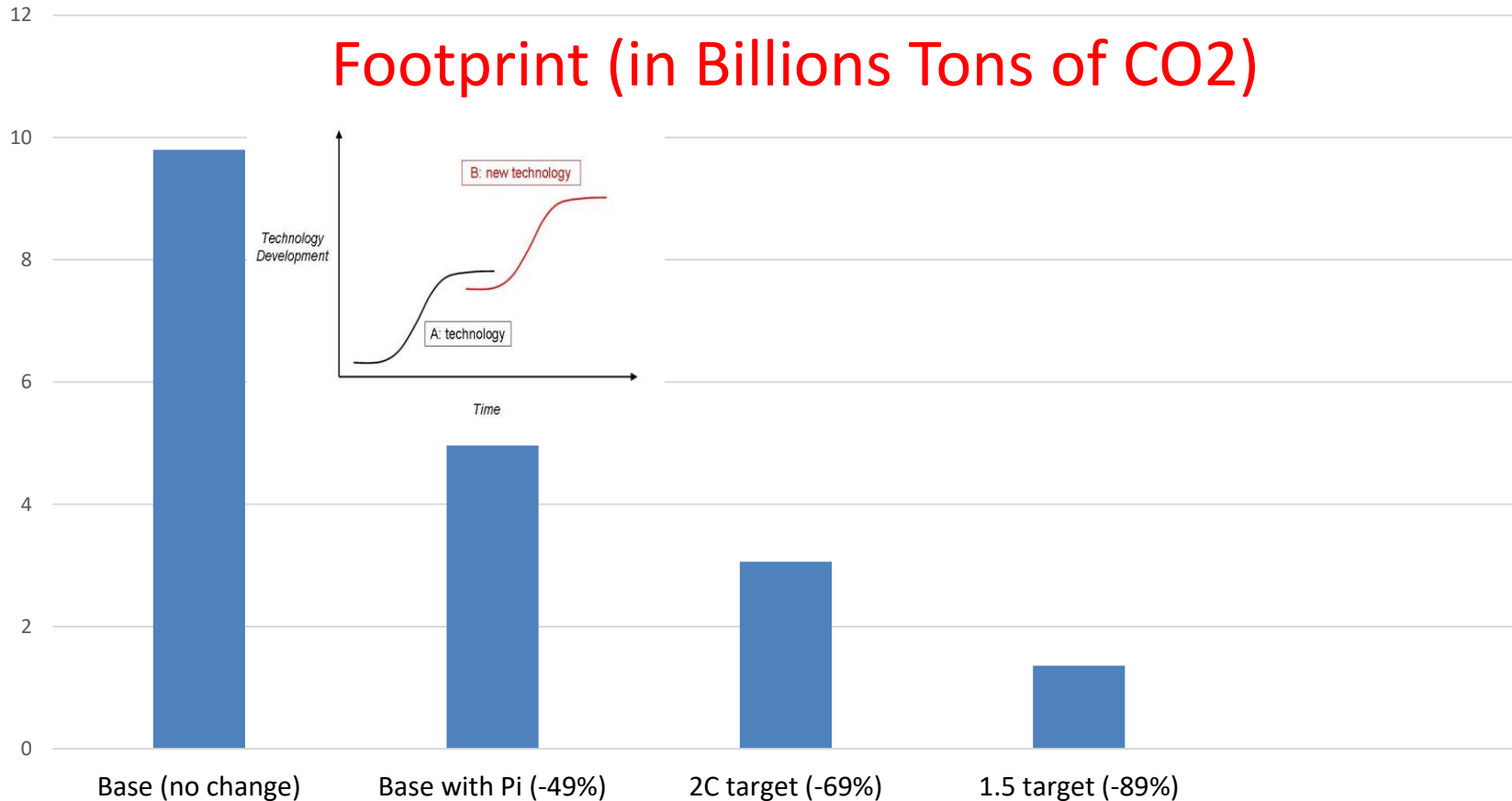
# COLLABORATION & BUNDLING - THE EXPECTED IMPACT



Interconnection of logistics services potential :

- 15% in distance
- +35% in vehicle fill rate
- up to -60% CO<sub>2</sub> (modal-shift)

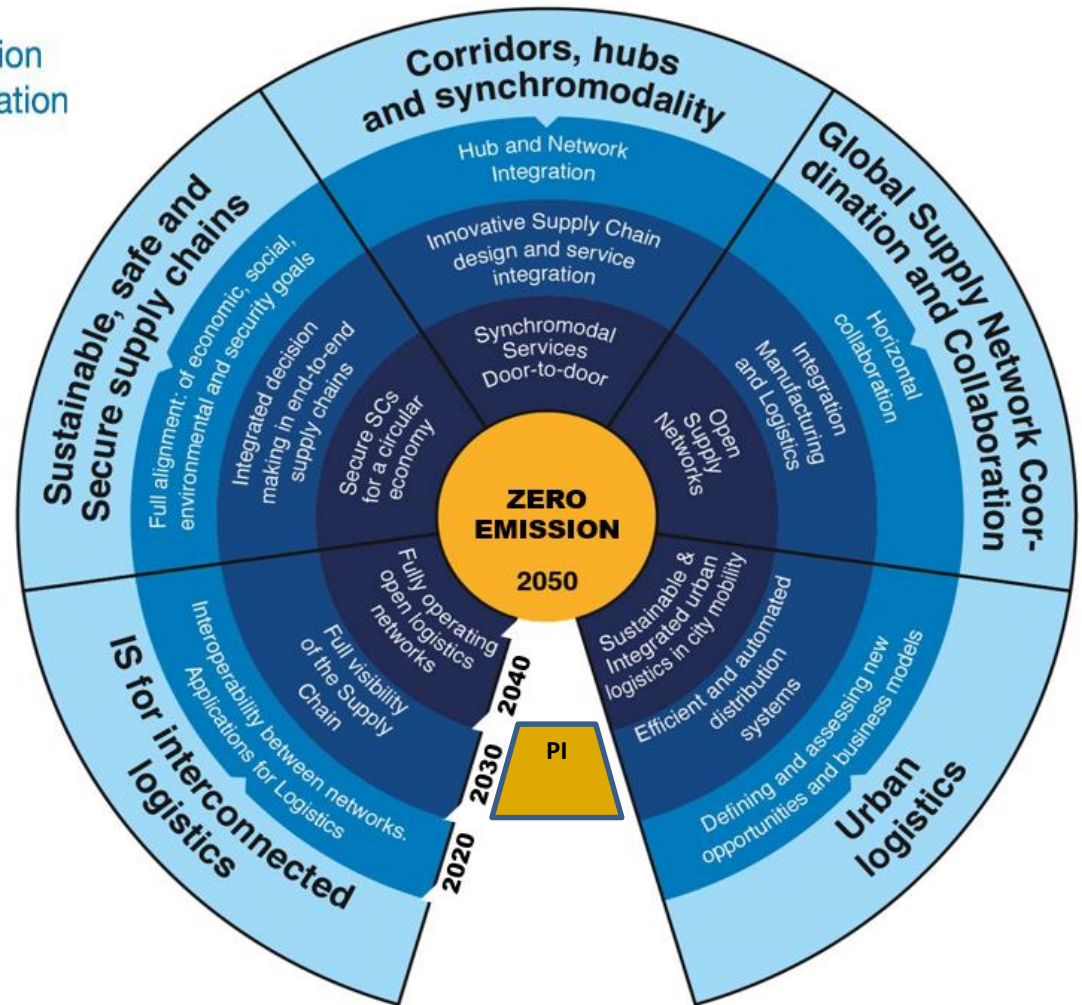
# •2050 Freight Transport Scenarii





**WHAT HAS BEEN DONE ON  
THE PHYSICAL INTERNET?**

**ALICE VISION is to realize PI by  
2030 to pave the way to Zero  
Emissions by 2050**



## Roadmaps



SUSTAINABLE, SAFE AND  
SECURE SUPPLY CHAINS



CORRIDORS, HUBS AND  
SYNCHROMODALITY



INFORMATION SYSTEMS  
FOR INTERCONNECTED  
LOGISTICS

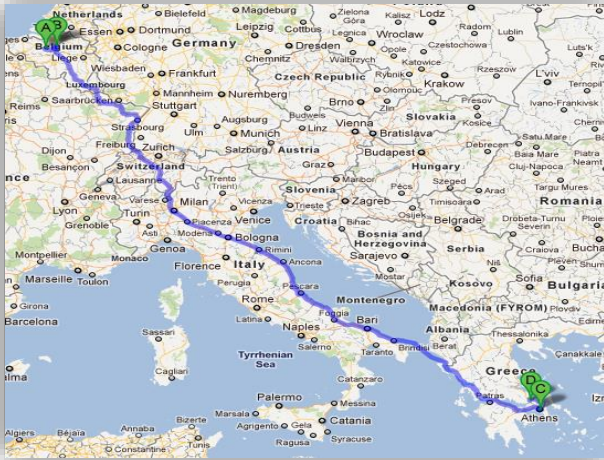


GLOBAL SUPPLY  
NETWORK COORDINATION  
AND COLLABORATION



URBAN FREIGHT

# 1. HORIZONTAL COLLABORATION



>15% less Cost

Save > 2M Tons CO<sub>2</sub>

Vehicle Cube Fill improvement

55% → 85%

by heavy & light mixing



Optimize Warehouse  
Productivity



Show Industry  
Leadership





# *“Cube-Fill”* Concept

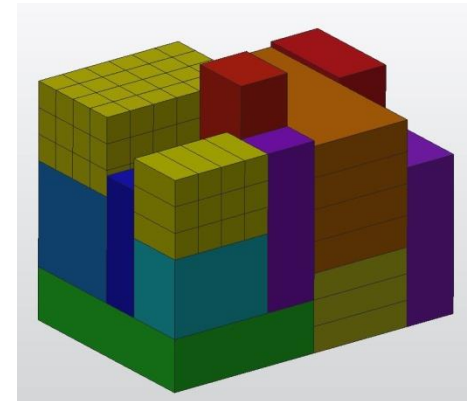
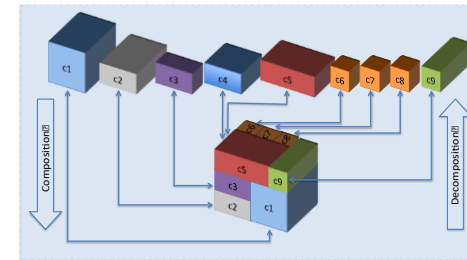


But it's not really easy...

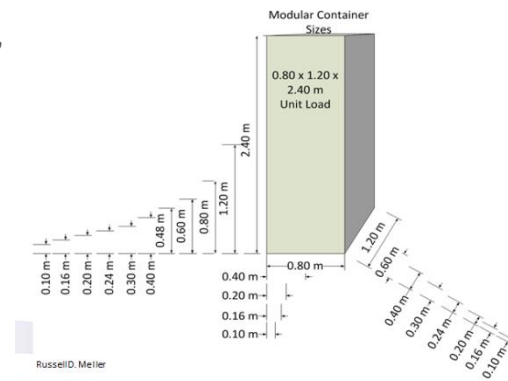





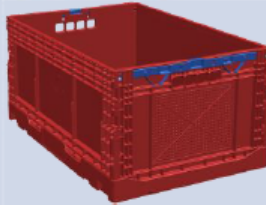



## 2. MODULUSHCA - NEW MODULAR CONCEPT



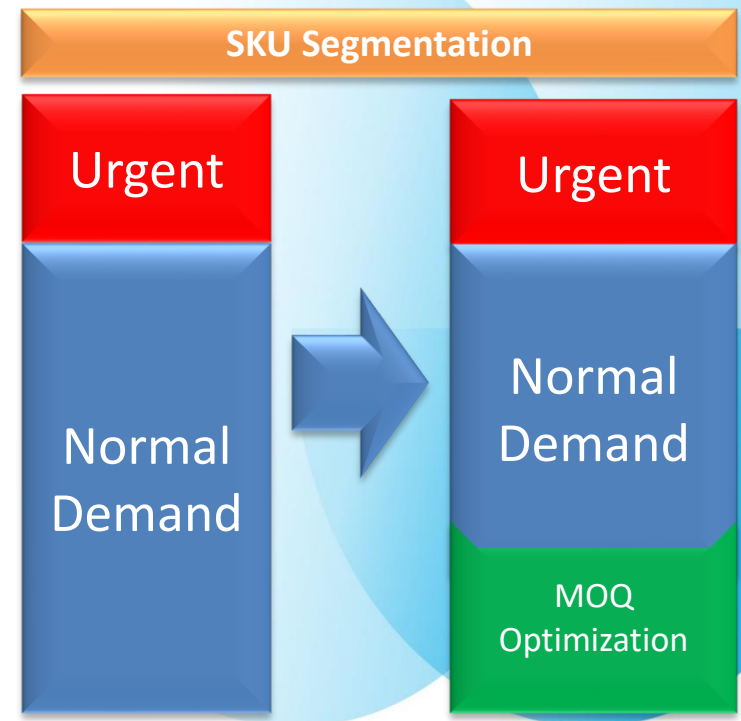
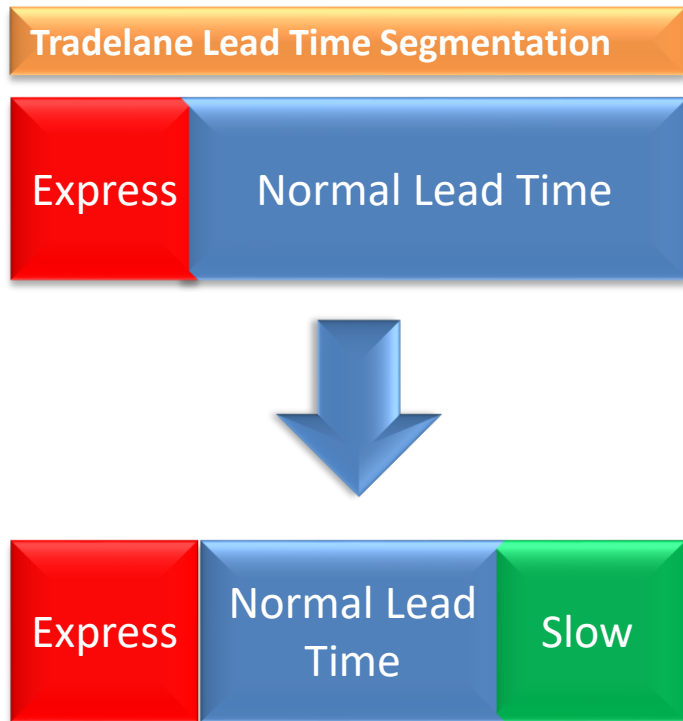
- Modular dimensions from cargo containers down to tiny sizes
- Easy to handle, store, transport, interlock, load, unload, construct, dismantle, compose and decompose
- Smart tag enabled, with sensors



| EDEKA  | Müller   | Rossmann  | dm   | GS1  |
|--|--|---|--|--|
| Stauchdrucktest<br>3-er Stapel**<br>1.200 daN                                      | 1.100 daN  | 1.000 daN   | 1.400 daN  | FEM-Berechnung   |
| Bodendurchbiegung*<br>30Kg- 5mm<br>Gewicht:3,2 Kg<br>LKR-Boden,10mm                | 7,5kg – 12mm<br>Gewicht: 2,3 Kg<br>Einfacher Boden,                                | 20kg – 11,3mm<br>Gewicht: 2,8 Kg<br>Einfacher Boden                                 | 30kg – 1,7mm<br>Gewicht: 3,2 Kg<br>Doppelboden                                       | Gewicht: 2,7 Kg<br>FEM-Berechnung,<br>Wert zu<br>definieren<br>Doppelboden           |
|  |  |  |  |  |

### 3. CLUSTERS 2.0 SYNCHROMODALUTY

Synchromodality : skus & tradelanes segmentation...





# SYNCHROMODALITY

## THE ALPHA ALPHA CASE



**ZARAGOZA REGION  
THE BEST  
ALPHA ALPHA GRASS**

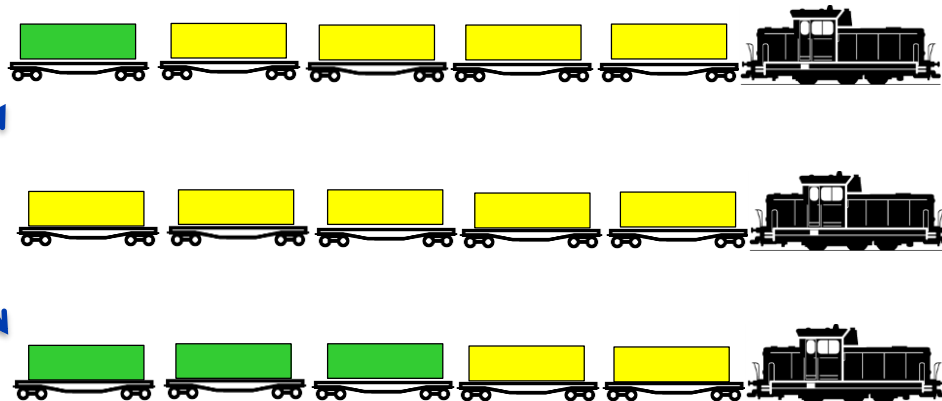


**THE NETHERLANDS  
THE BEST  
MILK COWS**



## HOW DO WE GET THE GRASS TO THE COWS?

ALPHA ALPHA LOADS  
ARE NOT URGENT  
AND USED  
AS A FILLER



ALPHA ALPHA GRASS LOAD



REGULAR LOAD





Is this the best  
you can do?

# Contact



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