Digital Platform Enabling Hyperconnected Logistics

Jeff Smith, Frédérick Benaben, Mohammad Ansari

One of the important concurrent research and innovation axes toward the Physical Internet is the *Digital Platform*. At the digital level, informational and decisional interconnectivity has to be enabled, including citywide real-time status and performance monitoring, visibility and traceability of π-containers, facilities, vehicles, infrastructures and services. Intelligent Transportation systems and Internet-of-Things technologies such as RFID and GPS, as well as their associated coding systems have to be harnessed and combined for comprehensive urban environments.

Simulation Modeling for Analyzing PI Supply Chains and Supporting Managerial Cockpits

Mohammad Ansari
Jeffrey S. Smith
Benoit Montreuil

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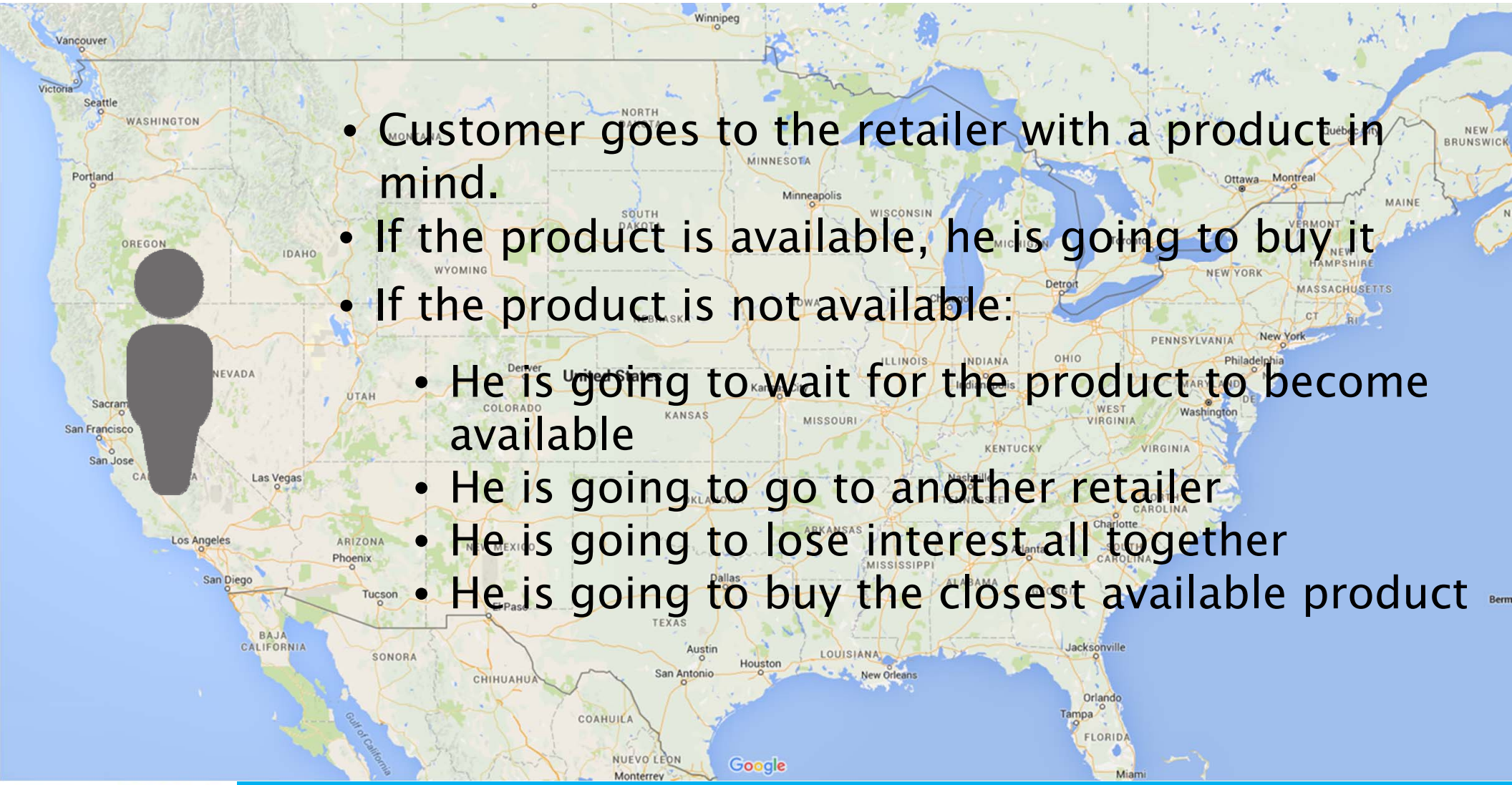
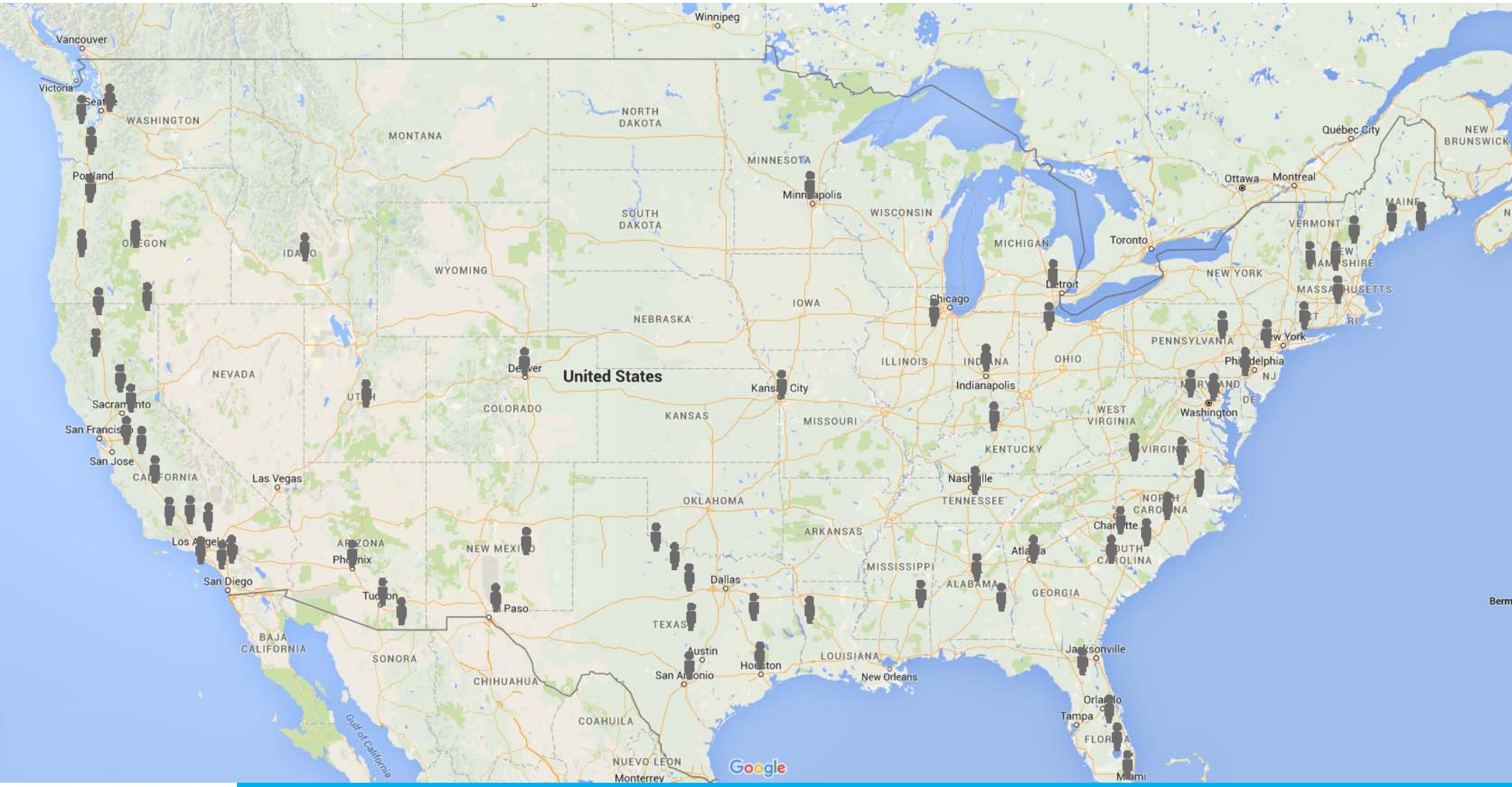


- Customer goes to the retailer with a product in mind.
- If the product is available, he is going to buy it
- If the product is not available:
  - He is going to wait for the product to become available
  - He is going to go to another retailer
  - He is going to lose interest all together
  - He is going to buy the closest available product



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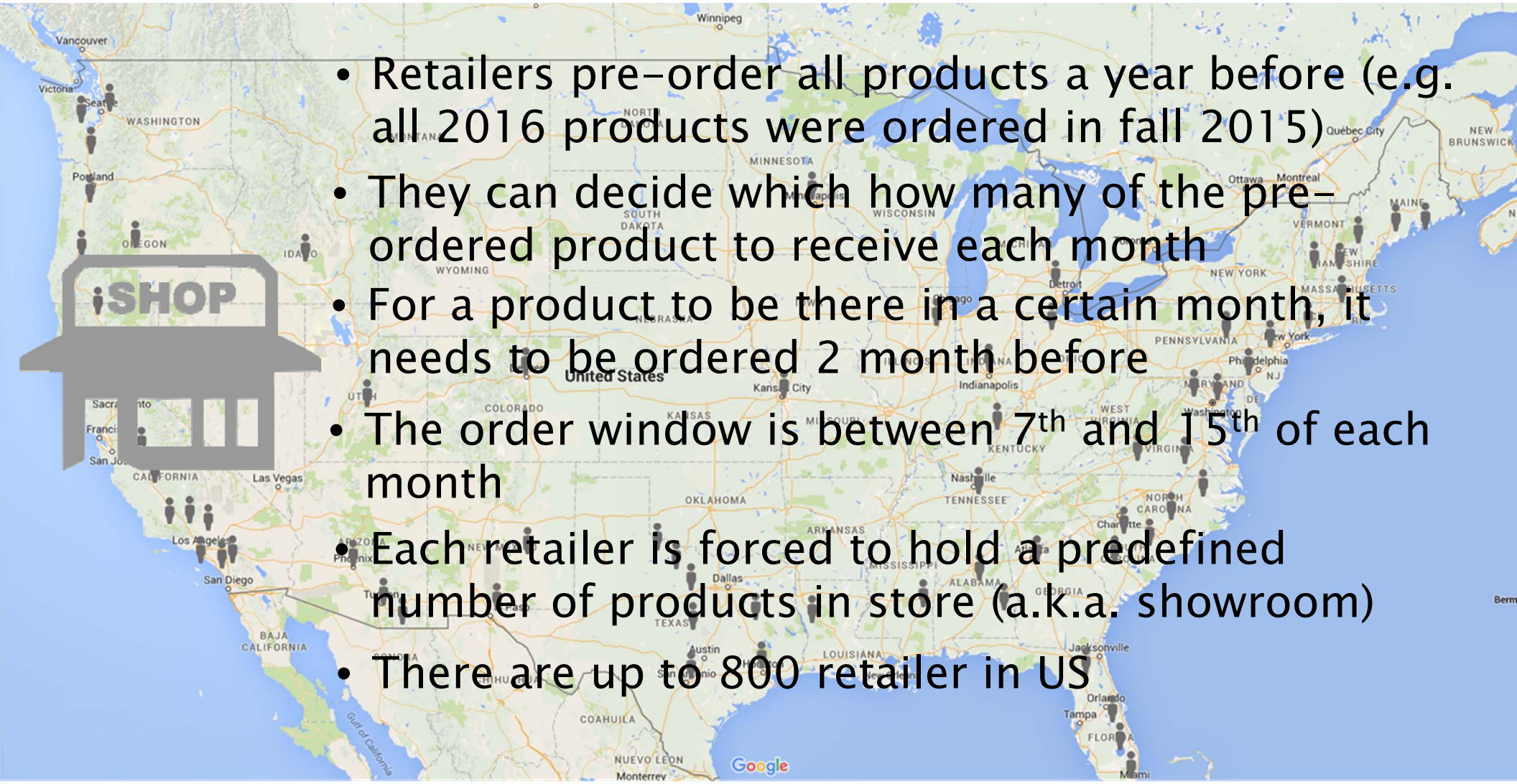
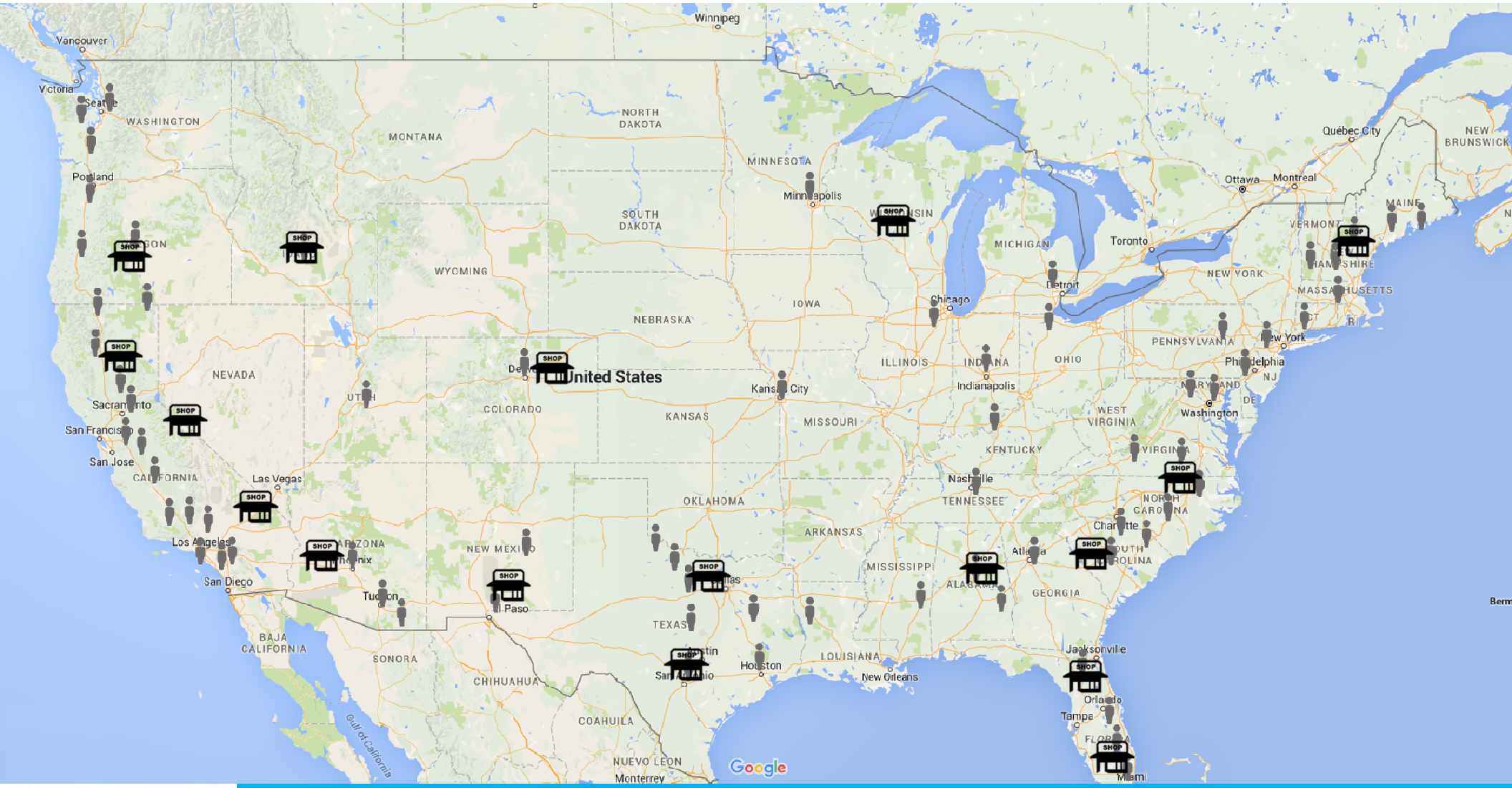


- Retailers pre-order all products a year before (e.g. all 2016 products were ordered in fall 2015)
- They can decide which how many of the pre-ordered product to receive each month
- For a product to be there in a certain month, it needs to be ordered 2 month before
- The order window is between 7th and 15th of each month
- Each retailer is forced to hold a predefined number of products in store (a.k.a. showroom)
- There are up to 800 retailer in US



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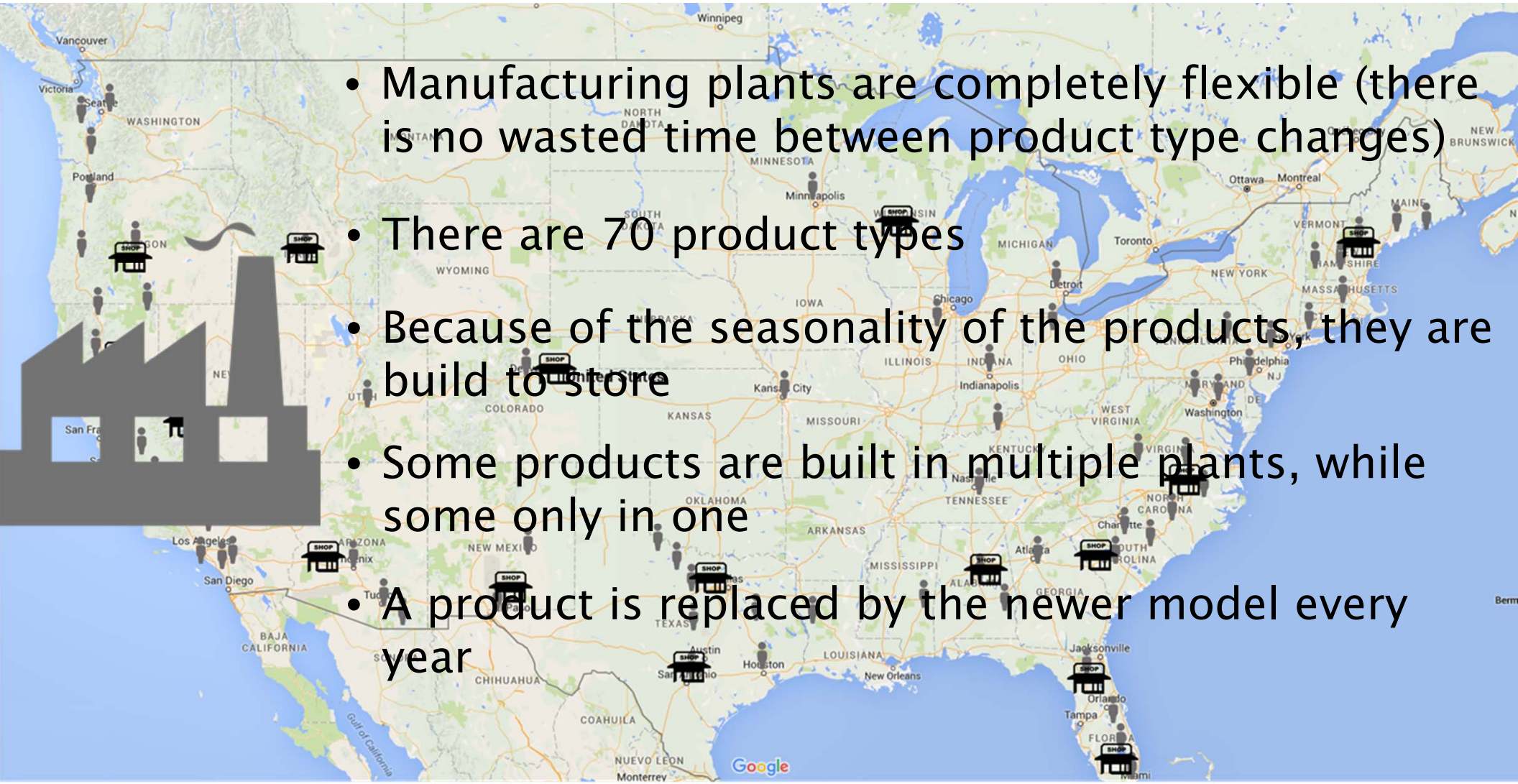
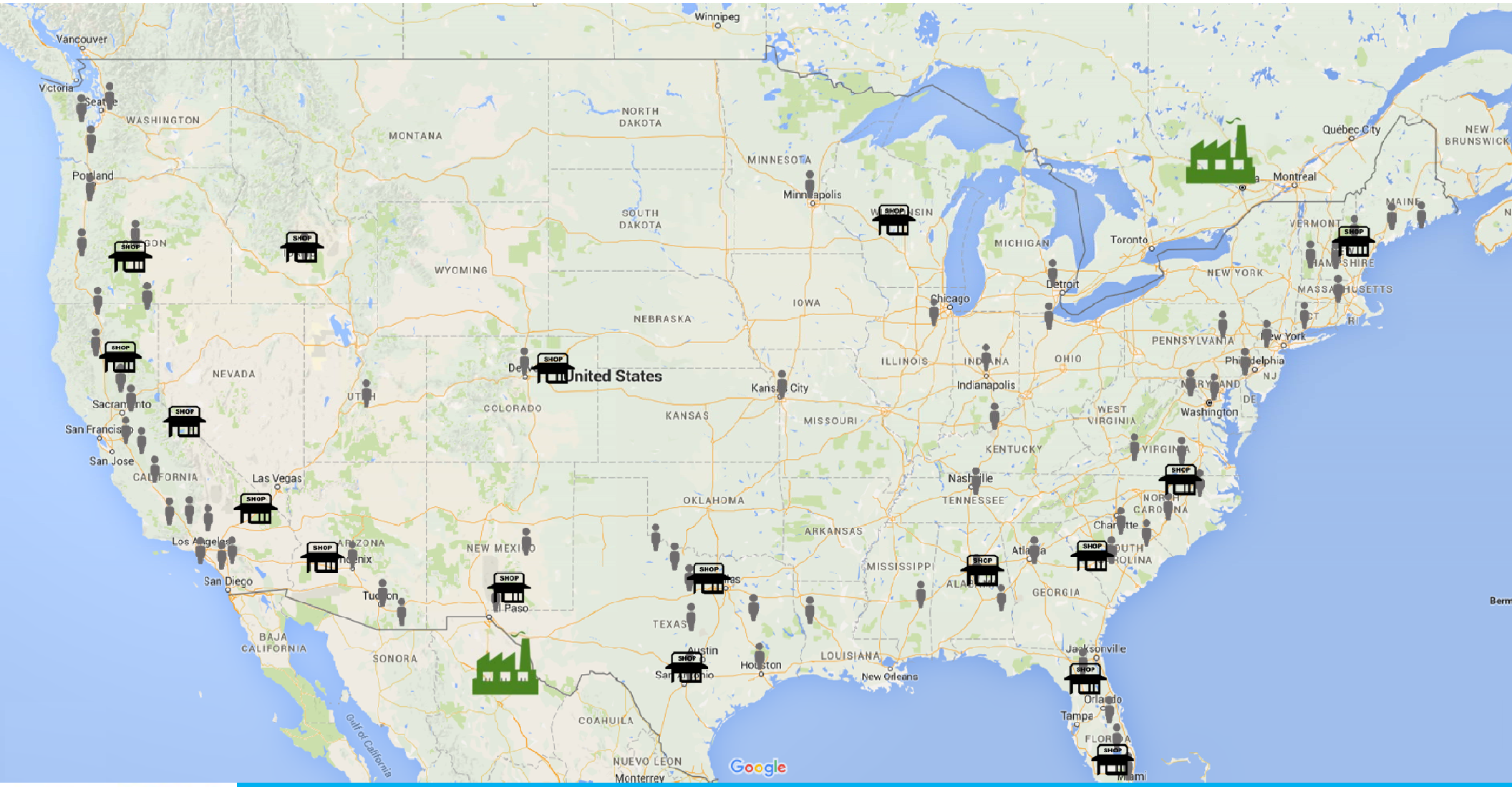


- Manufacturing plants are completely flexible (there is no wasted time between product type changes)
- There are 70 product types
- Because of the seasonality of the products, they are build to store
- Some products are built in multiple plants, while some only in one
- A product is replaced by the newer model every year



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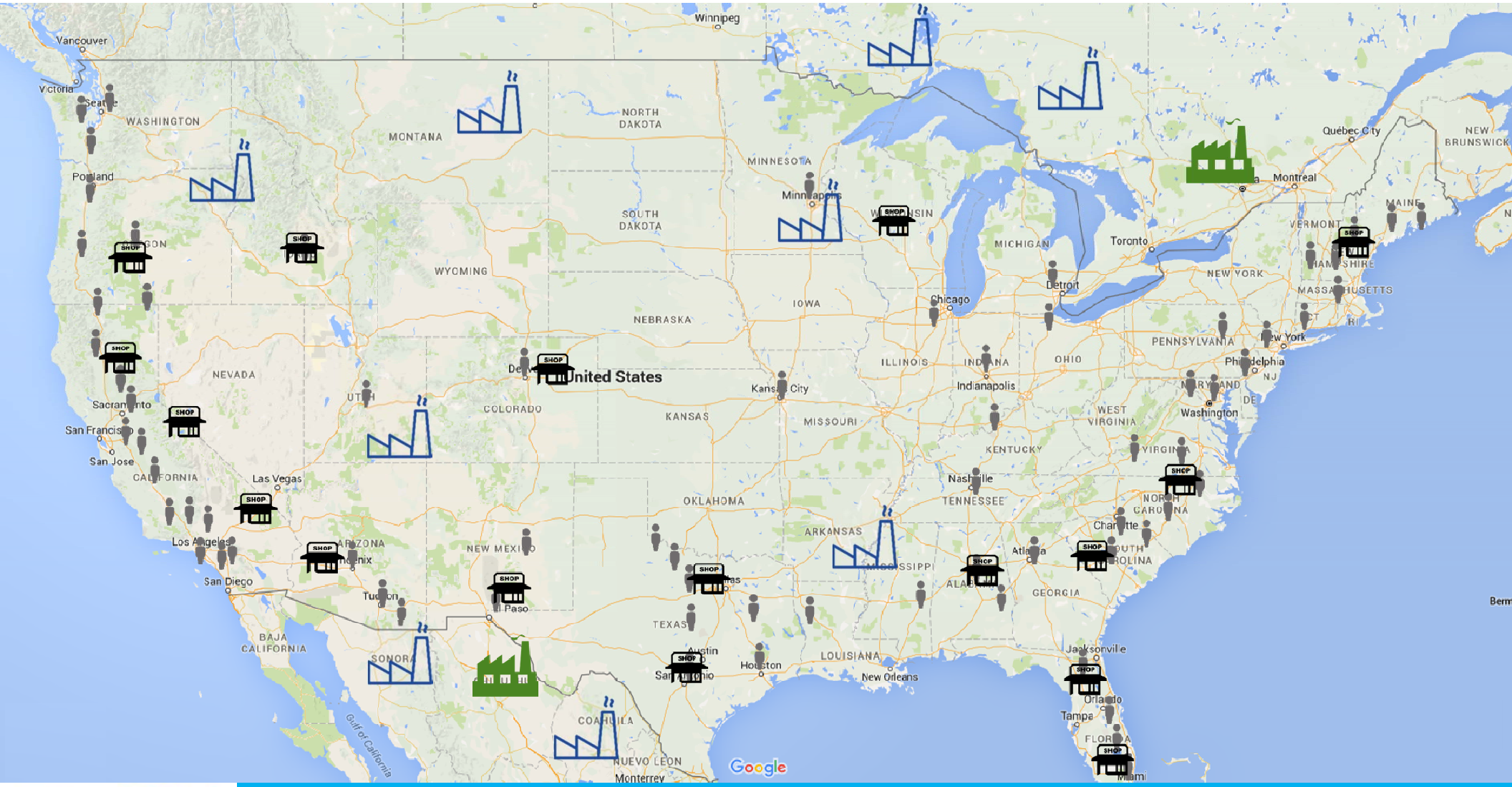
- Suppliers are spread trough out the world
- The products needs up to 50 major suppliers (not critical materials are excluded)
- It takes between 1 to 4 month to receive the material
- Orders to supplier are placed after the pre-order of products



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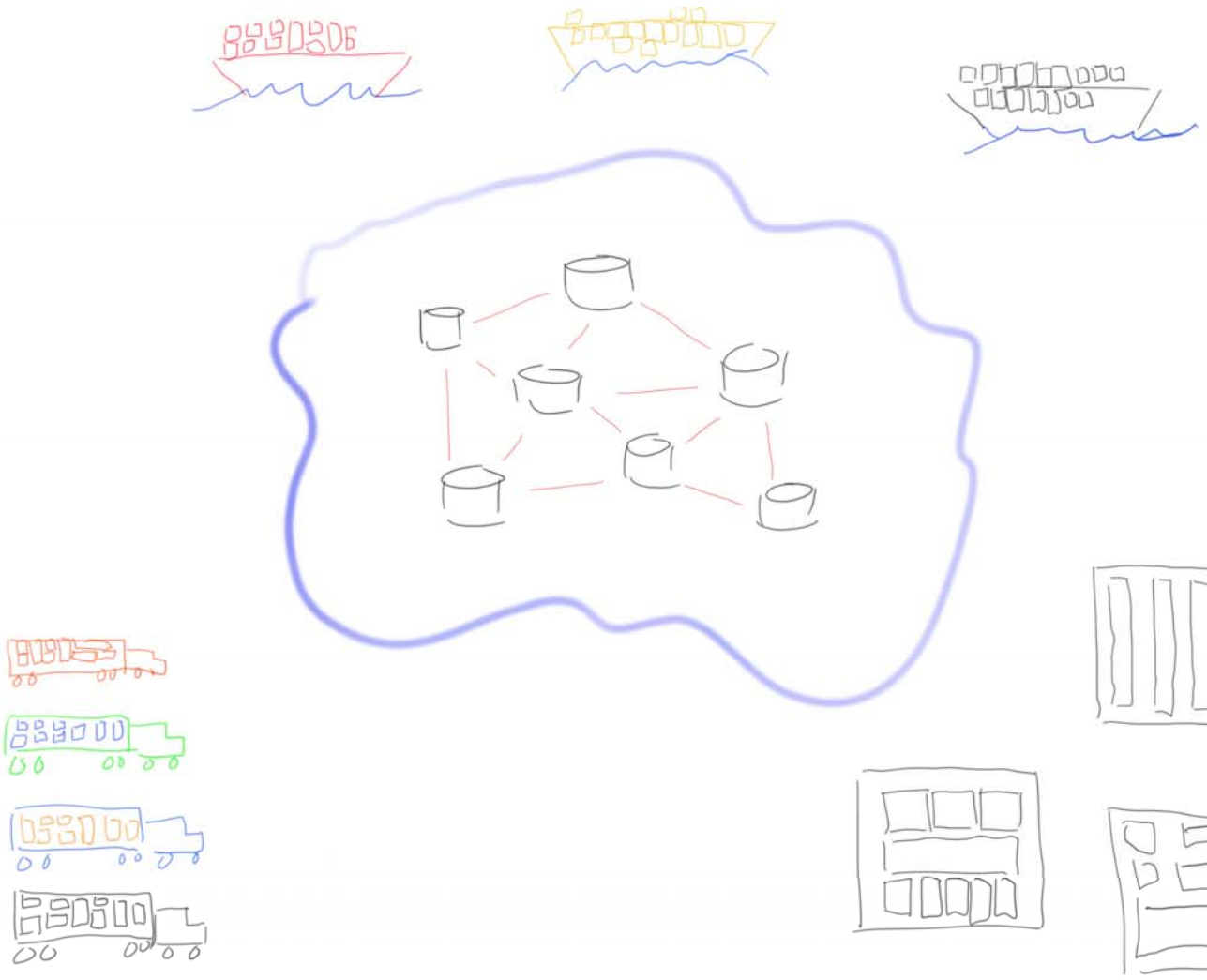
Shipment Progress What's This?

Location	Date	Local Time	Activity
PLAINFIELD, IN, US	06/27/2016	10:54 A.M.	Delivered
Indianapolis, IN, United States	06/27/2016	6:00 A.M.	Out For Delivery
Indianapolis, IN, United States	06/24/2016	6:44 P.M.	Destination Scan
	06/24/2016	3:57 P.M.	Arrival Scan
Nashville, TN, United States	06/24/2016	10:06 A.M.	Departure Scan
	06/24/2016	8:28 A.M.	Arrival Scan
Montgomery, AL, United States	06/24/2016	4:01 A.M.	Departure Scan
Montgomery, AL, United States	06/23/2016	10:33 P.M.	Arrival Scan
Opelika, AL, United States	06/23/2016	9:21 P.M.	Departure Scan
	06/23/2016	10:05 A.M.	The shipment has been dropped off and is now at a UPS Retail Location.
United States	06/22/2016	5:47 P.M.	Order Processed: Ready for UPS

- Different “Views”
  - Order
  - Vehicle
  - Company
  - Facility
  - ?
- More that simple “timestamp” information
- Automated collection of data
- Comprehensive, global access to *some* of the data/metadata



Major Questions

- Administrative
  - Who will design/build?
  - Who will manage?
  - Who will pay?
  - How will access be guaranteed?
  - Security/privacy
- Technology-related
  - Interfaces/APIs
  - Scalability/Redundancy
  - Security/privacy
  - Heterogeneous hardware and software

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An agile platform to support collaboration

Raphael Oger - Frederick Benaben - Matthieu Lauras
Toulouse University / IMT Mines Albi - FRANCE
30th of June 2016

0. FOREWORD

- Physical Internet
  - Globally, this is about seeing logistics protocol for goods through an analogy with internet protocols for data…
  - Here, we want to push (one step further) the analogy to workflows and collaboration processes…
- Objective
  - Supporting collaborative situations between stakeholders (industrial partners or organizations aiming at collaborating)
  - Building an agile business workflow management platform (IoT providing events).

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Our vision

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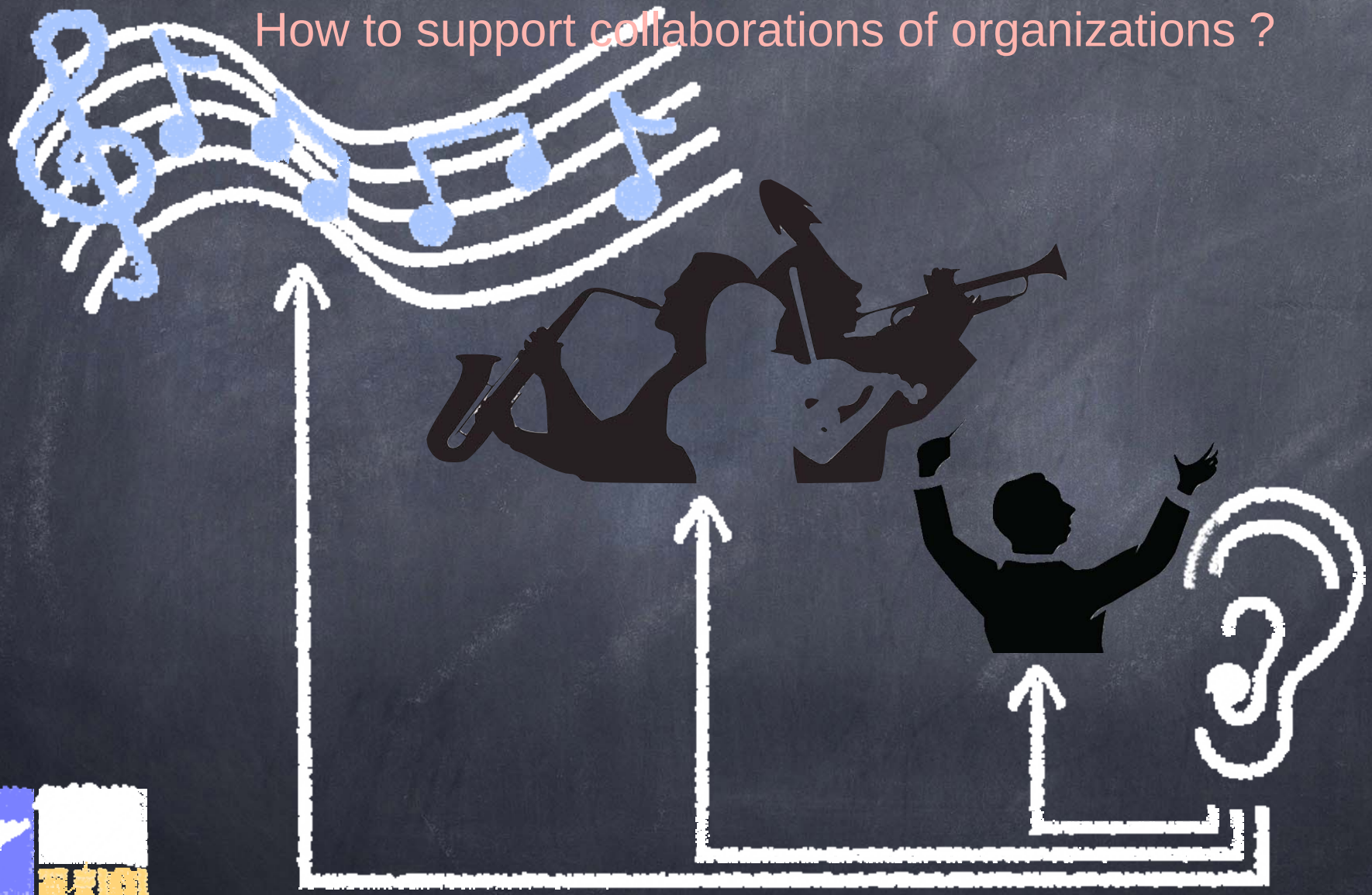
How to support collaborations of organizations ?



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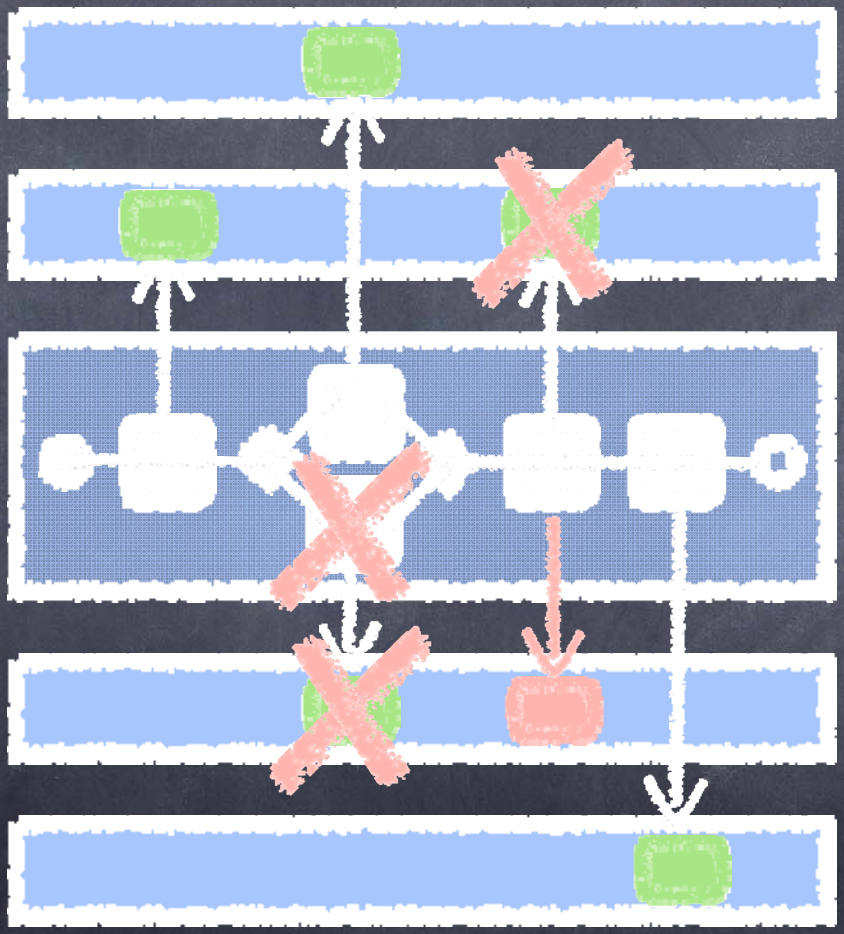
Our vision

COORDINATION

Define

Realize

Maintain



Our vision

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Knowledge

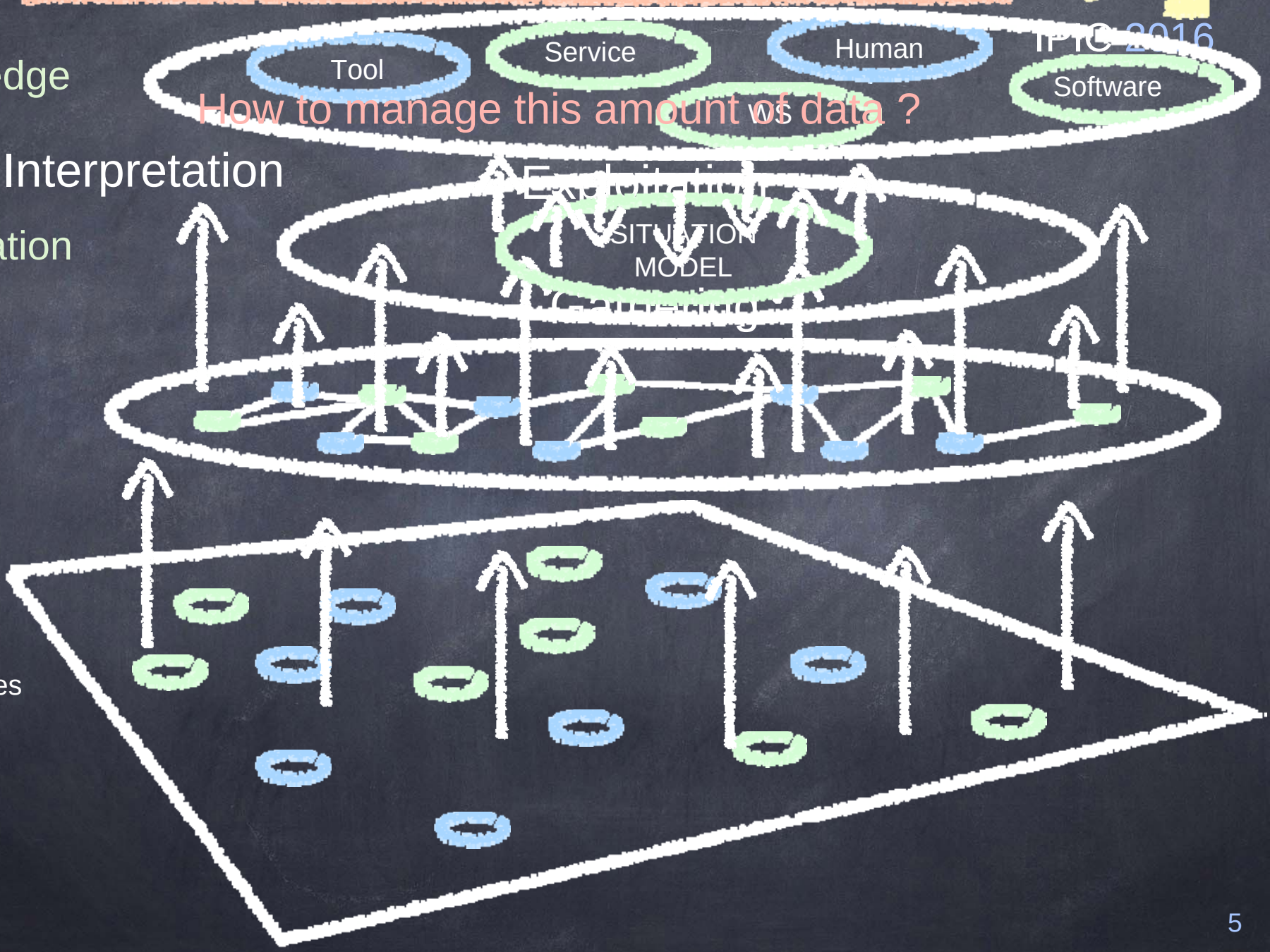
Interpretation

Information

Data

Data sources

How to manage this amount of data ?



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Our vision

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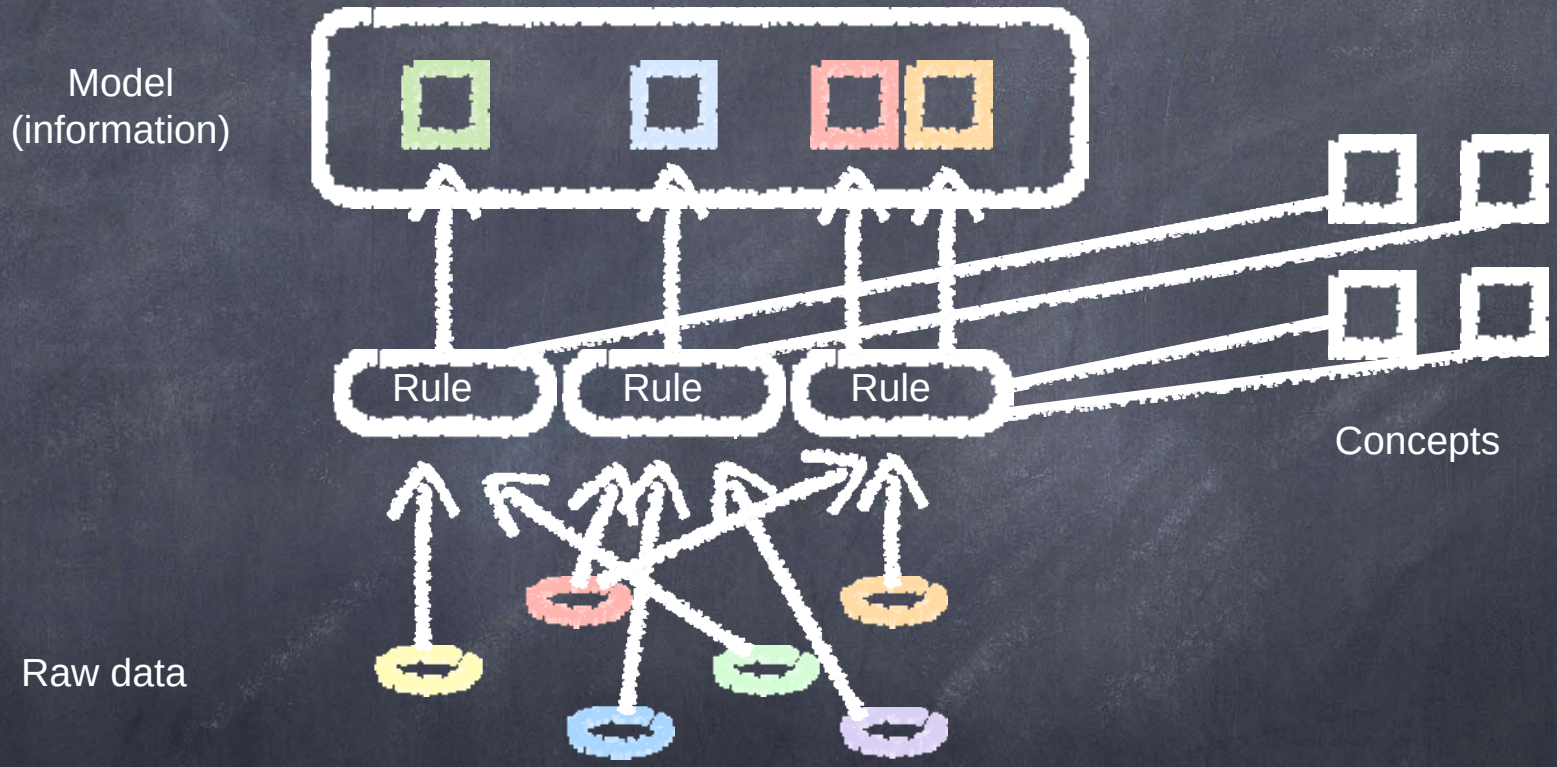
DATA MANAGEMENT



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Our vision

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Agility = (Detection + Adaptation) (Proactivity + Efficiency)

Time

Field Model

Monitoring events

Real field events

Distance measurement

+

Difference analysis

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Big Picture

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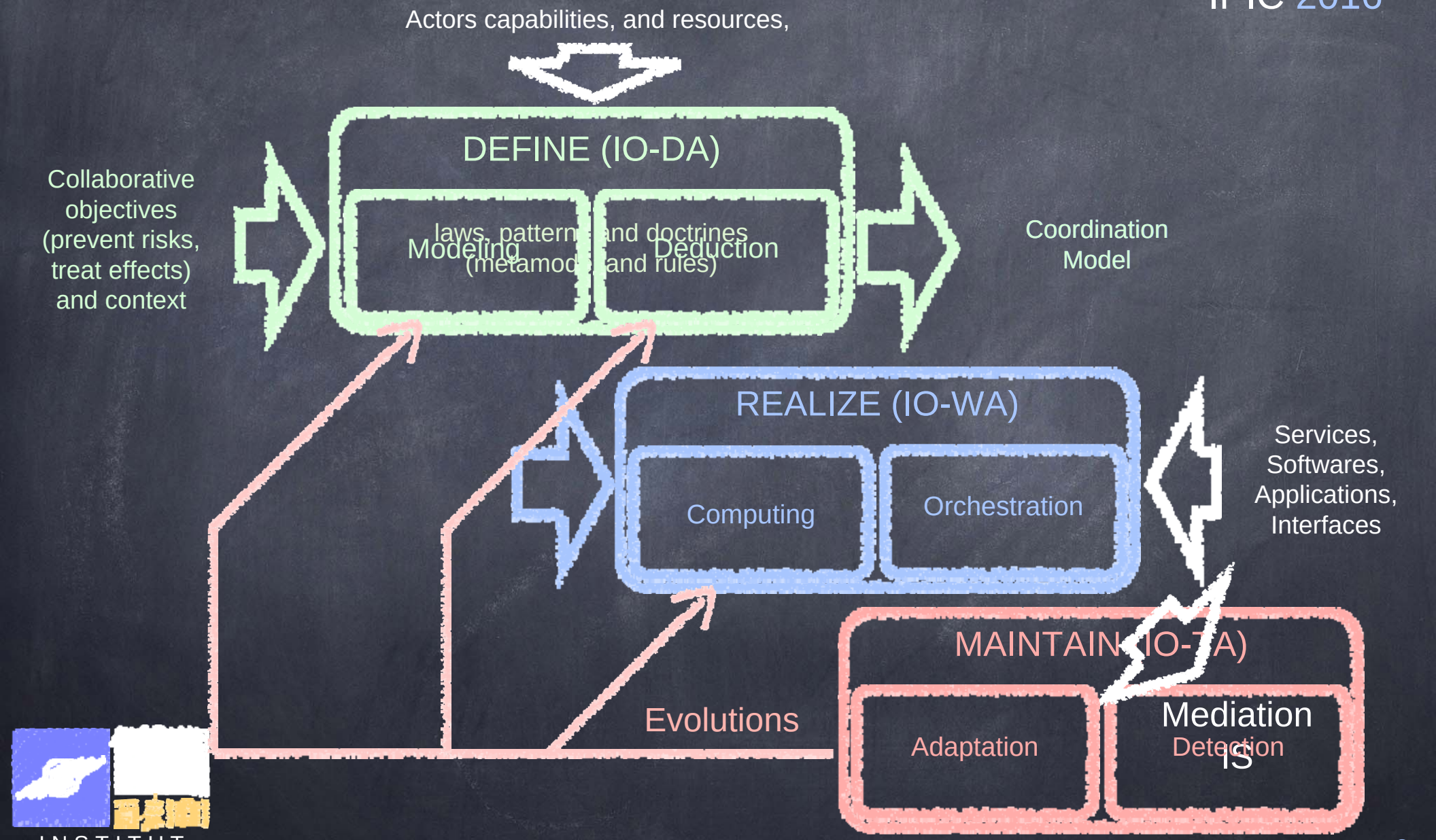

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Deployment

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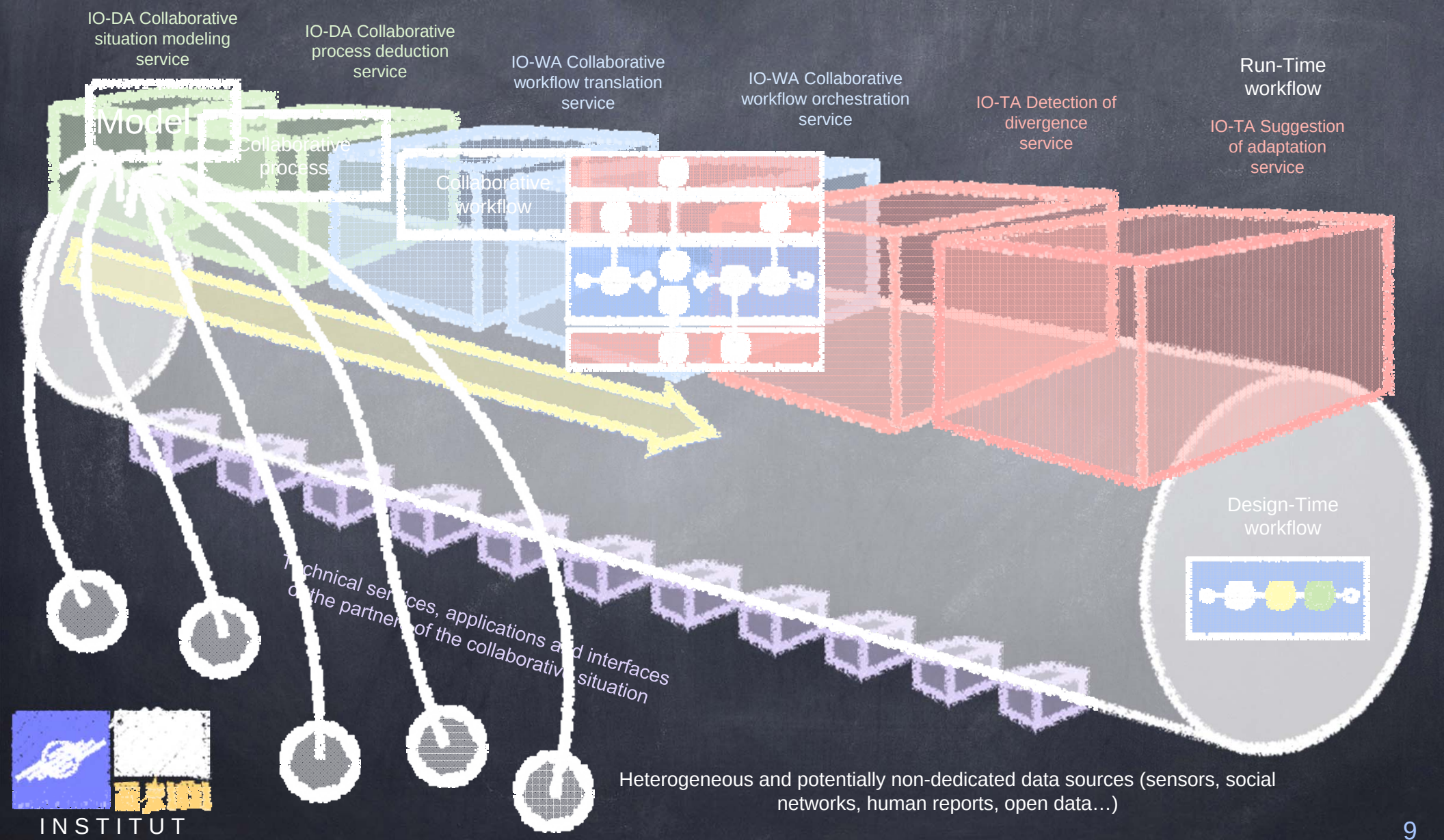

Heterogeneous and potentially non-dedicated data sources (sensors, social networks, human reports, open data…)

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Deployment

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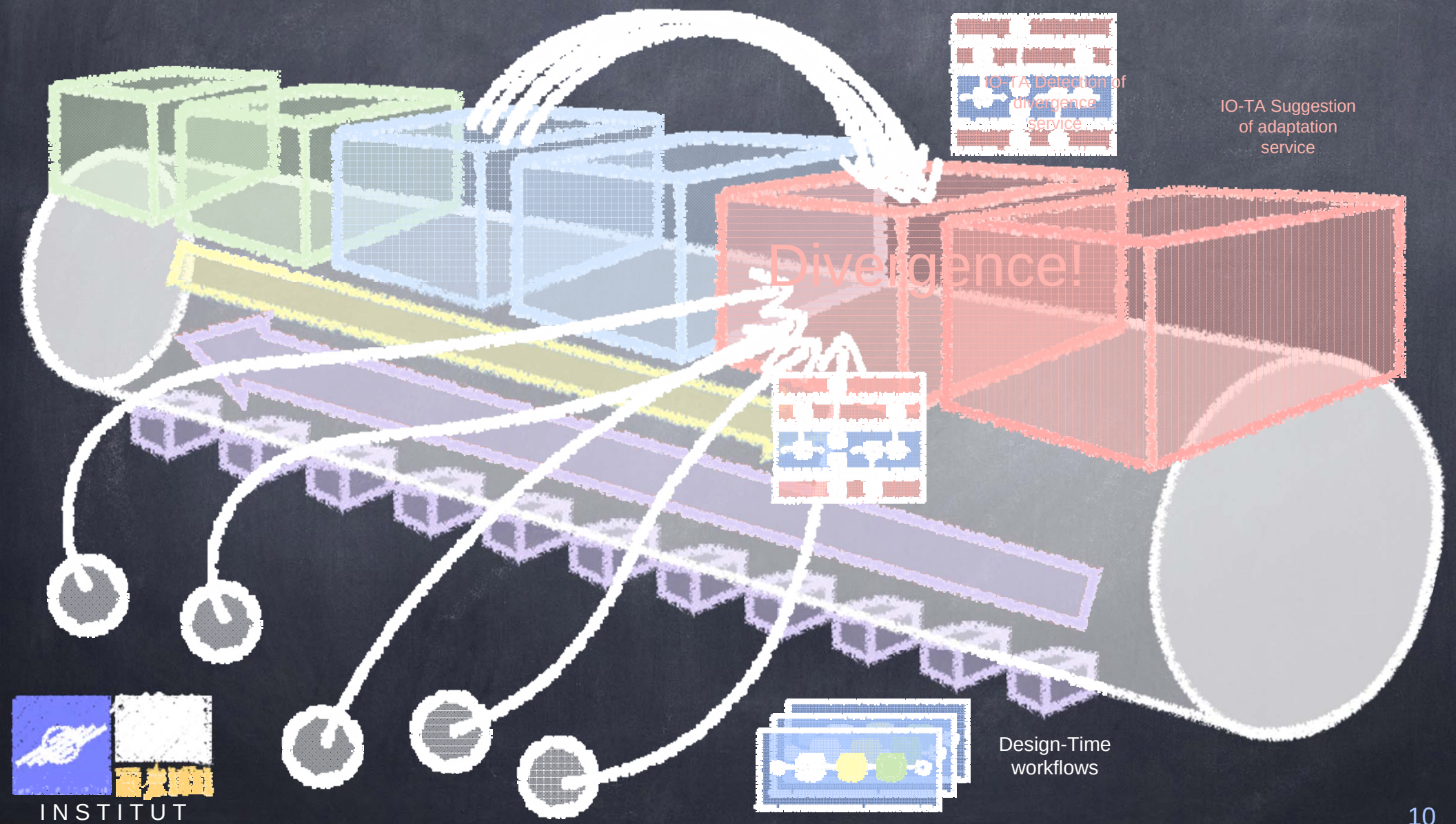
Agility = (Detection + Adaptation) (Reactivity + Efficiency)



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Conclusion

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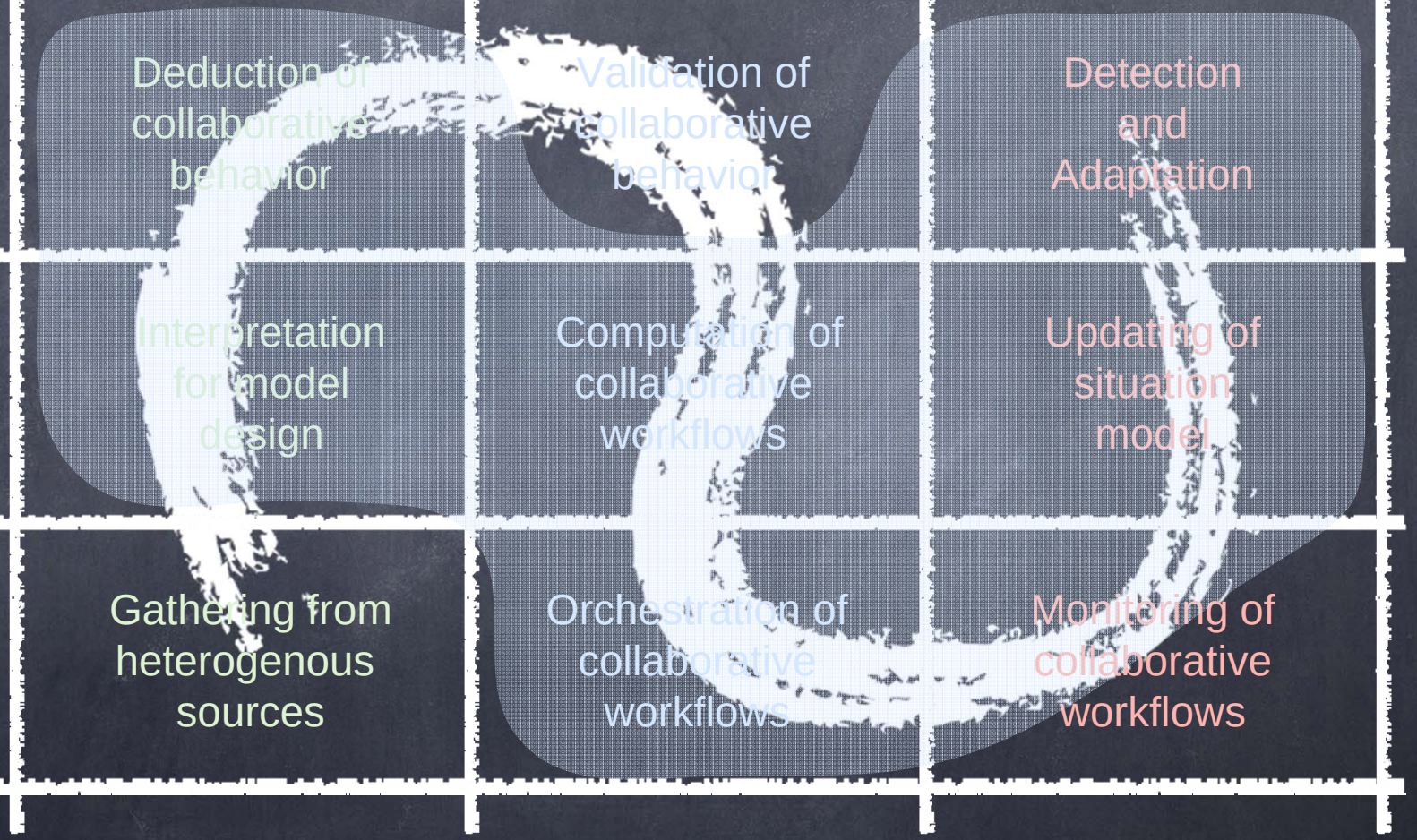

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World conference ISCRAM 2017

Information System for Crisis Response and Management

Albi (FRANCE) - 21-24 May 2017

MERCI very much...

Raphael Oger, Frederick Benaben, Matthieu Lauras
frederick.benaben@mines-albi.fr / @FBenaben / @ISCRAM2017
Toulouse University / IMT Mines Albi - FRANCE
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