

# IPIC 2018

5th International  
Physical Internet  
Conference

June 18 - 22, 2018 | University of Groningen, the Netherlands

# SMART CITY LOGISTICS

STUDENT ASSIGNMENT

## Your solution as answer for our future!



Living, working, spending your free-time... Nowadays, more and more residents live in cities. These cities are most of the time created in the time of the Industrial Revolution. You can imagine the structure of a city with industrial and economic -shopping and leisure – and living areas, all interconnected by an infrastructure for public and private transport of persons and goods.

Cities are changing. Changing in such a way that they become an environment where your work, live, learn, shop and recreate in almost every place of the city. In another rhythm, the rhythm of the 24- hours economy. However, this change impacts our infrastructure and solutions for logistics. We also want to have a sustainable city and future.

The main question arises: how can we construct sustainable city logistics for the future? This question is the central theme in this student assignment for bachelor and master students at universities and universities of applied sciences from all different disciplines. Also, senior secondary school pupils are invited to join us in providing an answer for the future.

One of the promising solutions for future logistics is the concept of the Physical Internet. We invite you to apply this concept to create a solution as answer for our future! This assignment is organized in the run up to our International Physical Internet Conference in 2018 and the best team will win a grant in order to present their solution during the Physical Internet Conference.

We will start this assignment with the problem setting in city logistics, followed by an introduction in the Physical Internet concept. The last part of this document will provide more information about the assignment, our community and procedures & deadlines.

We are looking forward to your solutions!

### **Prof. dr. Iris Vis**

Professor of Industrial Engineering  
*University of Groningen*

Chair of Organizing committee IPIC18

### **Dr. ir. Wout Hofman**

Senior Research Scientist Logistics  
*TNO - Netherlands Organization for  
Applied Scientific Research*

Chair of Jury committee IPIC18

## Problem setting: City Logistics

As mentioned before, our cities of tomorrow will be places where you work, live, learn, shop and recreate in almost every place of the city in a 24- hours economy including e-commerce. More and more orders will be placed via (globally operating) web shops and will be delivered via parcel companies. Different flows of logistics can be identified in a city: Logistics for construction and buildings, food/food service, retail logistics, healthcare logistics, e-commerce logistics and logistics of waste. The expectations of customers for these flows will be set higher: we want to shorten delivery times and the availability of products becomes more important. At the same time, cities want to reduce their CO<sub>x</sub> emissions in line with all the climate agreements, which poses demands to logistics. Furthermore, we see that cities become more popular to live in. More and more citizens move from rural areas to the urbanized areas/cities.

If we combine previous information, it is relatively easy to conclude that we will have other demands to our logistical networks in the future than the current ones. The challenge is that we must organize our transport and logistics in such a way that congestions in the cities are prevented and that a focus on sustainability will be maintained.

## Theory: The Physical Internet

The Physical Internet Initiative aims at transforming the way physical objects are moved, stored, produced, supplied and used, pursuing global logistics efficiency and sustainability. Originating from professor Benoit Montreuil, professor Eric Ballot and professor Russel Meller, this ground-breaking vision, revolutionizing current paradigms, has stirred great interest from scientific, industrial as well as governmental communities.

The Physical Internet is a vision of the future in which goods in a completely open and connected network will automatically be able to select their ideal routes from shipper to customer, using an optimal match means of transport. On their way, goods will be able to make use of any warehouse for the purpose of choosing a strategic storage location. Safely, rapidly and reliably, just like we currently use the Internet for sending our e-mails.

The Physical Internet may sound like science fiction, but let's not forget what we thought of the Internet about 20 years ago. Nowadays, we send our e-mails across the Internet without

hesitation. No one wonders 'how' they will arrive at their destination, we assume and experience they will arrive. On their way, e-mails are encrypted, cut up, sent using continually changing hubs (servers and satellites) and then pasted together and filed in the recipient's inbox.

What a difference with how things are still done in supply chains. Shippers and logistics service providers still make arrangements in framework contracts regarding fixed routes with fixed warehouses and, generally, they also draw up agreements about whether the shipment will be sent by water, road, railway or air (modes of transport).

Synchromodal transport solutions are gradually changing that. Shippers and LSPs no longer make arrangements on preferred transport modes and carriers. Currently, synchromodal transport is deployed for transporting containers from hub to hub, including seaports and inland terminals. The containers can have secure information carriers, small sensors which contain the most critical information about these containers, such as cargo, owner, track & trace. Synchromodal transport can be regarded as a step towards the realization of smart and self-organizing logistics: a Physical Internet.



### Elements of a Physical Internet

A Physical Internet network relies on three building elements:

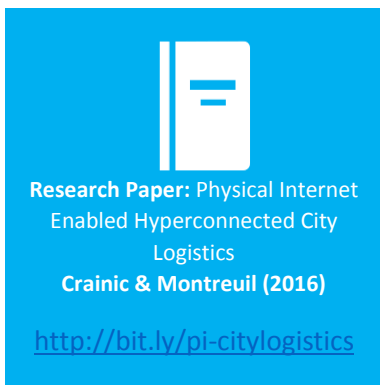
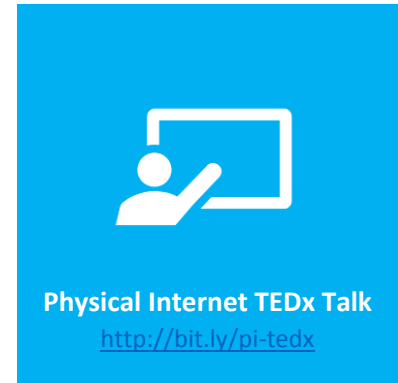
- Open and shared networks for information – and goods flows
- Standardized and modularized containers
- Track and trace, protocols, certificates and agreements

### Topics and themes (in research) regarding Physical Internet

- Corridors, hubs and synchromodality
- City logistics
- Sustainable and safe supply chain logistics
- Supply network coordination (4C)
- IT-systems for open and interconnected networks

## Resources for deepening your knowledge

By now, we hope that you have an overview of the Physical Internet Concept. For further deepening in the concept, we would like to advise you to visit one of these optional sources:



The Physical Internet Manifesto can help you in grasping the whole Physical Internet concept. The ALICE Explainer video is an easy way to acquire beginner knowledge about Physical Internet. The TEDx talk is a nice addition after viewing the ALICE explainer video, to get a little bit more feeling with the theory and the concept.

The research paper can be helpful in placing the Physical Internet concept in the field of City Logistics. The Outlook 2017 (composed by the Dutch logistics sector but also applicable for other contexts) can help you in exploring and getting familiar with the topic of City Logistics, the current problems and future expectations.

It depends on your choices in the assignment whether above resources are necessary. You won't be judged on using the resources, if your solution fits in the context of the Physical Internet and City Logistics.

## Your assignment

The question to solve in this assignment is:

**Which solution(s) can ensure safe, sustainable and efficient city logistics with the philosophy of the Physical Internet in mind?**

Design a solution that will help a city in efficient and sustainable city logistics, with the philosophy of the Physical Internet. You are free to choose any form in which you present the solution, ranging from prototype(s) of autonomous operating transport means of any type, IT solutions, to papers or presentations. Make sure that your work will have a valid and sound argumentation. Please include a proof of concept in order to demonstrate the feasibility. You are also completely free to choose the field of expertise or discipline (for example philosophy, biology, mathematics, economics or business, law) that you want to involve in solving this assignment. So, if you have the feeling that your discipline, background or knowledge can help in providing the answer: join us with this assignment!

## Procedures, deadlines and support

We would like to invite you to join our online community: our LinkedIn discussion group. In this group you can share interesting articles, papers or other relevant information. Are you uncertain about some elements, do you need more information about the physical internet concept or do you want to start a discussion about problems in city logistics nowadays? Feel free to post it! You are also invited to post in our group if you are looking for a team to participate in this assignment!

Join our group via this link (you will need a LinkedIn account): <http://bit.ly/pi-group>

### **Deadline and submission of your work**

Submit your final work via e-mail before **May 6, 2018 - 23:59 CET**. You can send your e-mail to [ipic2018@rug.nl](mailto:ipic2018@rug.nl). You will receive an acknowledgement of receipt from us on May 7, 2018. Your submission will be checked on plagiarism.

### **Evaluation criteria**

The submitted assignments will be evaluated regarding the following criteria:

- Relevance of your chosen/definition of problem setting
- Originality of the innovation or (technical) solution

- Feasibility of implementing the innovation or solution (proof of concept)
- Strength of argumentation and reasoning
- Level of contribution to the current base of literature and knowledge

### **Reward**

The winning team will be granted a price of 1250 euro, to enable a representative of the team to visit and present during IPIC2018. All submissions will be published on the conference website (<https://pi.events>), after a quality check and in accordance with you.

### **Support**

Questions about the content of the assignment, Physical Internet concept and/or city logistics can be posted in the before mentioned LinkedIn group. Questions about the procedures can be mailed to [ipic2018@rug.nl](mailto:ipic2018@rug.nl). Teachers can also contact us via [ipic2018@rug.nl](mailto:ipic2018@rug.nl) for content/knowledge related issues: we will only respond if we can verify via your e-mail address that you are an employee at a university, college or high school.