Replicators, Ground Drones and Crowd Logistics
A Vision of Urban Logistics in the Year 2030 – 3 Years Later

Prof. Dr.-Ing. Oliver Kunze Oct. 2019

Research Question:

How Could Urban Logistics Look Like in 2030?

Transportation Research Procedia
Volume 19, 2016, Pages 286-299

ELSEVIER

Replicators, Ground Drones and Crowd
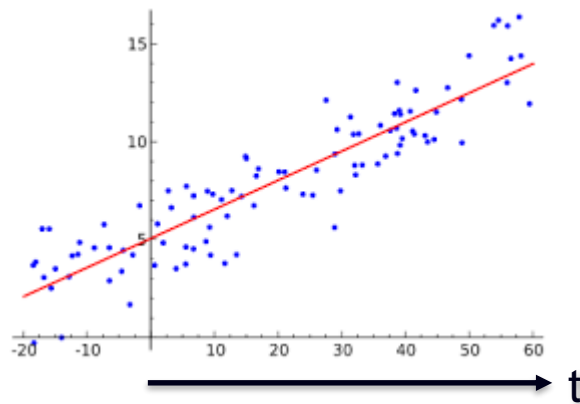Logistics A Vision of Urban Logistics in the
Year 2030 ☆

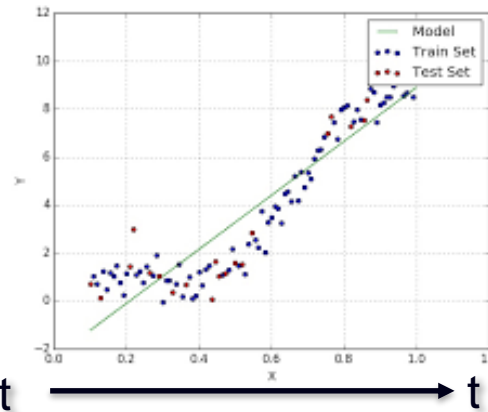Oliver Kunze

Research Question:

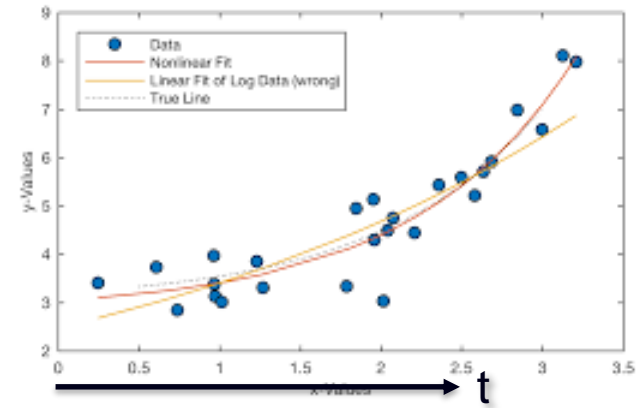**How Could Urban Logistics Look Like in 2030?**

Methodology **???**

Time Series Analysis for Forecasting?

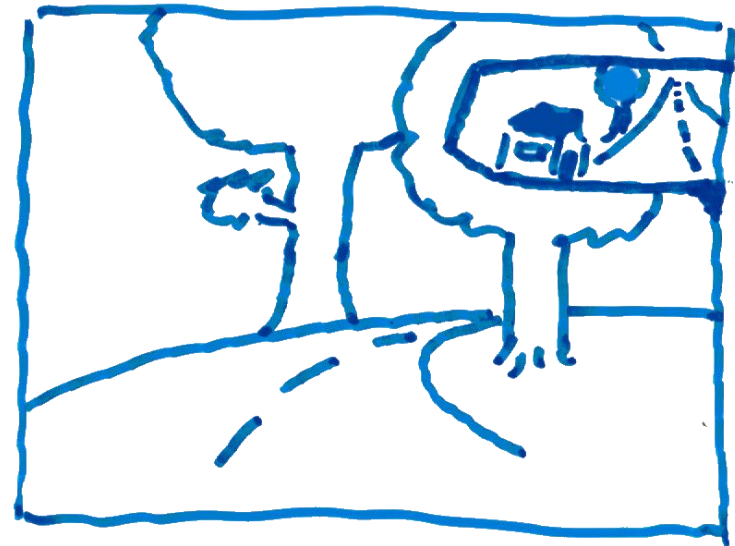Data Availability?
Sufficient Fitting R²?

Seasonalities?

Shape & Parametres of
non-Linearities?

Time Series Analysis for Forecasting

- Using time series analysis for forecasting is equivalent to **driving a car by looking into the rear mirror**, only
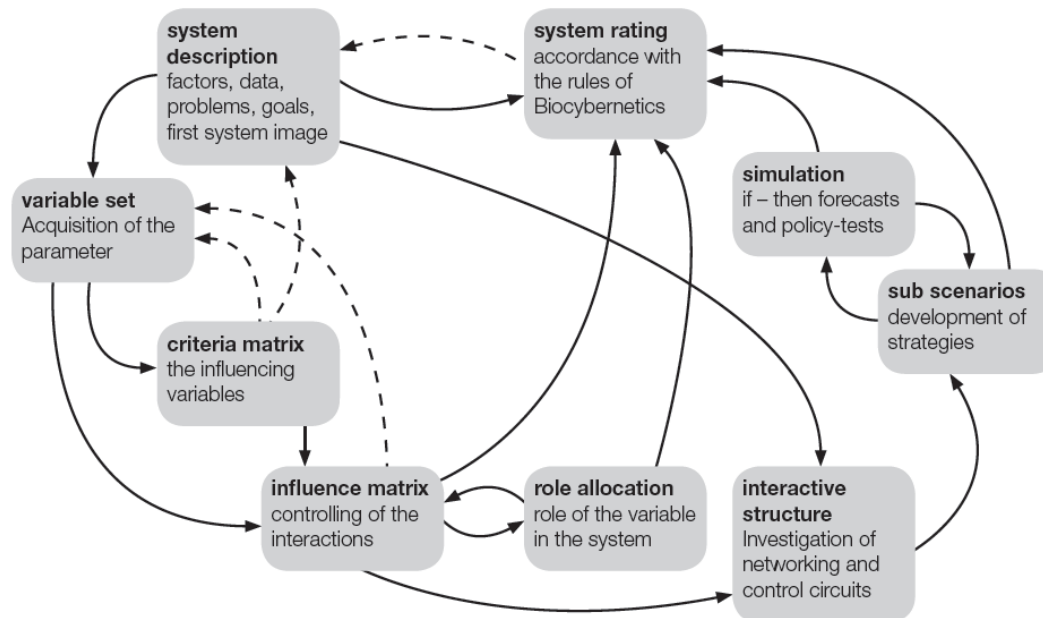

- As every decent textbook on time series analysis explains,
  it **cannot cover new or unforeseen events**

Methodology: Systems Thinking or Cybernetics

"The Art of interconnected thinking:
Tools and concepts for a new approach
to tackling complexity"

Introduced by Frederic Vester 2007

https://www.frederic-vester.de/eng/books/

Research Question:

How Could Urban Logistics Look Like in 2030?

Methodology:

Build a systems thinking model based on

- **global trends**

- **trends in logistics**

- **technologies &**

- **demands patterns**

only!

Global Mega-Trends

Table 1 – Global Mega Trends

Global Trend	Siemens AG	PwC	Ernst & Young	McKinsey & Company	Zukunftsinstitut
I. Digitalization & Technology Change	Digitalization	Technological Breakthrough	Digital Future	Accelerating Technological Change	Connectivity
II. Demographic Change	Demographic Change	Demographic Change	Health Reimagined	Responding to the Challenges of an Aging World	Silver Society, Health, Gender Shift
III. Climate Change	Climate Change	Climate Change & Resource Scarcity	Resourceful Planet	-	Neo-Ecology
IV. Urbanization	Urbanization	Urbanization	Urban World	Age of Urbanization	Urbanization; Mobility; New Work
V. Globalization	Globalization	Shift in Economic Power	Global Marketplace	Greater Global Connections	Globalization
Other Trends	-	-	Entrepreneurship Rising		**VI. Individualization**; Culture of Knowledge; Security
Source:	(Siemens 2015)	(PwC 2015)	(Ernst & Young 2015)	(McKinsey 2015)	(Zukunftsinstitut 2015)

[Kunze 2016] Kunze, O. Replicators, Ground Drones and Crowd Logistics
A Vision of Urban Logistics in the Year 2030; Transportation Research Procedia 19 (2016) 286 – 299; Elsevier

Global Mega-Trends

Climate Change

Urbani-zation

Demographic Change

Globali-zation

Digitali-zation

Individuali-zation
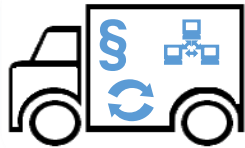
Trends in Logistics
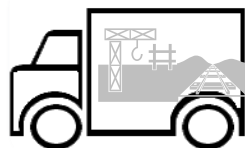
Table 2 – Logistics Trends (Translated from German)

Logistics Trend	Percentage of Experts Stating this Trend
1. Digitalization in Logistics	31%
2. Compliance, Processes & Organization	17%
3. Supply Chain Risks	16%
4. Development of Infrastructure	12%
5. Shortage of Trained Staff	10%
6. New Forms of Mobility	5%
7. Green & Sustainable Logistics	4%
Other Trends	5%

Source: (Statista 2015)

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Trends in Logistics
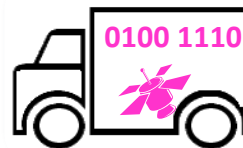
Compliance, Pro-
cess & Organization

Development of
Infrastructure

New Forms
of Mobility

Green & Sustain-
able Logistics

Supply Chain
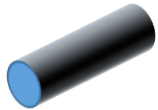Risks

Digitalization
in Logistics

Shortage of
Trained Staff

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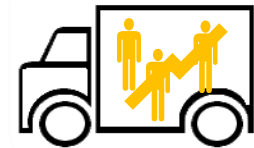
Urban Logistics Fulfillment – Technical Options

Pipe-line

Van& Truck

Ground Drones

Crowd Logistics

eVan& eTruck
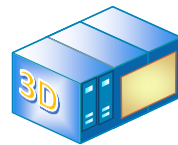
3D Print
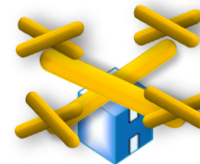
Air Drones

(e)Bike & Scooter

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Urban Logistics Service Types & Requirements

S2S
Service to Shop

N2F
Non-Face-to-Face

F2F
Face-to-Face

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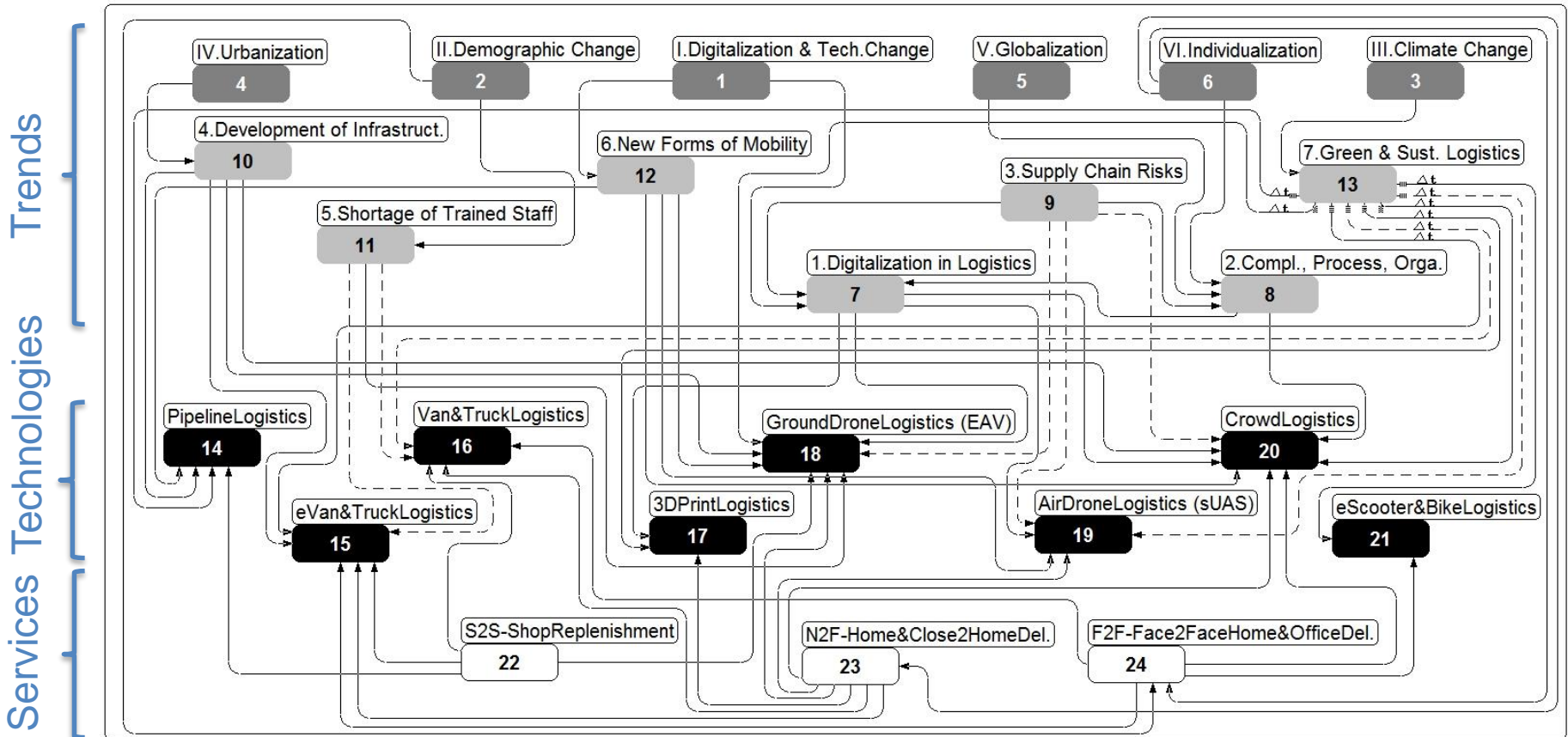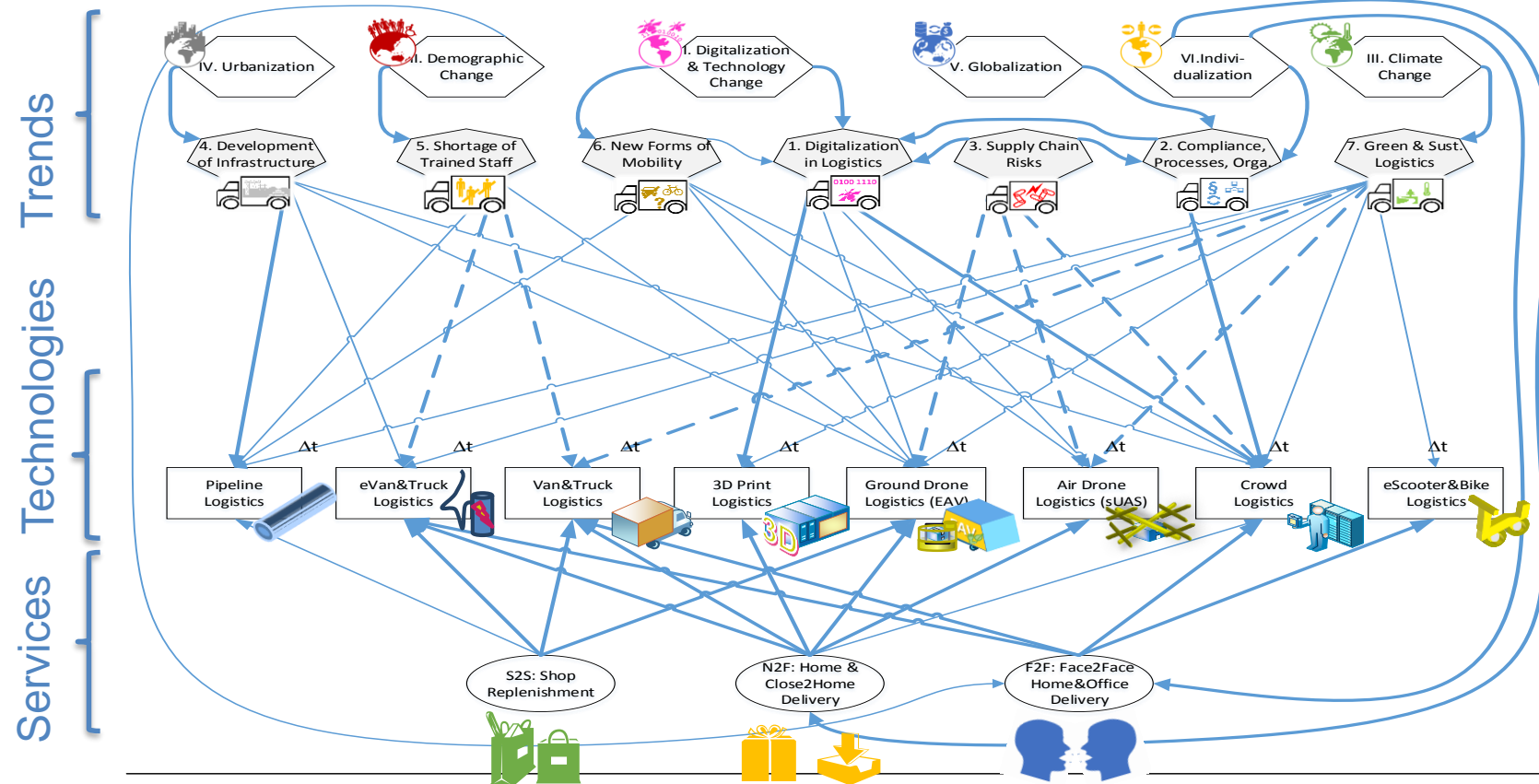
Systems Thinking – Interdependencies of Trends, Technologies and Service Requirements

Systemmodell: FutureUrbanLogistics

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Trends, Technologies and Service Requirements
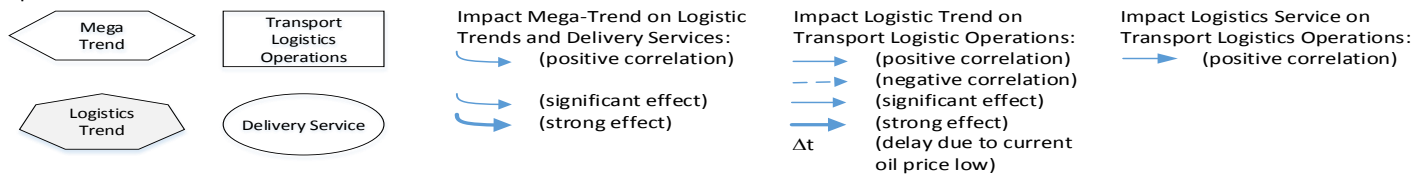
Vision of Urban Logistics in 2030

Vision of Urban Logistics in 2030

Parallel Heterogeneous Services
- Classic Vans
- Electric Autonomous Vehicles & Ground Drones
- Crowd Couriers
- eBike Services
- 3D-Printing
- (no Air Drones)

A Critical Popperian Perspective:

- Problem
- **Attempted** Solution**s**
- **Elimination**
- New Problems

https://books.google.de/books/about/All_Life_is_Problem_Solving.html?id=W0jP04qn0uoC&redir_esc=y

A Critical Popperian Perspective:

- just **one of many** possible attempted solutions
- **falsification possible** (at least in the year 2030)
- **published**
  => in order to enable critical discussion
  (i.e. elimination)
  => not because it is proven to be correct (common misunderstanding)

https://books.google.de/books/about/All_Life_is_Problem_Solving.html?id=W0jP04qn0uoC&redir_esc=y

Falsification Attempt:

How does the future of 2030 look from today's point of view compared to a 2016 point of view?

Vision of Urban Logistics in 2030

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Vision of Urban Logistics in 2030

Check 2019:

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https://fridaysforfuture.de/forderungen/

https://de.statista.com/statistik/daten/studie/6961/umfrage/anzahl-der-lkw-in-deutschland/

https://www.tagesschau.de/wirtschaft/konjunkturprognose114.html

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https://www.car-it.com/oems-und-zulieferer-gruenden-konsortium-fuer-autonomes-fahren/id-0065918

https://www.faz.net/aktuell/wirtschaft/zukunft-der-mobilitaet-realitaet-von-roboter-autos-16368536.html

Decisive Factors:
- Driver Shortage !
- Driver Costs !

Vision of Urban Logistics in 2030

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https://www.heise.de/ newsticker/meldung/ Amazon-Scout-Autonomer-Lieferroboter-bringt-Pakete-4286093.html

http://www. twinswheel .fr/

https://www.forbes.com/site s/amyfeldman/2019/08/20/st arship-technologies-raises-40m-to-expand-its-food-delivery-robots-on-college-campuses/#6259a3ce1cec

Vision of Urban Logistics in 2030

Check 2019:

Decisive Factors:
- Physical Internet Π !
- City Crowd Logistics !

Further infos see:
www.hs-neu-ulm.de/ccl

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- Crowd Couriers □???
- eBike Services
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https://www.dvz.de/rubriken/land/strasse/detail/news/uber-freight-startet-in-deutschland.html

https://www.dvz.de/rubriken/logistik/detail/news/mitbring service-bringbee-gibt-auf.html

Vision of Urban Logistics in 2030

Check 2019:

https://www.verkehrsrundschau.de/nachrichten/ups-bringt-ein-neues-e-lastenfahrrad-in-dortmund-auf-die-strasse-2209768.html

https://www.morgenpost.de/berlin/article210749865/DHL-faehrt-in-Berlin-jetzt-Pakete-mit-neuen-Lastenraedern.html

Prediction 2016:
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https://www.waz.de/staedte/bochum/paketdienst-gls-beliefert-kunden-mit-einem-elektro-lastenrad-id212327057.html

Vision of Urban Logistics in 2030

Check 2019:

"3D-Printing is a disruptive technology, as it can substitute physical transports by data transport" (Kunze)

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https://www.wiwo.de/technologie/gadgets/3d-druck-in-zukunft-werden-menschen-auch-ihr-schnitzel-drucken/25100222.html

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Ambiguous Situation:
+ Very Strong Lobbyism
+ Comsumer's "Laziness"
vs.
- Ecological Footprint
  (vs. Ground Drones)
- Noise Emissions
- Citizens Desire for Quiteness

https://www.cnbc.com/2019/10/01/ups-wins-faa-approval-for-drone-delivery-airline.html

Methodology from a Personal Point of View

- It was a choice to come up with one (provocative) vision only, and not with a multitude of different scenarios

- The prediction is as good as I could do it (based on my current understanding)

- I believe in it, but others may not

- Critics are right, if they say
  „This prediction is not more than an educated guess"
  but at least it is falsifiable ☺

Vielen Dank für Ihre Aufmerksamkeit!

Bei Fragen sprechen Sie mich gerne an.

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