

# Tendances, technologies et impacts sur les infrastructures

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# “TECHNOLOGY IS COMMODITY IN THE MAKING”



In an infamous article published in 2003 by the *Harvard Business Review*, Nicholas Carr asserted that information technology serves a similar purpose in industry as any other major technology has, such as railroads, the assembly line, or combustible engines. At first these innovations are proprietary and offer a substantial advantage in the market for those who possess this technology. But over time the technology becomes more common and standardized, providers more plentiful, competition rises, and consequently, the value of that technology becomes insignificant from a competitive perspective. - <http://www.peachpit.com/articles/article.aspx?p=2027232&seqNum=2>

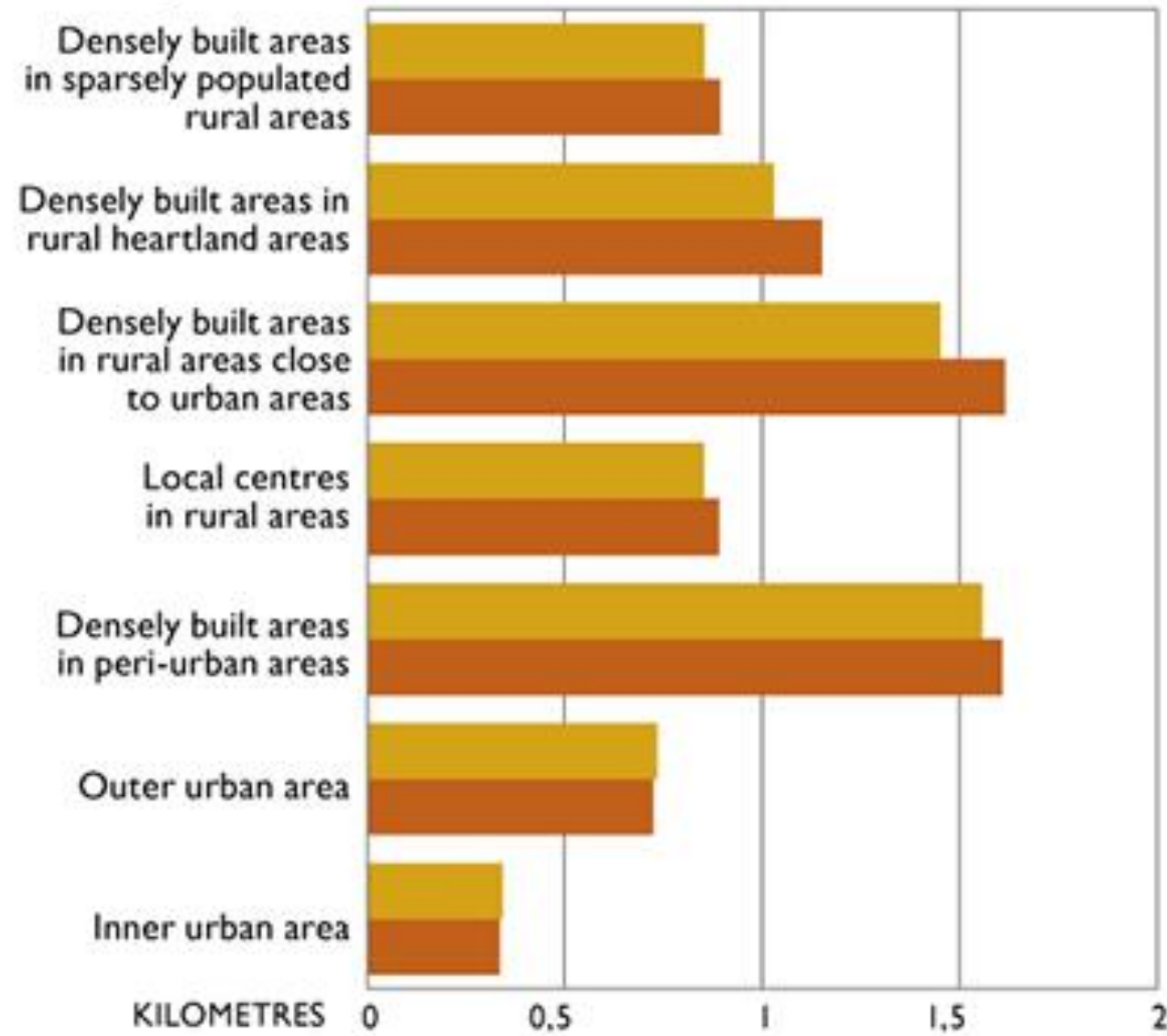
ORIGINES



1.5km

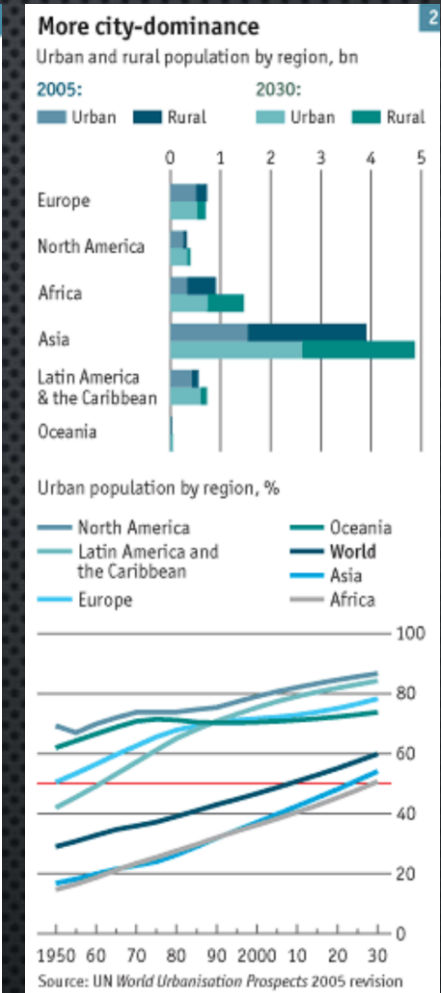
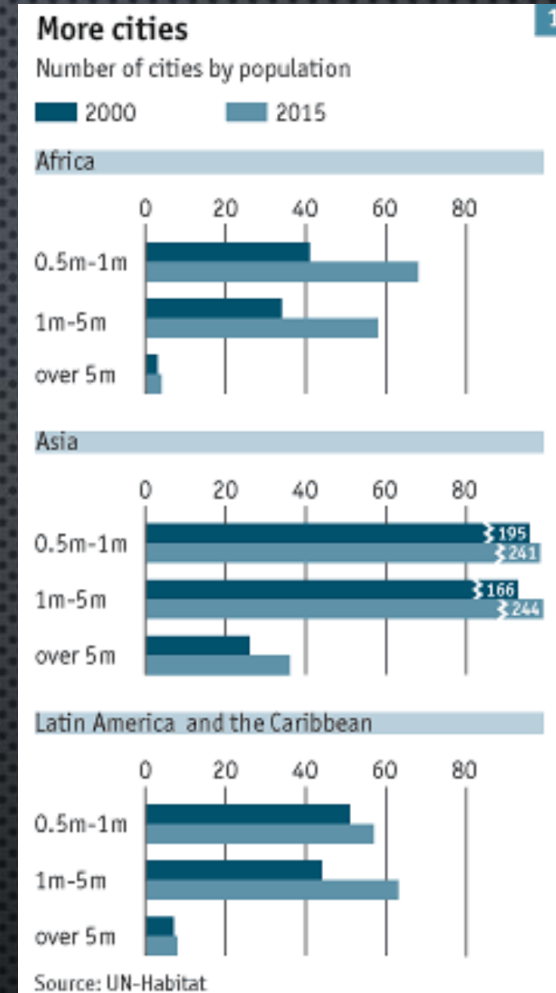


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Source : CDC [https://www.cdc.gov/pcd/issues/2015/15\\_0065.htm](https://www.cdc.gov/pcd/issues/2015/15_0065.htm)  
[http://www.ymparisto.fi/en-US/Maps\\_and\\_statistics/The\\_state\\_of\\_the\\_environment\\_indicators/Communities\\_and\\_transport/Services\\_move\\_further\\_away\(28838\)](http://www.ymparisto.fi/en-US/Maps_and_statistics/The_state_of_the_environment_indicators/Communities_and_transport/Services_move_further_away(28838))  
Image : <https://www.flickr.com/photos/35034361412@N01/558333048>

Rank ↕	City ↕	Population ↕	Area (km²) ↕	Area (mi²) ↕	Density (/km²) ↕	Density (/mi²) ↕	Country ↕
1	City of Manila	1,780,148 <sup>[1]</sup>	42.88 <sup>[2][3]</sup>	16.55	41,515	107,562	Philippines
2	Pateros	64,147 <sup>[1]</sup>	2.10 <sup>[4]</sup>	0.81	30,546	79,114	Philippines
3	Dhaka	8,523,137 <sup>[5]</sup>	300.0 <sup>[6]</sup>	115.83	28,410	73,583	Bangladesh
4	Caloocan	1,489,040 <sup>[1]</sup>	53.34 <sup>[4]</sup>	20.6	27,916	72,302	Philippines
5	Levallois-Perret	63,436 <sup>[7]</sup>	2.4 <sup>[7]</sup>	0.93	26,432	68,458	France
6	Le Pré-Saint-Gervais	18,121 <sup>[8]</sup>	0.7 <sup>[8]</sup>	0.27	25,887	67,047	France
7	Neapoli	30,279 <sup>[9]</sup>	1.17 <sup>[9]</sup>	0.45	25,879	67,027	Greece
8	Chennai	4,681,087 <sup>[10]</sup>	181.06 <sup>[11]</sup>	69.91	25,854	66,961	India
9	Vincennes	48,689 <sup>[12]</sup>	1.9 <sup>[12]</sup>	0.733	25,626	66,371	France
10	Delhi	11,007,835 <sup>[10]</sup>	431.09 <sup>[13]</sup>	166.4	25,535	66,135	India
11	Saint-Mandé	22,627 <sup>[14]</sup>	0.9 <sup>[14]</sup>	0.35	25,141	65,115	France
12	Bnei Brak	182,800 <sup>[15]</sup>			24,871 <sup>[15]</sup>		Israel
13	Bally	291,972 <sup>[10]</sup>	11.81 <sup>[16]</sup>	4.56	24,722	64,031	India
14	Kolkata	4,486,679 <sup>[10]</sup>	185 <sup>[17]</sup>	71.4	24,252	62,813	India
15	Saint-Josse-ten-Noode	27,548 <sup>[18]</sup>	1.14 <sup>[19]</sup>	0.44	24,165	62,404	Belgium
16	Montrouge	48,410 <sup>[20]</sup>	2.1 <sup>[20]</sup>	0.81	23,052	59,705	France
17	Malé	133,412 <sup>[21]</sup>	5.8 <sup>[22][23]</sup>	2.24	23,002	59,559	Maldives
18	Malabon	353,337 <sup>[1]</sup>	15.76 <sup>[4]</sup>	6.08	22,420	58,607	Philippines
19	Guttenberg, New Jersey	11,481 <sup>[24]</sup>	0.507	0.196 <sup>[25]</sup>	22,645	58,577	United States
20	Pasig	669,773 <sup>[1]</sup>	31.00 <sup>[4]</sup>	11.97	21,606	55,958	Philippines



“... de plus en plus de villes plus denses”

Source : Wikipedia & autres ci-dessous

<http://www.economist.com/node/9070726>

[https://en.wikipedia.org/wiki/List\\_of\\_cities\\_by\\_population\\_density](https://en.wikipedia.org/wiki/List_of_cities_by_population_density)



### Pull factors

- more and better jobs
- better hospitals and **health care**
- better **living standards**
- cities are **social** and financial centres
- better education—schools and universities



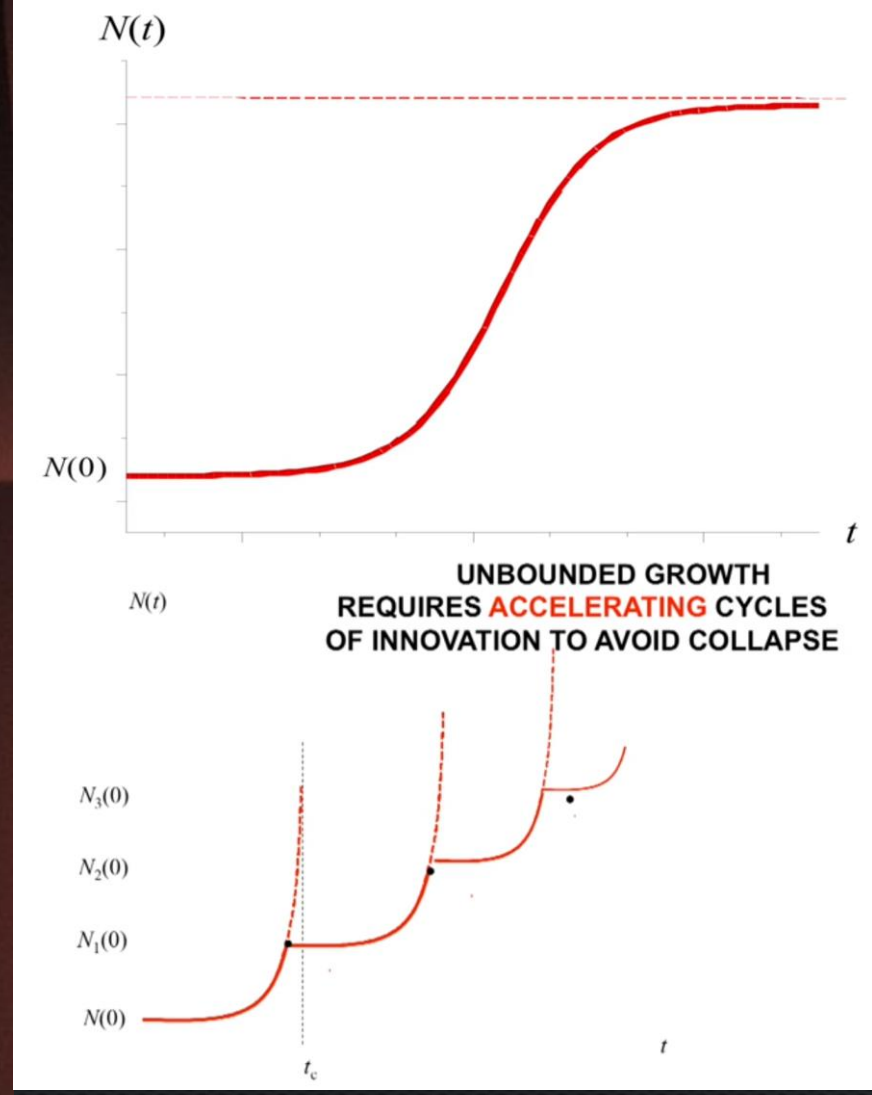
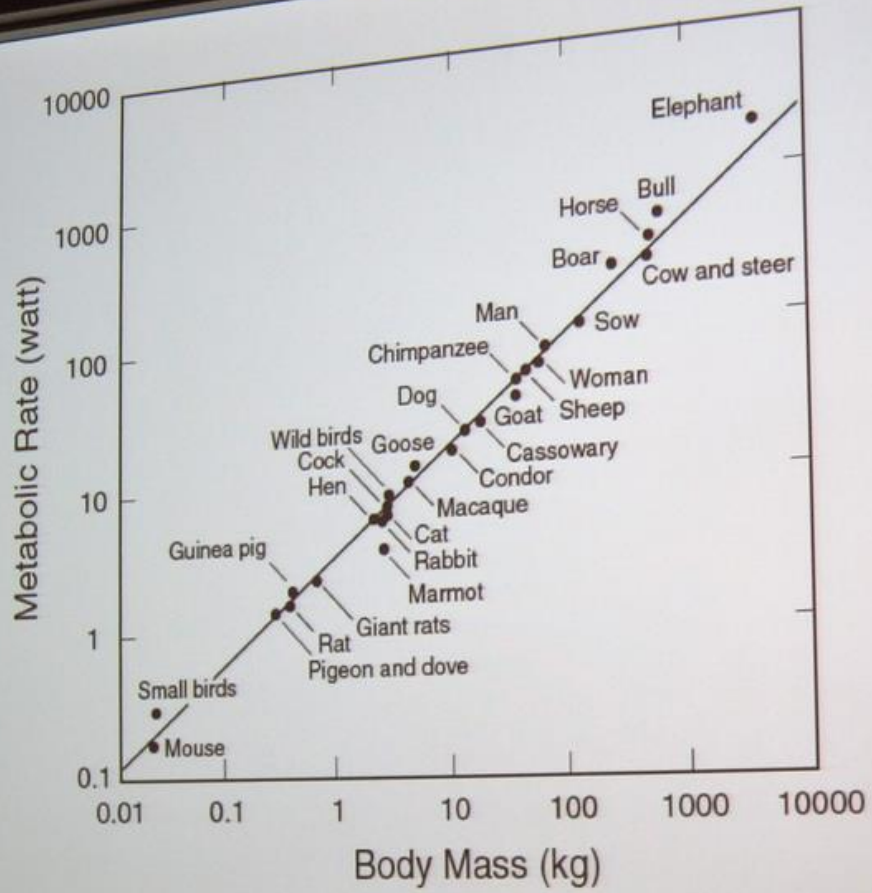
“2015 Worst city to  
drive on Earth”



<http://cnnphilippines.com/metro/2015/10/01/Metro-Manila-Philippines-worst-traffic-longest-commute-Waze-survey.html>

Photo : Wikipedia. [https://en.wikipedia.org/wiki/File:Pic\\_geo\\_photos\\_-\\_ph%3Dmm%3Dmanila%3Dermila%3Dmakati\\_skyline\\_-\\_view\\_from\\_world\\_trade\\_exchange\\_tower\\_binondo\\_-\\_philippines--2015-0615--ls-.JPG](https://en.wikipedia.org/wiki/File:Pic_geo_photos_-_ph%3Dmm%3Dmanila%3Dermila%3Dmakati_skyline_-_view_from_world_trade_exchange_tower_binondo_-_philippines--2015-0615--ls-.JPG)

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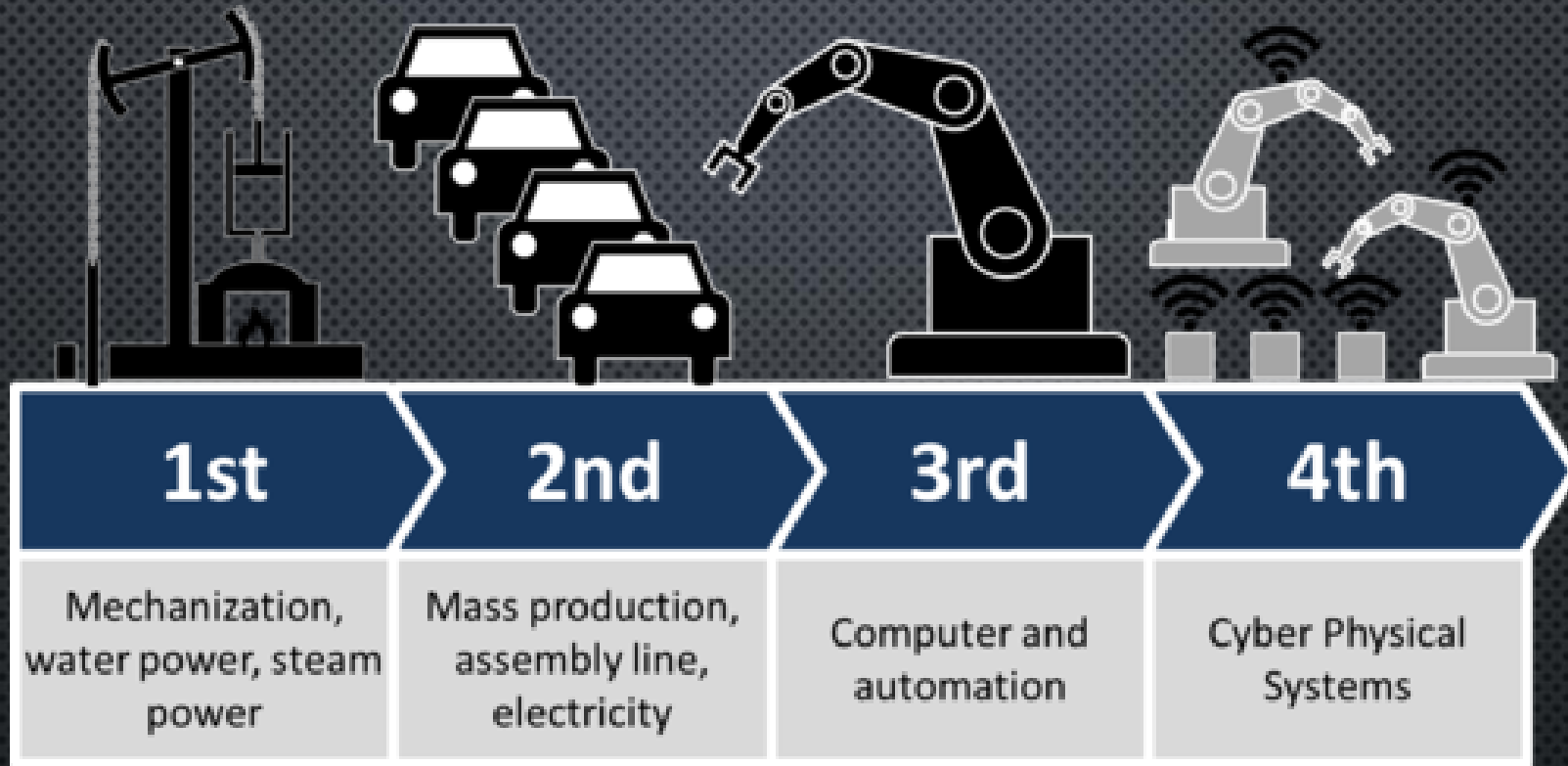


[https://www.ted.com/talks/geoffrey\\_west\\_the\\_surprising\\_math\\_of\\_cities\\_and\\_corporations](https://www.ted.com/talks/geoffrey_west_the_surprising_math_of_cities_and_corporations)

Geoffrey West (2011)

<https://www.flickr.com/photos/jurvetson/4873904711>

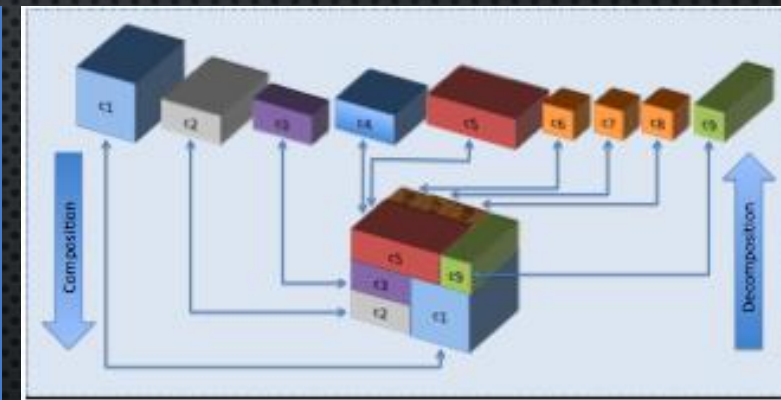
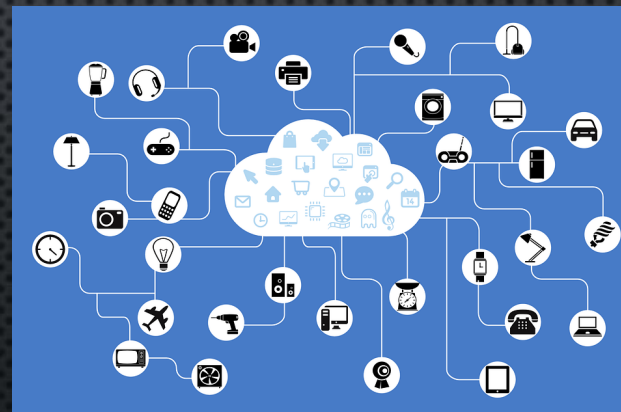
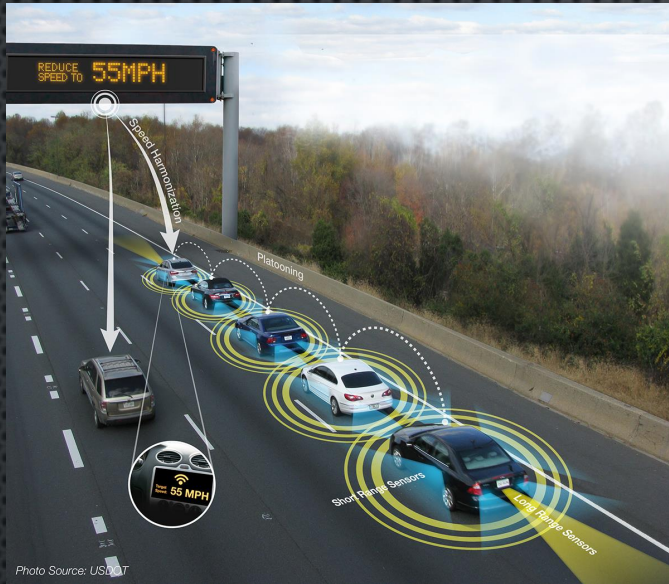




[https://www.google.ca/search?q=industrial+revolutions&source=lnms&tbm=isch&sa=X&ved=0ahUKEwi7u5\\_b7bfQAUM3IMKHbEKCc4Q\\_AUICCGB&biw=1569&bih=768#imgrc=dZNizQ7zLL80EM%3A](https://www.google.ca/search?q=industrial+revolutions&source=lnms&tbm=isch&sa=X&ved=0ahUKEwi7u5_b7bfQAUM3IMKHbEKCc4Q_AUICCGB&biw=1569&bih=768#imgrc=dZNizQ7zLL80EM%3A)

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# Quelques technologies qui auront bientôt un impact sur nos infrastructures routières



<https://pixabay.com/en/network-iot-internet-of-things-782707/>

<https://www.pinterest.com/pin/266979084130736592/>

[https://commons.wikimedia.org/wiki/File:Electric\\_car\\_charging\\_Amsterdam.jpg](https://commons.wikimedia.org/wiki/File:Electric_car_charging_Amsterdam.jpg)

[https://commons.wikimedia.org/wiki/File:Platooning\\_Back\\_022414\\_Final\\_noTpye.jpg](https://commons.wikimedia.org/wiki/File:Platooning_Back_022414_Final_noTpye.jpg)

[https://en.wikipedia.org/wiki/Physical\\_Internet](https://en.wikipedia.org/wiki/Physical_Internet)

[http://physicalinternetinitiative.org/Manifeste%20pour%20l'Internet%20Physique\\_FR\\_Version%201.11.1%202012-11-28.pdf](http://physicalinternetinitiative.org/Manifeste%20pour%20l'Internet%20Physique_FR_Version%201.11.1%202012-11-28.pdf)

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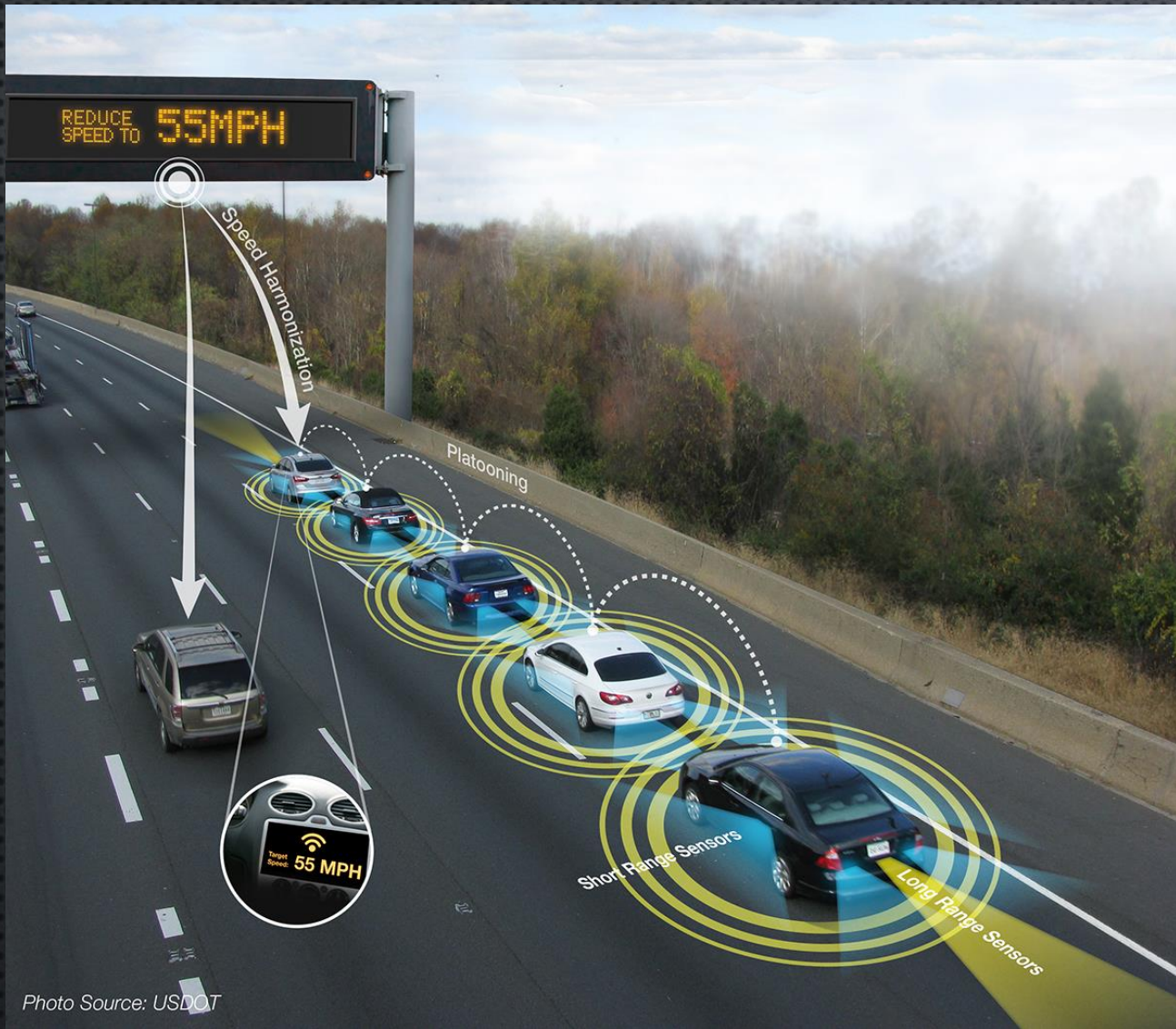


Photo Source: USDOT

Connected vehicles are vehicles that use any of a number of different communication technologies to communicate with the driver, other cars on the road (vehicle-to-vehicle [V2V]), roadside infrastructure (vehicle-to-infrastructure [V2I]), and the "Cloud."

[http://autocaat.org/Technologies/Automated\\_and\\_Connected\\_Vehicles/](http://autocaat.org/Technologies/Automated_and_Connected_Vehicles/)

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An **electric car** is an automobile that is propelled by one or more electric motors, using electrical energy stored in rechargeable batteries or another energy storage device.

[https://en.wikipedia.org/wiki/Electric\\_car](https://en.wikipedia.org/wiki/Electric_car)

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An **autonomous car** (driverless **car**, self-driving **car**, robotic **car**) is a **vehicle** that is capable of sensing its environment and navigating without human input.

**Autonomous cars** can detect surroundings using a variety of techniques such as radar, lidar, GPS, odometry, and computer vision.

[https://en.wikipedia.org/wiki/Autonomous\\_car](https://en.wikipedia.org/wiki/Autonomous_car)

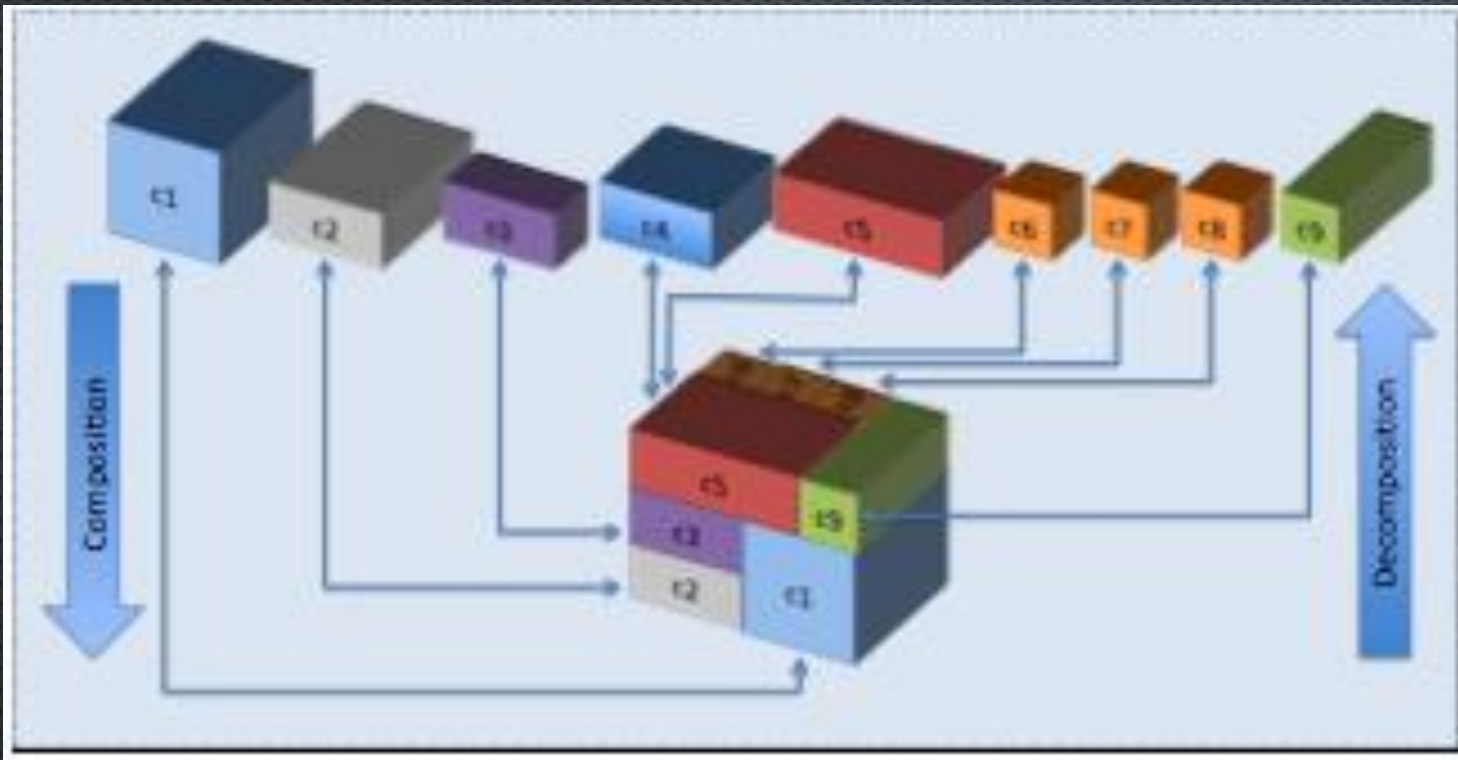
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A **sharing economy** is an economic model in which individuals are able to borrow or rent assets owned by someone else. The **sharing economy** model is most likely to be used when the price of a particular asset is high and the asset is not fully utilized all the time.

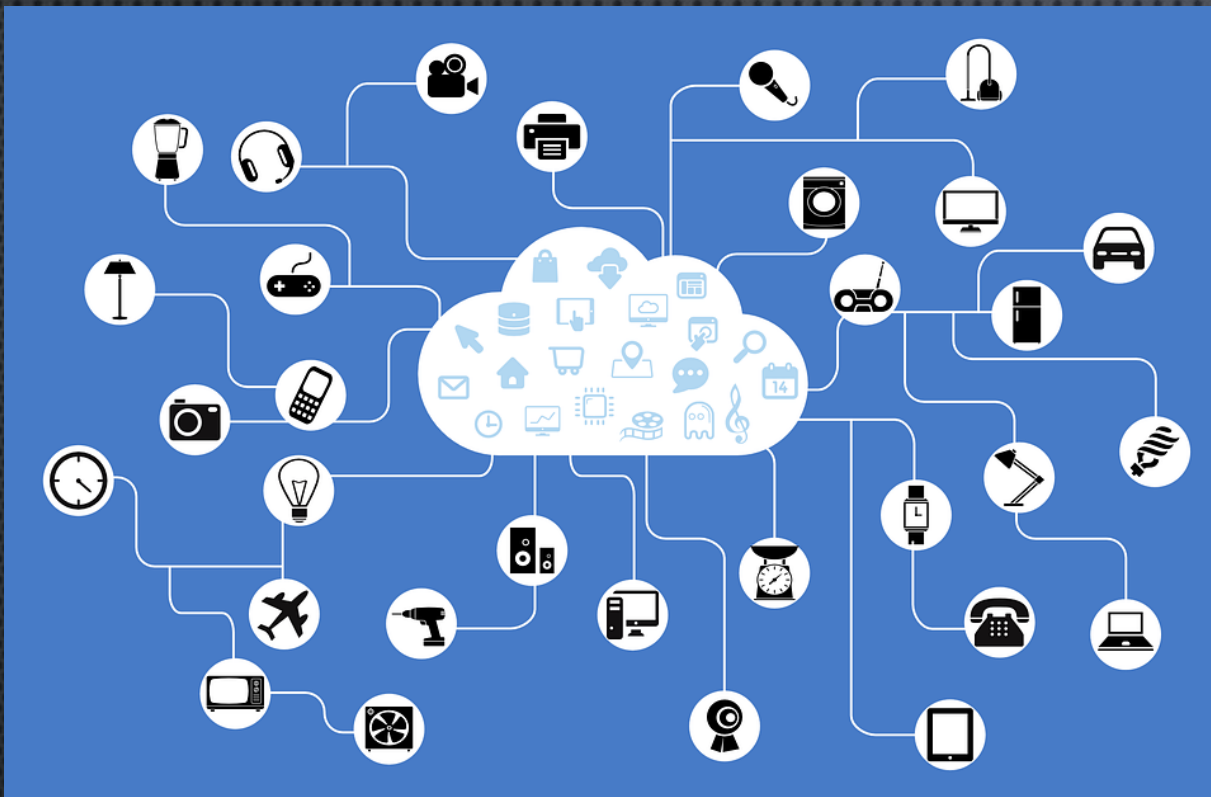
<https://twitter.com/techbikers/status/631868573737201664>

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In logistics, the **Physical Internet** is an open global logistics system founded on physical, digital, and operational interconnectivity, through encapsulation, interfaces and protocols.<sup>[1]</sup> The Physical Internet is intended to replace current logistical models.<sup>[2][3]</sup> The project currently has funding from the National Science Foundation as well as contributions from MHIA and CICMHE.<sup>[4]</sup>

The Physical Internet Initiative's manifesto is "Transforming the way physical objects are handled, moved, stored, realized, supplied and used, aiming towards global logistics efficiency and sustainability."<sup>[1]</sup> It attempts to achieve this by applying concepts from internet data transfer to real-world shipping processes.<sup>[2][5]</sup>



The **Internet of things** (stylised **Internet of Things** or **IoT**) is the internetworking of physical devices, vehicles (also referred to as "connected devices" and "smart devices"), buildings and other items—embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data.<sup>[1][2][3]</sup> In 2013 the Global Standards Initiative on Internet of Things (IoT-GSI) defined the IoT as "the infrastructure of the information society."<sup>[3]</sup> The IoT allows objects to be sensed and/or controlled remotely across existing network infrastructure,<sup>[4]</sup> creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit.<sup>[5][6][7][8][9][10]</sup> When IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, smart homes, intelligent transportation and smart cities.

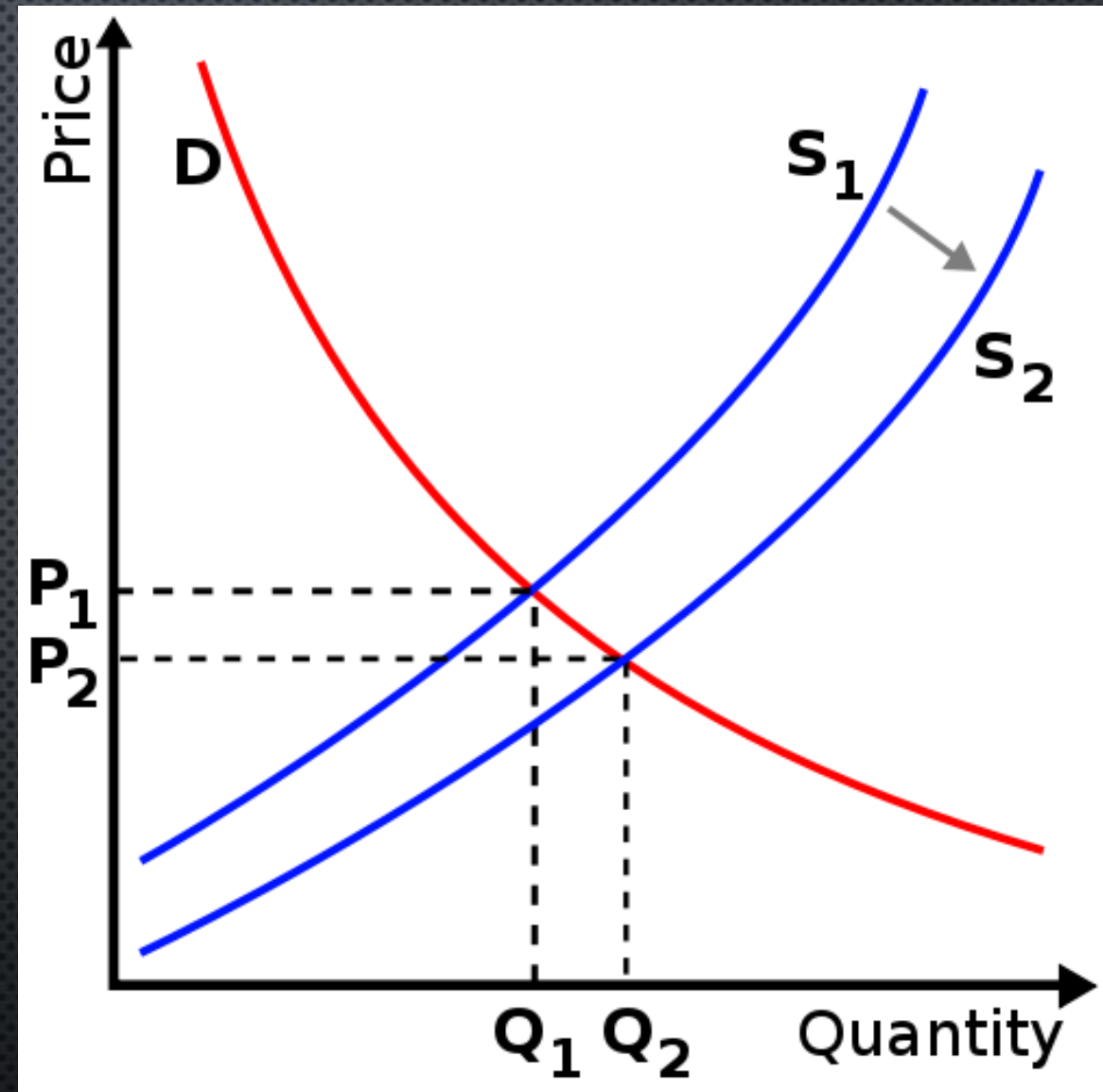
[https://en.wikipedia.org/wiki/Internet\\_of\\_things](https://en.wikipedia.org/wiki/Internet_of_things)

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Problème A  
Prix nul demande  
infinie

- Congestion
- Défis de sécurité
- Fluidité réduite
- Temps de parcours incertain



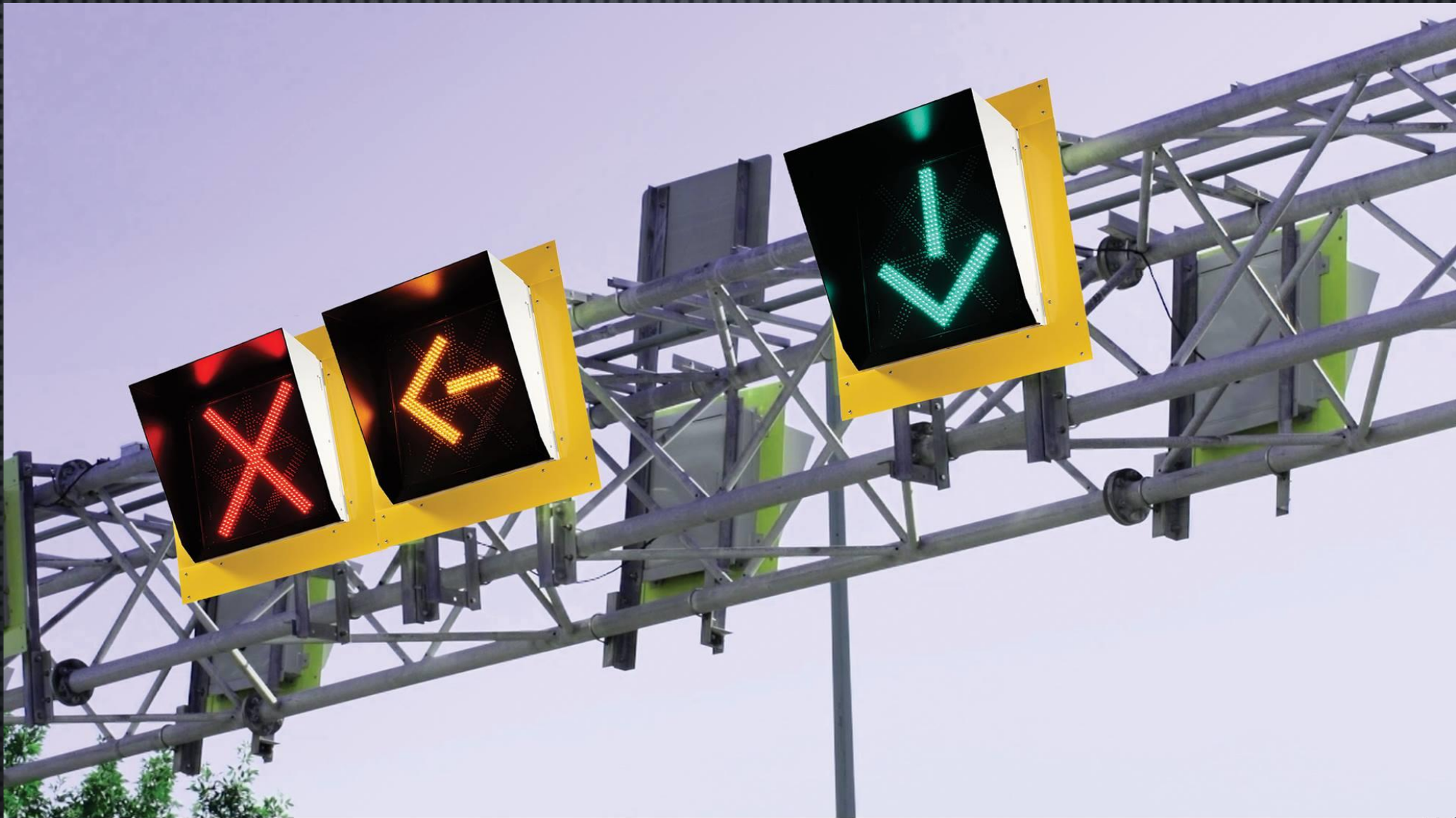


*Archives de la Ville de Montréal*

Solution A1 : Péages  
physiques ou virtuels

<https://www.flickr.com/photos/archivesmontreal/22726427423>

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Gestion dynamique des voies

Source : Orange Traffic [www.orangetraffic.com](http://www.orangetraffic.com)

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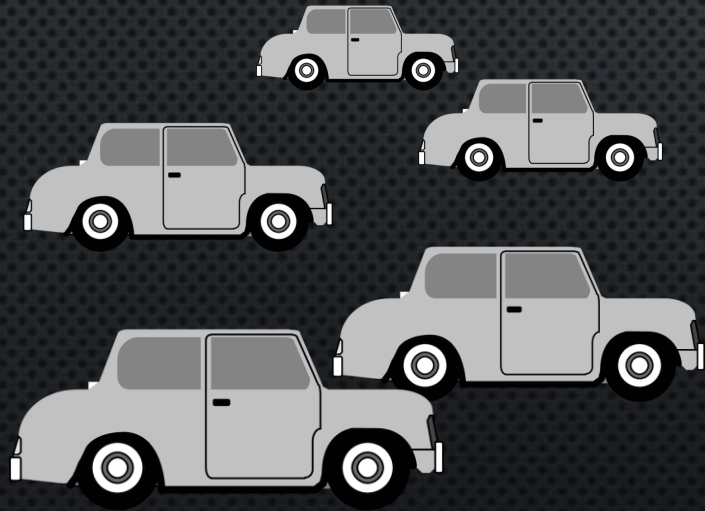


Capteurs Bluetooth de temps de parcours

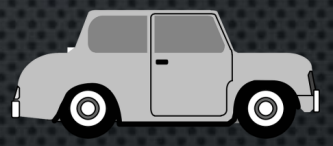
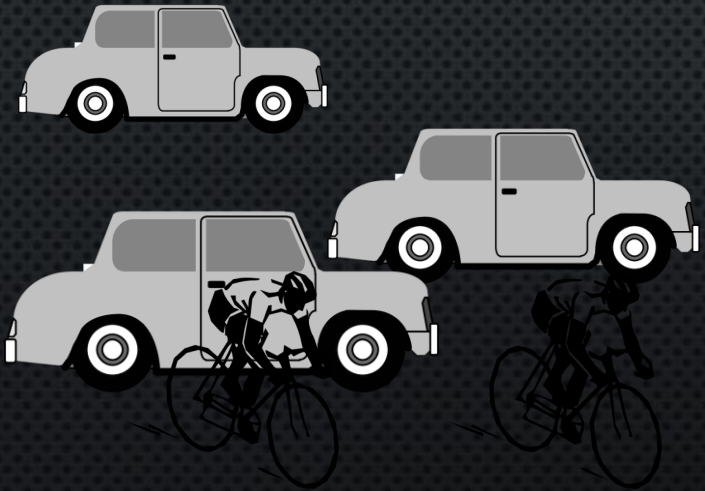


Signalisation active

Problème B  
Usage différent même  
espace physique



Solution B1 : Séparation temporelle des modes de transport



Solution B2 : Contrôle physique /  
separation des modes de  
transport incompatibles

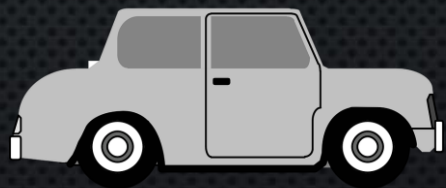
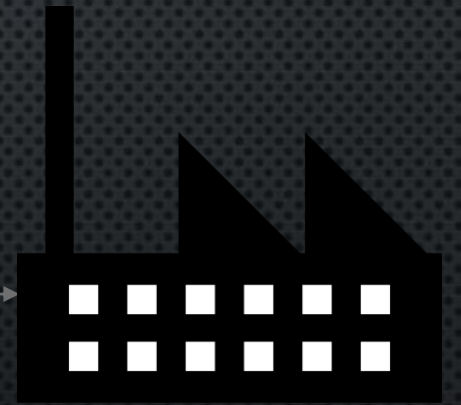
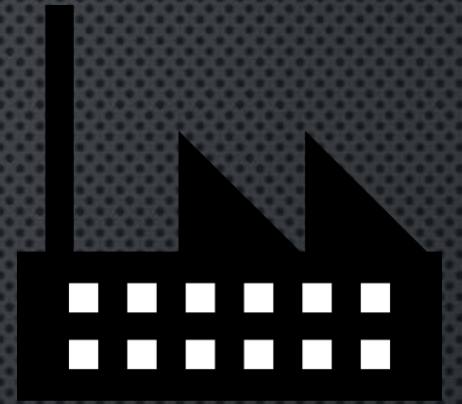
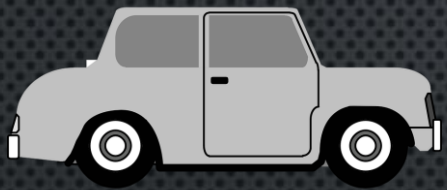


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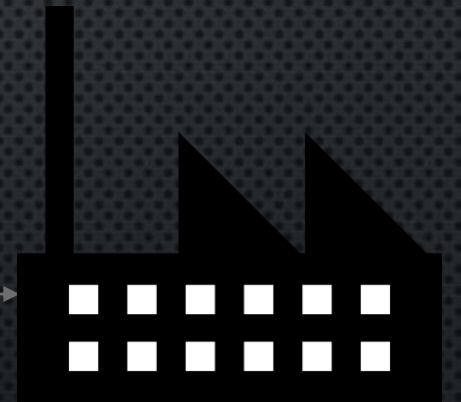
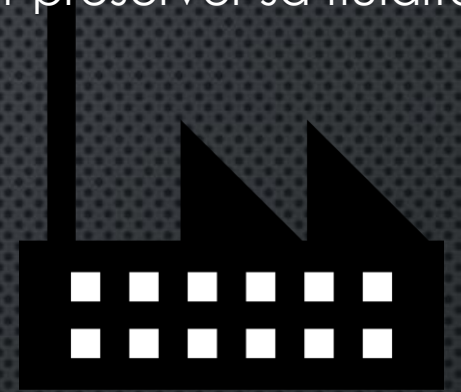
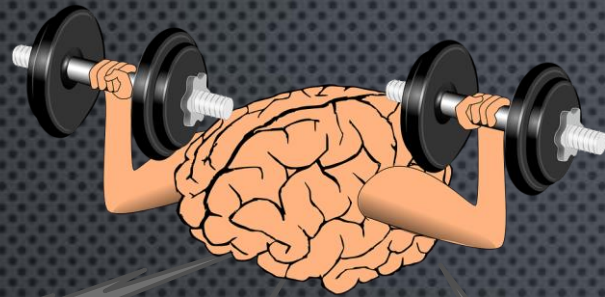
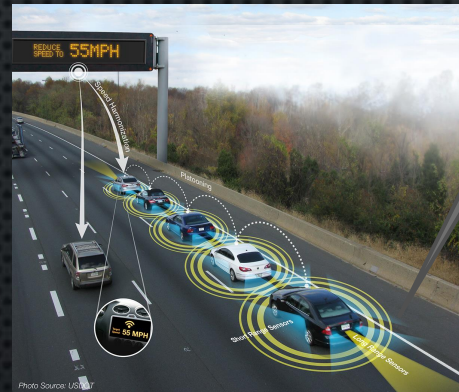
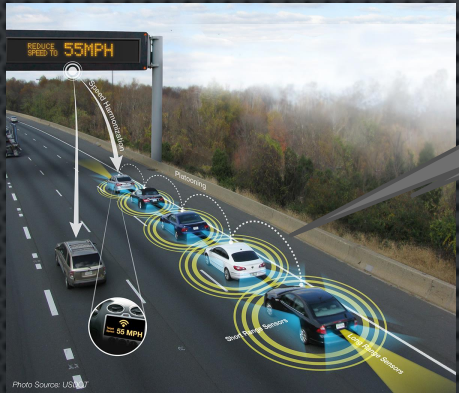


## Problème C

Destinations différentes sur un même chemin, avec un horaire non planifié

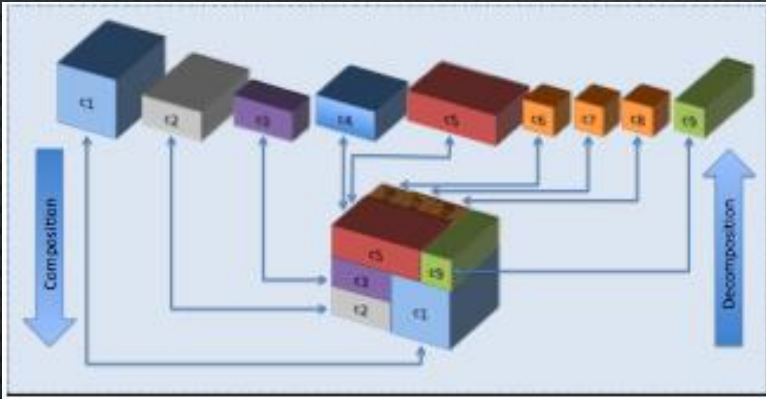


Solution C1 : Véhicule connecté informe l'infrastructure de son itinéraire.  
L'infrastructure analyse, attribue et réserve l'accès pour préserver sa fluidité et sa sécurité.





Solution C2 : Internet Physique  
et communautés vertes  
"Compact Urban Cells"



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# MERCI!



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# CRÉDITS / SOURCES ADDITIONNELLES

- PRÉSENTATIONS ÉCLAIRANTES / SOURCES D'INFORMATIONS :
  - WANIS KABBAJ WHAT A DRIVERLESS WORLD COULD LOOK LIKE (TED, 2016)
  - GEOFFREY WEST THE SURPRISING MATH OF CITIES AND CORPORATIONS (TED, 2011)
  - KENT LARSON BRILLIANT DESIGNS TO FIT MORE PEOPLE IN EVERY CITY (TED, 2012)
  - JENNIFER HEALEY IF CARS COULD TALK, ACCIDENTS MIGHT BE AVOIDABLE (TED, 2013)