



DYNAMIC ROAD TRAFFIC MODELING: SOME ELEMENTS

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EQUIPE PROJET
ACUMES

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Traffic modeling: what for?



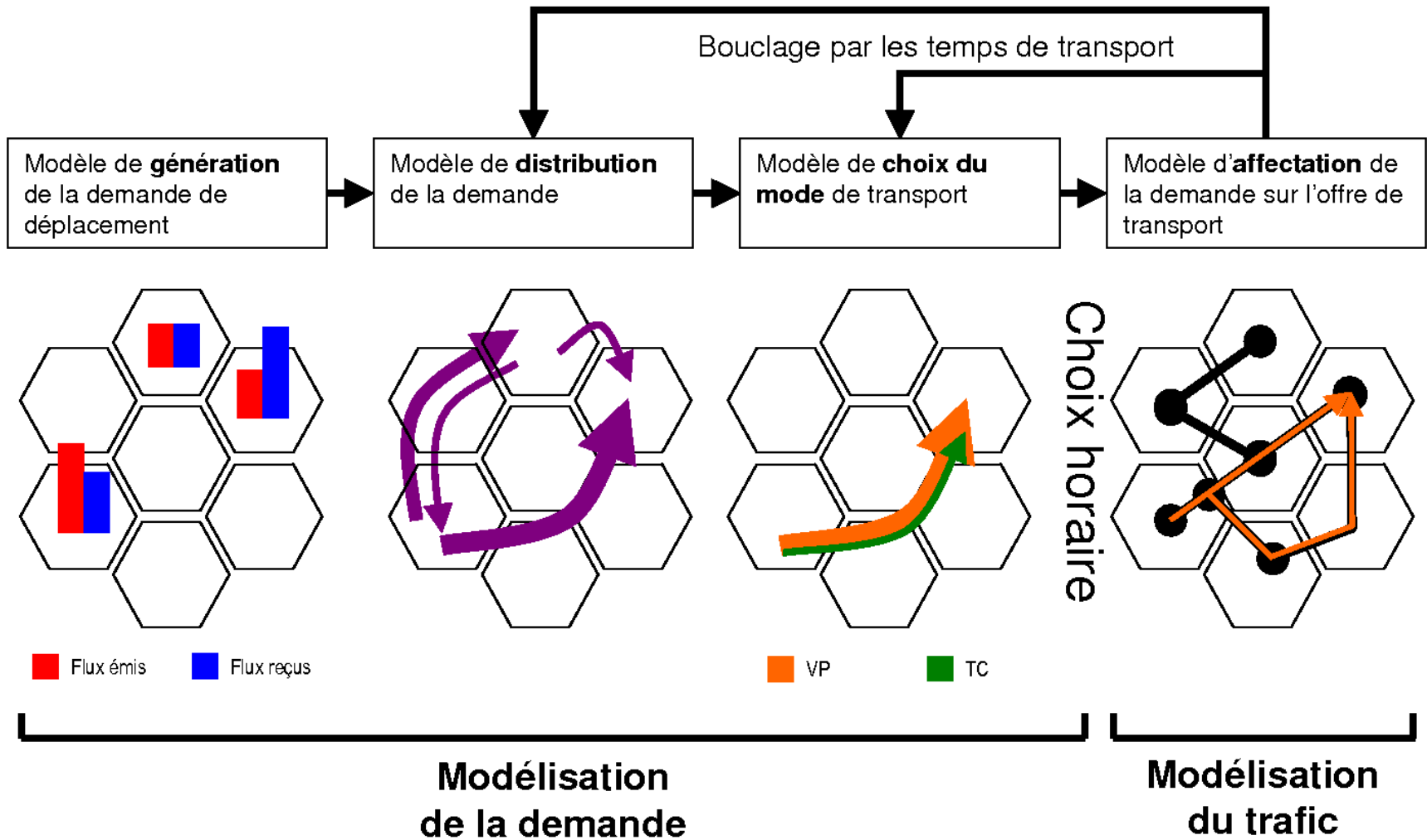
◆ For **long term**: infrastructure **planning**

- How will **the trips evolve** in the next years/decades?
- Where do public agencies have **to invest money**?
- How to adapt **public transports**?

◆ For **short term**: traffic **management**

- How can we **alleviate congestion** burden?
- How **to know the traffic state** on a network?
- How can we **inform road users** in real time?

Static four steps model



Dynamic traffic modeling: what for?

◆ « Dynamic » → **time** is an important feature

◆ Dynamic Traffic Assignment:

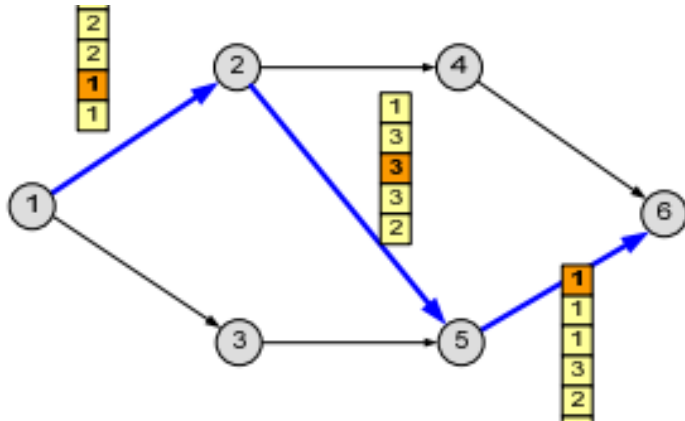
➤ **Predict:**

- Departure time,
- Route choice...

➤ **Dynamic Network Loading**

- Shortest path,
- Equilibrium...

➤ Consistent with **traffic flow theory**



Dynamic traffic modeling: what for?

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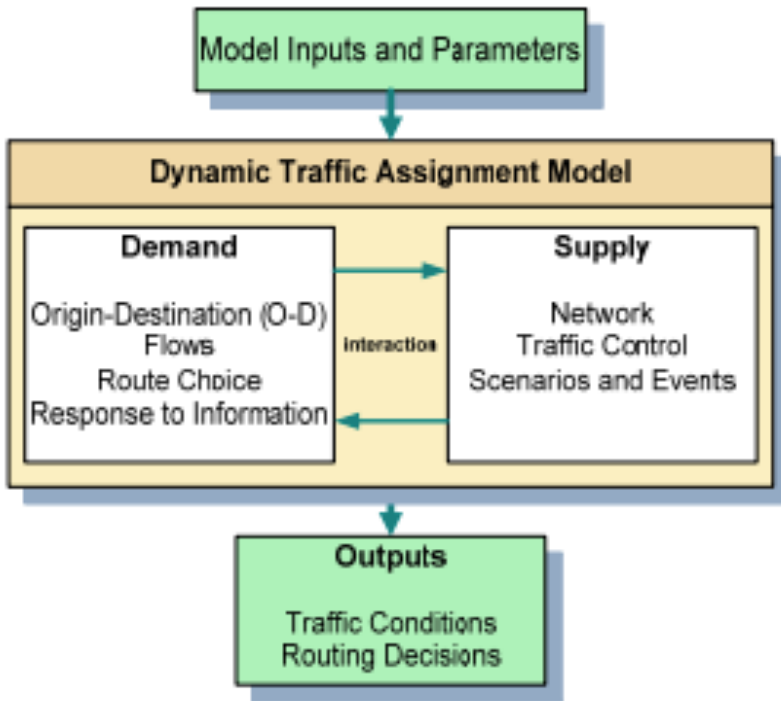
➤ **Predict:**

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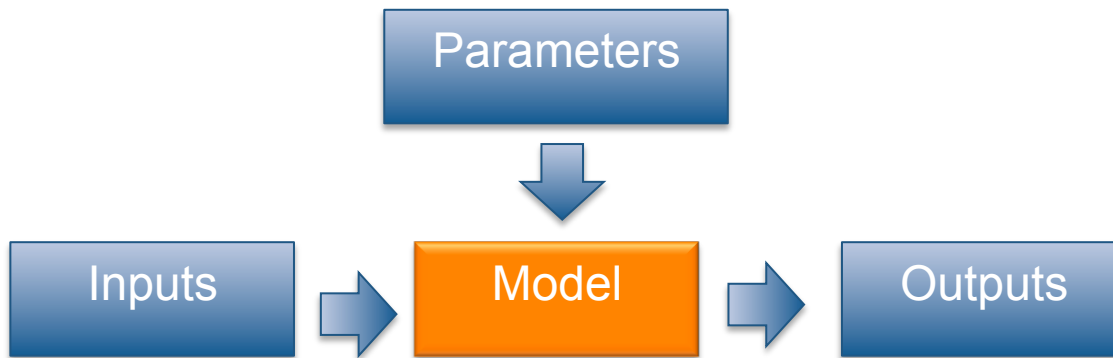
➤ **Dynamic Network Loading**

- Shortest path,
- Equilibrium...

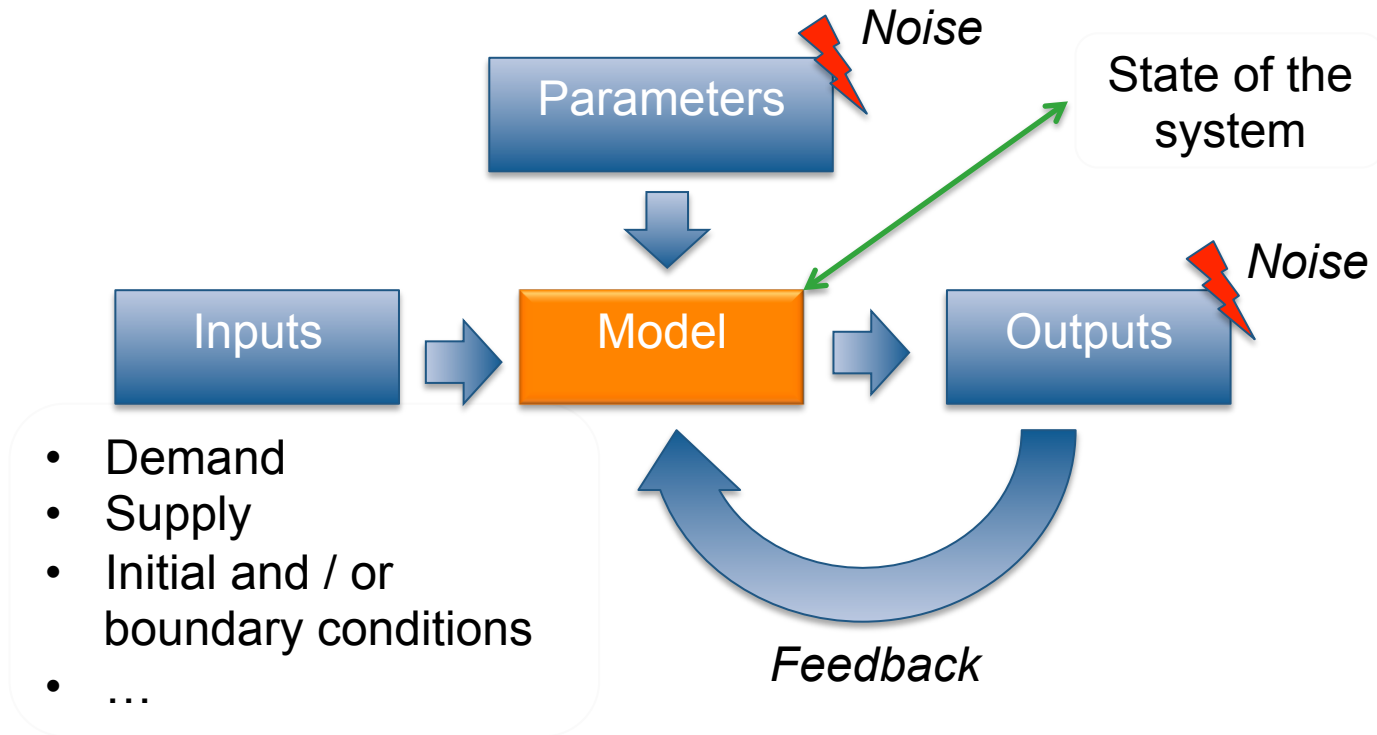
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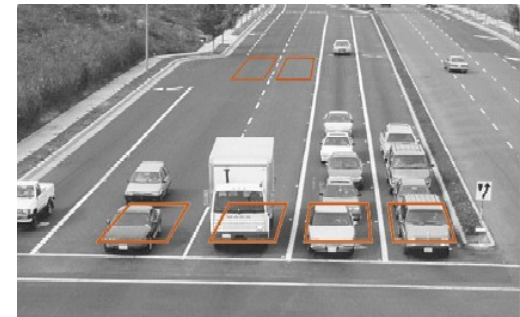
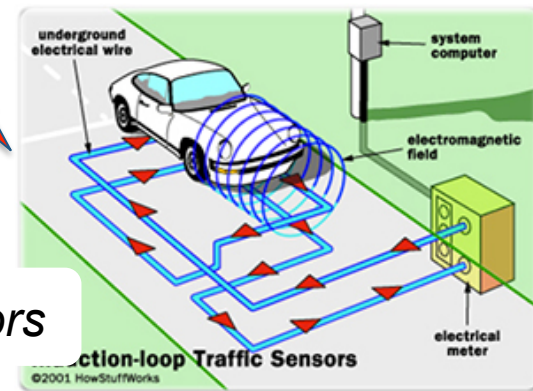
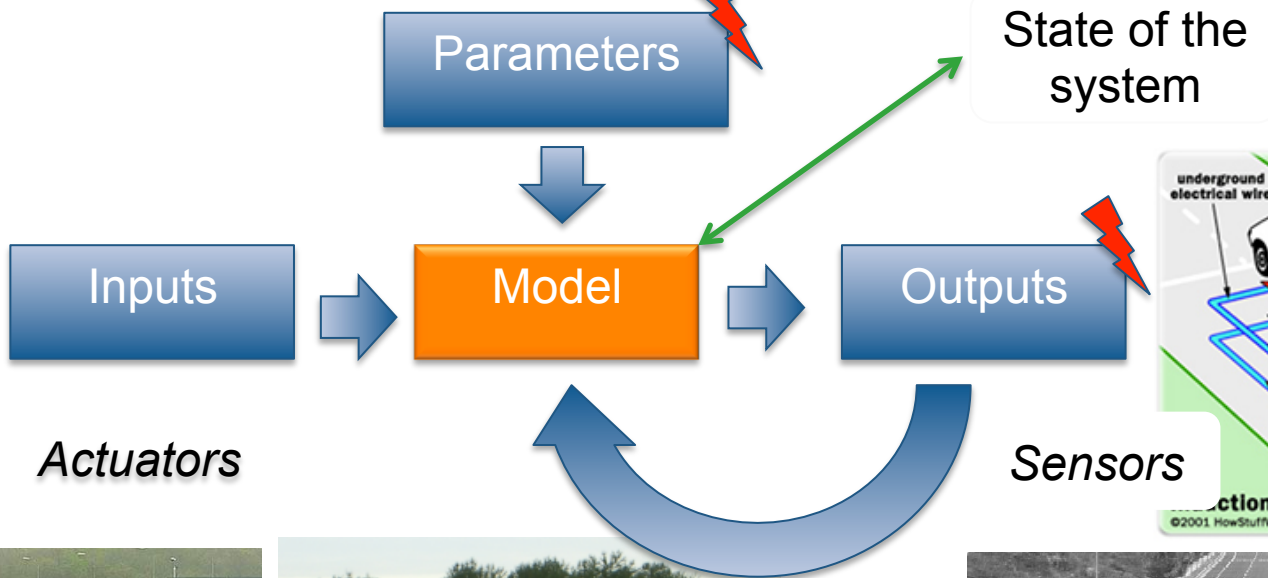
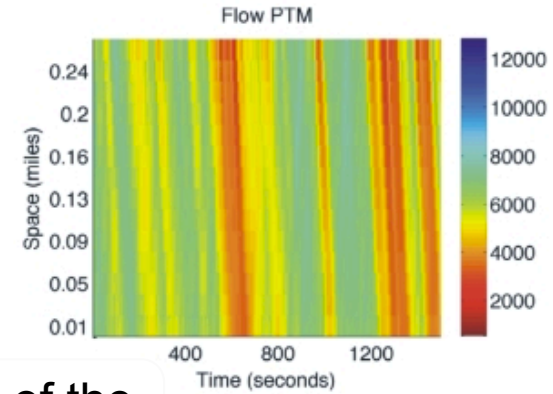
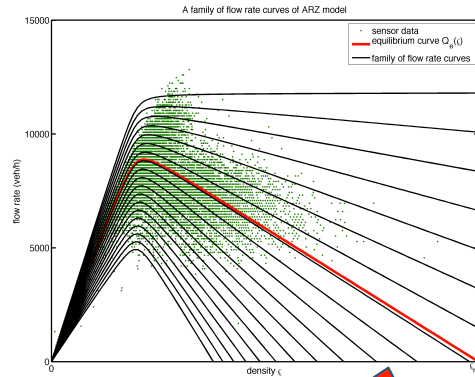
How?



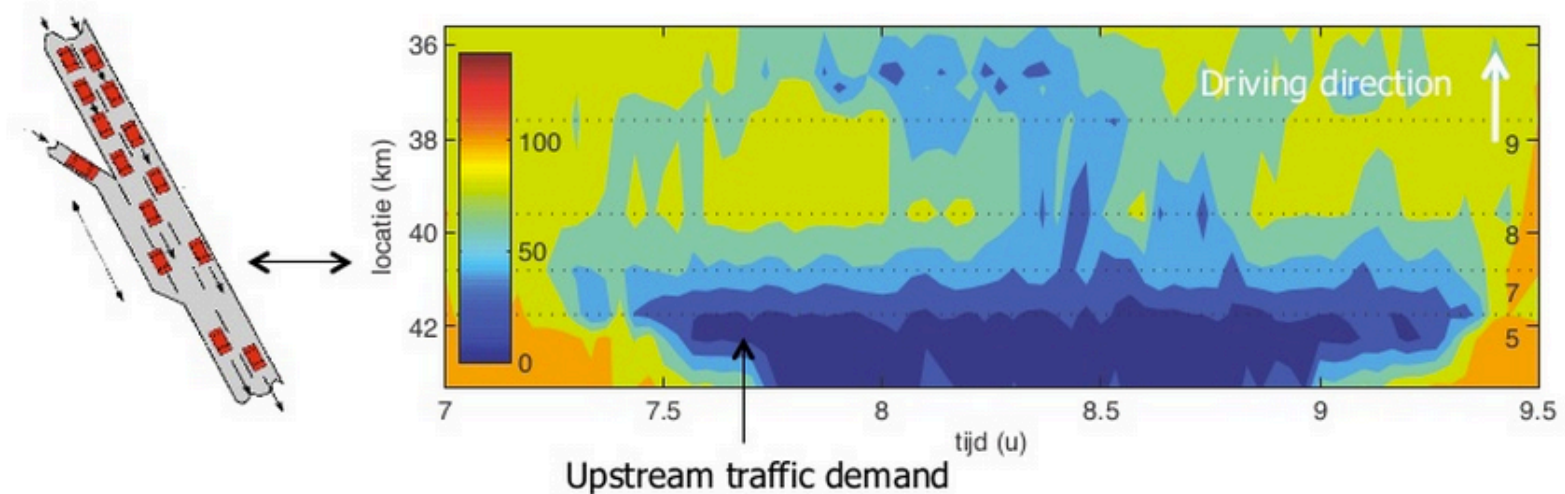
How?



How?



Micro or macro?



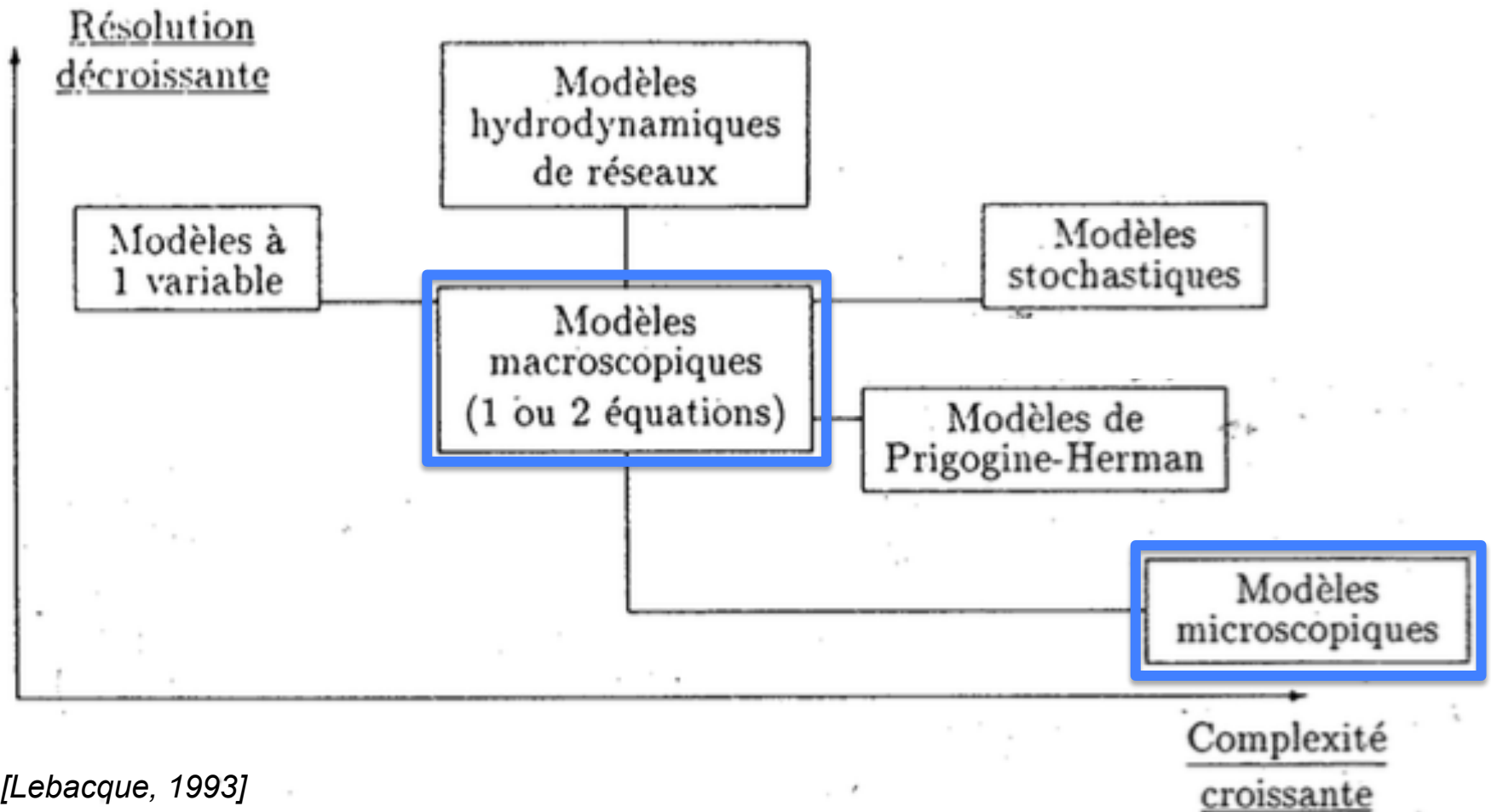
◆ Microscopic models

- Track **every** vehicle trajectory
- Car-following models
- High computational cost
- Small scales

◆ Macroscopic models

- Hydrodynamics analogy
- **Averaged** quantities
- Lower computational cost
- Larger scales

Micro or macro?



[Lebacque, 1993]

Uses of dynamic macroscopic modeling

◆ Estimation

- Determine the **current value** of the state of the system
- ...knowing **past inputs and outputs** (measurements)

◆ Forecast

- Determine the **future value** of the state of the system
- ...knowing **past outputs, past and future inputs**

◆ Optimal control

- Determine the **value of actuations** to apply to achieve an objective in the future
- ...knowing **past and current value of the state** of the system

Thanks for your attention

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