



Next Generation Integrated Mobility:

Driving Smart Cities

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Julian Schindler

German Aerospace Center (DLR)

TransAID – Effects of Transitions Related to Highly Automated Driving on Traffic Systems

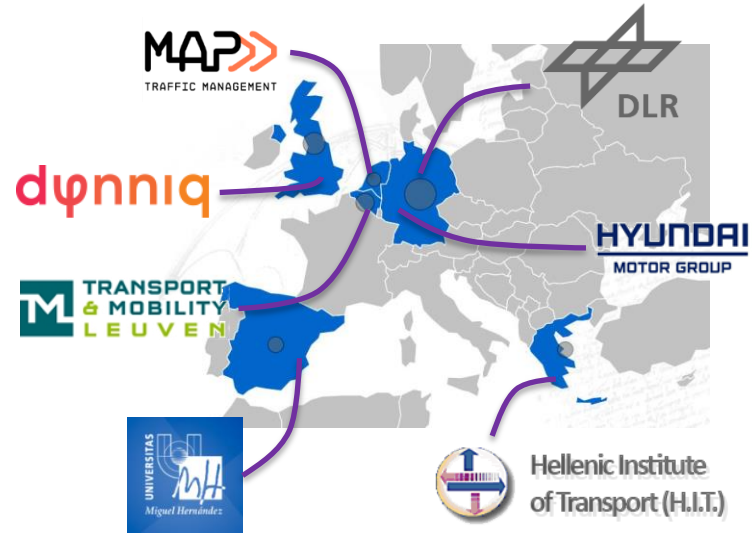


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 723390



Project details

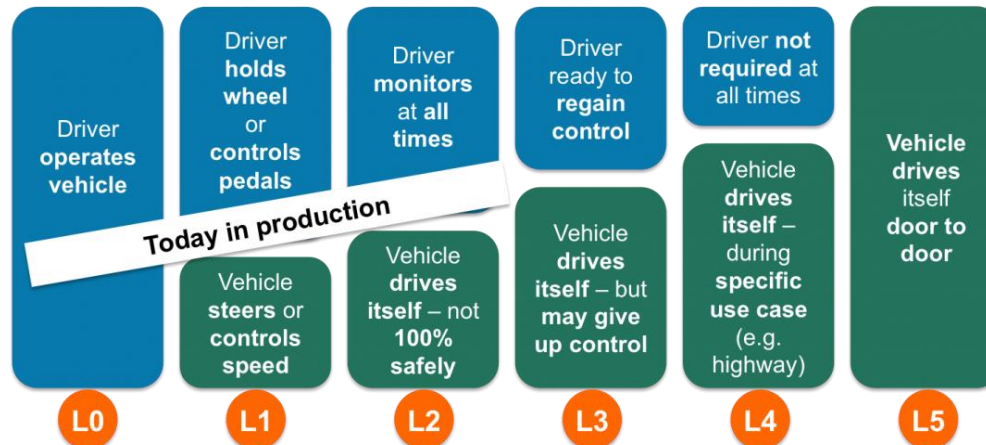
- **Transition Areas for Infrastructure-Assisted Driving**
- 7 partners from 6 European countries (technology providers, automotive industry, academia, research)
- 12 associated partners
- Coordinator: Julian Schindler, DLR (julian.schindler@dlr.de)
- Start: September 2017 (36M)
- Budget: 3.8 M€



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Automated Driving

- Automated driving reaches the market
- Vehicle systems able to drive in SAE level 3 are now reaching series production



Source: Audi



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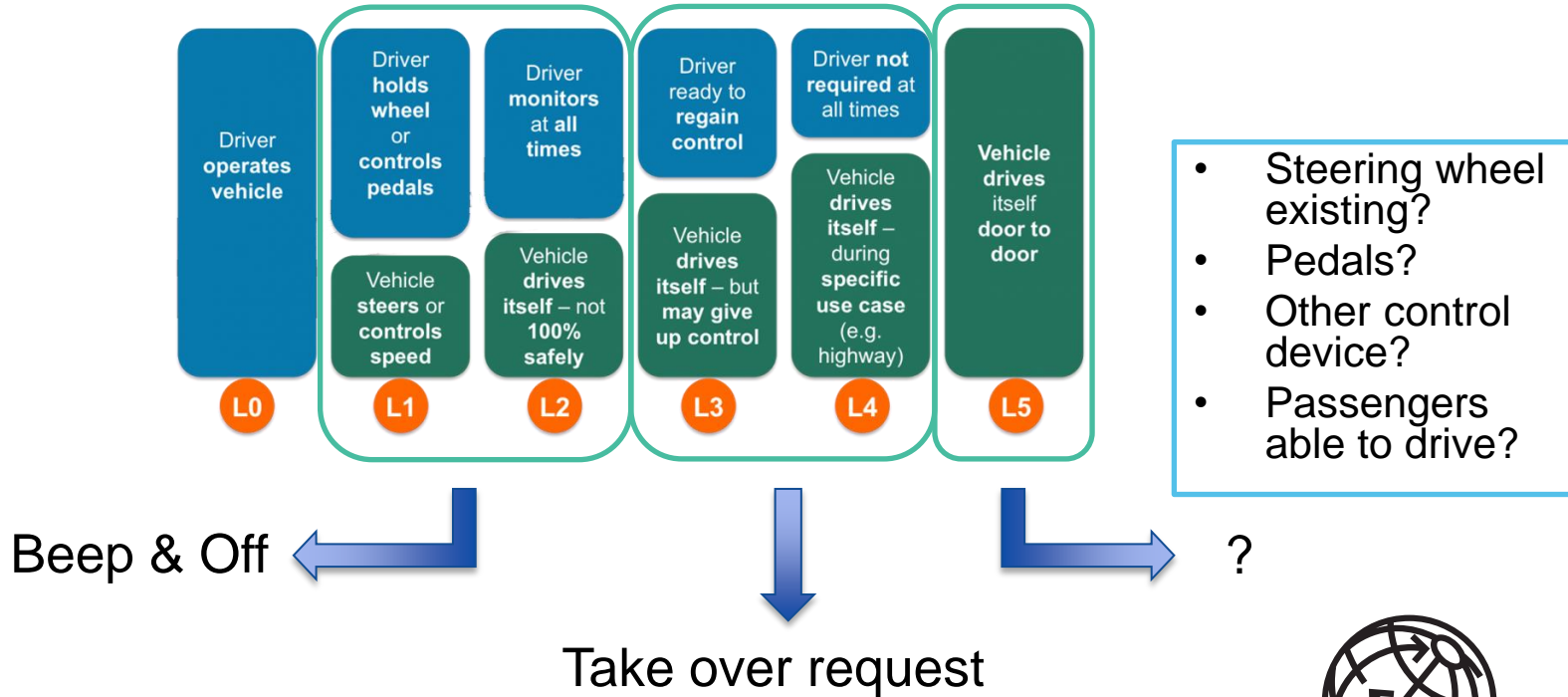
Source: Six levels of automation. Videantis.
<http://www.videantis.com/what-are-all-these-automotive-cameras-doing.html>

System Limits

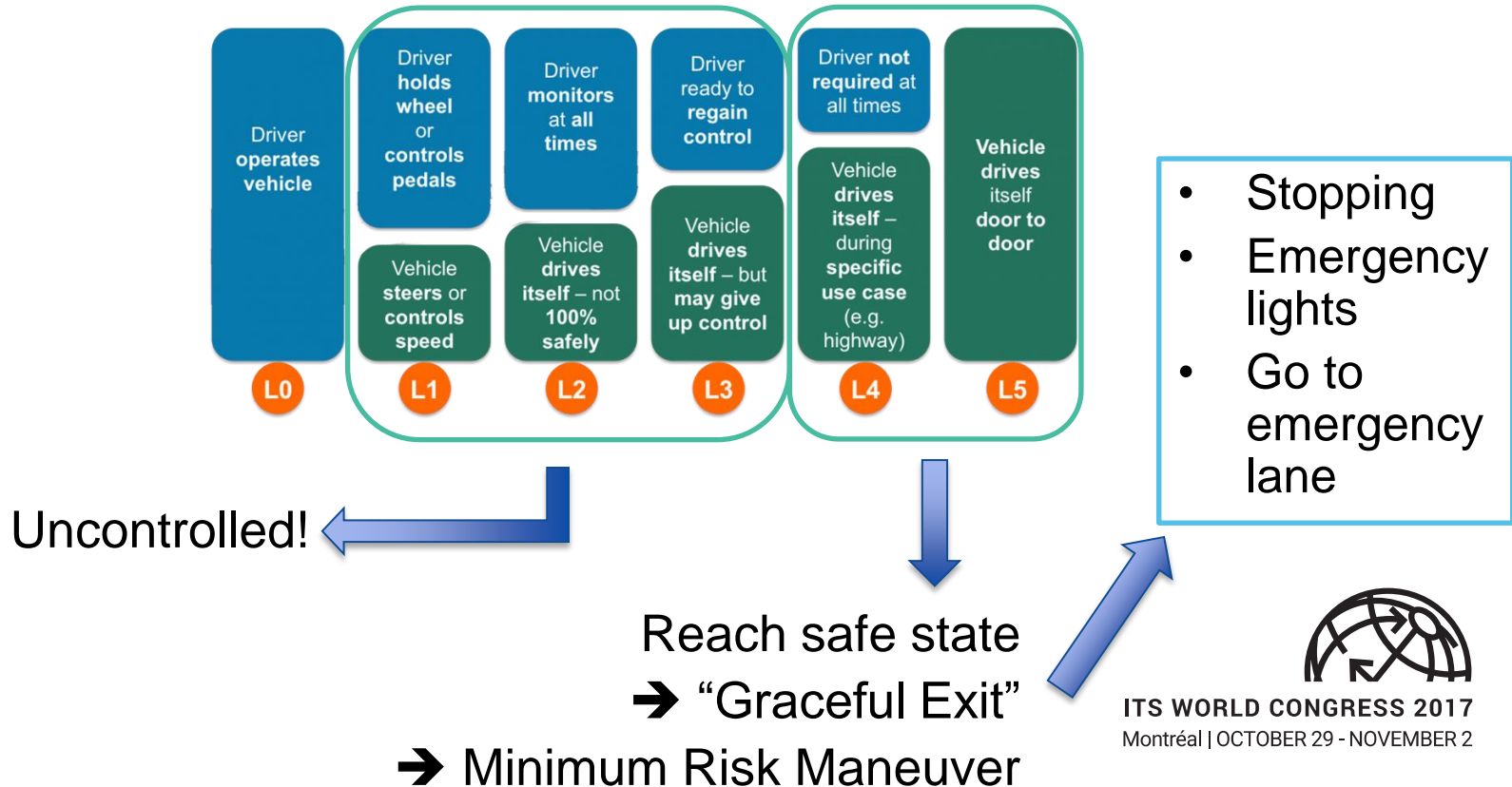
- Independent of the SAE level, there will be situations where the system reaches its limit
 - Reaching end of supported use case/area
 - Hardware or software failure
 - Situation not understood
 - Required action not possible
 - Required action not allowed
 - Required action not allowed without confirmation
- ...



Transition of Control to the “Driver”



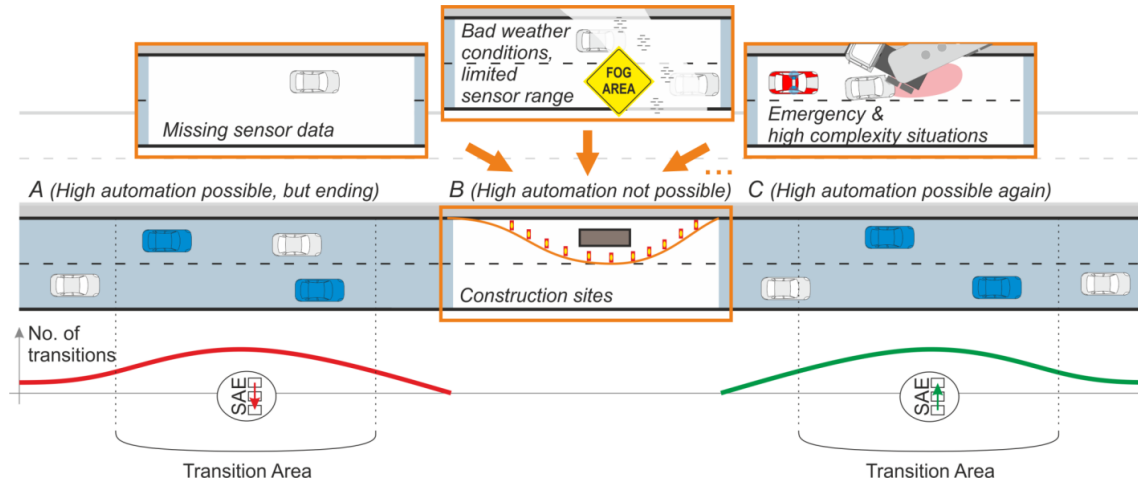
Driver does not take over control...



TransAID Research Questions

What happens...

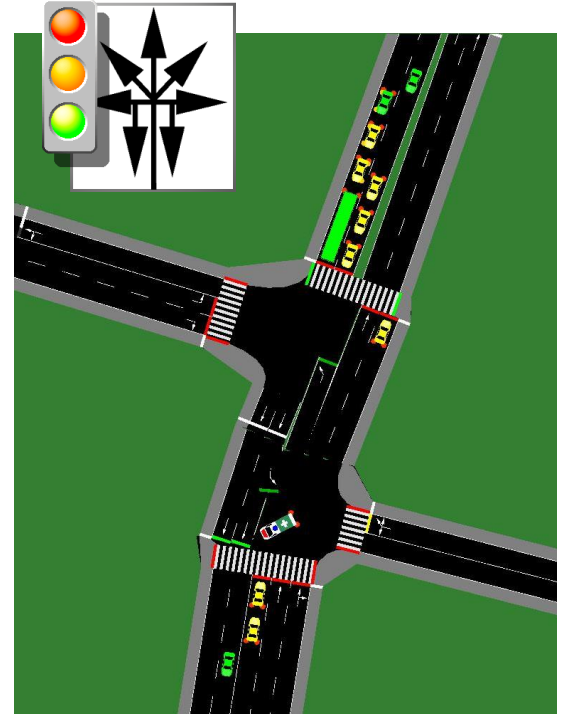
- ...if always happening on the same spot?
- ...if penetration rate of systems increases?



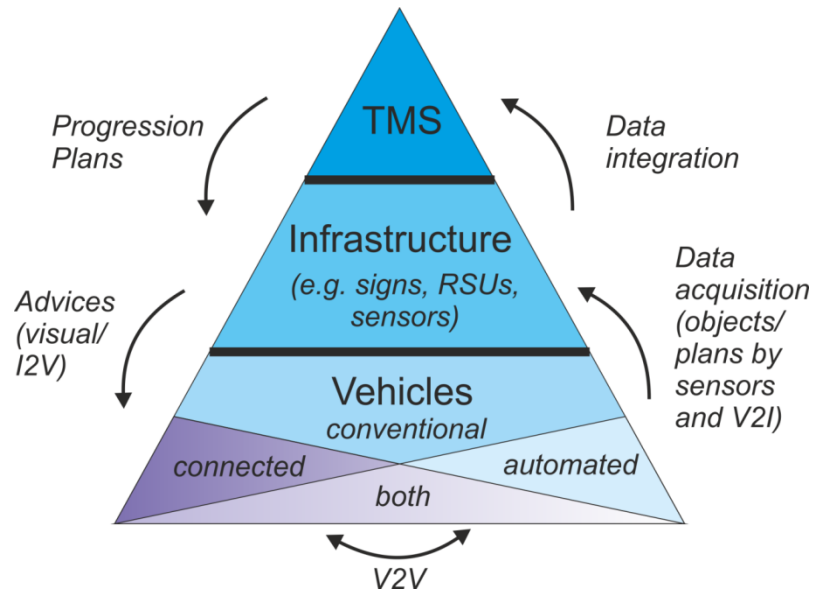
Baseline Simulations

- Modelling of automated vehicles' behavior
- Different SAE levels
- Different Minimum Risk Maneuvers
- Different penetration rates of each system
- Different road topologies

→ Leads to rough ideas of possible future problems

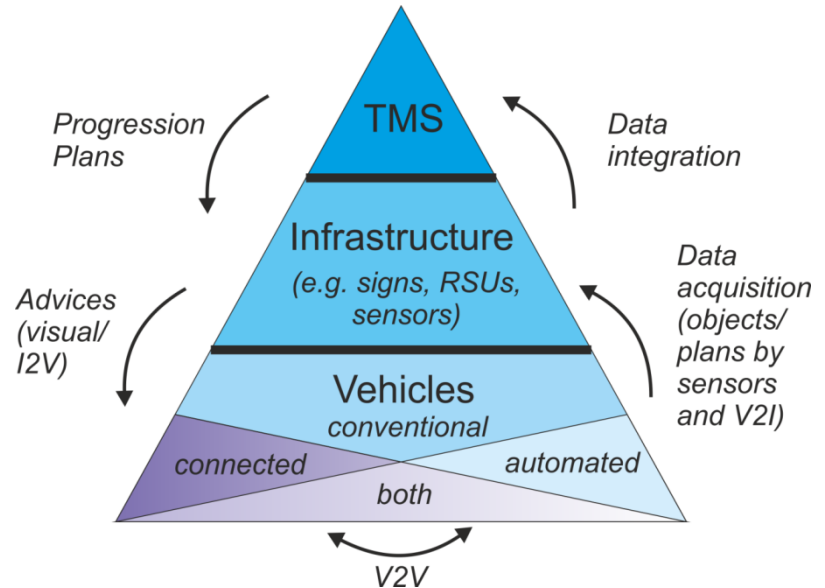


Finding solutions: Hierarchical Traffic Management



Development of Traffic Management Measures

- For the transition performing connected automated vehicle:
 - Early advises
 - Advising stopping areas
 - Advising maneuvers
 - Maximizing safety
- For the others:
 - How to avoid problems
 - Maximizing safety and efficiency
 - Individual (V2X) vs. general advices (Traffic lights, Variable Message Signs)



Example Use Cases

Vehicle sensor capabilities?

Infrastructure sensor capabilities?

Vehicle communication capabilities?

Infrastructure communication capabilities?

Vehicle system capabilities?

TMS capabilities?

Traffic lights?

Available time to transition of control?

Variable Message Signs?

Number of Lanes?

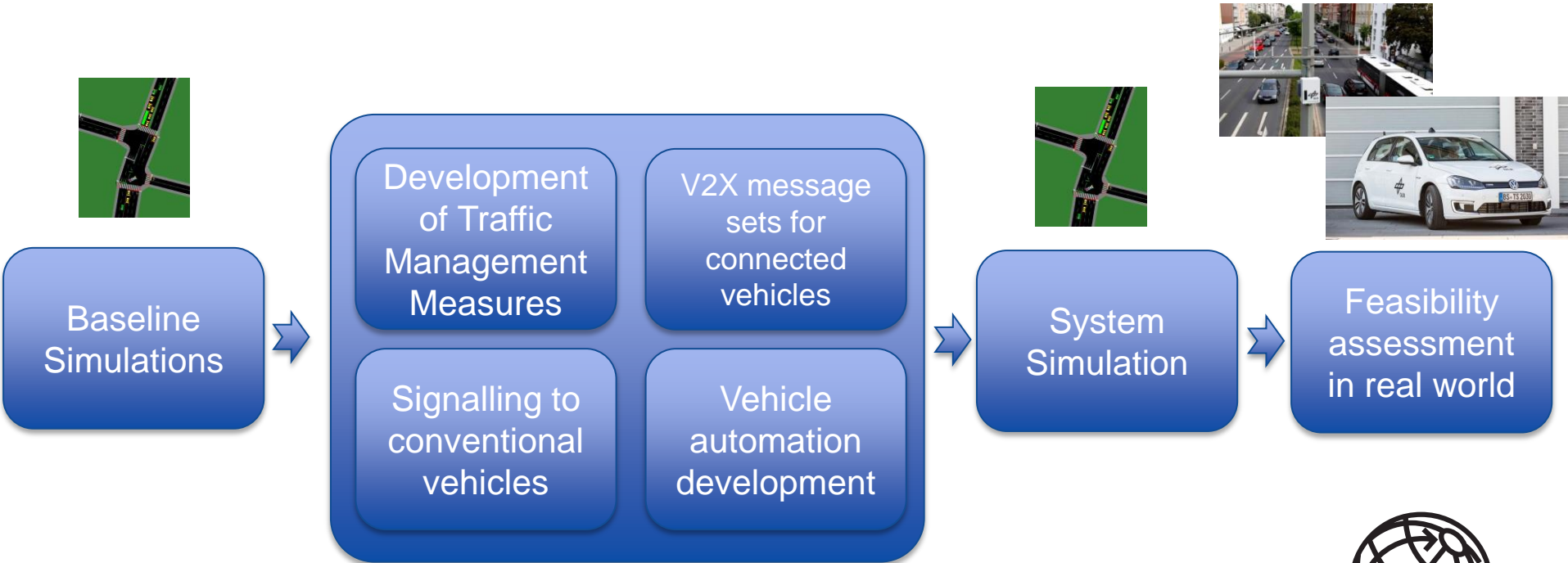
Vehicles around?

Special Minimum Risk Area available?

Penetration rate of different systems?



TransAID Procedure

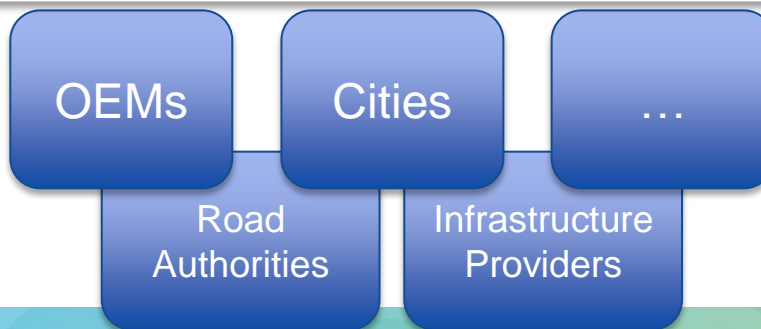


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Interaction with Stakeholders



Your input is very much appreciated!



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Thanks for your attention!



transaid.eu

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A small icon in the top right corner of the red box shows a traffic light with red, yellow, and green lights, and a road sign with a central vertical line and four arrows pointing up, down, left, and right.

Traffic simulation
SUMO:
Visit Berlin-
Brandenburg Pavilion
@ Exhibition
Booth 1924

Questions? Inputs?



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