

# Systems of systems – architecture concepts from an automotive perspective

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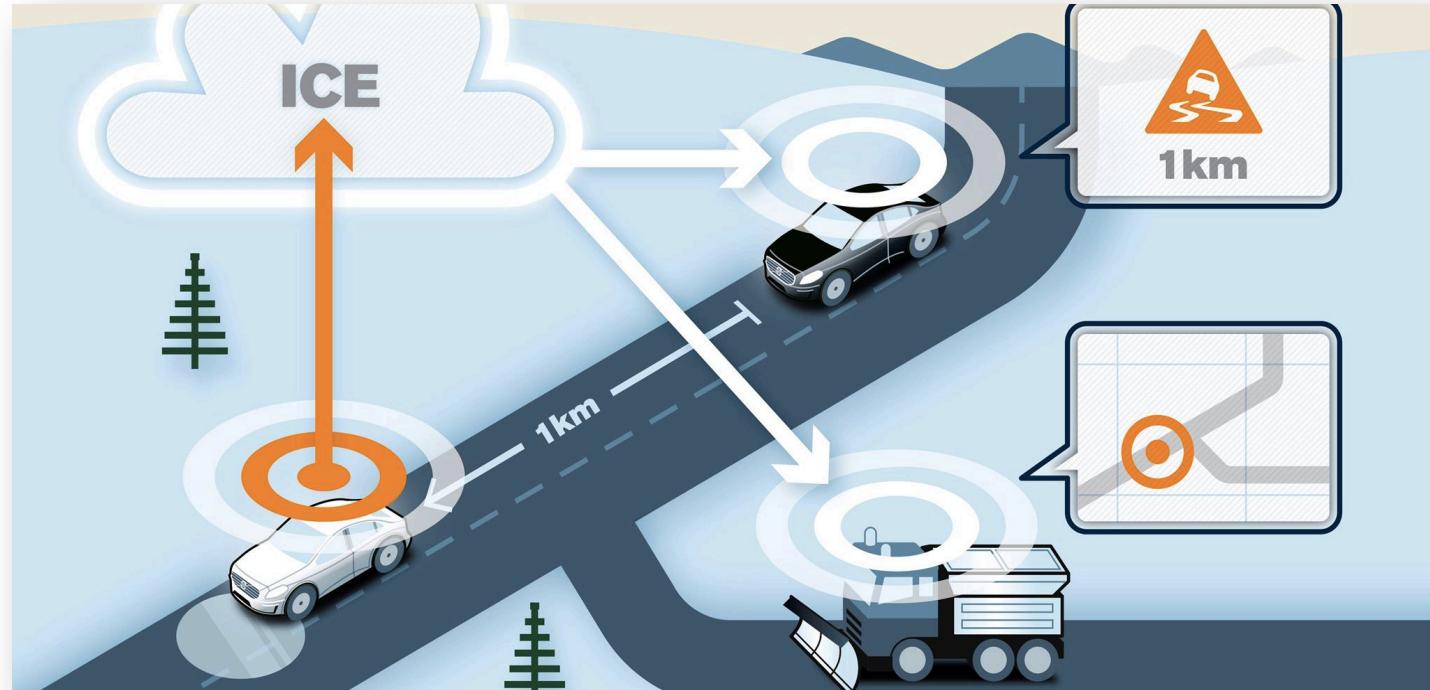
[www.patriziopelliccione.com](http://www.patriziopelliccione.com)

**NGEA**  
Next Generation Electrical Architecture



# Volvo Connected Safety

NGEA



<http://www.volvocars.com/intl/about/our-innovation-brands/connected-safety>

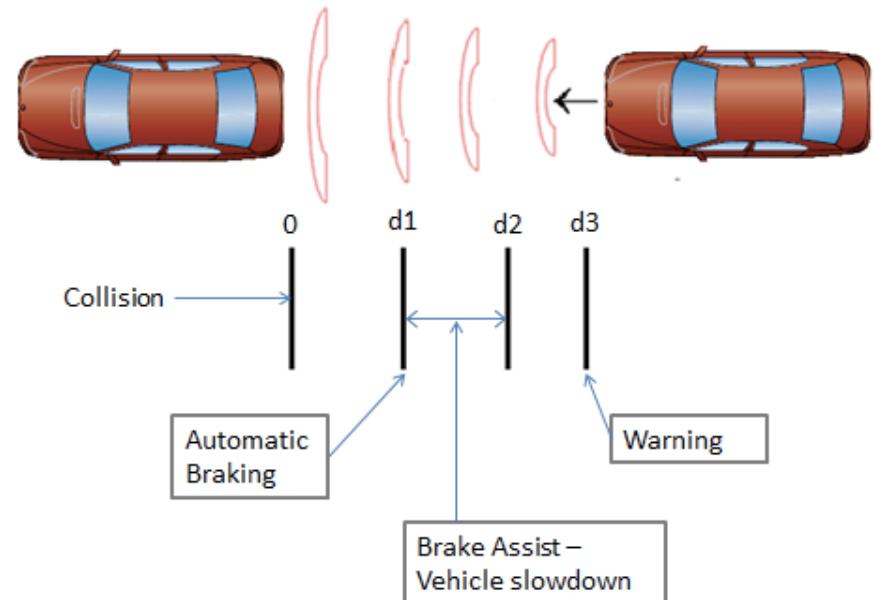
# Wearable Cyclists as part of the SoS NGEA



<https://www.media.volvocars.com/us/en-us/media/pressreleases/155565/volvo-cars-and-poc-to-demonstrate-life-saving-wearable-cycling-tech-concept-at-international CES-201>

# Beyond automatic braking system

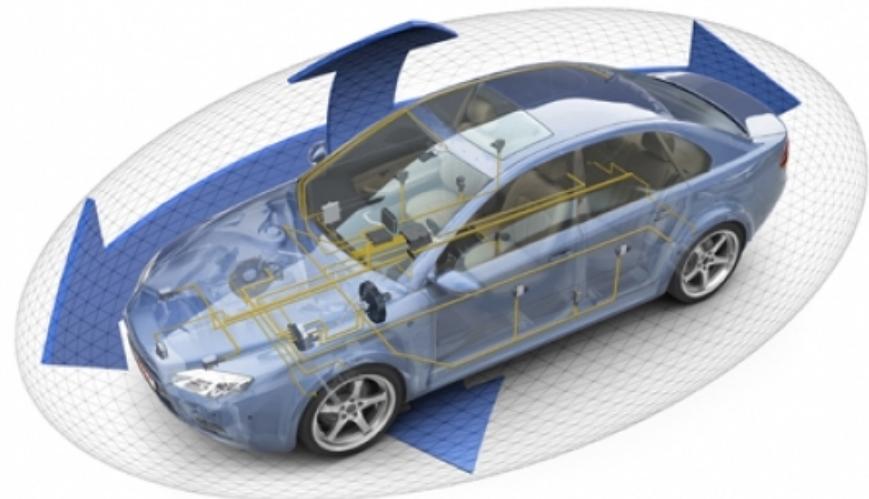
- Exploiting connected vehicle capabilities and SoS thinking to avoid accidents



# The car as a constituent of a SoS

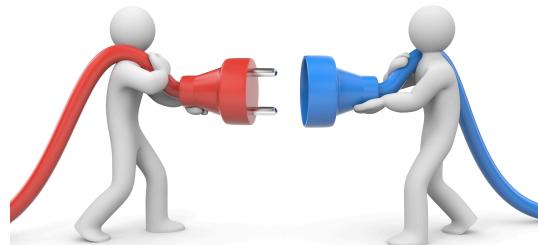
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*How to architect a car so to  
be part of a system of systems?*



# How to architect a car in a SoS?

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Connectivity and Heterogeneity  
of communication channels



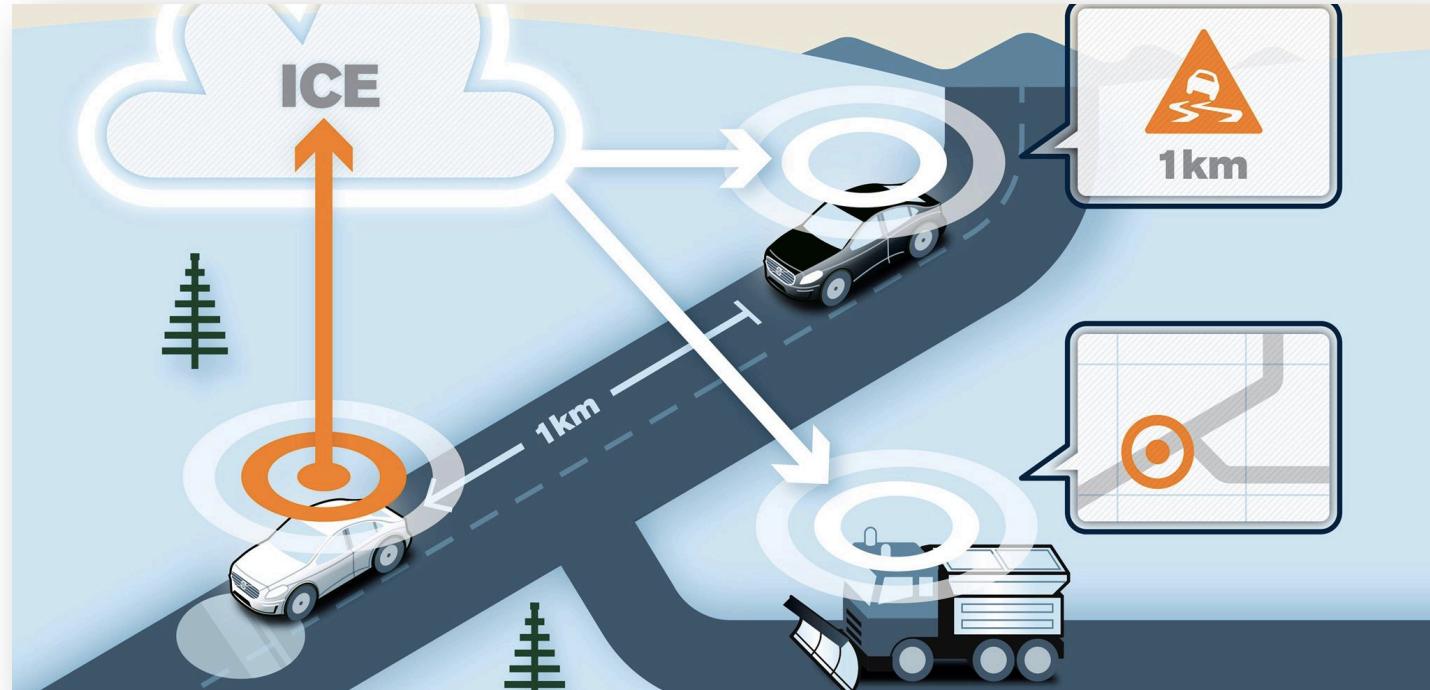
Large and unreliable information



Interoperability among constituent systems

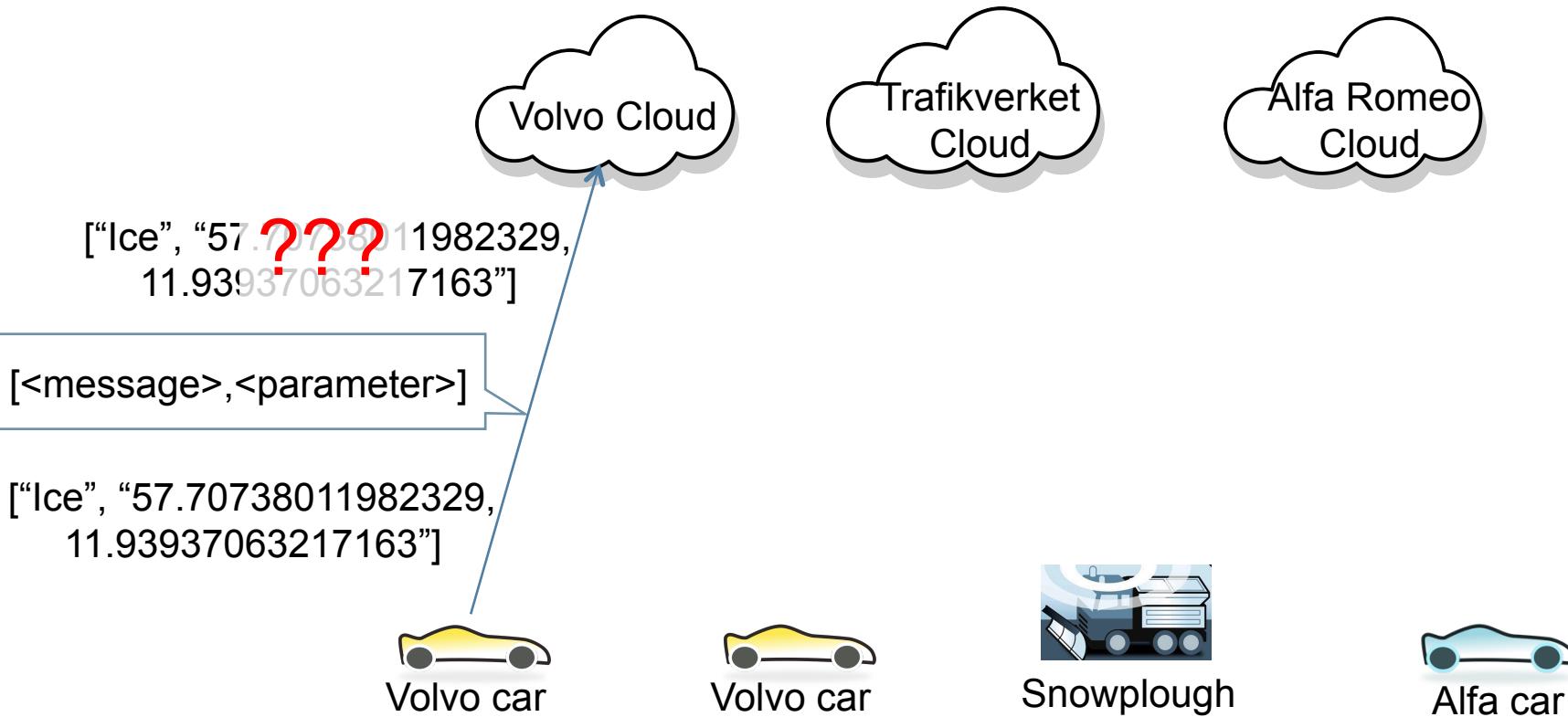
# Volvo Connected Safety

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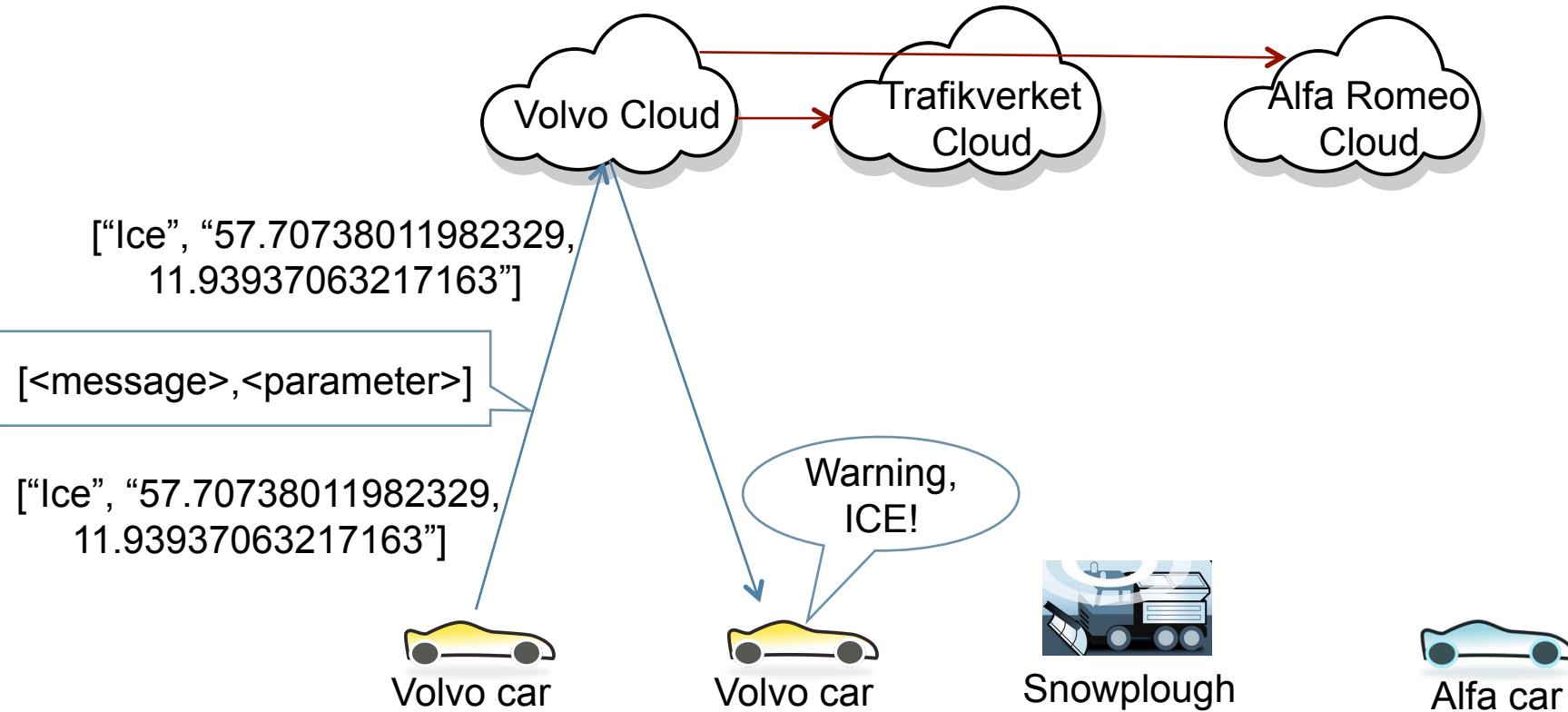


<http://www.volvocars.com/intl/about/our-innovation-brands/connected-safety>

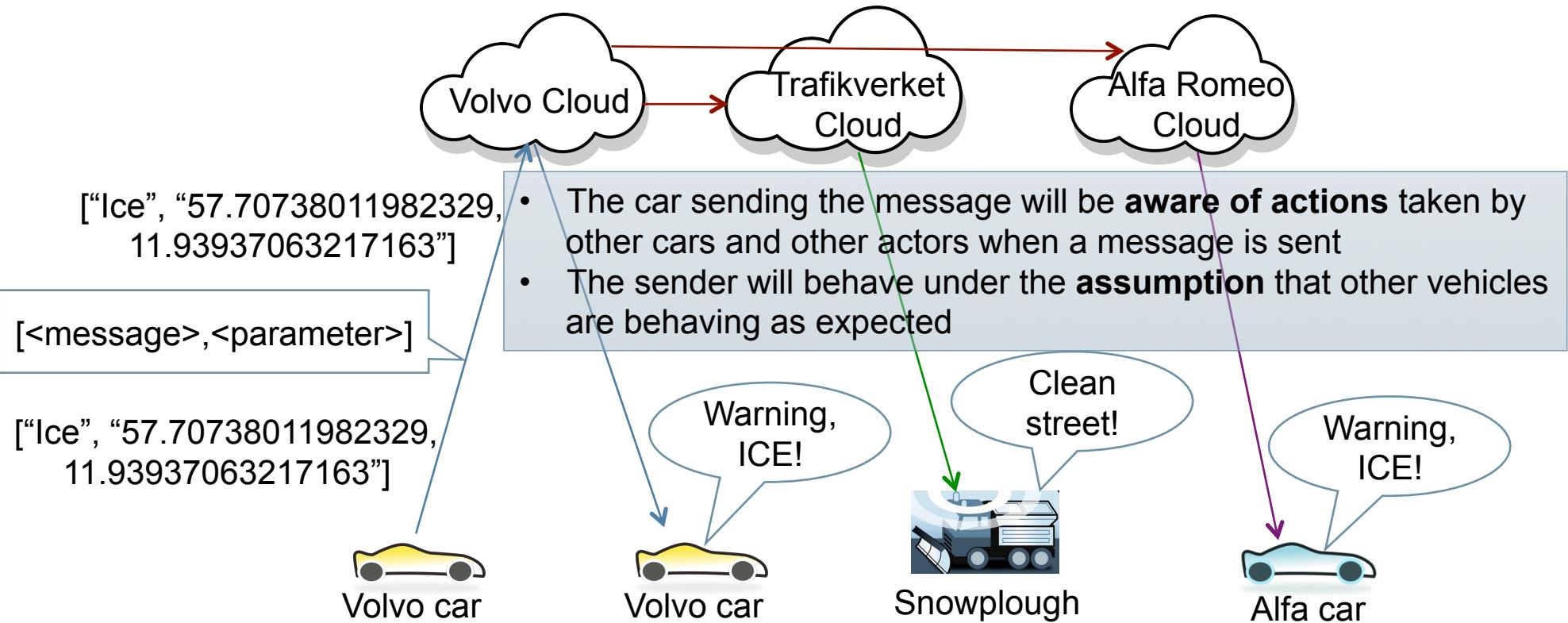
# Syntactic interoperability



# Semantic interoperability

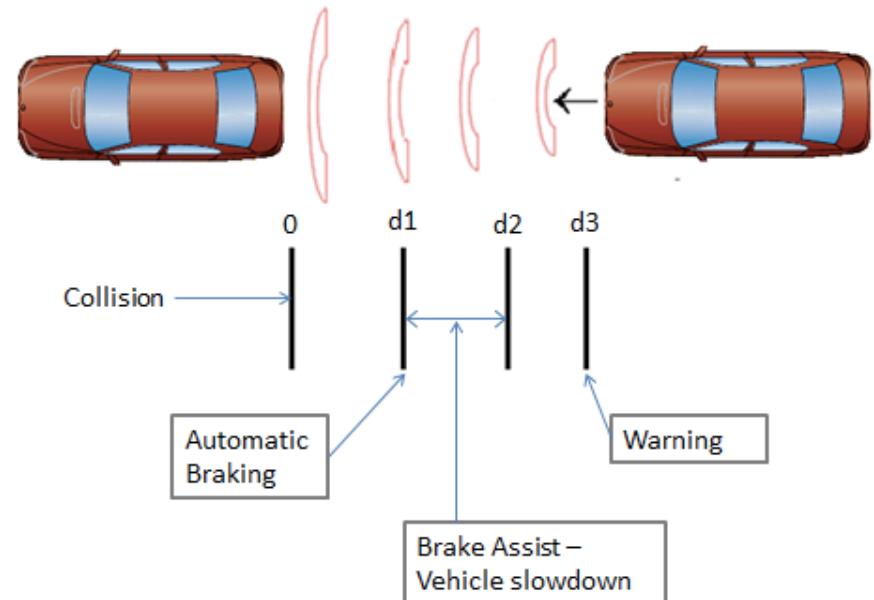


# Pragmatic interoperability



# Beyond automatic braking system

- Exploiting connected vehicle capabilities and SoS thinking to avoid accidents



# How to architect a car in a SoS?

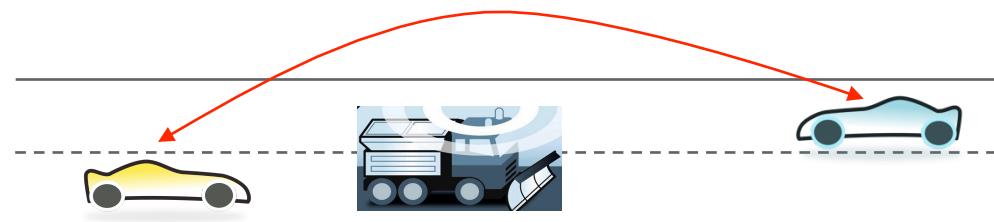
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Cyber security and privacy



Distributed end-to-end functionality



Functional safety

# Engineering SoS

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- Companies involved in the SoS have to **work together**
  - They should have a “**unique**” understanding of the reality
- The common understanding and agreement should drive the engineering of the SoS
  - This enables the implementation of all **actions that each “system” needs to perform in order to realize the system-of-systems goal**
- Often to realize these system-of-systems scenarios, constituent systems might decide to **temporarily sacrifice their own objectives** in order to ensure the realization of system-of-systems goals

# Questions?



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