Maschinen vernetzen für die Landwirtschaft der Zukunft

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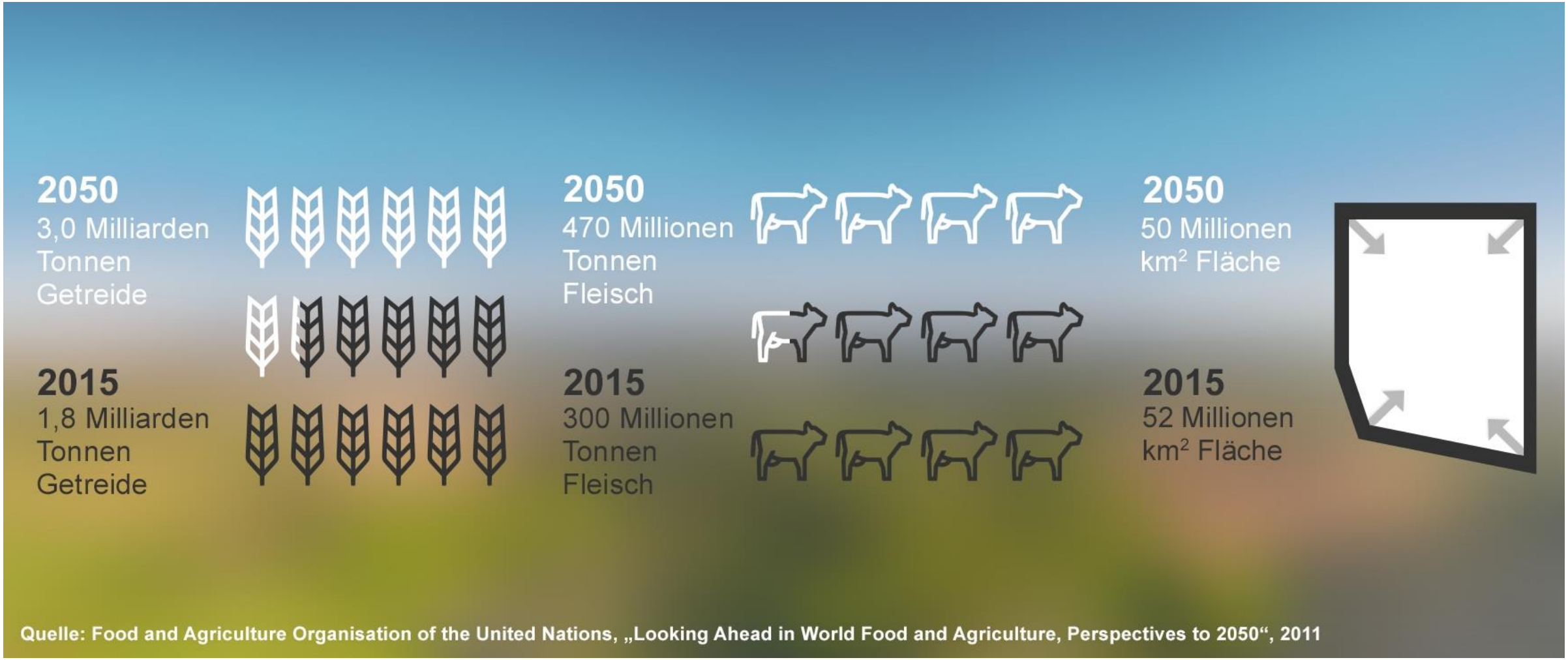
Agricultural Engineering in the Past

Nutritional Needs and Land Development

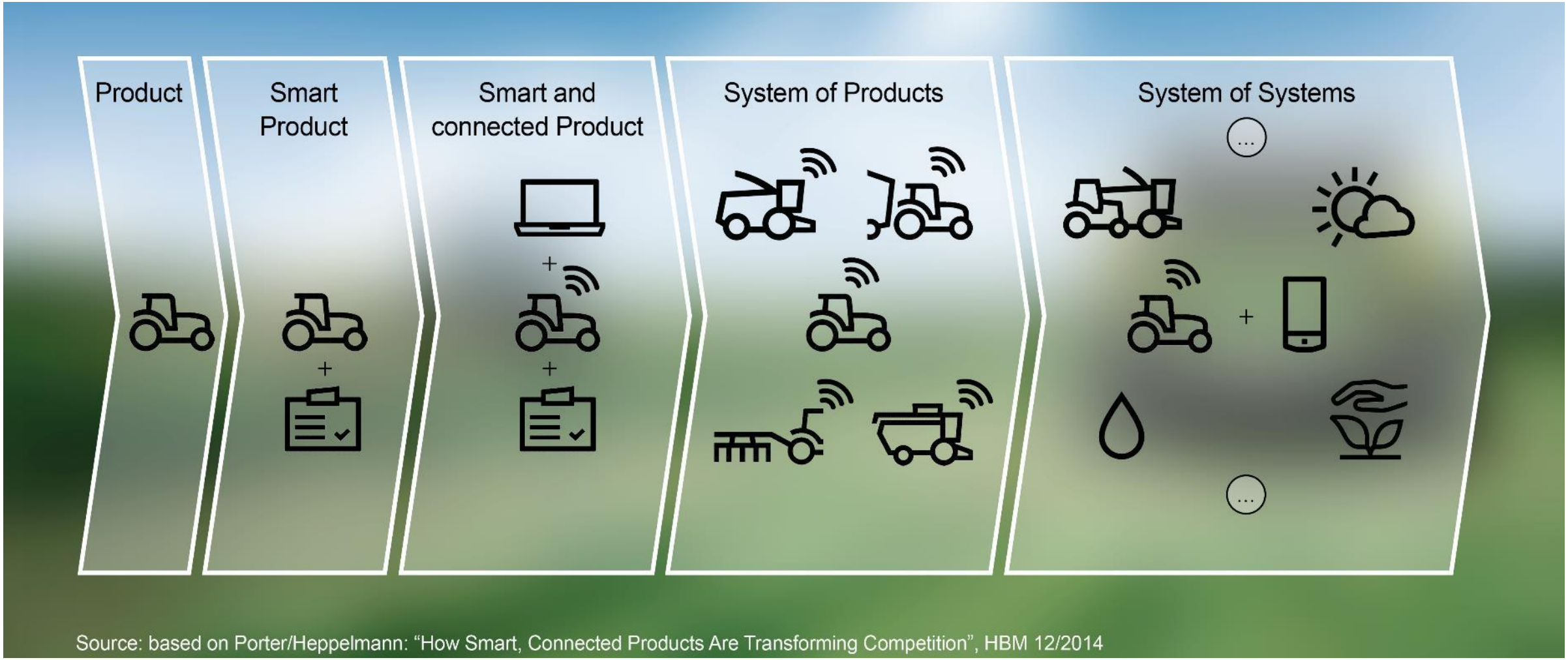
Nutritional Needs and Land Development



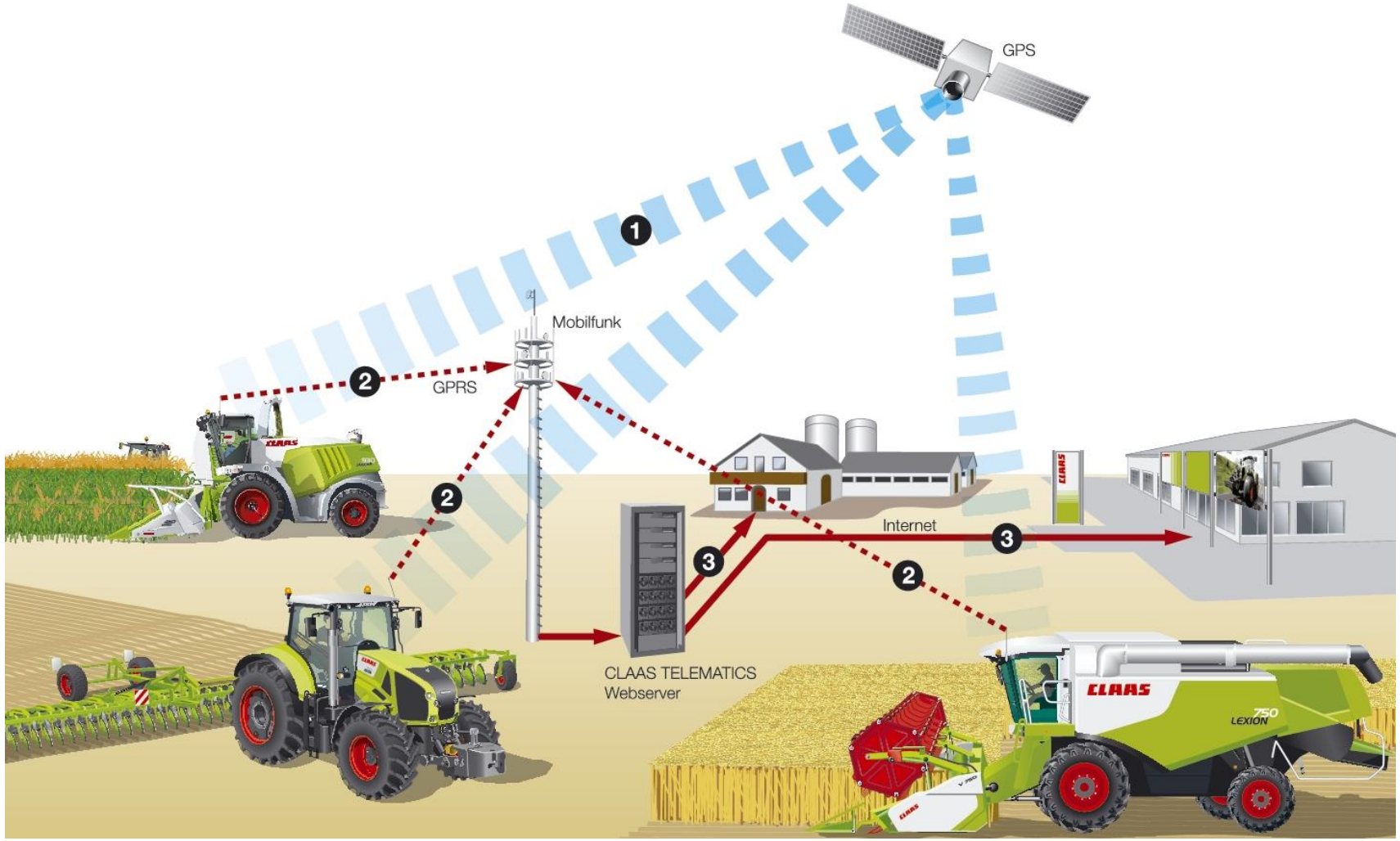
Have we reached our limits?

- Size growth of machines largely exhausted
- Focus today: Single machine optimization
- Transport logistics is a limited factor
- Future focus: Process optimization
  - Control of the entire process chain
  - Integration of all process participants
- M2X and M2M communication required

Electronics in the Agro-business: higher efficiency rather than more steel!



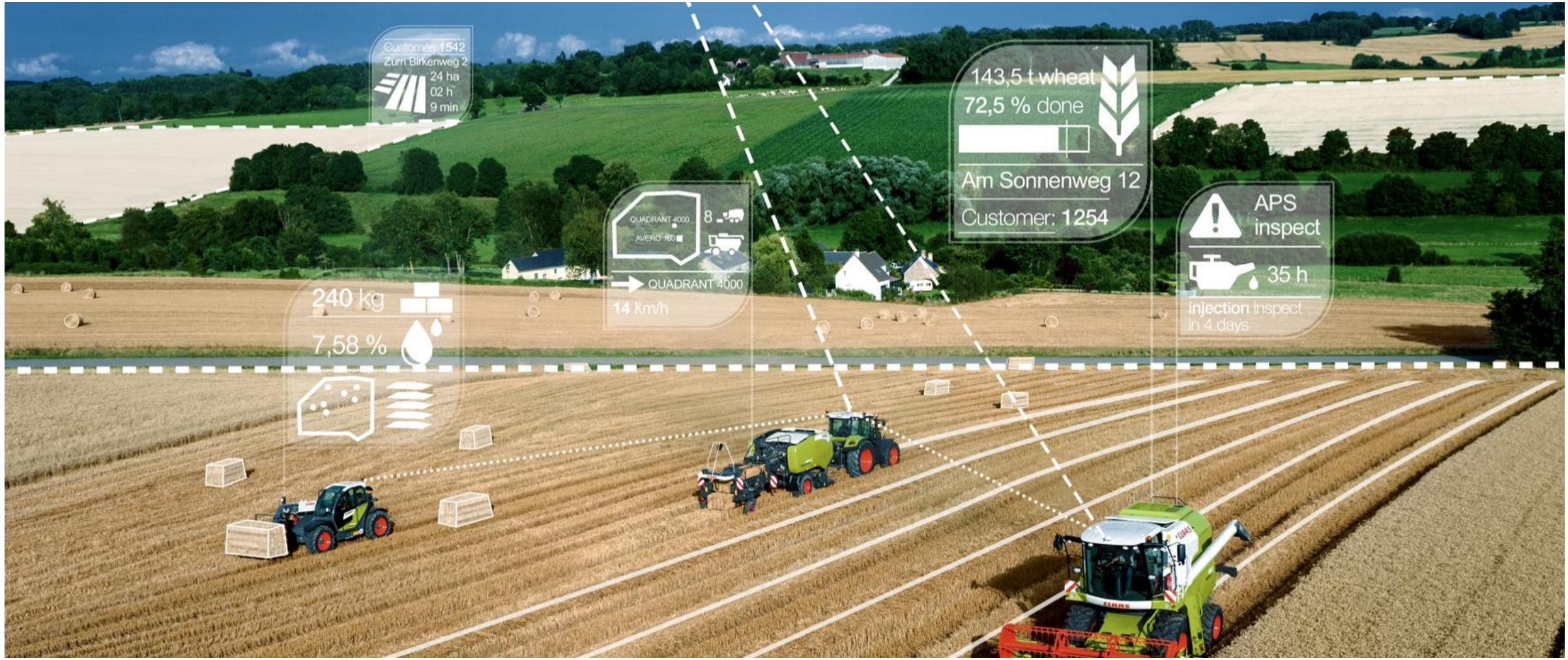
Connectivity in Agriculture



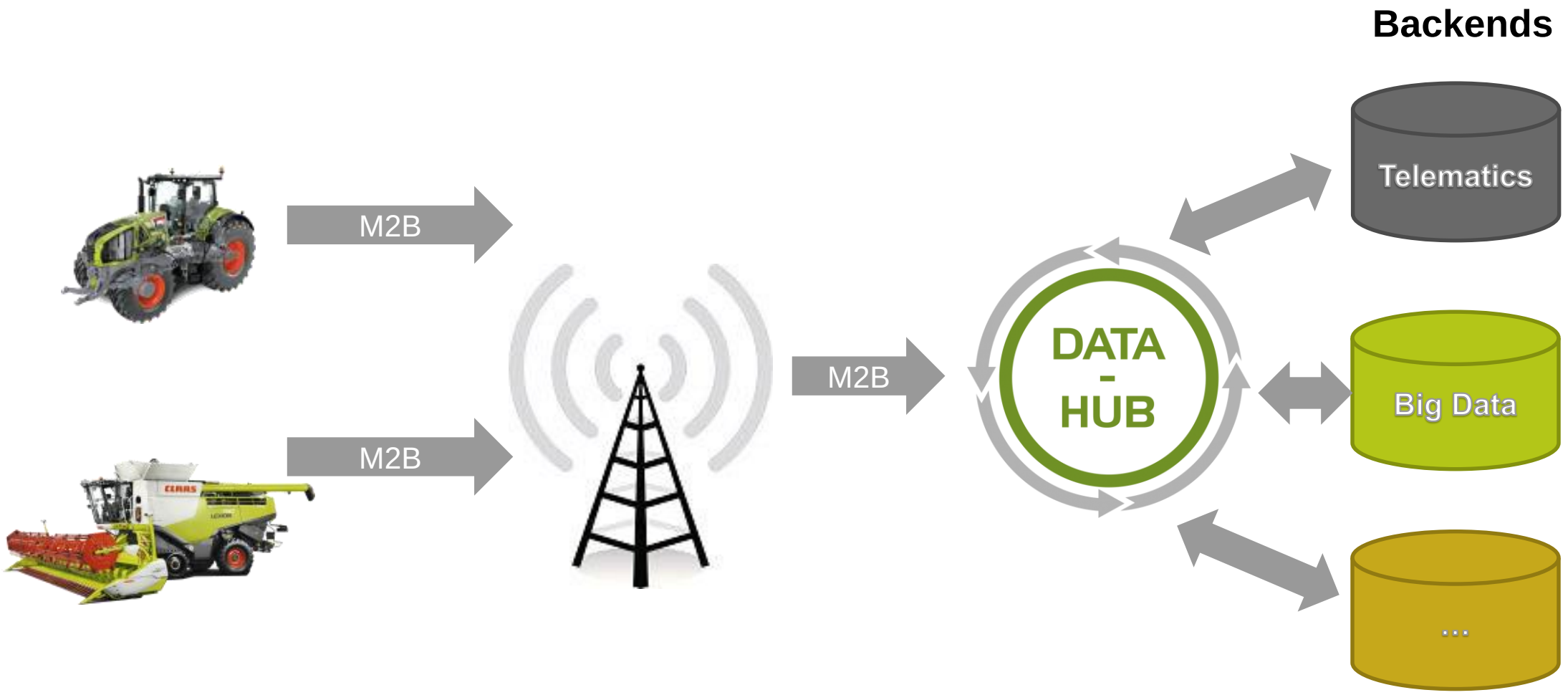
Connectivity on CLAAS machines:

- Satellite for GPS steering systems
- Radio data stream for GPS correction signals
- Cellular connection for data exchange like telematics

Data Management



Machine to Backend Communication

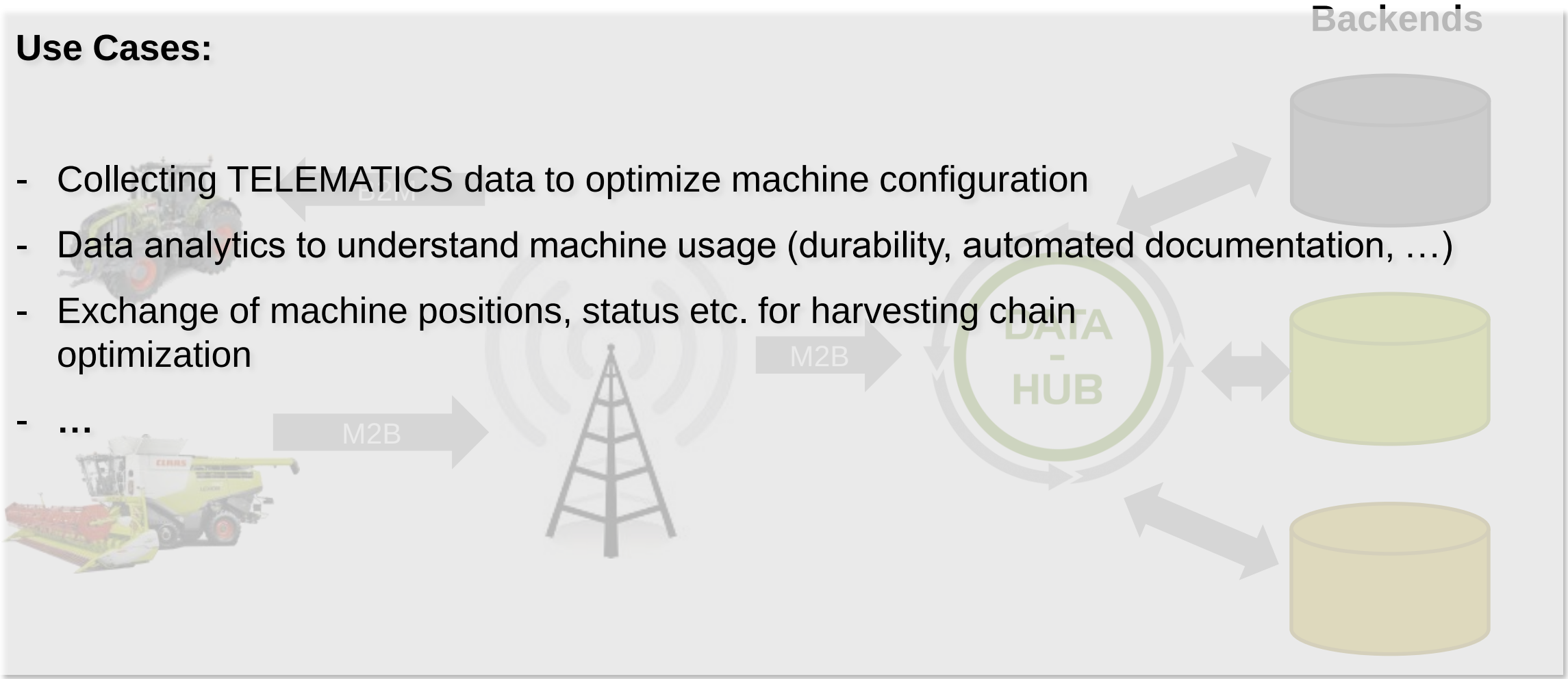


M2B: Maschine to Backend

Machine to Backend Communication

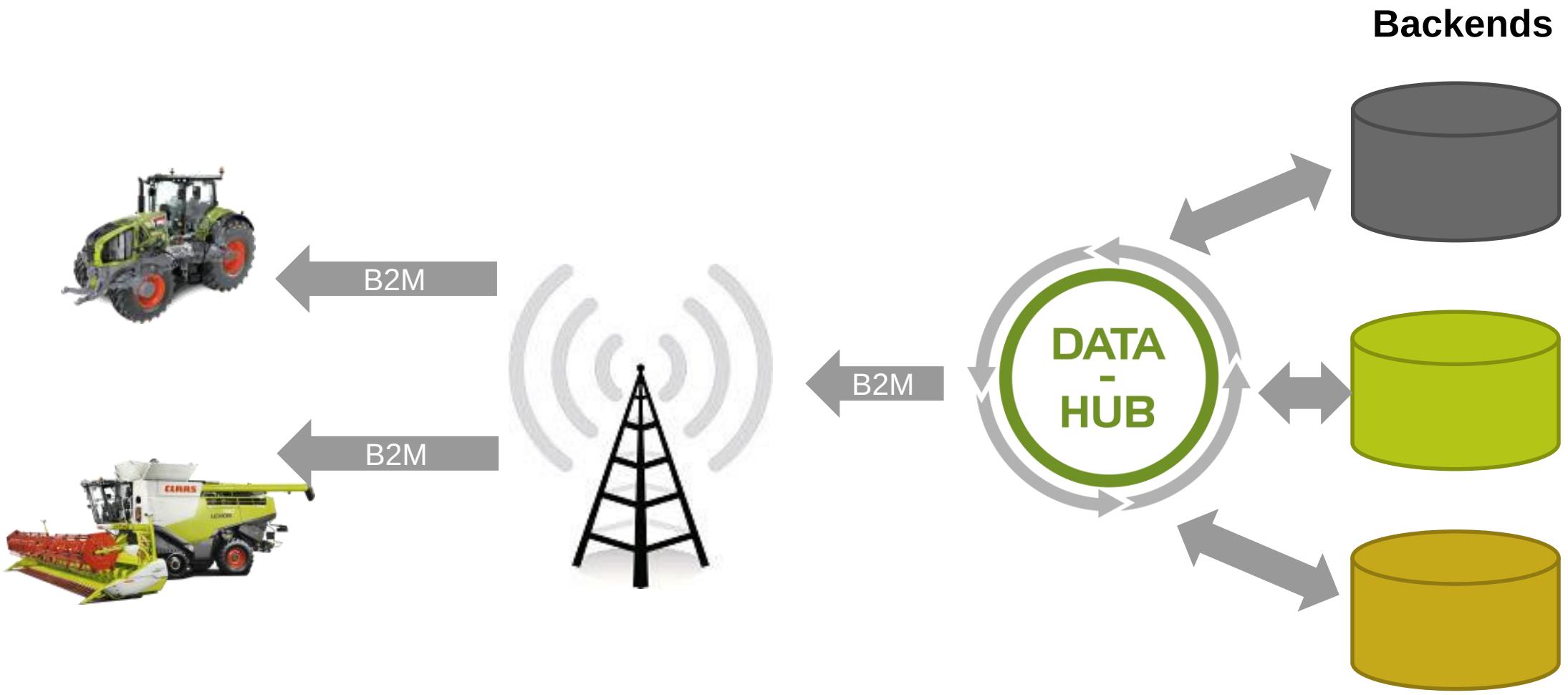
Use Cases:

- Collecting TELEMATICS data to optimize machine configuration
- Data analytics to understand machine usage (durability, automated documentation, …)
- Exchange of machine positions, status etc. for harvesting chain optimization
- ...



M2B: Maschine to Backend

Backend to Machine Communication

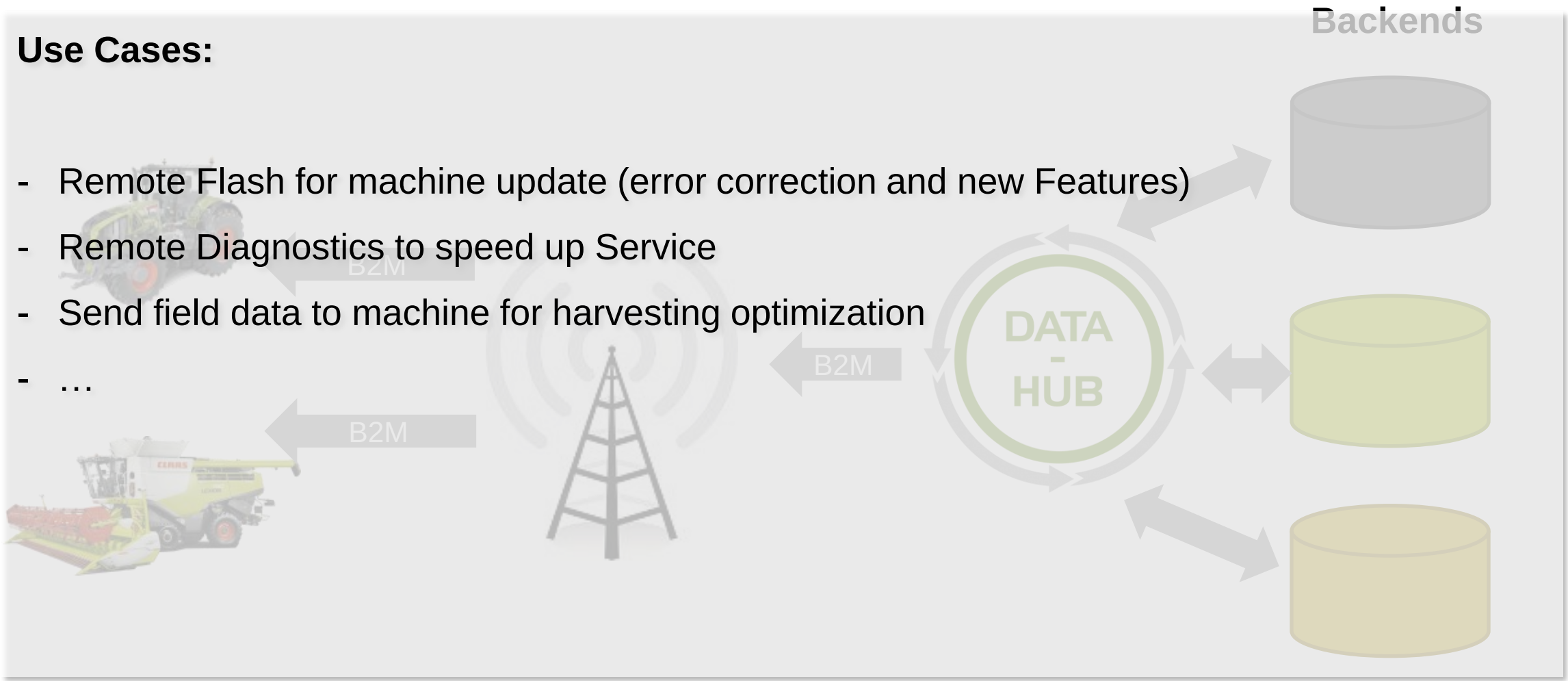


B2M: Backend to Maschine

Backend to Machine Communication

Use Cases:

- Remote Flash for machine update (error correction and new Features)
- Remote Diagnostics to speed up Service
- Send field data to machine for harvesting optimization
- …



B2M: Backend to Maschine

Decentral Communication

Technologies:

- WLAN 802.11p
- 5G V2x

M2M: Maschine to Maschine

Decentral Communication

Use Cases

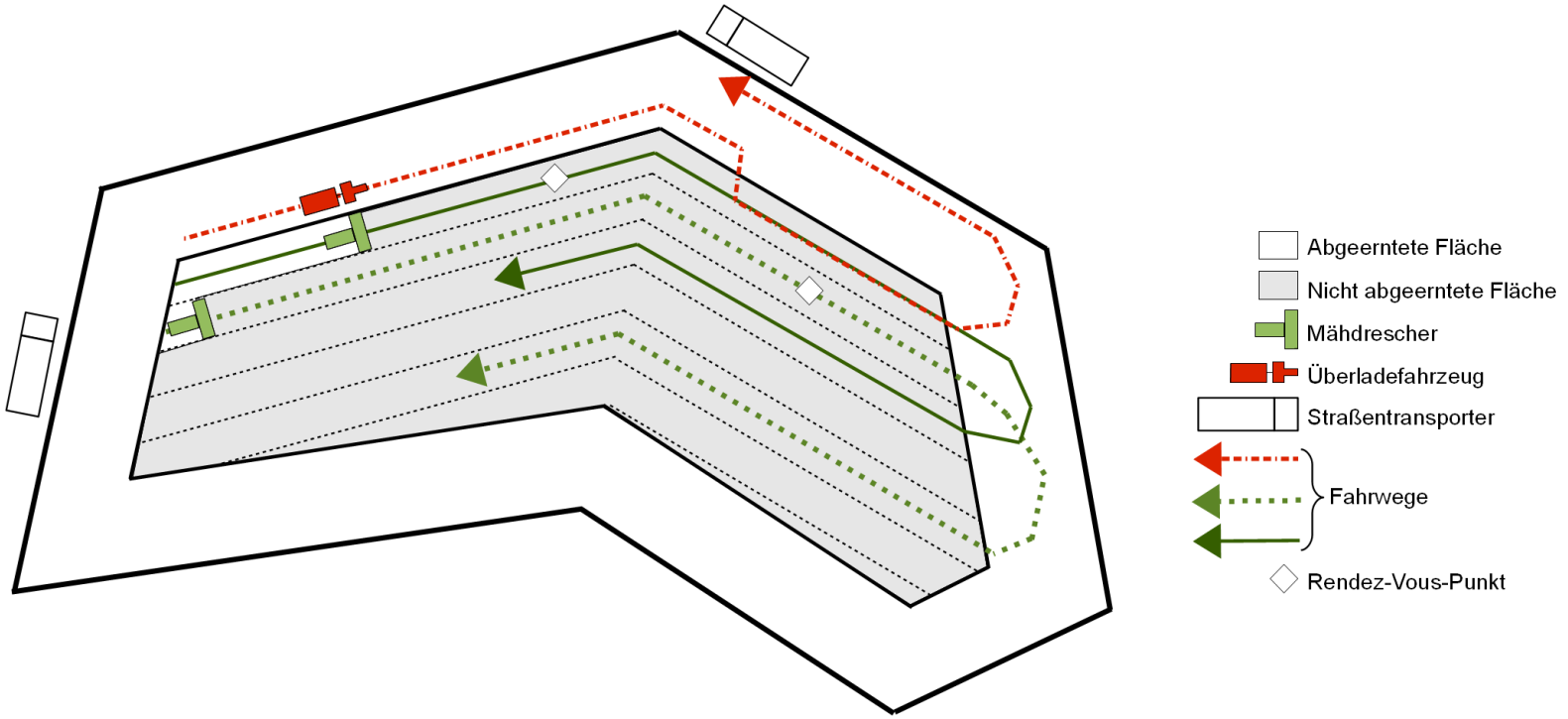
- Exchange of machine positions, status etc. for harvesting chain optimization
- Speed control and parallel driving for harvester and tractor
- Warning for cars on slow driving agricultural machines
- …

Technologies:

- WLAN 802.11p
- 5G V2x

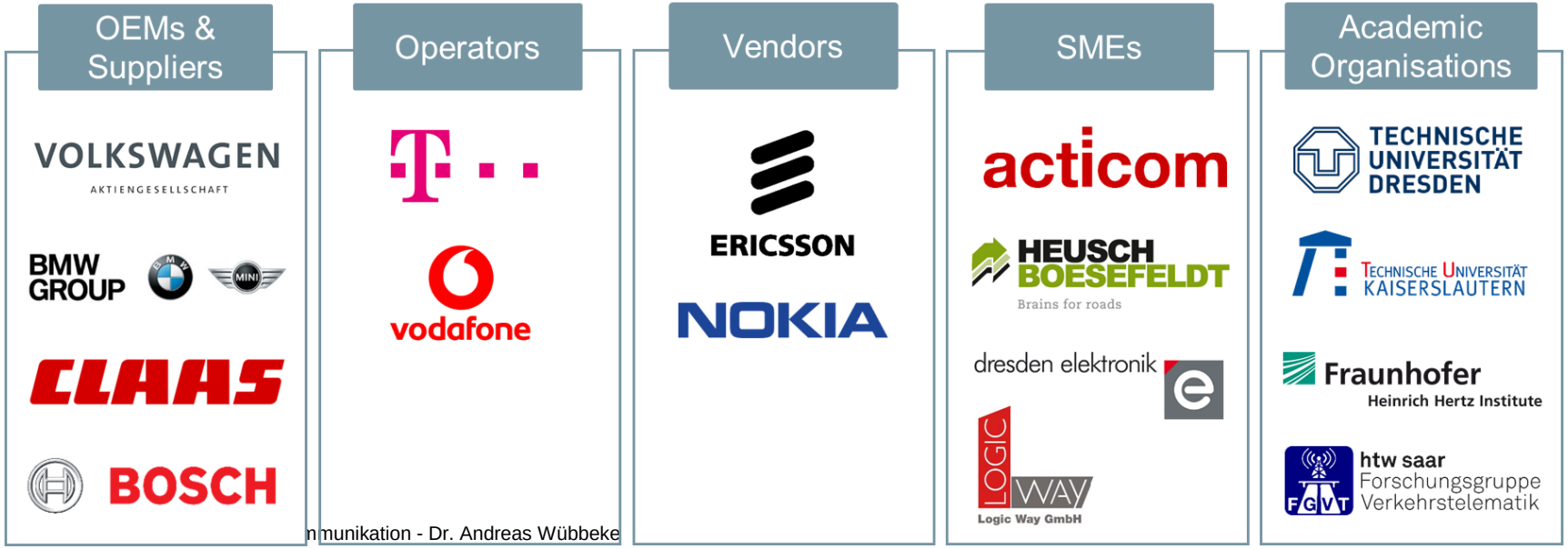
Logistic Chain Optimization: Fleet View

Logistic Chain Optimization: In-Field Management



V2V Use Cases in Agricultural Industry

Public funded Project:
5G NETMOBIL – 5G SOLUTIONS FOR FUTURE CONNECTED MOBILITY
01.03.2017 – 29.02.2020 (https://5g-netmobil.de/)



munikation - Dr. Andreas Wübbeke

V2V Use Cases in Agricultural Industry

REQUIREMENTS OF USE CASE

- Low Latency (below 50ms)
- High reliability for communication
- Standardized interfaces

PURPOSE

- Establish and control appropriate relative distances between vehicles to relieve strain on the machine operators
- Increase harvesting efficiency

TECHNICAL CHALLENGE

- Integrate different 5G V2V-communication technologies into agricultural machines' architectures
- QoS prediction in off-road usage
- Interoperability

Conculsion

Unique Selling Point:

- Data management in Agriculture is changing from only collecting data to detailed data evaluation and decision support systems

ToDo:

- Implementation of Machine to Machine direct communication
- Long Range infield communication missing (> 3 km)
- Detailed analysis of machine and process data for e. g. predictive maintenance
- Decision Support Systems for machine drivers and whole logistic chains
- Implementation of decentral control of fleets

think e-farming

Thank you!

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