



AEF's Impact on the Ag Digital World

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Who am I ?



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Summary

1. AEF Overview
2. HSI – High Speed ISOBUS
3. WIC – Wireless In-field Communication
4. AgIN – Agriculture Interoperability Network
5. AEF's Big Picture

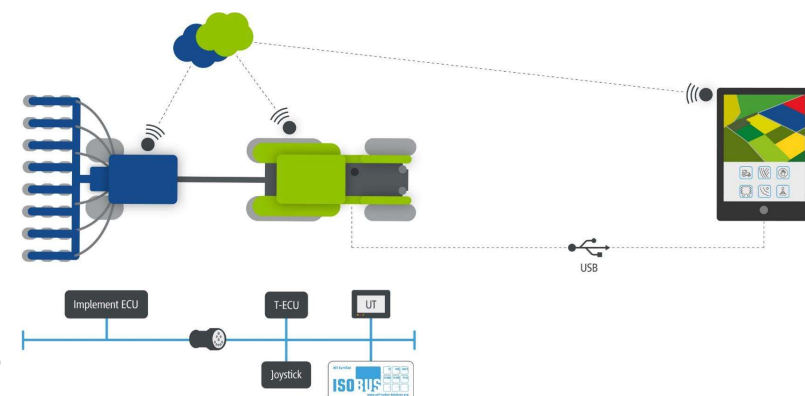
01

AEF Overview



Introduction to AEF

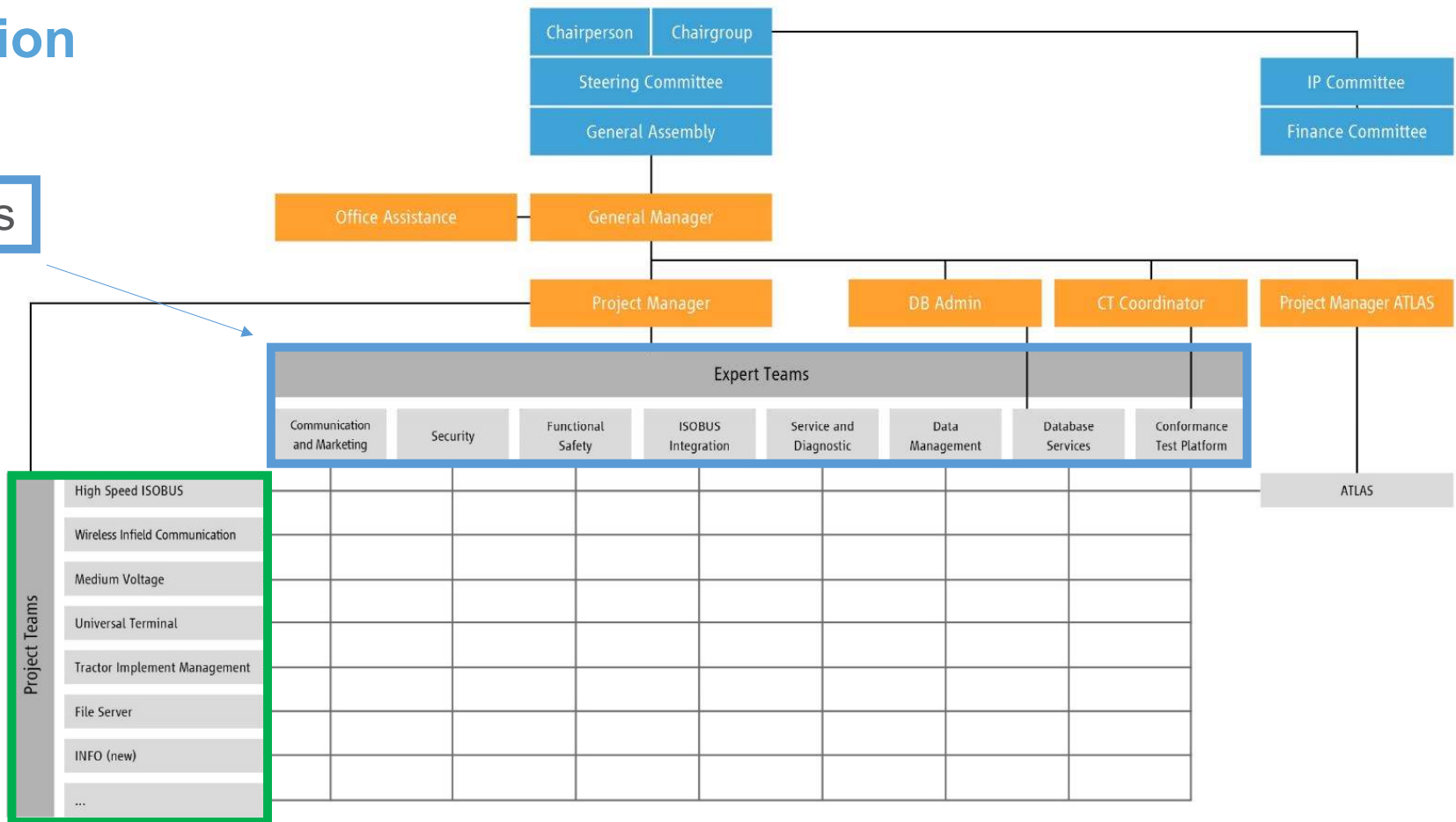
- Agricultural Industry Electronics Foundation
 - Founded in 2008; 8 major agricultural equipment manufacturers and 3 trade associations
 - Over 230 member companies
- Worldwide support of ISOBUS implementation
 - Structured in up to 17 different teams
 - Supported by 5 international test labs to certify products
- Define guidelines for Ag industry
 - Focus on Tractor – Implement connection using ISOBUS
 - Data exchange between machines and clouds
 - Coordinate activities and developments



Organisation

Expert teams

Projects



AEF Expert Teams and Projects

- International teams of experts from member companies who support the various projects as needed during the life of the project
- Collaborating to find solutions beneficial for the whole ag industry
- Solutions are specified in AEF Guidelines to compliment the ISO standard
- ISO 11783 + AEF Guidelines → basis for manufacturers to develop ISOBUS products
 - Released guidelines typically integrated into the ISO standard

Expert Teams



Projects



02

HSI – High Speed ISOBUS



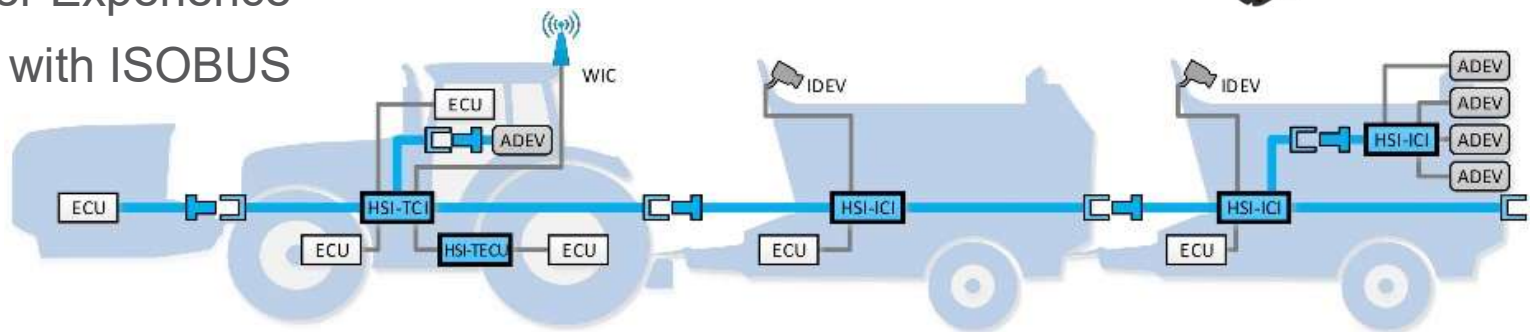
High Speed ISOBUS (HSI)

The next generation

- 1000BASE-T1 Industrial Ethernet (up to 4000 times faster)
- Topology similar to ISOBUS (Rear/front Connector, In-Cab Connector)

The benefits

- + Higher Performance Command and Control
- + Improved User Experience
- + Compatibility with ISOBUS

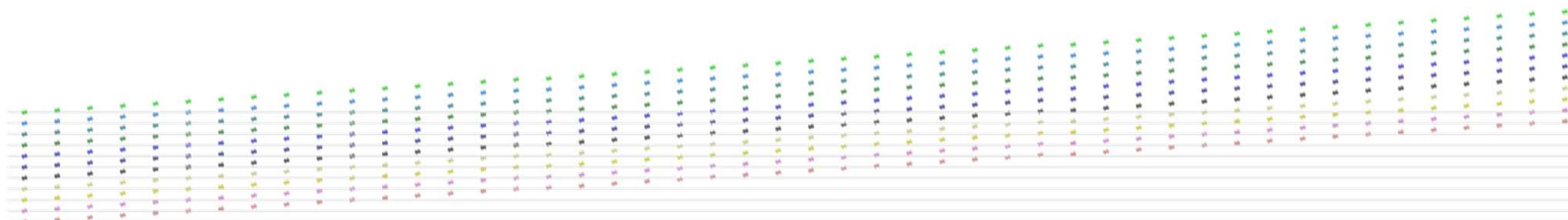


Use-Case – Task Controller Planting Example

- ISOBUS – Task Controller
 - ISOBUS [CAN] Bandwidth Limits
 - Section Level Control
 - Display Update Rate
- HSI – Task Controller
 - Use Existing “Task Controller” Functionality from ISOBUS
 - Row Level:
 - Control – up to 4000 times faster than CAN on HSI
 - Seed Rate, Skips, Doubles, Depth, and many more parameters, ...
 - Faster and more Precise Display Update Rate for Visualization
 - With HSI, it’s easily possible to “document” the location of every seed



For more precise application in Ag – Use case “Task Controller”



ISOBUS – Task Controller 48 sections
HSI – Task Controller 48 sections

+ Task Controller functionalities on HSI have a better performance which results in a more accurate application with less overlapping and defects.

Use-Case – Remote Camera Viewing

- Typical Analog Cameras
 - Video – lower quality / “grainy”
 - No “standardized integration” with ISOBUS
 - Companies moving to Digital – proprietary solution
- HSI Compatible Digital Cameras
 - Higher Resolution
 - Higher Refresh Rate
 - Image Processing
- Integration Possibility
 - Camera view integrated within Implements User Interface

Use Case “Remote Camera Viewing”

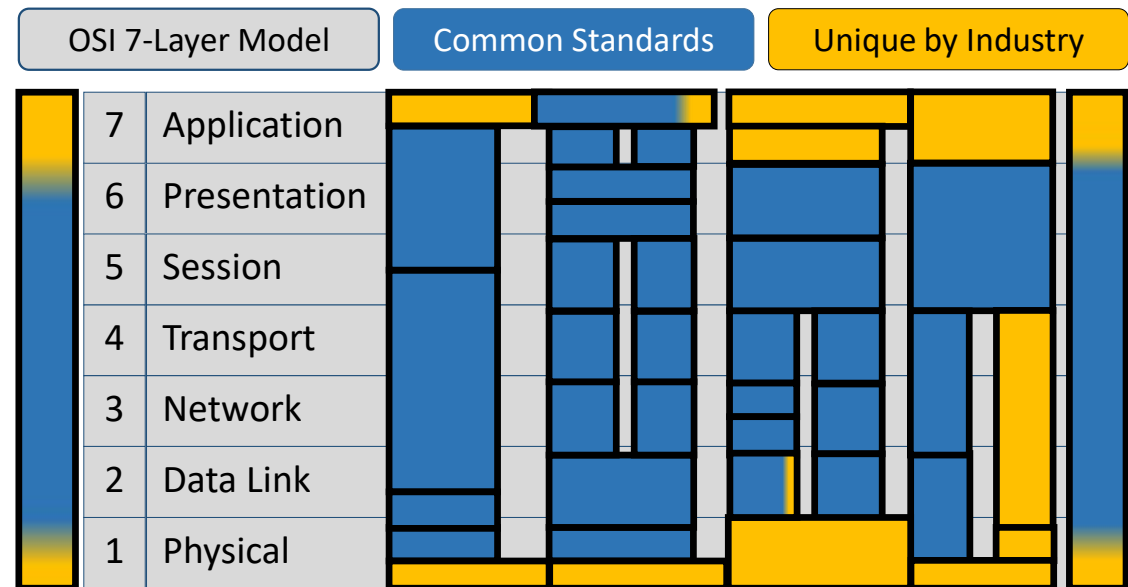
Digital camera

Analogue camera

- + Digital cameras on HSI provide better quality than today's analogue cameras
- + One connector for all: digital cameras on HSI do not need separate wiring

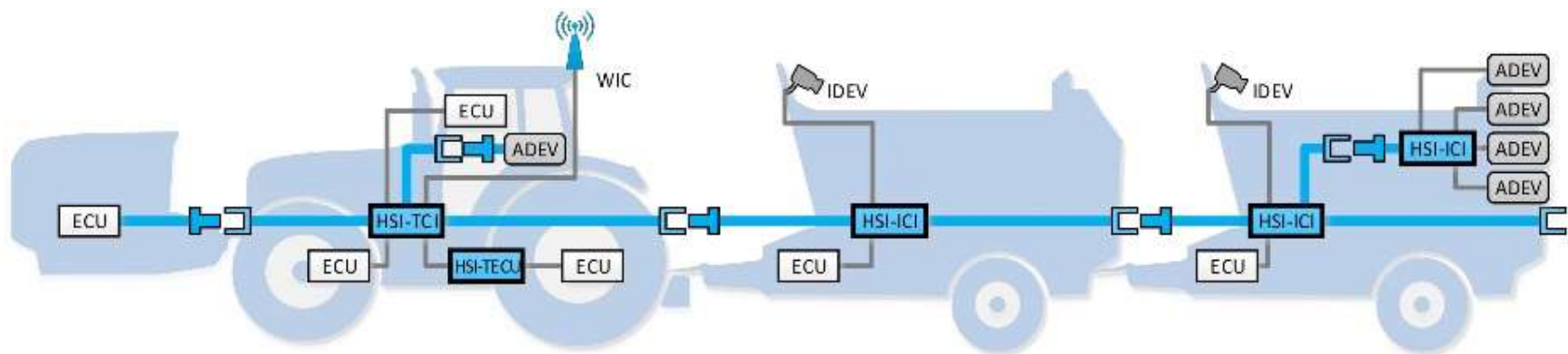
Industry Collaboration – Unique Requirements

- In ISO, JWG 16 has been created under TC127/SC3 to pull together the common interests from the following industries: ***Earth Moving, Mining, Ag, Construction, Forestry, Truck/Trailer***
- Application Layer (7)
 - Domain Specific Apps
- Physical Layer (1)
 - Connectors and Cable



High Speed ISOBUS – The next generation

- Two AEF Guidelines released already, a third is in draft state and a fourth has only just been started
- First hardware prototypes were demonstrated in March 2022 in New Orleans
- An HSI Plugfest took place in October 2022 to try out CAN tunneling



03

WIC – Wireless In- field Communication

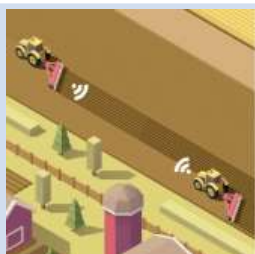





Wireless In-field Communication (WIC)

High value opportunities for customers worldwide by enhancing

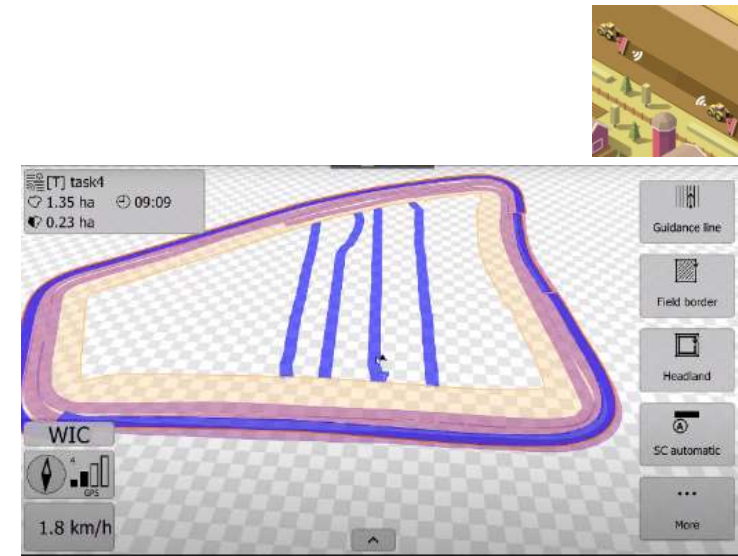
- Work efficiency
- Quality and safety even in rural areas



	Process data exchange	Cooperative machines	Camera, remote display	Road safety
				
<i>Range</i>	High (2/6 km)	Low (up to 50 m)	Medium	High
<i>Bandwidth</i>	Medium	Low	High	Low
<i>Latency</i>	Average	Low	Low	Low
<i>Relationship</i>	n to m	1 to 1	1 to 1	n to m
<i>Security</i>	Data privacy	Data integrity	Data privacy	Data authenticity

Use Case “Process data exchange”

- Sharing coverage, guidance reference lines, field boundaries and headland information is highly beneficial for cooperative field work
- First successful field test took place in April 2021
- Second field test took place in March 2022
- AEF Guideline draft by the end of 2022



Use Case „Video Streaming“

- Two companies working on a Proof of Concept
 - Multiple video streams
 - Using Wi-Fi5 plus automotive middleware for service discovery
- Results should be ready in autumn



Use Case „Road Safety“

- Reduce the risks posed by agricultural vehicles when participating in road traffic
- AEF & ETSI presented a pilot in 2018
- More recently a research project has started at the University of Dresden into on/off road safety



04

AgIN – Agriculture Interoperability Network



AgIN - Value statement

For agricultural software providers

Who enable their customers to use their data in any ag platform

The AgIN

Is a concerted and non discriminatory governed network

That streamlines peer-to-peer interfaces to other platforms but,

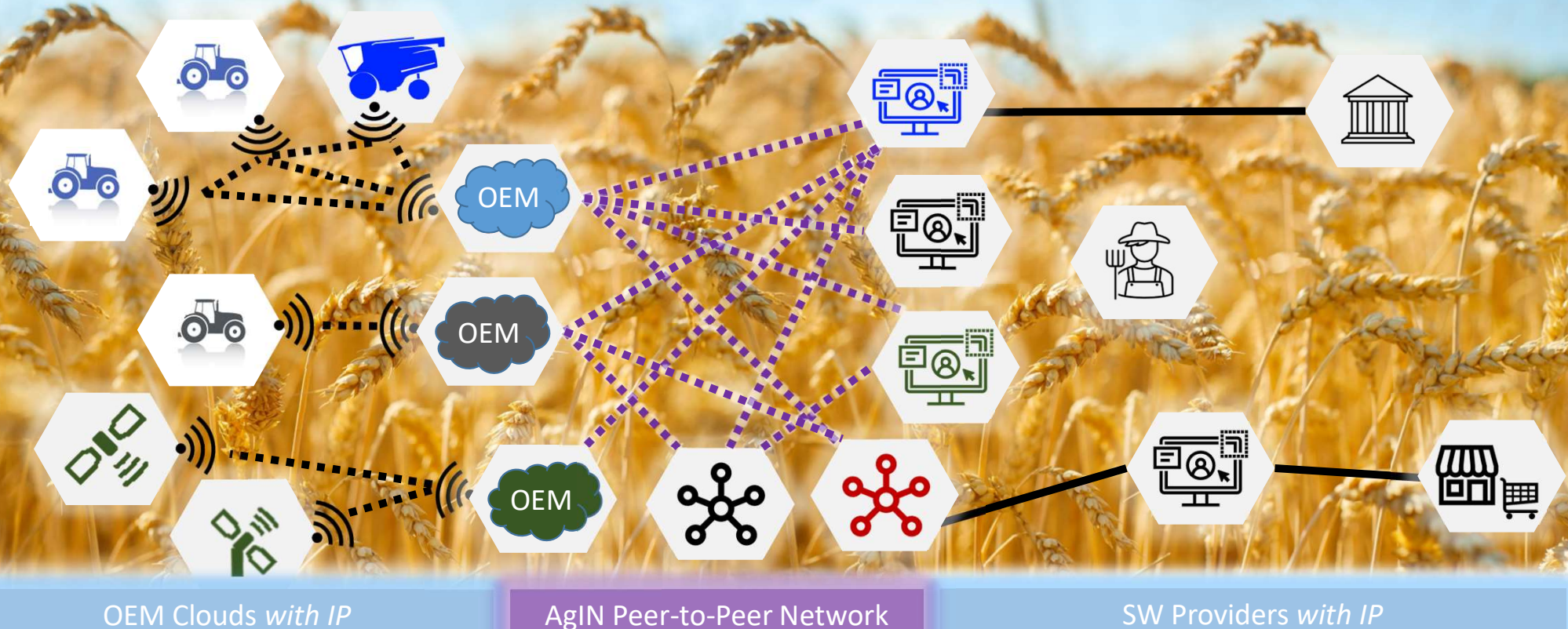
Unlike today's multitude of solutions,

Our solution ensures reliability and trust of the services in the network

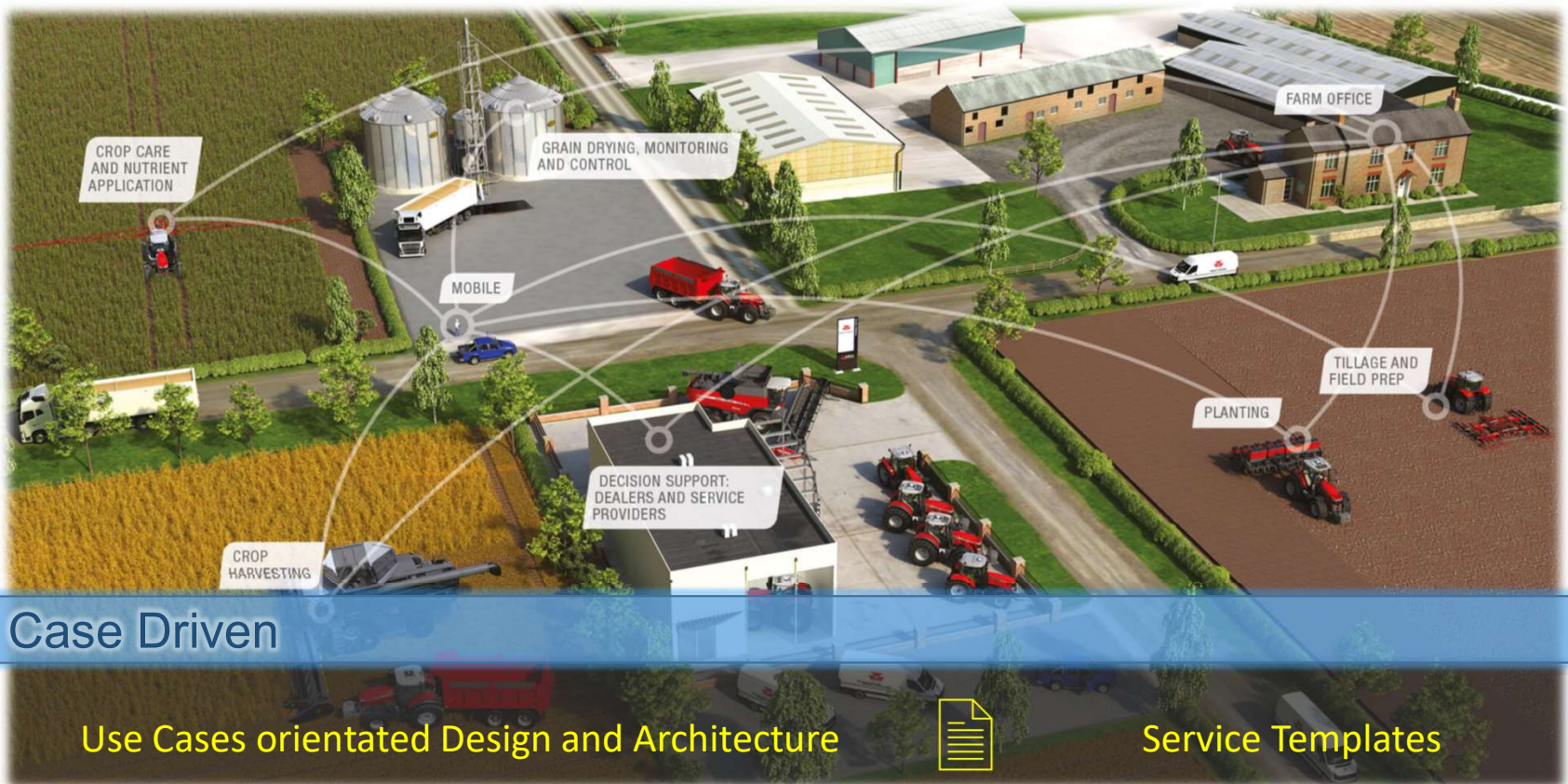
Providing cost savings for participants

with common SW, Infrastructure, Resources, Contracts and P2P design

AgIN - Scope



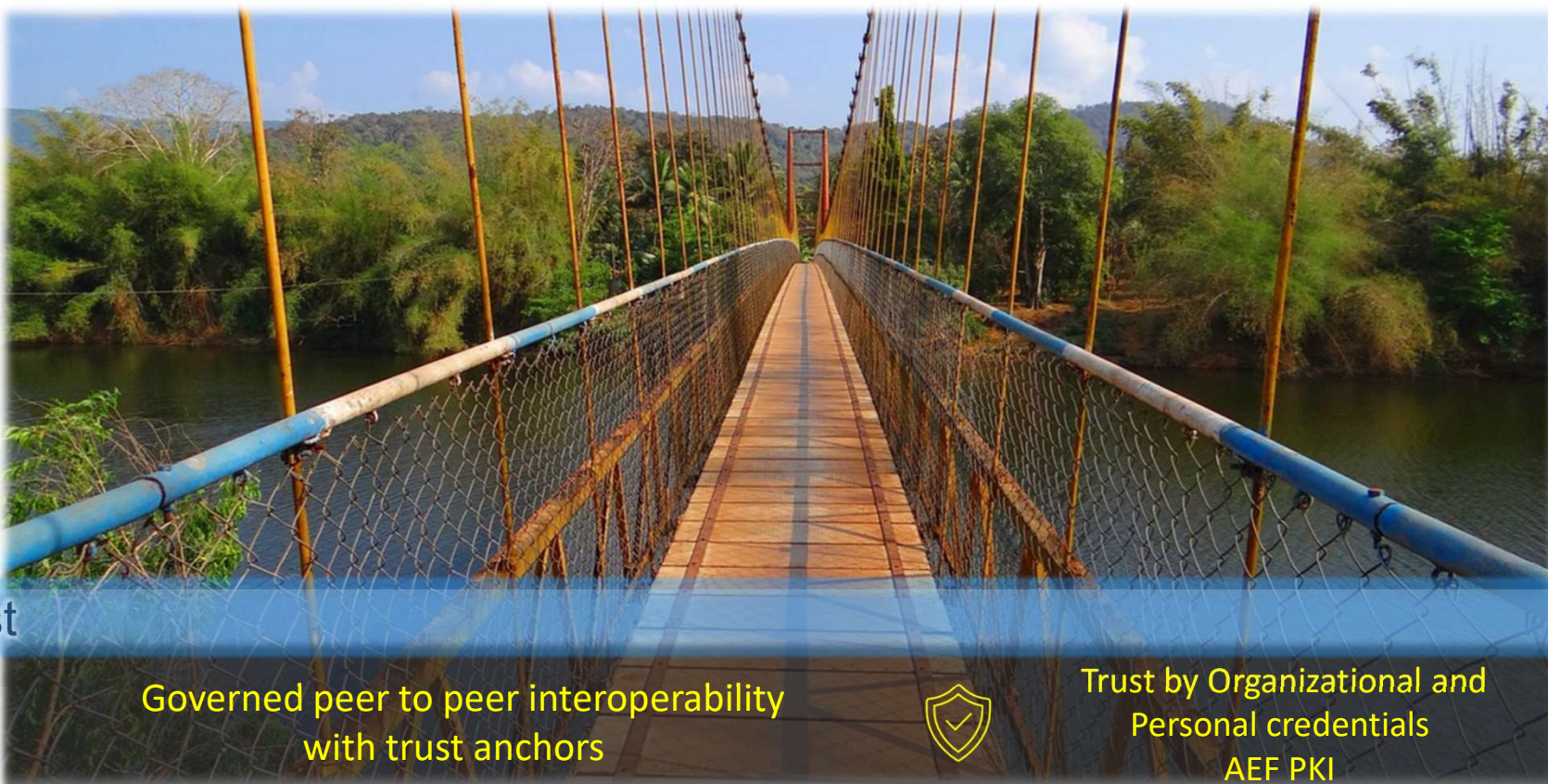
AgIN - Cornerstones



AgIN - Cornerstones



AgIN - Cornerstones



Trust

Governed peer to peer interoperability
with trust anchors



Trust by Organizational and
Personal credentials
AEF PKI

AgIN - Cornerstones



Adhocracy

Interoperability with legal confidence



Contractual Framework
Smart Contracts

05

AEF's Big Picture



AEFs vision for Digital Farming

- Farmers need easy access at all times to optimize operations
- Relevant data has to be easily manageable by the end customer
- Data interaction for cloud communication has to be standardized
- Cross industry engagement is working on common connectivity
- Existing legacy solutions will benefit independently of colour and platform
- Interoperability which follows common standards like ISOBUS needed

“The Big Picture”



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Thank you



QUESTIONS & ANSWERS