# AI IN AGRICULTURE:

## RUSHING BETWEEN CHALLENGES AND OPPORTUNITIES

Alessio Bolognesi – FederUnacoma - Officer for Digital Agriculture Affairs

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# AI is everywhere

- **Opportunities:**
  - AI in Ag is not just robotics, it may open a variety of brand-new opportunities for manufacturers and farmers
- **The focus is on the users:**
  - Whatever we do with AI, several regulations have been drafted and issued in EU in order to guarantee ethical and safe use of the technology so to safeguard the rights of the users
- **Challenges**
  - The EU New Legislative Framework has a big impact on the industry and it's important to rise awareness and also highlight the criticalities

# Some thoughts on the EU NLF

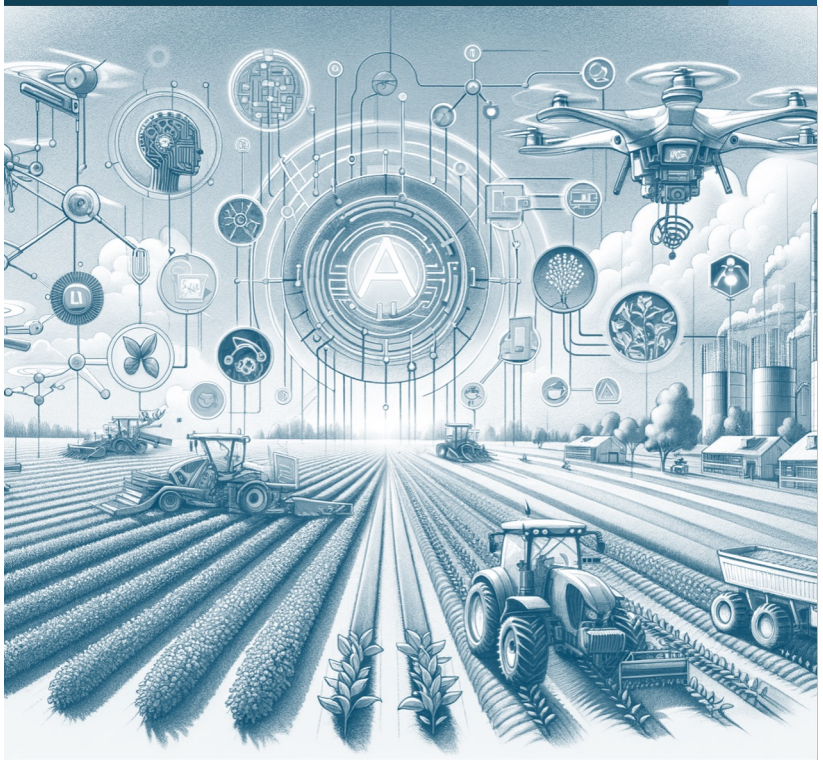
# EU New Legislative Framework in a nutshell …Foreground


- **Artificial Intelligence Act EU-2024:1689:**
  - Sets rules for the development, deployment, and use of AI to ensure safety, transparency, and trust while fostering innovation.
  - The definition of AI is way too broad
  - It classifies AI systems by risk: high-risk AI faces strict compliance and third-party assessment if required by the main safety regulation for the product
  - A risk management system shall be established throughout the entire life-cycle of a product
- **Machinery Regulation EU-2023:1230:**
  - Sets minimum safety requirements for machinery
  - “Safety component” now explicitly covers software (including AI)
  - In case of “high-risk machinery product” (including machinery or safety components based on AI and capable of self-evolving behaviour) shall be verified by a notified body
  - For self-evolving behaviours, risk assessment shall cover potential hazards generated by these behaviours

# EU New Legislative Framework in a nutshell …background


- **Cyber Resilience Act EU-2024:2847:**
  - Sets cybersecurity requirements for digital products and connected devices to ensure greater protection against cyber threats throughout their lifecycle
  - To improve safety by protecting Data
  - It has a **big impact on manufacturers** as it requires that a product is put on the market "**secure by design**" and free from known vulnerabilities
- **Data Act EU-2023:2854**
  - Sets rules on who can access and use Data
  - For our industry, it governs access, sharing, and use of data generated by machines and connected devices
  - From one hand, **farmers can control on how and who can access data** and the possibility to seamlessly switch service providers
  - However, **companies and manufacturers shall implement all the requirements** – base on their role in the data chain - in order to guarantee data sharing and their portability by adopting standards

# AI in EU NLF: a very brief picture



- **Definition (AI Act, Article 6):**
  - **An AI system is high-risk if:**
  1. **It is a safety component of a regulated product (e.g., machinery, medical device), and**
  2. **product, is required to undergo a third-party conformity assessment**
- **In agriculture: High-risk AI likely includes:**
  - Autonomous navigation & collision avoidance systems
  - Automated pesticide dosing or spraying
  - Safety-critical self-evolving DSSs influencing human decisions on hazardous materials
  - …
- **Providers must implement:**
  - Documented risk and vulnerability management system
  - Data quality and traceability controls
  - Human oversight functions
  - Post-market monitoring and reporting
  - …

# EU NLF effect on the industry

## Common Headaches and Their Causes

### Migraines

**Self-evolving / Adaptive AI**

How to deal with the safety of a machine that can evolve after deployment

### Tension-Type Headache

**Homologation vs Self-Certification**

Autonomous tractor? Autonomous tool carrier? Autonomous machinery? Agricultural robot?
**What to do?**

### Cluster Headache

**Regulations Overlaps**

AI Act vs MR
MR vs CRA
Data Act playing in the same team of CRA, AI Act, etc.

# AI Act and Machinery Regulation

- **Conflict zones are not just on a technical level:**
  - **Conformity routes:** The AI Act foresees *AI-specific assessment*, while MR follows *product-level CE conformity* and validation via notified bodies if required
    → The same product faces dual obligations with different approaches
  - **Responsibility confusion:** Who certifies the AI model—the machinery manufacturer or AI software provider if different?
  - **Adaptive systems:** The MR's "fixed conformity" model doesn't fit systems that evolve post-market.
  - **On data:** Are data used for training part of the validation?
- **Key insight:** The EU is drafting *implementation guidance and standards* to bridge these frameworks, **but there is still a long way to go and timelines are not aligned**

# Other areas of uncertainty: Safety vs Security

- **Traditional view:**
  - *Safety* = preventing harm from accidental failure.
  - *Security* = protecting against intentional attacks.
- **Now:** boundaries blur.
  - Connected agricultural systems → more attack surfaces (telemetry, cloud links, OTA updates).
  - A single cybersecurity failure can compromise **physical safety**.
  - The **Cyber Resilience Act** makes *cybersecurity an intrinsic part of product safety*:
    - Secure design, encryption, authentication.
    - Patch management and vulnerability handling.
    - Security documentation as part of technical file.
  - This concept is very strong for AI based machinery or safety components.
- **Industry implication:** Safety and cybersecurity teams must be strictly integrated

# Industry actions

CEMA
European Agricultural Machinery Association

The whole industry is acting in the EU association of manufacturers **CEMA** and in collaboration with **Orgalim** to analyse the impact of NLF on our industry and work at a political and technical level to mitigate it

# The role of Data Interoperability and other standards

# Multi-branded farm environments are the EU standard

- **Why it matters:**
  - **AI quality depends on large, consistent, high quality, annotated datasets**.
  - Agriculture data is **heterogeneous**: machines, sensors, weather stations, soil analyses, and FMIS platforms.
  - Lack of interoperability = costly data gathering, cleaning and annotation.
  - **Stadardization is one of the main requirements set by Data Act**
- **Current initiatives:**
  - **ISOBUS** (ISO 11783-1..14): first major step towards interoperability od machine data, guaranteed by AEF Certification
  - **AgGateway ADAPT:** Common data models and conversion framework for field operations data.
  - **AEF AgIN:** Standardized interface for smart machinery interoperability.
  - **ISO Smart Farming Coordinating Committee:** Aligns global standards (ISO 11783 extensions, sensor data models).
- **Goal:** Enable data reuse and multi-vendor analytics → essential for AI validation and benchmarking.

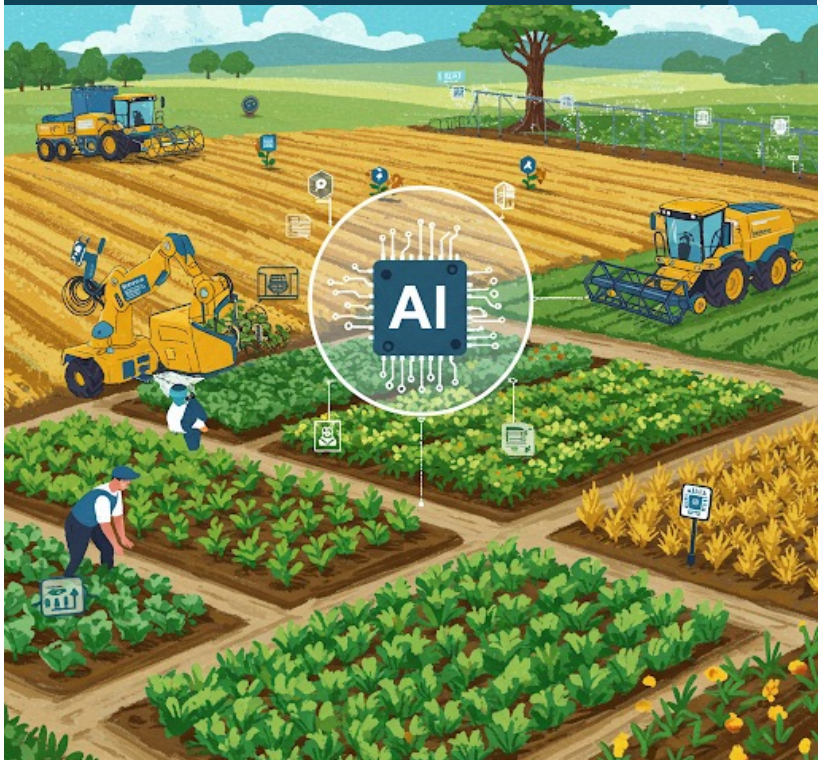
# Standards as compliance catalysts

- **International standards make compliance measurable and interoperable throughout the entire world**
  - **Some relevant frameworks:**
    - *ISO 11783 (ISOBUS communication).*
    - *ISO 25119 (Functional safety for agricultural machinery).*
    - *ISO 24882 (Cybersecurity Engineering in AG)*
    - *ISO 24089 (Software update engineering).*
    - *ISO/IEC JTC 1/SC 42 (AI standardization).*
    - *…*
- However, in EU the industry counts on is harmonized standards that provide guidance in the implementation of requirements and a clear path towards the presumption of conformity to EU regulations.

**There are NO harmonized standards for our sector in the area of innovative technologies. Some is under development but it is coming too late!**

# To conclude...

# A short summary




- **AI is pervasive:** from decision aids to autonomous systems.
- **High-risk classification** could cover most AIs directly impacting safety or environmental compliance.
- **Regulatory overlap** (AI Act + Machinery Reg.+CRA) demands integrated certification strategies and structured company departments.
- **Security-safety convergence** introduces new risk domains for agricultural OEMs.
- **Data interoperability** remains the key enabler for effective, validated AI.

# A final statement

- AI will be part of our future, like it or not. EU Regulations are here to try to protect us (as persons) from the risks arising to improper use of the technologies…
- …however, the number of new regulations implies a variety of completely new challenges for Ag Machinery industry,…
- ..but it also opens up to an entire world of new opportunities for whom capable to catch them!

# Grazie!! …for your attention

Alessio Bolognesi – Alessio.Bolognesi@unacoma.it