AGRI FOOD 4.0: NP-BASED SENSOR APPLICATION

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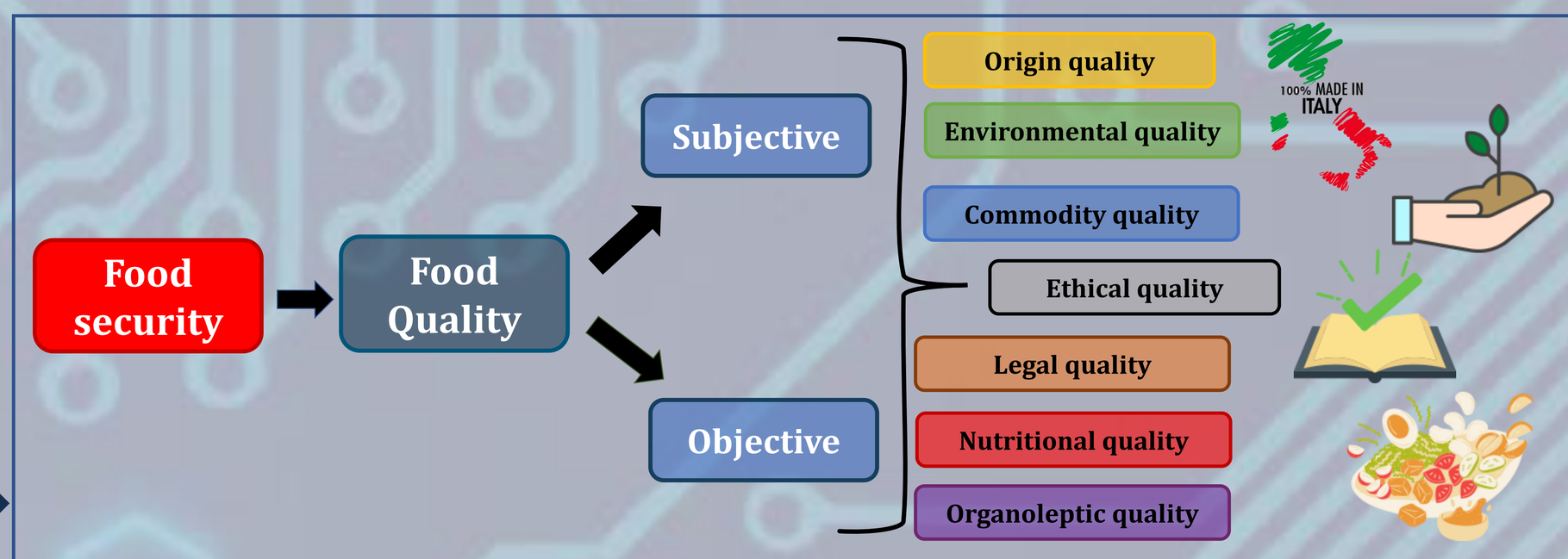
Food quality (FQ) and food safety (FS) are two primary interests for the world population, as well as very complex problems.



There are many factors to consider

1. The agri-food sector is a highly "*asymmetrical*", since one side (producers) is more informed than the other one (consumers).
2. When the consumer buys a food, he could make an unconscious choice caused by the lack of information about the product he is about to buy
3. The real problem of the consumer is the difficulty in identifying and objectively quantifying the quality characteristics of the various foods he is going to buy
4. Often to deal with this problem, companies use marketing or communication techniques, third-party certifications, or through "brand strength"
5. However, contamination in the food supply chain remains possible, due to natural agents, introduced incidentally or due to incorrect practices

This problems could be partially solved through the Industry 4.0 technologies.

The "*Industry 4.0*" (or fourth industrial revolution) takes its name from the industrial plan that the German government had presented in 2011 and which included investments in infrastructure, the education system, energy production systems, and companies, adapting them to the latest technologies such as: *cloud computing*, *sensors*, *artificial intelligence*, *deep learning*, *use of big data*

Thanks to these technologies, a new way of producing is born based on interconnected objects, which are able to communicate with each other. This paradigm is profoundly changing the *modus operandi* of companies, and thanks to digital technologies it has led to automated and interconnected industrial production.

Industry 4.0 & Nanoparticles based sensors

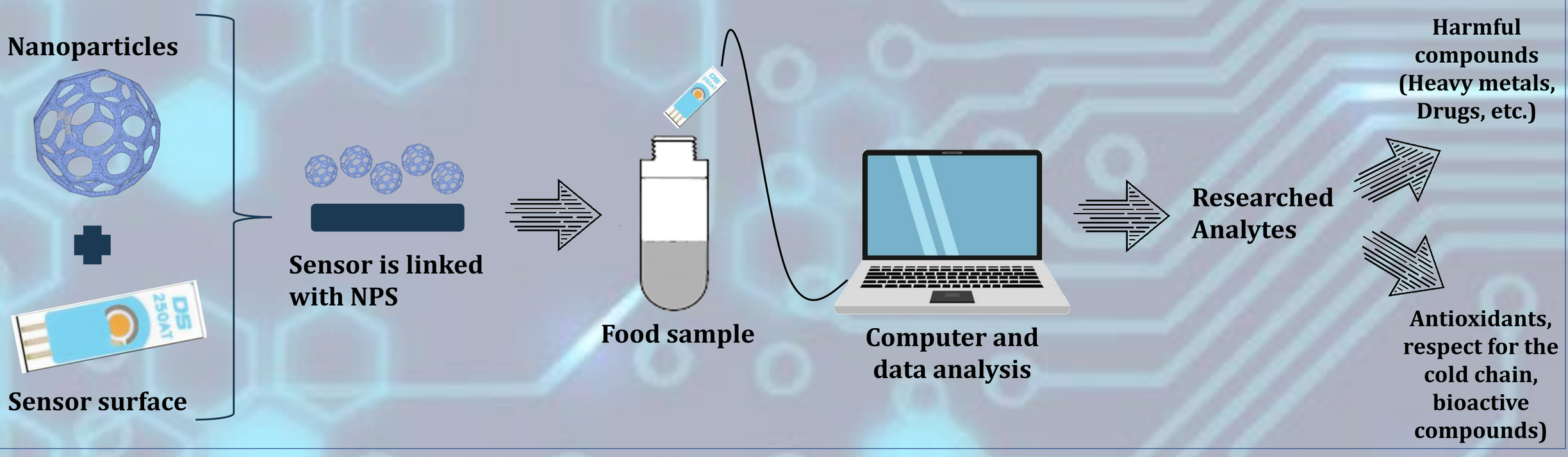
In the area of FS and FQ, sensor monitoring allows to have reliable and robust methods

The Nanoparticles (NPS) based sensors allow to perform non-destructive analyses and automate the methods, facilitating not only the operator work, but also to allow their application in the industrial field

These are nanomaterials that capture an "*analyte*" of interest within a sample in a very selective way.

This methodology has been applied to have a selective and rapid technique compared to other laboratory ones such as chromatograph (HPLC), that can often be expensive and with very long times.

How Nanoparticles based sensors works



Conclusions

The combined use of NPs and sensors allow rapid, non-destructive analyzes to be carried out in real time and at low cost. The NP-based sensors use allows to have devices with excellent advantages compared to conventional laboratory analyzes. The application of NP-based sensors to monitor and evaluate food quality and safety will require further exploration in order to be applied in industrial field.

References

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