



The digital Mediterranean farm: 6 years' experience of a model connected wine estate

Part II: a project to form part of a successful digitization dynamic

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The digital farm (Crestey and Tisseyre, 2020)¹ is a working wine estate equipped with 15 latest-generation and regularly updated professional digital services. After 6 years of experimentation, the goal is to provide feedback to assess the interest (or otherwise) of replicating this system in other wine-growing regions. This second part focuses on the value of the digital farm for digital service companies and more generally on the successful development of new digital services.

A site for continuous improvement

The digital farm allows observation of the adoption and use of each solution and identification of synergies likely to improve the user experience. This role has been structured within a technical committee (Figure 1) which brings together: i) the 15 companies associated with the project, ii) the project leaders (ITAP, Institut Agro Montpellier) and iii) the estate team tasked with producing two campaign reports per year. This way of working has made it possible to identify areas for improvement at the interface between two or more digital solutions. The automatic integration of data from the weather station into the software for modeling vine diseases (downy mildew, powdery mildew) was, for example, the first result to come out of the digital farm. Other less trivial improvements have been identified, such as communication between the estate's technical management software and decision-support tools that require information on some operations to make certain predictions more reliable. For example, the application of a crop-protection spray, entered in the estate's technical management software for traceability purposes, could then automatically update the disease prediction model. These tools currently operate independently, meaning that the vineyard manager has to enter the information twice. These observations are important for the companies and the development of the services they provide. It should be noted, however, that after 6 years of activity the technical committee's ability to jointly develop digital solutions remains limited. One of the main limitations is that the companies' development timetables are not synchronized and they do not necessarily share the same priorities.

A site for clarifying the business positioning of digital solutions

The digital farm is an environment that allows companies (and also visiting professionals) to clarify the function, positioning and utility of digital tools. For example, there is great confusion between techno-economic management software and technical data aggregation platforms. The mapping interface of techno-economic management software might suggest that it can incorporate and analyze any type of spatial information (aerial image, soil sampling, etc.), which is not necessarily the case. By incorporating both types of solution, the digital farm can clarify the role and complementary nature of these digital tools.

It should be noted that this role is also very important for the development of new digital services because it allows clear identification of their



FIGURE 1. Meeting of the digital farm Technical Committee bringing together the product managers of the solutions deployed (December 2017).

business value and assessment of synergies in the existing digital ecosystem. This function is all the more important for certain innovative companies, which sometimes know little about the professional digital ecosystem in viticulture.

A site for identifying major questions about digital data

The digital farm has highlighted the central importance of the digital vineyard plot in the configuration of multiple tools. However, there are several definitions of the plot, whether on the definition of the outline of the plot in relation to the rows of vines or on the descriptors associated with these plots. For example, techno-economic software often includes space for turning in the definition of the plot, while the definition required for subscription to a remote sensing service includes only the actual vines (without space for turning). The digital farm has highlighted the coexistence of six definitions of the digital vineyard plot. This diversity of definitions is a major obstacle to the fluid exchange of information between software applications. The identification of this problem has led to the creation of a working group (within the framework of a corporate chair - the AgroTIC Chair) which has proposed definitions as well as methods for moving from one plot to another².

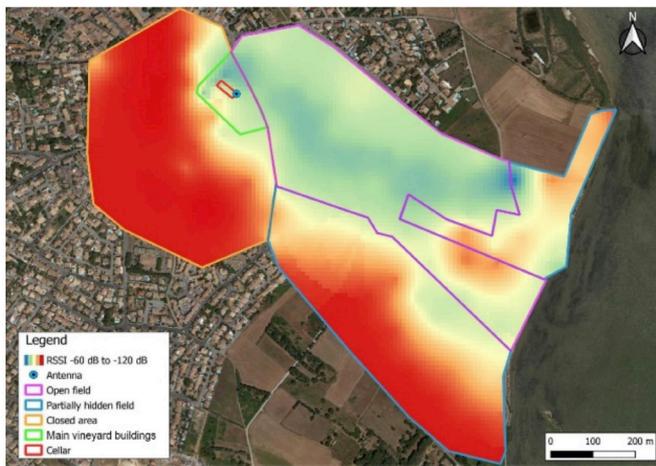


FIGURE 2. a) Map of the reception quality of a low-speed network on the estate (Brunel *et al.*, 2021a)³, b) Connected camera installed on one of the estate plots (Brunel *et al.*, 2021b)⁵.

A site for benchmarking and experimenting with new tools

The digital farm allows for testing the value and limits of a new technology when deployed in a highly digitized real production environment. Several publications highlight this function of the digital farm: testing low-speed networks on a wine estate³, assessment of a low-cost multi-spectral sensor⁴, assessment of a connected static camera⁵, etc. Given the rapid evolution of technologies, this role, which combines technical monitoring, business knowledge and experimentation, provides significant added value for companies and professionals. The advent of free centimeter-precision GNSS corrections through the Centipede RTK project⁶ will make this a priority area for experimentation in coming seasons. The results of the various projects or solutions are available on the project website and wiki (<https://lemasnumerique.agrotic.org/wiki>).

Limitations of the project and further work

The digital farm is an original tool for creating a continuum between the profession, teaching, research and companies. The complementary nature of the associated stakeholders shows that it presents a certain interest in forming part of a successful digital transition. This approach is of interest to the profession, as it allows joint development of realistic and sustainable digitization in line with the reality on the ground. Nevertheless, the project has limitations, given that its production context necessarily restricts the diversity of the services implemented. This limitation favors the replication the system in other regions and with a more diverse range of partners.

Contacts

Companies or start-ups wishing to test solutions at the digital farm are invited to contact Thomas Crestey (Thomas.crestey@supagro.fr) to discuss the terms and conditions.

Advisors or professionals wishing to obtain technical information on the solutions may consult the digital farm wiki (<https://lemasnumerique.agrotic.org/wiki>) or contact the authors directly (Thomas.crestey@supagro.fr). ■

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1 Crestey T., Tisseyre B., 2020. The digital Mediterranean farm in the south of France: a model farm to facilitate the appropriation of precision farming tools and methods for wine growers and advisors, Chapter 7.1, In: *Agricultural Internet of Things and Decision Support for Precision Smart Farming*. Eds. A. Castrignano, G. Buttafuoco, R. Khosla, A. Mouazen, D. Moshou, O. Naud. Academic Press, ISBN 9780128183748.

2 AgroTIC 2022. <https://www.agrotic.org/wp-content/uploads/2019/10/Chaire-AgroTIC-Parcellaire-numerique-viticole-Dossier-de-presse.pdf>

3 Brunel G., Moinard S., Ducanhez A., Crestey T., Pichon L., Tisseyre B., 2021 a. How to evaluate a wireless network sensor before its implementation in a vineyard: an empirical approach based on LPWAN (LoRa) technology, *OENO One*, 55(2), 301–313. <https://doi.org/10.20870/oeno-one.2021.55.2.3102>.

4 Moinard, S., Brunel, G., Ducanhez, A., Crestey, T., Rousseau, J., & Tisseyre, B., 2021. Testing the potential of a new low-cost multispectral sensor for decision support in agriculture. In *Precision agriculture'21* (p. 2025). Wageningen Academic Publishers.

5 Brunel, G., Moinard, S., Pichon, L., & Tisseyre, B. 2021b. Potential of time series of VIS images from connected static camera for decision support in vineyard. In *Precision agriculture'21* (p. 252). Wageningen Academic Publishers.

6 Centipède RTK 2022, <https://centipede.fr/>