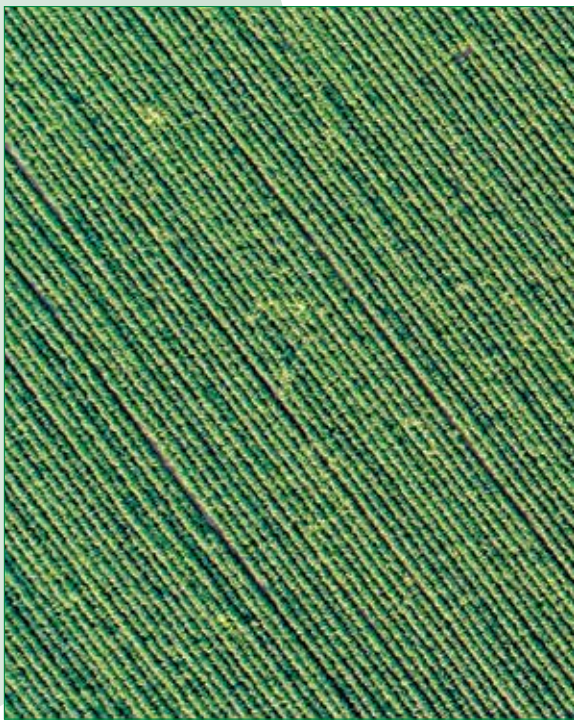
The Future of Drones in the Modern Farming Industry



by Nathan Stein

With the prominence of precision agriculture platforms rapidly increasing in the modern farming industry, Nathan Stein, Ag Solutions Manager at senseFly, explores the key trends in 2018 and how innovative technologies, such as unmanned aerial vehicle (UAV) solutions, can meet the day-to-day challenges ag professionals face.

The modern farming industry is at a turning point. With the development of more advanced farm management techniques, such as precision agriculture, industry professionals now have more tools than ever to improve the accuracy and efficiency of processes. Innovative technologies, such as unmanned aerial vehicle (UAV) solutions, also have a growing presence in this arena, as the benefits become more apparent and access to hardware and software improves.

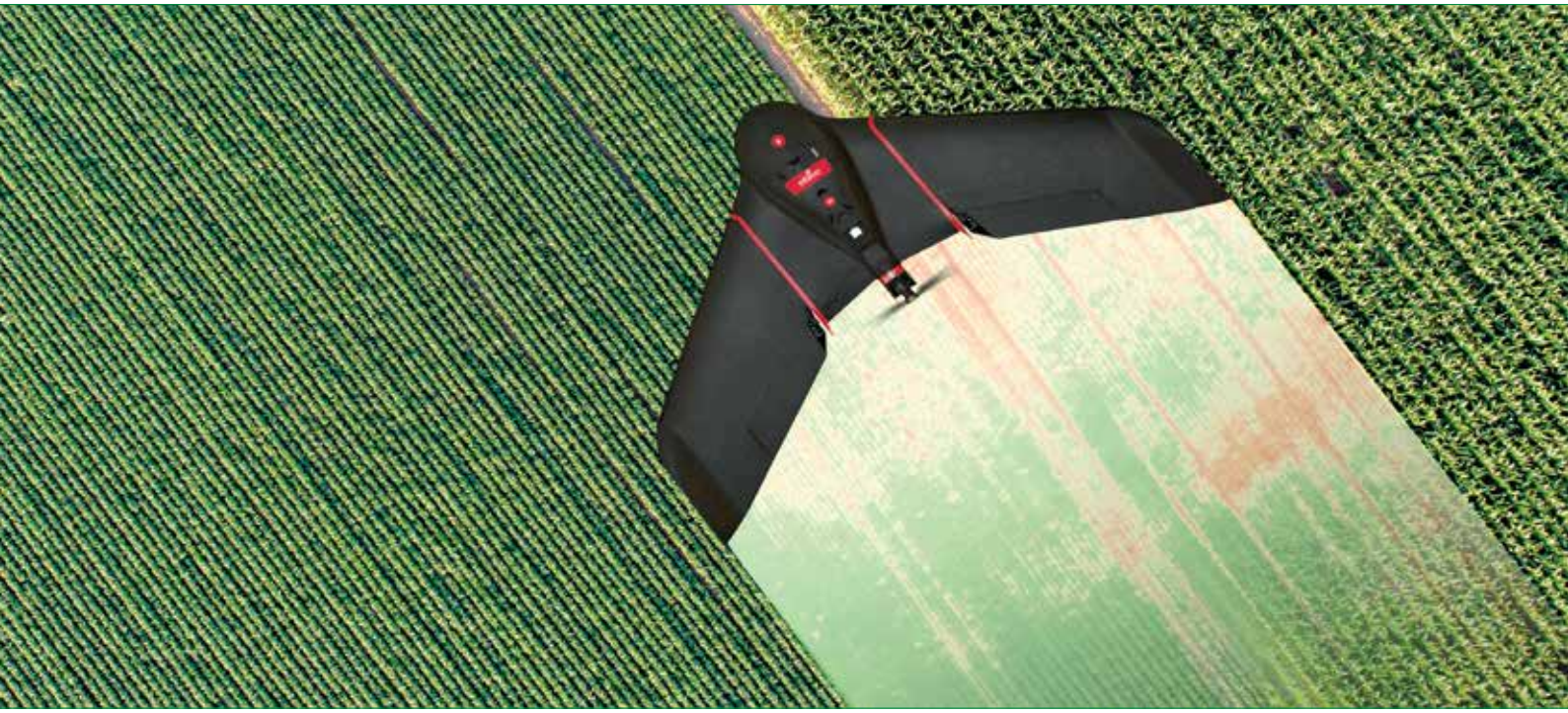
Such advances have complemented the ground-based techniques historically used in agricultural surveying applications, and enabled a more holistic approach to data collection. This is especially true in the European agriculture market, where countries like Italy, which has more than 12.9 million hectares of utilised agricultural area (UAA), are seeing more widespread acceptance of modern mapping technologies[1].

With the agriculture industry set for greater adoption of advanced technologies, UAV solutions are expected to become more integrated and capable of meeting the needs of industry professionals.

Current challenges

While the modern agriculture industry is learning to adapt to evolving demands and technologies, farmers and agronomists across the globe still face challenges that can complicate business operations. For instance, with world supply at an all-time high, commodity prices are at an all-time low, meaning that budgets have become tighter and improved resource management is a necessity. There is also a growing demand from end-users for greater product traceability; consumers want to know where the goods they buy come from and how they were grown. As well as creating a need for more stringent food safety and quality control checks, this farm to fork movement has resulted in the establishment of more

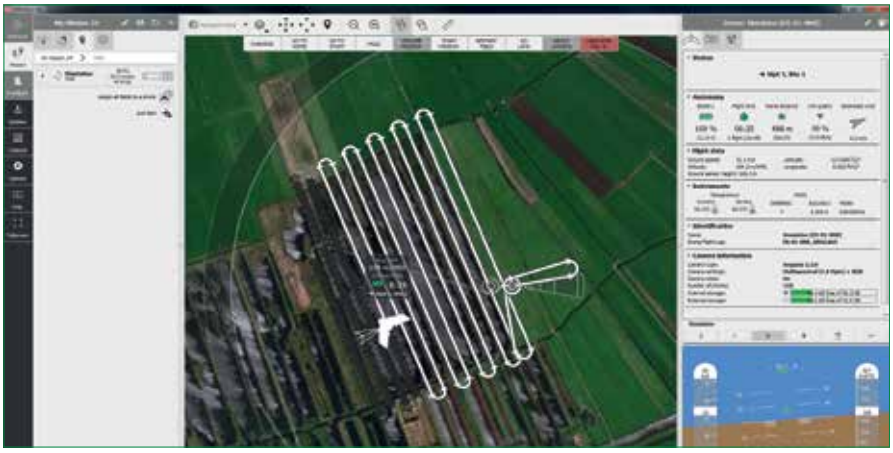
1 European Union, Eurostat: Agricultural census in Italy [website] http://ec.europa.eu/eurostat/statistics-explained/index.php/Agricultural_census_in_Italy (retrieved 4 December 2017)



in-depth, controlled systems to track and record a product's journey, often at additional expense.
Optimising sustainability also continues to be a key challenge in the global farming industry. Agriculture professionals face pressures to produce more crops using fewer resources, such as water and fertiliser, to minimise the impact on the environment, public health and animal welfare. With such fluctuating market conditions to contend with, these demands can place significant strain on operational efficiency and profitability. Seeking new opportunities to economise is therefore vital for the farming industry.

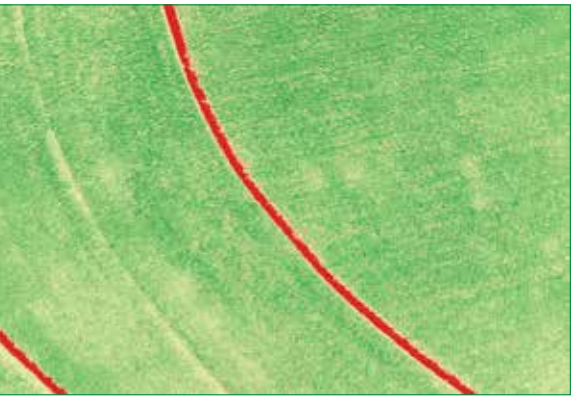
Past approaches

Prior to the development of new, advanced technologies, traditional solutions have been used to address these challenges; however, these are typically time, resource and labour intensive. For instance, in volatile market conditions, estimating annual yield has been a common approach, to guide decision-making and help manage expectations in the face of economic uncertainty. To successfully manage traceability, careful monitoring and record-keeping of product origin and journey has played an important role. Enhancing sustainability has also relied upon documentation, with this having often been achieved by benchmarking the volume of resources, such as water, fertiliser and seeds, required in the previous year, in an effort to minimise excess. While these traditional approaches all once played a key role in helping farmers to safeguard their interests and deal with market fluctuations, the increased need for more on-demand insight means that faster, more efficient solutions are growing in popularity. Similarly, with the demand for large quantities of precise, accurate data increasing, traditional terrestrial approaches to crop monitoring, such as laser scanning and remote sensing, are less favourable today due to the time and labour requirements these methods necessitate. Further problems arise when faced with challenging weather conditions, which can significantly impact the time it takes to map large areas of farmland, particularly when on-foot, and can delay projects for days.



The role of UAVs

In light of these challenges, it is increasingly essential for the farming industry to explore new approaches and embrace innovative precision technologies, to better navigate the market and protect profitability.
While drones have been present in agriculture for many years, recent developments, such as improved accuracy and efficiency, have seen UAVs emerge as a trustworthy and efficient data collection tool during crop season.
In addition to data quality, drones can play a significant role in streamlining workflows and processes, with more resources being invested in improving UAV integration with existing farm management information systems (FMIS). For instance, agronomists can take field boundaries from their existing FMIS and fly drones repeatedly during crop season without re-drawing them, helping to reduce time spent planning and in the field. Providers of drone solutions, such as senseFly, are leading the way to support agriculture professionals in integrating new software with terrestrial techniques. Professional, end-to-end solutions, such as the senseFly Ag 360, provide in-depth aerial insights to monitor crop development, increase yield and reduce inputs. Collaborative partnerships between hardware and software manufacturers enable these solutions to facilitate more streamlined, integrated workflows, supporting agriculture professionals from data collection through to processing and analysis. Once analysed, this data can then be converted to a prescription, which is applied to crops using Mobile Implement Control System (MICS). These systems are now installed in many tractors, and can be used to map areas of , as well as precisely apply seed, fertiliser and crop protection products.

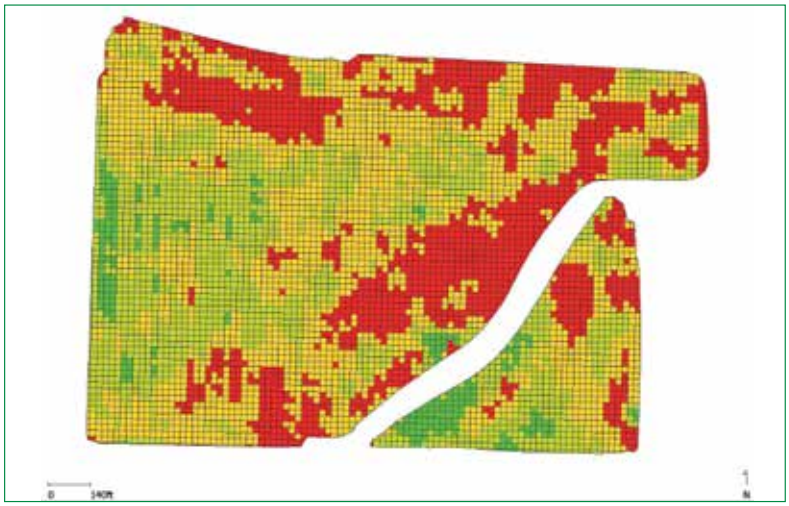


Navigating the challenges

Aside from facilitating more effective data collection, UAVs can also help address the key challenges facing the industry today. Take unfavourable commodity markets as an example. Having an informed, comprehensive plan is essential to help determine areas of high and low production. With highly detailed measurements, UAVs can offer accurate insights to guide decision-making. This data can also support the streamlining of product traceability, by providing a digitised map with the GPS location of every point in the journey and enabling farmers to move away from traditional, time-consuming written records.
In addition, the insights from drone technology can help to improve the sustainability of crop production. With this information, farmers can utilise optimal quantities of water, fertiliser and crop protection to maximise growth, while minimising excess. This can be further complemented by other imaging techniques such as satellite imagery which, while providing lower quality data, can monitor crop changes on an ongoing, longer term basis and with less expenditure.

What's next for UAVs?

While UAVs can offer a wide range of advantages to farming professionals, moving from written and qualitative measurements to highly accurate quantitative methods is not always simple. The integration of UAVs into existing workflows has been further impacted by stringent regulations on agricultural drone use in Europe. In Italy specifically, while regulations have become gradually more accommodating, there are still restrictions in place that have impacted take up. For instance, regulations put in place by the Italian aviation authority, Ente Nazionale per l'Aviazone Civile (ENAC) dictate that, for use in critical operations such as cities, railways and highways, drones must be below 2kg[2].
Despite this, as users become more aware of the operational and legislative requirements of commercial drone use and seek



to broaden their service offering, the integration of UAV solutions is expected to grow in 2018 and the years to come. To maintain a competitive edge, many professionals are also developing UAV programmes for scouting or fertiliser management, while hardware and software providers, like senseFly, are collaborating to develop end-to-end solutions that facilitate more integrated workflows for rice, corn, soybean, fruit and nut partners, as well as vegetable growers. While more work is needed to create analytics that can optimise the data collected, the potential for integrated drone solutions in agriculture is significant.

The future of ag

In an evolving, and often volatile market, a comprehensive understanding of farm and crop conditions is essential for agriculture professionals to optimise their operations and increase commercial success. While ground-based mapping techniques continue to play an important role, aerial mapping systems, like UAVs, can complement these options, providing consistent and highly accurate insights in a timelier and more cost-effective fashion. While the road to widespread adoption of drones in ag has not been simple, the benefits – from time savings to logistical problem-solving – are evident. With sustainability in farming higher on the agenda than ever before, UAV solutions may prove to be key in contributing to safeguarding the environment, while also protecting and increasing profitability in the industry.

2 Regolamento ENAC "Mezzi aerei a pilotaggio remoto" (ENAC Regulation "Remotely Piloted Aerial Vehicles"), 2nd edition, [website], 2015 https://www.enac.gov.it/repository/ContentManagement/information/N122671512/Reg_APR_Ed%202_2.pdf, (retrieved 4 December 2017)

KEYWORDS

Unmanned aerial vehicles; UAV; drones; precision agriculture; end-to-end solutions; integrated workflows

ABSTRACT

With the modern farming industry continuing to evolve, and demand for faster, more efficient farmland mapping at an all-time high, the potential for unmanned aerial vehicles (UAVs) in the agriculture industry is greater than ever. While more investment in R&D programmes is required, collaborative partnerships between hardware and software providers are enabling the creation of more integrated, end-to-end drone solutions, capable of meeting the needs of agriculture professionals worldwide and influencing future developments in modern farming.

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