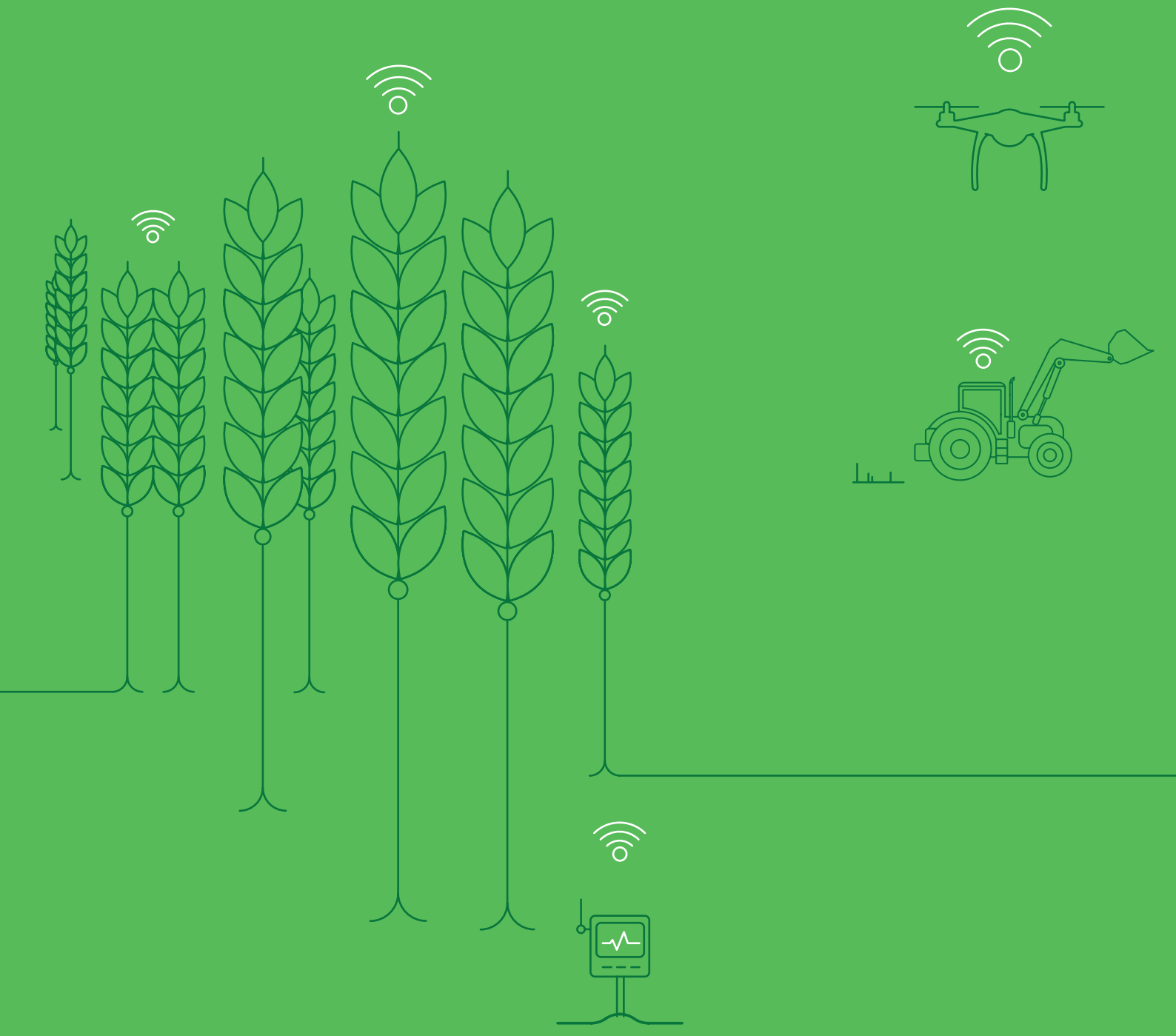
# Smart Farming »

## The sustainable way to food



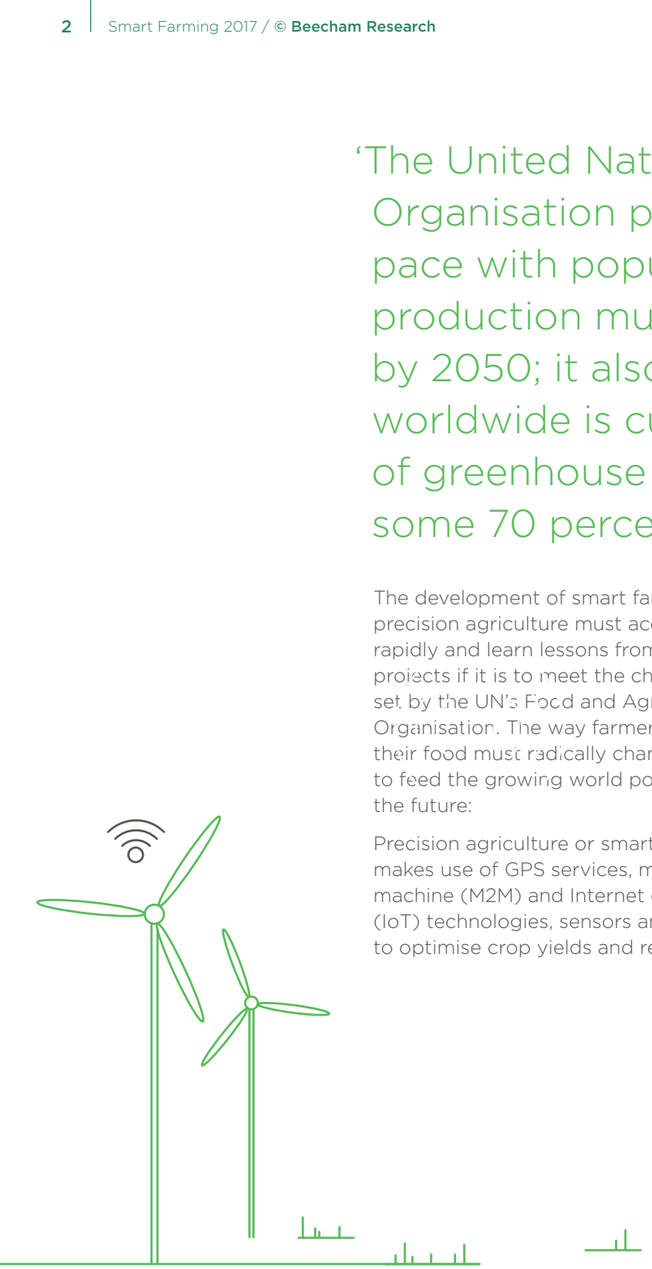
Beecham Research

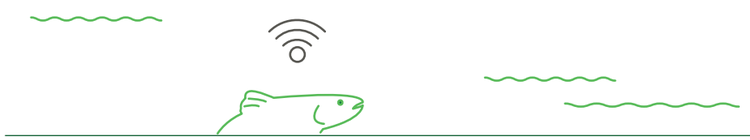
‘The United Nations Food and Agriculture Organisation predicts that in order to keep pace with population growth, food production must increase by 70 percent by 2050; it also estimates that agriculture worldwide is currently responsible for a fifth of greenhouse gas emissions and for using some 70 percent of the world’s fresh water.’

The development of smart farming and precision agriculture must accelerate rapidly and learn lessons from smart city projects if it is to meet the challenge set by the UN’s Food and Agriculture Organisation. The way farmers produce their food must radically change in order to feed the growing world population of the future:

Precision agriculture or smart farming makes use of GPS services, machine to machine (M2M) and Internet of Things (IoT) technologies, sensors and big data to optimise crop yields and reduce waste.

Decision based support systems, backed up by publicly available data - including weather conditions and forecasts, machine status, crop information and animal health - can provide real time information at a level of granularity not previously possible. This enables better, more accurate decisions to be made and results in less waste and maximum efficiency in operations. (See Figure 1); this matters in an industry where margins can be tight, and a saving of a few percent can amount to a great deal of money and precious resources.





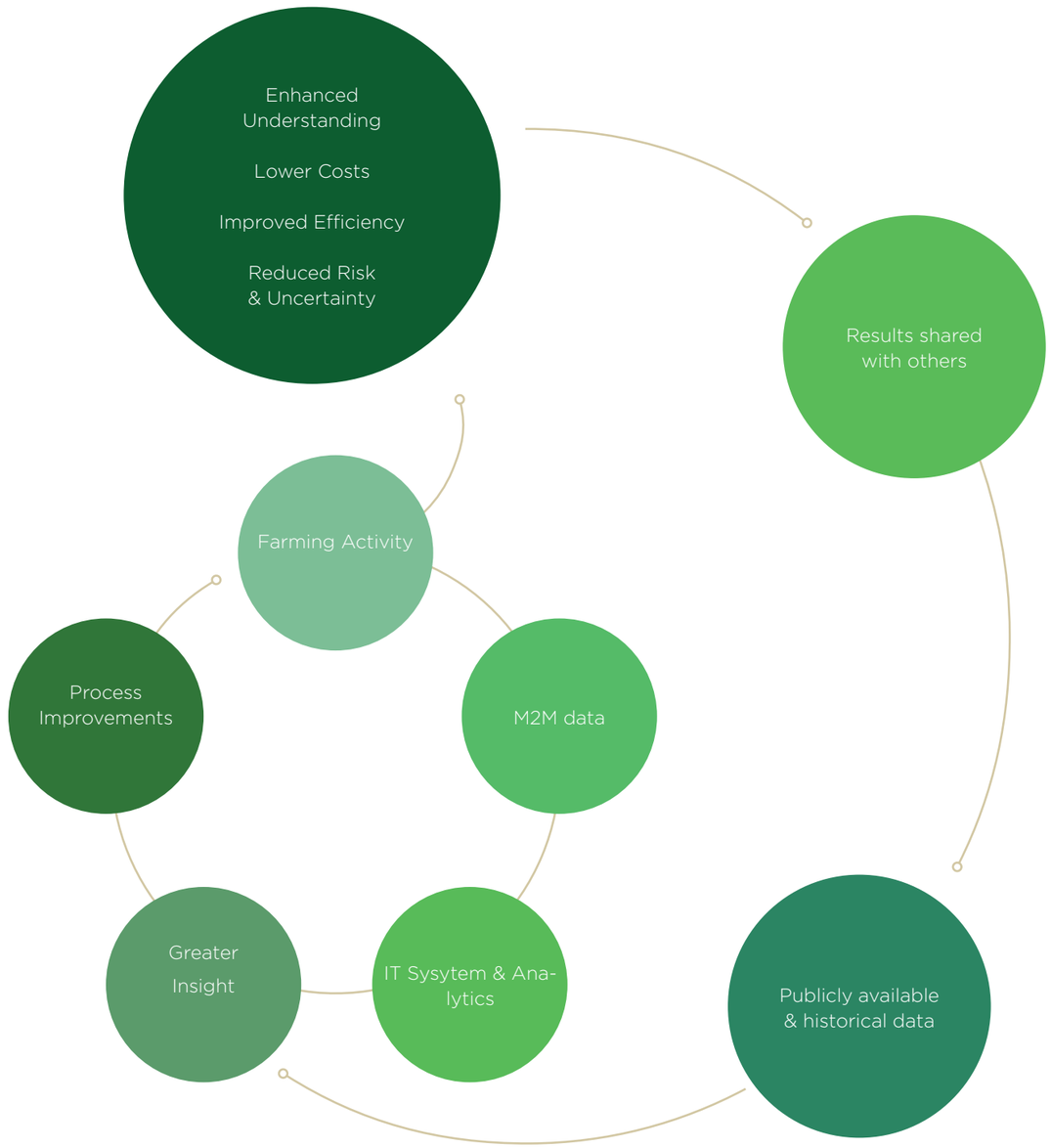



**Fig. 17** Precision Farming depends on a decision support system

This very latest, comprehensive Beecham Research report highlights the importance of harnessing these new technologies and gives insight into the optimization of the use of energy and natural resources. It identifies some of the main challenges and activities where smart farming will have the most impact including: fleet management of farm vehicles, arable farming, monitoring livestock, indoor farming and greenhouses, fish farming, forestry, storage and water monitoring.

Post-harvest, Beecham Research also sees sensor-based technologies and decision support systems playing a vital role in the post farm-gate supply chain. This includes the detection of food fraud, identifying and dealing with bacterial and other contamination, mitigating spoilage and food waste, cold chain monitoring and meeting the growing need for traceability from farm to the consumer (Fig. 2).

This comprehensive report also examines in over 100 pages the roles of the multiplicity of suppliers in the chain, including technology providers, farm equipment suppliers, as well as influencers – movers and shakers of public opinion and government policy. It also discusses current collaborative projects – research projects and projects undergoing commercialisation, and various national government stimuli to encourage the adoption of smart farming.

Despite a growing level of exciting research and new smart farming projects, the emerging M2M and IoT technologies have been slow to be adopted in agriculture compared to other industries such as smart cities. The reason for this is primarily cost – only large farms can afford the investment and the industry is by nature conservative.

Unpredictable weather events and a demanding and changing legislative environment are other reasons making agriculture harder. Whilst precision agriculture cannot solve all problems, it can help farmers control some aspects of farming better and optimise results. The report goes into detail in examining factors – economic, business and technological – driving the adoption of smart farming, and the challenges faced.



In the long term therefore, we have no choice but to invest in the use of precision agriculture and smart farming because of the urgency of the problems the world faces. This means that despite a slow start, future growth in this area will be huge in comparison to other industries where M2M and IoT are already established.

That said, there are early signs of returns on investment from precision agriculture. The report cites examples from the cultivation of high value crops, where it was possible to initiate trials in a small area at relatively modest cost. The benefits have been found to go beyond simple monitoring of a crop or site. Return on investment was demonstrated, but the results also enabled a greater understanding of the wider factors controlling the growth itself.

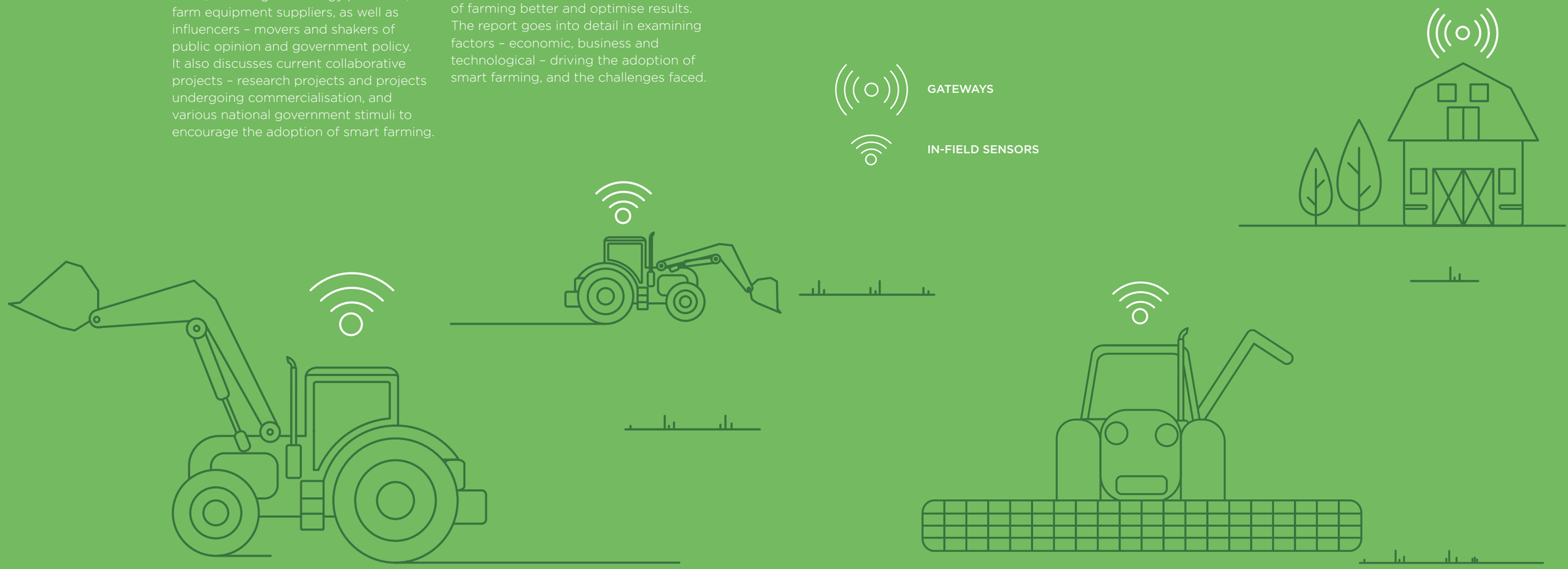
We also anticipate that the use of sensors in farming will spread to adjunct areas, such as environmental monitoring, land management, and food traceability. This is a consequence of the greater public focus on issues such as food safety and wildlife preservation.

This report gives invaluable insights into the future of smart farming to strategic planning and technology staff including mobile network operators and connectivity providers, sensor manufacturers and software developers specialising in agricultural solutions.

It is also targeted at end users and adopters of the technology solutions, farming associations and organisations.

The report also looks at the area of supply chain and food traceability and therefore will be of interest to logistics providers, cold chain companies and supermarkets.

**Fig. 2** Agricultural Machinery with sensors & gateways



## What's Inside The Report

01

### Smart Farming as a tool to safeguard the future »

With the global population set to reach 8 billion by 2024, people are looking towards science and technology to answer the problem of a shortage of land, water and energy.

02

### Defining Precision agriculture »

Based on sensor technologies whose use is well established in other industries, this section looks at the application of Precision Agriculture across diverse applications.

03

### Stakeholders and the Value Chain »

This chapter scrutinises the complex value chain and the broad range of key players involved throughout all the specialist areas of farming.

04

### Role of governments and public policy makers »

Government agencies are stimulating adoption of new technologies through subsidies and projects. Increasingly we are finding that investments both public and private are attesting to the belief in the smart farming future.

05

### The technologies involved in Smart Farming »

A wide variety of information regarding soil and crop behaviour, animal behaviour, machine status and storage tank status is presented for action by the farmer through the use of sensor technologies whose use is well established in other industries.

06

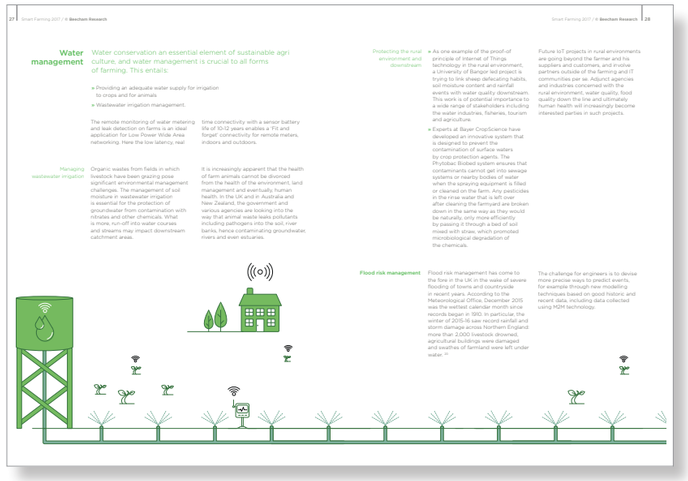
### Drivers, Challenges and Opportunities »

Like any other industry in modern times, agriculture is under pressure from change. Climate change, a growing world population, water stress and the rising cost of energy are all factors forcing the industry to become more efficient and productive.



Easy to navigate with each section clearly divided.


In -depth research with hyperlinks to reports

Principal analyst **Saverio Romeo** runs research in the areas of M2M, IoT, IoT policy, and wearable technologies. He also publishes studies, advises vendors & adopters on these topics, and frequently contributes to IoT conferences. He is a Visiting Fellow at the Centre for Innovation Management Research and guest lecturer on the IoT at the Department of Informatics at Birkbeck University, London. Previous to Beecham Research, he worked at Frost & Sullivan, Technopolis Group and the European Commission. He holds three MSc in Telecommunications Engineering, Information Technology, Innovation Management & Technology Policy. He is native Italian, fluent in English, intermediate in Modern Greek.

Prior to Beecham Research, Saverio ran research on the use of broadband and mobile technologies for rural areas at Frost & Sullivan and the European Commission. He has always been interested in technologies in rural areas, And likes to play with sensors in the land his grandfather left him in Italy.

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Senior Analyst **Dr Therese Corey** began as a scientist in biomedical research, where she gained a PhD. She has since worked as an IT and telecoms analyst for over twenty years, participating in consultancy and research projects and authoring published reports. Recent areas of activity at Beecham Research include Smart Grids and Utilities, Smart City, Smart Farming and other Internet of Things applications. Therese previously worked as a quality manager at two software companies.

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## About Beecham Research

**Beecham Research** is a leading market research, analysis and consulting firm, specialising in the worldwide Machine 2 Machine and Internet of Things market. We are internationally recognised as thought leaders in this area, where we have deep knowledge of the market dynamics at every level in the value chain.

Experts in M2M/IoT services and platforms, and also in IoT solution security, we have extensive technical knowledge. We explore the impact of the Internet of Things in various sectors and are also the leading analysts in satellite M2M.

Our clients include component and hardware vendors, major network/ connectivity suppliers (cellular, fixed, satellite, short/long range), system integrators, application developers, distributors and enterprise adopters in both B2B and B2C markets.

## Beecham Research, Smart farm & Rural research Programme

Since 2015, **Beecham Research** has explored the impact of the Internet of Things vision in rural communities and in smart farming. The Smart Farm and Rural Research Programme is run by Saverio Romeo and Dr. Therese Cory.

Their first smart farming report, published the towards the end of 2015, was well received by the M2M/IoT community and the agri-tech community. Since then they have been involved in various agri-tech conferences and workshops, have advised companies on the topic and contributed to a variety of articles published in specialised media.

Saverio and Therese have also explored the impact of IoT in other sectors, for example researching the use of assisted living solutions for providing healthcare within rural communities.

Last year they moved their attention outside the farming gate, addressing issues such as sustainability, food traceability and environmental monitoring for climate change purposes.


Please click here if you would like to purchase and download the full Smart Farming 2017 report from Beecham Research.