Value Creation in the Digital Agribusiness Network
Transform and Grow
to sustainably feed the world
Dear Customers,

The world population is growing to upwards of 10 billion people by the middle of the century.¹ This growth combined with urbanization and the rise of the middle class will increase the demand for healthy, fairly produced, and sustainable food and will require agricultural production to double.² To succeed, we need smart solutions from farm to fork.

We expect the digitization of agribusiness to play a key role in solving this challenge. New processes and technologies optimize seed selection, irrigation, fertilization, and crop protection; automate farming work with autonomous equipment; optimize asset utilization; and streamline the food supply chain to avoid waste. But even in a high-tech economy, agriculture is still exposed to the weather, crop and animal diseases, and substantial fluctuations on commodity markets. Predictive analytics and simulations enable optimized risk mitigation strategies. Digital technology is turning the farm into a digital enterprise and the farmer into a digital entrepreneur.

Farmers stand in the center of a complex ecosystem of farming equipment manufacturers, food processors, and agrichemical specialists. At the same time, consumer behavior is changing radically. Consumers are the focus point of the food industry. They want to know the origin of their food and how it was produced and processed, driving the need for transparency along the end-to-end agribusiness supply chain. Digital transformation is a fertile ground for new business models, innovative business processes, and new ways to work in the agribusiness network for this planet.

SAP has a long and trustful relationship with many companies in the agribusiness ecosystem, from origination, trading and food processing, to agrichemical companies, farm machinery and equipment manufacturers. We have been helping our customers optimize their business processes and make the best use of their IT investments.

SAP is the global leader in digital business processes, business networks, real-time database technology, and supplier and customer relationship management. With SAP HANA, we have the unified digital platform to integrate transactional and analytical data for real-time insights and business processes. Bringing these together, we address the challenges in the digitized agricultural world. Find out how the digital agribusiness platform based on the SAP HANA Cloud Platform will help you to simplify your business processes in an increasingly complex world. We are co-innovating with leaders along the agricultural supply chain to simplify, innovate, and digitize business.

This document offers a point of view to start the discussion on the most relevant trends, new business models, and processes in the agribusiness and food industry and explains how digital technology drives this transformation. The content focuses on the digitization of crop farming, but we invite you to also discuss the impact on livestock farming.

Our vision is to transform and to grow your business to sustainably feed the world. The insights that follow are the tools to make that vision a reality. We offer you to take your current business applications to the next level to meet the challenges of the new digital economy.

Thank you for your interest, and I look forward to your feedback.

Run Simple

Anja Strothkämper
VP SAP Agribusiness and Commodity Management

"Digital technology and collaboration are key enablers to provide sustainable, yet affordable food for a growing world population."

Anja Strothkämper
VP SAP Agribusiness and Commodity Management
SAP SE
# EXECUTIVE SUMMARY

## Top 5 Technology Trends
- Hyperconnectivity
- Supercomputing
- Cloud Computing
- Smarter World
- Cybersecurity

## Reimagining
- Reimagine Everything
- SAP HANA: The Great Simplifier

## Digital Business Framework
- The Digital Core
- Customer Experience
- Workforce Engagement
- Business Networks and Supplier Collaboration
- Assets and the Internet of Things
- The Digital Agribusiness Platform
- How Does It All Come Together?

## Why SAP?
- SAP is Committed to Innovation
- Complete Digital Business Solution
- SAP Services and Support
- SAP Comprehensive Ecosystem
EXECUTIVE SUMMARY

Big picture: The digital agribusiness is real and it’s here to stay. Digitization in the agribusiness sector significantly increases the ability to feed the rapidly growing world population in a sustainable way.

The Digital Economy in Agribusiness

In the agricultural industry, strong business transformation drivers coupled with major technology trends are leading to new business models. The challenge to the world population, which will grow to upward of 10 billion people by the middle of the century, is on top of the industry’s agenda. Digitization and new technologies, such as drones, connected machines, and field sensors, are becoming affordable and have the potential to drive more efficiency in the agriculture world through innovation.

Breakthrough technology trends have matured and hit scale together: hyperconnectivity, supercomputing, cloud computing, the Internet of Things, and cybersecurity. These trends will fuel the emergence of new business models. The speed of innovation is enormous, and start-ups in the agriculture space have the mission to innovate fast and change every aspect of the industry as we know it today. In 2014 alone, start-ups in the agricultural technology space raised up to $1 billion on venture capital.

Agribusinesses are trying to adopt innovations fast. If you have no drone in your garage yet, chances are your leading competitors have several of them. But while trying to adopt technical innovations, agribusinesses in all segments (farmers and producers, cooperatives, farm machinery and equipment manufacturers, agrichemicals, originators and traders, food companies) struggle to realize the full value potential for their organizations and customers.

Aware but unsure

Executives know the world has changed. Research shows 90% of CEOs believe the digital economy will have a major impact on their industry, but less than 15% are funding and executing on the plan.

Leaders in agribusiness are learning how to leverage these technologies to:

- Increase farming efficiency
- Create transparent and sustainable food supply chains
- Manage market and price volatility
- Implement new, sustainable business models
- Engage with the right partners in business networks

Early adopters are winning

Agribusiness leaders need to decide where they stand while business transformation drivers and new technologies disrupt their industry. Research shows that early adopters are seeing significant value, with +9% revenue creation, +26% impact to profitability, and +12% market valuation.

WHAT DOES THIS TELL US?

The road map to relevance requires reimagining business models in agribusiness and proactively evolving before new digital competitors emerge.

Digital business models are disruptive. The rules in agribusiness have changed.

- Land O’Lakes, a major cooperative, acquired Geosys, a company that collects crop data via satellite to develop tomorrow’s agricultural technology today.
- InVivo, France’s number one cooperative, is investing in Big Data to become the European leader in agriculture.
- Cargill provides software services that guide farmers on how to best plant crops, helping farmers maximize their output.
- Nestlé is not only buying from rural farmers, but is also investing into farmer training to secure sustainable and high-quality supply of commodities, such as specialty coffee.
- Monsanto acquired Precision Planting, a manufacturer of precision equipment, and Climate Corporation, a provider of super-local weather information. Monsanto shows that it is serious about precision farming and has now transformed from a seed business to a data science organization, providing the “glue that holds the pieces together.”
- John Deere has 2,600 employees who come in every morning to develop software. John Deere is providing fleet telematics solutions that allow farmers remotely manage their equipment and analyze sensor data in real-time.
EXECUTIVE SUMMARY

Digital agriculture: Agribusiness is turning digital

Transformation drivers

Driven by digitization, agribusiness is transforming rapidly. Traditional industry boundaries and segments are blurring. This transformation is driven by the need to:

- **Increase farming efficiency**
  At the start of the value chain, there is tremendous pressure to increase the efficiency of farming to produce more high-quality food in a low-margin business and to reduce the consumed resources. Growing consumer demand in developing markets is fueled by developing countries’ increasing population, which has a big appetite for meat and other high-calorie food. At the same time, the scarcity of resources, such as water and fossil fuels, and decreasing arable land in many parts of the world are an even bigger challenge when considering that crop output per acre will have to increase, and in fact double, by 2050.

- **Create transparent and sustainable food supply chains**
  Consumer patterns in mature markets are rapidly changing and consumers have a growing interest in food safety and sustainability. People want to know the exact origin of what they eat and how it was processed. This requires the ability to track and trace ingredients and processes all the way back to the farmers and even beyond to the seed and crop input businesses. It creates the need for a connected, efficient supply chain that helps to reduce food waste. The food chain is under government and NGO scrutiny, which leads to increasing and changing regulations.

- **Manage supply and price volatility**
  Agribusinesses find themselves in an environment of highly volatile commodity prices and crop supplies. Companies therefore have a stronger than ever need to react to supply and demand shortages as well as market price changes in real time. They need to put efficient risk management and hedging processes in place. At the same time, new technologies are opening up new sales channels for producers and enable the emergence of new commodity marketplaces.

New business models

Reimagining agribusiness is about connecting the “digital farmer” – who needs to act as a farming entrepreneur to run a profitable business in a volatile natural and market environment – to the “digital consumer,” who needs healthy, tasty, fair, and affordable food. This encourages all players in the agricultural industry to reimagine their business models and processes.

- **Outcome-based services**
  Agricultural companies are increasingly leveraging Big Data (e.g., field, livestock, machine, sensor, and weather data and aerial imagery) to achieve better yields and outcomes for themselves and their customers. This includes smartly bundling digital farming insights and improvements with products and services to provide precise and integrated agricultural solutions, optimizing outcomes based on the individual requirements of each farmer. This makes Big Data a valuable asset and creates completely new opportunities and revenue channels.

- **Farmer-centricity**
  Farmer-centricity is a new driving force in agribusiness. Many companies buying from farmers still consider farmers their “upstream customers” rather than traditional vendors. With challenging market conditions and new, innovative farming products and solutions, farmers need to act as entrepreneurs who operate their business in a complex and dynamic environment. This also increases the need for specialized neutral agronomy consulting services, strong relationships, and close collaboration across the ecosystem.

- **Local commodity marketplaces**
  With growing connectivity, new channels are opening up for farmers to sell their crops. This lowers the barriers for new players to collect supplies from the farmers and create new online marketplaces where bids and offers for commodities are published. While agribusinesses reinvent their business models, they need to engage with new partners and become more agile in establishing new business relationships. Business networks provide unprecedented opportunities to tap into new segments and are a logical evolution of classic supply chains in a digital world.

The world is changing

- Until the mid of the century the world’s population will raise to 10 billion people. Food production needs to roughly double.
- Annual meat production will need to rise by over 200 million tons to reach 470 million tons by 2050.
- By 2030, global water demand will increase by more than 50%.
- The amount of arable land to feed the world’s population is shrinking. In 2005, 2,300 square meters of farmland was available per person, but by 2030, there will only be 1,800 square meters.
EXECUTIVE SUMMARY

Burning platform: Complexity is an obstacle to digitization

Complexity in agribusiness

Complexity is the most intractable issue of our time. It is an epidemic of wide-ranging proportions, affecting our lives, our work, and even our health.

Why are we not getting the maximum value out of the technology? Why is the speed of adaption and change so slow?

Agribusiness is getting more and more complex. Increasingly demanding customers are forcing food companies to track, trace, and label their products. Complex food supply chains are spanning the globe, with processing steps in various countries. Regulations from governments require endless efforts to achieve compliance. Outsourcing, networking, and subcontracting are abundant in the seasonal business of growing crops. Agribusiness players are dealing with a diverse group of suppliers and customers, often due to the blurring lines more vertical integration within the industry.

Need to standardize

For 20 years businesses invested in standardizing business processes and implementing productivity tools to address this complexity. The results were remarkable – significant business value was achieved in terms of productivity, use of assets, and compliance.

But still, complexity is ubiquitous with the proliferation of products, business networks, regulations, etc.

How do we pull ourselves out of this quagmire of complexity?

The answer is simple:

To get the most out of this new world of digital business, you need to run simply.

Finding ways to run simply matters more than ever in order to drive business innovation. When you reimagine business models based on real insights, not trends, you can run simply. It’s when you can serve customers, not your process. It’s when technology works for you, instead of the other way around.

SAP doesn’t do simple. It creates simple. It delivers simple. It engineers simple.

SAP’s Run Simple approach integrates digital systems and enables reimagining for unrestricted innovation.

SAP HANA is the great simplifier.

The basis of digital business is a flexible, secure, real-time innovation platform – SAP HANA. By combining the simplicity and power of SAP HANA with the endless possibilities of the cloud from the SAP HANA Cloud Platform, we have a universal digital platform to manage Big Data, hyperconnectivity, and the Internet of Things. This is the foundation for the digitized agricultural reality where business networks are forming and connecting and all members of the ecosystem are collaborating closely.

But how can you develop your road map to run simply?

FROM: STANDARDIZATION

TO: SIMPLIFICATION AND INNOVATION

• SAP customers produce more than 82% of the coffee and tea we drink each day
• SAP customers produce more than 79% of the world’s chocolate
• SAP customers produce more than 77% of the world’s beer
• SAP customers distribute more than 78% of the world’s food
• SAP customers produce 85% of the world’s pet food

Source: “Fast Facts” SAP Marketing Research 17
EXECUTIVE SUMMARY

Road map to Run Simple: Three steps to digitize your business

REIMAGINING
Do you have the right strategy? Start by reimagining your business, with business outcomes and customers at the center.

REIMAGINE BUSINESS MODELS
Drive competitive advantage by expanding beyond traditional industry boundaries and transforming from an asset to a service/outcome-based organization

REIMAGINE BUSINESS PROCESSES
Change or eliminate fundamental business processes with digitization

REIMAGINE WORK
Step-change improvements to existing processes based on real-time information used to make the right decisions and drive immediate impact

DIGITAL BUSINESS FRAMEWORK

SAP’s digital business framework is based on the five key pillars of a digital plan and architecture:

1. **Customer experience** to successfully market products and services in the different stages of the agricultural supply chain – both to existing and new customers, through the appropriate channels

2. **Supplier collaboration** across all spend categories. In a large network of different players, agriculture-specific goods are sourced starting from crop inputs like fertilizer and planting services, to the produced agricultural goods. This requires close collaboration with suppliers

3. **Core business processes**: Agribusinesses rely on solid back-office functions in logistics and financials to maintain consistent data along the whole value and supply chain

4. **Workforce engagement**, including employees and contractors. In agribusiness, subcontractors are employed on a seasonal basis and tasks are shared among different people

5. **Assets and the Internet of Things**: With sensors, drones, Big Data, and mobile technologies, farming can become more precise and sustainable

**ROI drives this significant phase** of the transition to digital. It’s not about any one of the five pillars, but rather how they all interconnect to achieve business outcomes.

We leverage **Design Thinking** as a key approach to the reimagining phase. Design Thinking can be described as a discipline that uses the designer’s sensibility and methods to match business needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity.
DIGITAL AGRIBUSINESS PLATFORM

In order to reimagine your business, you need to have the right platform in place. You need to have a neutral partner who is committed to an open ecosystem. SAP focuses on creating business value for our customers as empowered participants in the agricultural ecosystem, instead of implementing business models where data ownership is transferred away from the agribusiness to the solution provider.

The digital agribusiness platform enables innovation and agility for applications along the agricultural value chain. At the same time, it ensures data security and trust in collaborative scenarios and protects intellectual property (IP), for example, in the form of precision agriculture algorithms.

• The platform helps agribusinesses to offer precise, outcome-based agricultural solutions leveraging agricultural Big Data. It creates insight and supports constant optimization of processes and practices by leveraging smart algorithms.

• Connecting to the agricultural Internet of Things, including smart machines, drones, and robots the platform enables smart data collection and automation
• Through standardization and open interfaces the platform facilitates collaboration and allows to offer outcome-based digital services in an open agribusiness network.

EXECUTIVE SUMMARY

Road map to Run Simple: Three steps to digitize your business

SAP HANA CLOUD PLATFORM
TOP FIVE TECHNOLOGY TRENDS

Top five technology trends that are enabling the digital economy and changing the landscape in agribusiness
EXECUTIVE SUMMARY

Perfect storm: Five technology trends changing agribusiness

We are witnessing an unmatched era of true innovation in agribusiness. Breakthrough technologies have matured and hit scale together, enabling five defining trends:

1. HYPERCONNECTIVITY

   Every market participant and every machine is connected, disrupting established rules in agribusiness. Connectivity drives the movement of goods, services, people, knowledge, and wealth. Connectivity also reaches developing countries where agribusiness often contributes a significant share of the GDP.

2. SUPER COMPUTING

   The limits of 20th century computing power are gone. Networking and in-memory computing will play a key role in feeding over 9 billion people by 2050. This is a prerequisite to manage the huge amount of data that is created along the agricultural value chain by sensors and machines.

3. CLOUD COMPUTING

   Technology adoption and business innovation now move at lightning speed. Agribusiness companies need a flexible and cost-efficient IT infrastructure that allows them to manage their data on a global scale and includes the knowledge of a distributed network of business partners.

4. SMARTER WORLD

   Connected sensors, drones, and robots are reshaping the modern farming business, both for crops and livestock. Platform-based technology bundles data and services.

5. CYBER SECURITY

   Cyber criminals have expansive new capabilities to attack, undermine, and disrupt businesses. Trust remains the ultimate currency, giving security-focused businesses a significant advantage in brand reputation. Data protection is vital for agribusinesses to secure valuable IP and data, e.g., in crop sciences.
Imagine agriculture when every machine and piece of equipment provides sensor data. Crop farmers and contractors are connected and able to operate based on precise aerial image data.

Hyperconnectivity in agribusiness requires an exchange of data and digital services between farmers, seed producers, agrichemical companies, laboratories, equipment manufacturers, agricultural service providers, contractors, agronomists, commodity markets and originators, food producers, financial service providers, governmental organizations, and other stakeholders.

Standardization of data services and the establishment of common data standards across the industry are ongoing requirements. Flexible solutions are also required so that participants can simply adapt when new strategic partnerships are established and the ecosystem consolidates technology standards. A neutral network orchestrator that is unbiased and familiar with different industry perspectives can provide an open platform.

Exchange of expertise will be one of the core efficiency drivers resulting from the digitization of agriculture. Data and technology alone will not provide value is there’s no exchange of expertise. Digitization provides the technology to share experience locally and globally. Benchmarking and agronomy services will help to identify best practices. Communities and relationships can be strengthened when individuals are connected via the Web or, in developing countries, via SMS, helping farmers to increase their yields and efficiency.

1. Sensors and aerial imagery in farming
   Sensors in the field measure soil and weather conditions (e.g., humidity, temperature) and livestock data, while sensors on farming equipment give a real-time insight into yield and quality parameters. Aerial imagery from drones and satellites has become more accurate and affordable and is used to manage huge areas in amazing detail.

2. Robots and drones
   Robots are already common in the dairy industry and are entering the farm field space. Drones can collect field imagery and sensor data to detect crop health and growth and support precise farming activities such as dropping beneficial bugs into fields as a natural pest control exactly where required. Robots will soon automate many farming processes and take over tasks such as weeding, fertilizing, seeding, or pruning plants.

3. Track and trace connected goods
   Digital transmitters and sensors revolutionize storage, transportation, and processing. Tracking and tracing raw materials and processed goods along the whole agricultural and food value chain will become standard practice.

4. Mobile devices in farm management
   Tablet PCs are already commonly used in tractors. Through online connection to the farm management system, the farmer stays informed about planned and completed tasks, often combined with GPS/GNSS and a GIS map of his fields. In developing countries, mobile phones are attractive for farmers, e.g., for micro-payments or agronomy information services.

5. People and communities
   Building relationships and communities to share knowledge is key for farmers and their success. Farmers have specific requirements when it comes to the right channel and technology. Whether via omni-device farmer portals with embedded analytics in industrial countries, or SMS communication with farmers in rural areas in developing countries, it is the content and service that drive value and participation within a community.

Agriculture is expected to make up 80% of the potential market for drones in the near term.\(^\text{18}\) 60% of farms in the United Kingdom are already using IoT technology.\(^\text{19}\) The market for agricultural robots is expected to reach $16.8 billion by the end of 2020.\(^\text{20}\)
Digitization example: Smallholder farmers in Africa – digitally integrated in the global food supply chain

Imagine that mobile applications enable smallholder farmers in Africa to get SMS notifications on deliveries, weather updates, and information on agricultural practices and prices from their customers. These customers are the big commodity trading and processing companies that want to ensure traceability as well as high quality from the very first stage of the value chain.

Conducting business in more sustainable ways is becoming increasingly relevant, as is the demand to adhere to global and national trade standards. To stay ahead of competition, agribusinesses and their customers need to track, trace, and document in detail where the product is coming from and how it has been produced. Consequently, smallholder farmers need to be fully integrated into the supply chain to assure food safety.

By using mobile devices and smart processes in rural areas to identify the farmers and digitize the procurement process, agribusiness enterprises are collecting electronic data from farmers, even if they are located in the remotest parts of rural Africa. This helps to identify the producers and support a sustainable and traceable supply chain and allows for the capture of detailed data, such as single received bags of commodities like shea or macadamia nuts, coffee, cocoa, and many others.

Digitizing means improving the agricultural value chain - in particular for smallholder farmers.

- Increasing transparency, efficiency, and accountability and avoiding fraud in the commodity value chain through integrated paperless processes
- Enabling end-to-end traceability for certification
- Sharing and ensuring farming best practices and regulations
- Communication and training, also in areas where no Internet connections are available, through SMS
- Mobile collection of data through mobile phones and central monitoring of data
- Efficient and transparent processing of advances and payments through mobile payments using various local standards
- Crowd-sourced translation into local languages
- Opening the door to financial services from banks and insurance companies for smallholder farmers, thereby improving their livelihood
Digital agribusiness creates a huge amount of data; crop, livestock, machines, and processes are constantly observed with sensors and aerial imagery. Commodity markets are streaming real-time market data around the world, making supply and demand more transparent than ever before. Analyzing this data, drawing the right conclusions, making the right decisions, and executing on them are key to mastering the digital shakeup.

Supercomputing will play a tremendous role in feeding over 9 billion people by 2050. Processing the enormous amount of data that is collected in all parts of the agricultural supply chain is only possible through a huge increase in computation power. Leveraging this data will increase efficiency in agricultural production, commodity markets will become more transparent, and the commodity supply chain more agile.

After eight years of innovation and development, SAP, with the Hasso Plattner Institute and our strategic partners, created a completely new platform that eliminates the separation of transactions and analytics. This technology, SAP HANA, has provided a massive breakthrough to the business world.

SAP HANA will enable agribusinesses to simplify supply chain, finance, and other processes and run them in minutes, not hours or days, changing how people work. Changes such as reorganizations, product launches, etc. can be made in one-tenth of the time. Huge amounts of agricultural data from sensors and machines, about weather and a multitude of other sources together with geospatial information, can be crunched by smart algorithms. This adds tremendous agility and speed to the business.

- **Precision agriculture algorithms**
  Algorithms that optimize agricultural production activities will be a key differentiator and competitive advantage when agribusinesses make the transition to digital. By correlating data and applying smart models, algorithms, and machine learning to agricultural data, it is possible to create insight and optimize farming activities such as irrigation, application of fertilizer, and crop protection.

- **Predictive analytics and simulations**
  Shortages and disruptions will be predicted before they happen by combining data – both structured and unstructured – from a large range of sources such as field, weather, economic, and market data and agricultural news. Data scientists and quants will become a vital part of businesses.

- **Research and genomics**
  Data generation in agricultural production will create huge opportunities for research and genomics. The availability of this data, produced under real conditions, will allow researchers to constantly and more efficiently optimize their models, algorithms, and products.

According to Eduardo Barros, Accenture’s Global Products Agribusiness Lead, a six-month pilot study found that precision farming may already directly increase crop size by 15%, with further potential for improvement.25

The precision agriculture market is growing at over 13% per year, reaching $3.7 billion by 2018.26

Conventional weather models have a resolution of 12 km. Researchers from IBM and the U.S. Dept. of Agriculture are building weather models on parallel processing supercomputers with a resolution down to 1.5 km.27
By moving parts or all of the IT infrastructure into the cloud, our customers can innovate with faster time to value and focus on their real business, whether they manufacture agriculture machinery, produce seeds or fertilizers, or raise livestock and plants.

Agribusiness companies are dealing with a network of suppliers and customers that all are sources of valuable data. A shared source of common data allows all players to execute their business in a more coordinated manner based on real-time data.

What if a cooperative, which acts on behalf of hundreds of farmers, provides a single cloud-based instance of all their assets and activities? And what if the individual farmer can access his and his parent company’s data directly from his office or even from his tractor? New market and sales data are available at his fingertips, whenever the cloud-held system is fed with new data or functions.

A farmer can make bids and sell his or her products through a farmer portal, thus accessing the world of agriculture without making lengthy phone calls with numerous partners.

1. **Software-as-a-service (SaaS)**
   SaaS is a mature trend, with companies like Ariba providing solutions via the cloud. SAP has 80 million+ users leveraging SaaS and helps companies like machinery manufacturers or agrichemical producers standardize their business processes.

2. **Platform-as-a-service (PaaS)**
   PaaS provides an entire computing platform in the cloud, including hardware, software, and open APIs, to build new businesses and create new solutions. An agriculture PaaS with a real farming data model and a set of open services can be the foundation for a farmers’ network. Shared services allow farmers and agriculture companies to work with a wealth of real-time farm field and livestock data.

3. **Infrastructure-as-a-service (IaaS)**
   Businesses are leveraging IaaS to get up and running in a matter of hours, without spending significant capital expense. This increases time to value and leaves them to focus on their core agriculture business.

4. **Business networks**
   Agriculture companies are engaging and sharing information and transactions with their business partners over business networks. This collaboration changes how commerce is done in agribusiness and enables companies to develop new partnerships and stay agile in a digital world.

Global SaaS software revenues are forecasted to reach $106 billion in 2016, increasing 21% over projected 2015 spending levels. Projected spending on cloud computing infrastructure and platforms will grow at a 30% CAGR from 2013 through 2018, compared with 5% growth for overall enterprise IT.
According to Eduardo Barros, Accenture’s Global Products Agribusiness Lead, data-driven decisions about irrigation, fertilization, and harvesting can increase the profitability of corn farms by $5 to $100 per acre.

A survey conducted by the American Farm Bureau indicated that the use of precision technologies has reduced input cost by 15% on average and increased crop yield by an average of 13%.

Precision agriculture can improve Nitrogen fertilization efficiency by 10-15%. This reduces the required amount of nitrogen fertilizer without an negative impact on crop yield.

There are a number of key innovations enabling the world of agriculture to become smarter:

1. **Digital farming** smartly combines several technology trends to make farming more efficient, sustainable, and resilient. It relies on the data collected by sensors and aerial imagery, bringing this data together with the domain experience brought into precision agriculture algorithms. This combination enables predictions, simulations, and optimizations. Digital farming helps to boost yields, increase quality, save input resources, and reduce the impact of negative events like droughts, flooding, or pest infestation.

2. **Smart procurement and trading**
   Originators or traders can develop and adapt procurement and trading strategies by combining fundamental agricultural data with real-time market data, thus reducing their risk exposure.

3. **Agricultural data and service marketplaces**
   Changing business models and partnerships will create the need for flexible, secure ways to exchange and market data and digital services to allow collaboration and integration between all participants in the agribusiness ecosystem. This will help participants monetize the value of the exchanged data and digital services.

4. **3D printed food**
   A recent technology innovation is the printing of food, which enables a quick and customer-specific food experience. While this is still in early days, it has high potential for disruption in the industry’s future and is worth keeping an eye on.

Connected sensors, drones, robots, and artificial intelligence will completely reshape the modern farming business, both for crops and livestock. Affordable and abundant technologies are digitizing the farm and the farm-to-fork supply chain.
Cyber Security

With ever-increasing risk of corporate spying and digital theft, cybersecurity must be addressed as organizations in agribusiness set and execute their digital strategy.

Corporate spying and digital theft are on the rise, and organizations need to address cybersecurity at the corporate level. Farmers are increasingly creating and owning valuable and sensitive data, which need to be secured in a business with relatively low margins.

Managing security across your digital business must be accomplished through proper governance. This reduces TCO, business risk, and compliance breaches and solidifies the trust of your customers.

The following cybersecurity elements should be addressed:

1. Securing data
   Securing data requires that companies and their partners adhere to data privacy and compliance regulations, understand local data controls, and establish encryption and classification criteria. All data collected from farms requires secure and controlled networks, storage, and distribution. As most agricultural data is geo-tagged, it can be traced back to the farmer. The seed and crop input business also needs to secure highly confidential and competitive data.

2. Securing interactions
   Value chain interactions must be secured. Joint SLAs should be in place with partners, checks should be at the application level to prevent wide-spread impact, and connectivity should be safeguarded.

3. Securing identities
   Access to digital information should be restricted to authorized users. There should be central authentication regardless of device, and devices must be maintained to prevent hackers from gaining access to your digital IP.

4. Partner with trusted suppliers
   Supplier relationships are key in establishing trust as more non-core processes are outsourced. Companies, co-operatives and farmers should build relationships with a few partners who will meet the highest security standards. This will also result in a more simple and nimble architecture.

5. Securing intellectual property
   Agribusinesses are investing billions of dollars into research and innovation. Safeguarding intellectual property and patents is a matter of survival. Services and algorithms that are being developed in the new era of smart farming have to be safeguarded.

In 2014, 47% of adults in the United States had their personal information exposed by hackers.\textsuperscript{33}

In 2014, five out of six large companies were targeted by cybercriminals, a 40% rise on the previous year.\textsuperscript{34}

Globally, cyber crime costs businesses $375-$575 billion annually and a net loss of up to 200,000 jobs in the United States alone.\textsuperscript{35}
REIMAGINING

THE DIGITAL ECONOMY OFFERS INFINITE NEW OPPORTUNITIES

The ecosystem of agricultural companies, partners, and farmers is becoming a digital network. Smarter products and services will refocus commerce on business outcomes.
DIGITAL INNOVATION IS REAL

Agribusiness companies understand that hyperconnectivity and Big Data are the keys to value creation. Based on SAP’s collaboration with thousands of businesses worldwide, we’ve seen that winning companies are moving quickly in three strategic areas.

**REIMAGINE BUSINESS MODELS**

A focus on outcomes, specialized agronomy, and evolving marketplaces drives new agribusiness models.

- **Outcome-based services:** Agribusinesses are increasingly leveraging Big Data (e.g., field, livestock, machine, sensor, and weather data) and aerial imagery to achieve better yields and outcomes for themselves and their customers. An example of this is smart bundling of digital farming insights and optimizations with products and services. Businesses can thereby provide precise and integrated agricultural solutions, optimizing outcomes based on each individual farmer’s requirements. Big Data is a valuable asset and creates completely new opportunities and revenue channels.

- **Farmer-centricity:** Many companies buying from farmers still consider them as their “upstream customers” rather than traditional vendors. With challenging market conditions and new, innovative farming products and solutions, farmers need to act as entrepreneurs who operate their business in a complex and dynamic environment. This also increases the need for specialized neutral agronomy consultancy services, strong relationships, and close collaboration.

- **Local commodity marketplaces:** With growing connectivity, also in rural areas, new channels are opening up that lower the barriers for new players to collect supplies and create new marketplaces.

**REIMAGINE BUSINESS PROCESSES**

When analytics and transactions are combined in real time on the same platform, business processes will never look the same.

- **Farm-to-fork traceability and transparency:** By achieving visibility of materials and goods along the whole value chain, agribusinesses can react to the growing consumer demand to understand where their food is coming from and how it was processed. Achieving traceability in commodity processes is complex, but agribusinesses can gain a significant competitive advantage and realize premium prices with these process capabilities.

- **Self-optimizing processes:** Processes across the value chain can be optimized by smart algorithms that help save input resources and boost productivity – in agricultural production, transportation, and processing. Self-optimization, e.g., of stock levels, supply, and demand, helps reduce cost and waste and increase both margins and environmental sustainability.

- **Agile enterprises:** Business processes need to seamlessly cross organizational, technical, and geographic boundaries. As business becomes more agile, processes have to adapt to unanticipated situations and changes without causing disruptions. By predicting malicious events in machines or in production, it is possible to react earlier and avoid cost and disruptions.

**REIMAGINE WORK**

Employer of choice status goes beyond recruitment and retention to fundamentally revolutionizing the way people engage.

- **Empower the information worker:** By enabling users to access the right information at the right time on any device, you enable better decisions. Work and critical processes can be completed faster, with reduced time pressure on the information workers.

- **Leverage subcontractors:** Find workers for seasonal or one-time tasks on the fields, farm, and throughout the value chain.

- **Fair and sustainable working conditions:** Workers and farmers in rural areas can enjoy improved working conditions by integrating into the supply chain. With mobile phones, it becomes possible to collaborate closely, exchange best practices, and assure compliance to standards and certifications.

- **Simple:** If we simplify everything, we can do anything. By making work simple, workers can focus on creating value.
In order to reimagine everything in a digital agribusiness ecosystem, agility and flexibility are required to adjust course at any time. This involves two key concepts: simplification and innovation.

- **Simplification** is all about doing what we are already doing, but better, faster, and cheaper
- **Innovation** is all about reimagining business models and customer value by leveraging the five technology trends

**What is the SAP HANA platform?** SAP HANA is a revolutionary approach to data analysis. As an in-memory data platform, it enables information analysis on large volumes of data at unprecedented speeds. You can process literally hundreds of millions of complex data records in seconds. This real-time platform utilizes data that is resident in-memory. Because the data is not written to disk and does not need to be pre-aggregated, information is instantly available for use.

The platform enables flexible analytical models that use both real-time and stored data.

SAP HANA enables simplification with a unified platform, bringing together transactions and analytics for a variety of data sources and integrating all types of data:

- Geospatial data
- IoT, machine, and sensor data
- Weather data
- Aerial imagery
- Real-time data streams (market data)
- Unstructured text (processing of rules and regulations)
- Genomics data (for R&D applications)
- Social media data (for sentiment analysis)
- Third-party data sources and databases

**However digital agribusiness needs information – not only data:**

Extensive data preparation adds time and cost to any system. Agribusinesses need to be able to analyze complex variables across diverse data types and sources in real time, and without having to aggregate data – a process that often lacks detail and analysis options. Taking full advantage of today’s data-rich agribusiness environment requires nothing less than a new approach to data analysis.

SAP HANA analyzes data in minutes, not in days. This translates into faster and more precise farming activities, better agricultural product recommendations and prescriptions, and more efficient and precise agricultural supply chain management, operations, and planning. With flexible analytical models, smart real-time analytics, predictive algorithms, and machine learning, agribusinesses can generate **valuable insights.** These insights enable agribusinesses to make faster, better decisions and be better informed than ever before.

**The SAP HANA platform ecosystem is constantly growing** with new customers, development partners, and innovative startups constantly adding to the base of solutions, expertise and content for SAP HANA.

SAP enters into new partnerships to facilitate collaboration and integration. We cooperate with the European Space Agency (ESA) to process large amounts of earth observation data from the Sentinel satellites in the Copernicus Space program. This data can be used by agribusinesses to observe fields and crops. Enabling fast and efficient access to such new data sources creates opportunities for applications and scenarios that once were unachievable.36

**SAP HANA innovation example:** Meteo Protect is a French insurance and reinsurance broker that helps agribusiness companies and cooperatives manage weather risks.

The company provides customized policies based on specific parameters (analyzing geo-location, risk period, weather parameter, and value insured). Pricing is individual to each policy based on sophisticated climate models. Each quote is based on the weather history and climate model tailored to the specific risk parameters. SAP HANA calculates the risk and provides the quote in real time.37
DIGITAL BUSINESS FRAMEWORK

A SIMPLE APPROACH TO VALUE CREATION THROUGH DIGITIZATION

Every agribusiness company requires a simple digital approach to build a pragmatic and executable vision of its digital strategy.
SAP understands the five technology trends, and we also understand that these ever-changing requirements are big challenges for businesses. The reimagining process helps crystalize the future business model.

We have built a structured framework to help develop and execute on your digital business strategy: the digital business framework. With this framework, the entire agriculture value chain will be digitized, including the core, which serves as the platform for innovation and business process optimization.

Every agribusiness company can develop a digital strategy across these five pillars.

1. **Outcome-based customer experience**: An optimized customer experience is required to market products in the different stages of the agricultural supply chain
2. **Supplier collaboration** to accelerate growth innovation
3. **Re-platform core business processes** and bring together transactions and analytics in real time to be smarter, faster, and simpler
4. **A smarter and engaged workforce** across all employees and contractors
5. **Harness assets and the Internet of Things** to drive real-time insights and new business models

**DIGITAL BUSINESS FRAMEWORK**

Every company needs to think about digitization across five key pillars
THE DIGITAL CORE
A new generation of ERP solution, running in real time, integrating predictive, Big Data, and mobile, will change how agribusinesses work.

With advanced in-memory computing, you can run simply and unleash the full power of the digital business.

**Real-time business**
Real-time optimization of business-based changes will have massive implications for how we work, how we do business, and how we organize.

**Simplified financials**
Finance organizations need to embrace the digital age to keep up with new and evolving business models and provide decision makers with instant insight. You can achieve a common view over all financial and operational data as well as flexible, easily consumable reporting and automated processes – and instantly evaluate the financial implications of business options with prediction and simulation.

**Commodity trading and risk management**
With SAP Commodity Management, the digital core provides insight into the commodity price risk positions. Within a fully integrated suite, you have all the tools to hedge market price risks, including position reporting, mark to market, and financial instruments.

**Origination**
With SAP Agricultural Contract Management, food companies and agricultural traders or originators can procure agricultural products from cooperatives and farmers based on contracts. After the recording of quantities and qualities, the loads can be assigned flexibly to existing contracts.

**Deployment choice and lower TCO**
The consuming solution to run the core has to be simple. Companies now have the choice to deploy in-house or in the cloud. In-memory computing will also have a significant impact on TCO, as it will free up more budget for innovation.

**Consumer-grade user experience**
User experience is key to success. It drives adoption, user engagement and, ultimately, productivity.

### Simplify with SAP

**SAP S/4HANA** is the only end-to-end solution that covers all business processes in the agriculture business and runs in-memory.

The **SAP Commodity Management** solution helps food companies manage their commodity value chain and reduce pricing risks. **SAP Agricultural Contract Management** is used by agriculture originators and traders to effectively procure their goods from farmers.

**John Deere**
built innovation on the SAP HANA platform. Larry Brewer: "We believe this will let us identify problems in the field much quicker. In some cases we've estimated we'll be able to spot problems **two to three months** faster than before."38

**Florida Crystals**
took only **four weeks** to upgrade to SAP S/4HANA and SAP S/4HANA Finance (formerly SAP Simple Finance) 2.0. That upgrade into full production was a first for any SAP customer.39

**Manage complexity**
Don Whittington of Florida Crystals: "Our business has grown into the world’s largest cane sugar refiner, which means we are managing complex operations amidst the **volatile commodities market and ever-changing cost structures** (...) SAP S/4HANA Finance (formerly SAP Simple Finance) enables our financial management to run simple, with instant insight and ease of use, helping us to stay competitive and retain our industry leadership position."40
These key trends are reshaping the customer experience:

**Sell through a network**
In a network of networks, the agricultural producer will sell products with high visibility on quality and price through a farmer portal. The agricultural platform enables farmers, farm machinery and equipment producers, and agrichemical companies to collaborate and conduct business in a standardized way.

**Mobile sales of products and services in rural areas**
In rural areas, especially in Africa, the farmer is included in the agricultural value chain in a fair manner. In this win-win situation, food companies and the producer benefit from sustainable and high-quality food. Mobile technology (e.g., payments via SMS, mobile services through SAP HANA Cloud Platform mobile services, or SAP Mobile Services) play an increasing role.

**Big Data, services, and market prices**
By gathering Big Data from fields and sheds, the farmer will enter into a completely new, profitable business. Other partners in the network provide services in exchange for knowledge, such as farm field data.

**Sales channels**
Cloud technology leverages sales processes into various channels (SAP Hybris solutions). This optimizes sales processes and boosts the sale of products, data, and services.

86% of customers are willing to pay more for a better customer experience.

57% of the buying process is completed before a first interaction with sales.

1 Million
Spare parts are available to order in a catalogue on a B2B platform directly connected to BayWa’s SAP system. This international trading and services group runs an integrated B2B platform based on SAP Hybris in cooperation with machine manufacturer Claas to facilitate the ordering of spare parts for farming equipment.

**Digitize your end-to-end customer experience with SAP**

A single platform brings together marketing, sales, services, and commerce (including SAP Hybris omnichannel solutions) to ensure seamless digitization of the entire customer experience. SAP customer engagement and commerce solutions, powered by SAP HANA, enable a 360-degree view of your customer, real-time interaction, and sophisticated predictive analytics, fully integrated to the core transactional system. With additional agribusiness-specific applications, such as SAP Rural Sourcing Management and a farmer portal for agricultural food companies, there is a unique customer experience for farmers and originators.

**SAP Hybris**

**SAP Cloud for Customer**

- Orchestrate business processes across marketing, commerce, sales, and service
- Deliver personalized experiences in context with each interaction
- Create a single, harmonized experience for your customer while reducing the burden on employees
- Be prepared to engage your customers on the channels they choose at any moment in their journey
- Achieve full integration with your core business processes
Over 1 billion people are employed in world agriculture, representing 1 in 3 of all workers.\(^{45}\)

Around 273,000 farmers were trained by Nestlé in 2012. “We have to focus on the next generation of farmers to make it happen that we really have long-term ensured supply.”\(^{46}\)

Digitize your workforce with SAP: SAP S/4HANA + SAP SuccessFactors solutions + SAP Fieldglass solutions + SAP Fiori provide the tools for total workforce engagement and advanced analytics.

- Attracting the best workforce
  Recruit and onboard the best workforce, simplify their work, and ensure that regulatory and compliance requirements are met. Fitting the right role with the right skills is mandatory
- Managing the total workforce lifecycle
  From recruiting and onboarding, to performance, compensation, and learning – all in one place
- Smarter apps with greater user experience
  Enable the workforce to easily access the right information across any device and through a dramatically simplified user experience

The world is getting smarter in the digital agricultural industry, but complexity is hampering the workforce in this pursuit.

All along the agricultural supply chain, the required workforce fluctuates heavily throughout the year, driven by harvest seasons and yield. Assuring the right resources are in place while still staying competitive is a major challenge for agribusinesses. Organizational complexity is driving costs up in this area and slowing down progress and flexibility. Three forces need to be addressed:

**Changing of the guard**
Millennials will make up as much as 76% of the U.S. workforce by 2025.\(^{44}\) This will require a workforce strategy to address this new reality, especially since working in the agriculture sector is losing popularity in developed countries, where, more and more, people are moving into the big cities.

**Contingent labor is on the rise**
To drive agility, lower fixed-cost companies are frequently turning to contractors and services providers. Often farmers use subcontractors on a seasonal basis, and tasks are shared among different people. SAP Fieldglass solutions are used to manage the seasonal workforce, both on the farm and along the supply chain when additional resources are required.

**Sustainability and social responsibility**
Agricultural companies do business on a global scale, with a value chain spanning several countries. This food chain is under scrutiny by NGOs, local governments, and the end customer, and needs to develop towards a more sustainable and social value chain. Child labor and worker safety and health standards at supplying companies are hot topics.

**ConAgra Foods’ success is its people.** With SAP SuccessFactors solutions, the company standardized its systems to capture succession planning, talent reviews, and other key data to spur change management and growth. ConAgra’s HR team now benefits from more available data on staff, more engaged and productive employees, and improved efficiencies from standardized, integrated processes.\(^{47}\)
BUSINESS NETWORKS AND SUPPLIER COLLABORATION

All players in the agricultural industry are collaborating in networks by market segment. With blurring industry boundaries, these will converge into a network of networks. The agricultural industry needs a solution to simplify its networked business.

Companies in the agricultural industry need to reimagine business processes to remain competitive and best serve customers in the digital economy. From sharing data securely and in real time, to providing personalized and contextual insights, to changing how companies exchange and offer products and services, collaboration across entire vertical markets is key to value creation. Several trends in the agricultural industry are redefining the game:

**Farm-to-fork transparency and traceability**
The digital core provides an end-to-end view over the whole value chain, with the ability to track and trace products from the farm, through processing, to the end consumer.

**Farmer collaboration**
Working directly with farmers as customers, vendors, or both requires close collaboration over the right channels to increase farmer retention. This can be achieved through customized farmer portals to share relevant content like market information, best practices, trainings, or agronomy advice. In rural areas where connectivity is limited, SMS services can be offered. Often an expert team that maintains direct contact and travels to the farmers is also required.

**Services and consulting**
Agrichemical companies, machinery providers, and cooperatives are increasingly leveraging Big Data (e.g., livestock health and farm field data) and services (e.g., consulting, planting services, etc.) to provide integrated agricultural solutions to their customers. This requires the selective sharing of useful data, such as expected or actual crop data, or forecasted milk production.

**Connect businesses to the world of agriculture and the world of agriculture to your business**

SAP’s solutions for procurement give you incredible capacity to digitize business processes across your value chain. Companies have end-to-end supply chain visibility from farm to fork.

- **SAP Global Batch Traceability** can track and trace raw materials through processing to finished goods. **SAP Commodity Management** and **SAP Agricultural Contract Management** for agricultural traders and originators enable you to extend processes across company borders.
- **Business networks operate on a global basis**, meet data security standards, and operate using industry best standards.
- **Services from partners** vastly extend the value of core offerings.

**Networked companies** are 50% more likely than their peers to have increased sales, higher profit margins, and be a market leader.48

50–75% faster transaction cycles are being achieved with the Ariba Network.49

Dole is achieving efficiencies with the Ariba Network and was able to trim its 16-day purchase order process down to just a few hours.50

A leading consumer food processing company connects to more than 450 suppliers from over 17 countries through the Ariba network. With $346 million in annual spend over the network, the company can keep its supply chain moving faster than ever.51

The global food traceability market (“farm to fork”) had an estimated size of $7.8 billion in 2014, and may reach over $19.0 billion in 2022.52

- **Travel and entertainment**
- **Direct and indirect material**
- **Labor and services**

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SAP Digital Agribusiness Whitepaper (03/16) © 2016 SAP SE. All rights reserved
Agribusiness companies are finally understanding the full potential of the interconnection between physical and digital assets and the Internet of things. We are witnessing new use cases with breathtaking results. Below are some key trends:

**Digital sensors and IoT**
Digital sensors that measure humidity, temperature, soil, etc., are providing a huge amount of data. Together with GPS-based coordinates, they provide a real-time view of the farm.

**Big Data and cloud platform**
Huge amounts of data are collected, analyzed, and retrieved. Data models and algorithms turn such time series data into intelligent application-specific data.

**Mobile technology**
With tablet PCs, information can be collected on remote fields and on the farm, making it immediately available in the back office. Electronic steering devices control machines on the field or in the sheds.

**Intelligent machinery, robots, and drones**
Self-driving tractors and intelligent machinery use the prescription data calculated by algorithms. Robots can both collect data and help replace repetitive, manual work on fields or in the dairy business. Drones collect crop data, such as height of plants or insects and mold.

**Machinery assets**
Modern farms have a wide variety of machinery that needs to be documented and have maintenance performed at regular intervals.

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With SAP HANA, Internet of Things edition, organizations like agrichemical companies, food processing companies, and cooperatives can now take embedded device data, analyze this data into information in real time, and leverage this information across the value chain to drive business insights and create new business models.

$1.77 Billion
Estimated size of Precision Farming Software and Services market by 2020.54

Up to $1 Billion
Investments into more than 150 startups in agriculture and food in 2014.55

1.8 billion mobile messages are reliably processed by SAP Mobile Services worldwide every day.56

97% of world’s mobile subscribers can be reached through SAP Mobile Services.56
In order to reimagine business, agricultural organizations need to have the right platform strategy in place to enable innovation. Innovation can come from your own company or come from others. The challenge is to get value out of innovation and make it consumable for your organization. Agribusinesses need to work smarter using the right skills and tools to make that happen. Building and leveraging innovation often means trying, failing, learning, and trying again. Agribusinesses throughout the supply chain need a digital agribusiness platform so they can dream big, develop fast, and deliver everywhere.

This can only be achieved with the SAP HANA Cloud Platform, with the simplicity of SAP HANA at its very heart, as the foundation of the digital agribusiness platform. The agribusiness platform must support these new digital business processes for every part of the agricultural value chain. Though provisioning of input materials, farming, origination and trading, and downstream food processing and marketing to the customer require different domain-specific features from the digital platform, it must provide a connected, open, and integrated foundation across all processes, with no silos or barriers, to empower the business. A digital platform architecture has to follow these key principles:

1. **Integrated** with every necessary system and network, whether on premise or in the cloud
2. **Open** for you and your partners in the ecosystem
3. **Business aware** to support the specifics of your segment and every segment you want to disrupt

SAP focuses on creating business value for our customers as empowered participants in the agricultural ecosystem instead of implementing business models where data ownership is transferred away from the agribusiness to the solution provider.

The digital agribusiness platform ensures agility and a rich environment for innovation that supports functionality and scenarios that are required in farming.

The digital agribusiness platform supports your applications, SAP’s own applications, and partner applications.

**Security**: Data and process security are key to gain your customers’ trust. The platform enables you to safeguard your experience and IP about the specifics of your domain.

**Full integration**: Access large volumes of data from a variety of sources to unlock insights never seen before. The platform allows you to integrate with everything inside and outside your business and facilitate data exchange via standard protocols, APIs, and an open architecture.

**IoT scenarios**: Many value scenarios in agribusiness require data that are collected by sensors and machines, whether on the field, in the supply chain, in transportation, or production – the platform makes data easily consumable for applications, smart algorithms, and users to support insight, optimization, and automation to create maximum business value.

**Mobile**: Applications need to be consumable where commodities are produced, processed, transported, and consumed. When connectivity is unstable, the platform supports applications that are offline-capable by synchronizing data and transactions at a later time. When farmers have no smartphones available, they can still be reached via SMS.

**Spatial**: The platform provides functions to analyze and process geospatial information. For insight and optimizations, weather and sensor data and aerial imagery are mapped and brought into context with spatial data from fields and yield. Users can create interactive, real-time visualizations.

**Smart algorithms**: To transform Big Data into smart data, algorithms that support simulations, optimization, and predictions can run on the platform to create value out of your data, domain experience, and IP. This will help agribusinesses optimize yield for a specific crop variety, make smarter decisions in commodity trading, and optimize operations in the supply chain.

And much more...

For example, processing real-time data streams, e.g., from market data providers, analysis of unstructured information and text, e.g., from news feeds or social networks.
Agricultural traders are buying farmland, consumer products companies are engaging directly with farmers, cooperatives are processing and selling food, and commodity producers are extending into new segments, such as bio-energy. There is increasing vertical integration along the agricultural value chain, and industry boundaries are blurring.

While agribusinesses reimagine their business models, business processes, and work, they need to engage with new partners and increase their agility in establishing new business relationships. In this environment, business networks provide unprecedented opportunities to tap into new segments and are a logical next step of evolution for classic supply chains in a digital world.

Business networks are connecting companies in areas like procurement, travel, labor, sustainability, and financial services. In agribusiness, we are now also seeing the process of transformation to business networks, beginning with the conversion of one-to-many communication to many-to-many collaboration over communication hubs, where smaller networks exchange data and services. Data security in these networks will be key, as farmers will want to retain control of their data.

Business networks based on stable cloud platforms enable data exchange and reflect the growing focus on the farmer and the agricultural production, where highly valuable data is created. They will provide integration and interoperability, while at the same time assure security and privacy of agricultural data. Big Data can then be leveraged to optimize processes in farming and across the end-to-end supply chain.

In a digitized world where technology is not a barrier but a driver, these business networks will evolve to become a network of networks in which all members realize maximum value by collaborating closely across technical, organizational, and industry boundaries.

HOW DOES IT ALL COME TOGETHER?

The formation and evolution of business networks create unprecedented opportunities

WE SEE THE INDUSTRY TAKING AN EVOLUTIONARY APPROACH FROM TRADITIONAL VALUE CHAIN TO A NETWORK
HOW DOES IT ALL COME TOGETHER? – EXAMPLE

While the five digital business pillars deliver significant value as stand-alone capabilities, the ultimate goal is to design the next generation of agricultural business processes that will span all the digital pillars.

**IOT AND BIG DATA ARE THE KEY DRIVERS OF DIGITAL FARMING AND PRECISION AGRICULTURE. THEY PROVIDE REAL-TIME INFORMATION TO THE FARMER TO OPTIMIZE FARMING ACTIVITIES.**

**Example 1: Digital farming**
The diagram shows how farmers can leverage services and individualized agricultural solutions provided by agribusiness companies.

Agribusinesses can use algorithms on field data shared by the farmer to calculate prescriptions that optimize efficiency for each individual farmer. These prescriptions can be published to farmers with recommendations on irrigation, fertilization, application of crop protection, or harvesting. Based on these prescriptions and recommendations, farmers can choose the services, solutions, or input materials that are best suited to their needs. Prescription and task maps can then be transferred to smart field machines or forwarded to contractors for execution.

Field and actual yield data can be used for benchmarking and developing best practices. Digital farming services can also help farmers comply with the growing number of regulations around farming activities, e.g., the application of crop protection or water consumption, by making the collected sensor data available and consumable for reports and audits.

By leveraging Big Data and connected mobile devices together with a digital farm management application, the farmer can get a complete and real-time overview of farm operations, from business, workforce, and resource planning, to scheduling farm activities and field operations, to integrated crop marketing and transparent financial execution.

Digital farming helps improve efficiency and provides opportunities within the ecosystem brings, such as:
- More precise application of input products leads to lower costs and higher revenues through better yields and quality
- Holistic digital service, solution offerings, and agronomy advice from cooperatives through the digital agribusiness platform to help farmers achieve optimal prices for input products
- Fertilizer or crop protection producers provide prescriptions and more precise agricultural solutions to farmers
- Machine and equipment manufacturers collect huge amounts of valuable IoT data directly on the field and offer value-adding services and applications
- Originators and food processors and producers offer complementary digital services to farmers, thereby obtaining additional information about available supply to ensure high quality
- Agricultural labs, contractors, or financial services organizations provide digital offerings supporting completely new business processes and outcome-based scenarios

Watch this video on Digital Farming: [https://www.sap-tv.com/video/37043](https://www.sap-tv.com/video/37043)
WHILE THE DIGITAL CORE IS THE MAIN HOLDING INSTANCE OF ALL CONTRACTUAL AND FINANCIAL DATA, COLLABORATION WITHIN A SUPPLIER NETWORK IS HAPPENING THROUGHOUT THE WHOLE ORIGINATION PROCESS.

Example 2: Origination processes in agribusiness
Building and maintaining relationships with farmers and cooperatives is key for companies that directly originate commodities. Depending on their business model, they either enter into contracts based on demand plans or are supply-driven and try to maximize the contracted volumes.

To optimize procurement and pricing strategies, agribusinesses have to constantly analyze market and price information, establish adequate hedging and risk management strategies, and execute them efficiently. Integrated supply chain management is needed to effectively store and transport the procured commodities. This also includes efficient handling of commodity contracts, such as flexible assignment of loads to contracts, offering storage programs, and an integrated quality management along the supply chain. This is the basis for efficient invoicing and settlement procedures.

Relationship management with farmers is a crucial aspect for origination. Farmer portals can run as part of an agricultural industry platform.

Customer benefits:
- Fully supporting the highly dynamic requirements for flexible pricing, load assignments, and frequent reassignments and complex settlements
- Catering for high volume processing and business-by-exception based on user-definable business rules
- Providing full transparency and control over all business aspects of the entire contract lifecycle
- Integrated risk management enabling efficient hedging of commodity risks

Offering the right information and making services simple to consume builds closer relationships and increases loyalty and retention with farmers.

Farmers portals offer individualized services and information directly to farmers on smart devices and can integrate with contract management systems that support seamless execution of agricultural contracts and origination processes.
HOW DOES IT ALL COME TOGETHER? – EXAMPLE

CLOUD, MOBILE, AND IOT COME TOGETHER IN SAP’S LATEST DEVELOPMENT TO MANAGE A NETWORK OF SUPPLYING RURAL FARMERS.

Example 3: Rural sourcing
The following diagram shows the main process steps of sourcing in rural areas. An integrated sourcing process for commodities grown in rural areas helps farmers by making best practices and training available. A direct connection to farmers is a prerequisite and allows track and trace of products from farm to fork. It helps improve transparency of the origination and settlement process and reduce fraud risk. Companies can promote sustainable, fair processes and working conditions and check if the farming practices are in line with fair trade labels or other certifications.

SAP Rural Sourcing Management is a cloud based and mobile-enabled application to manage the crop receipts from farmers and payments to farmers based on delivered products.

With SAP Rural Sourcing Management the cooperative or farmer group manages its farmers and the collection of crop produce. The solution is fully mobile enabled with offline and synch working modes.

Watch this video on SAP Rural Sourcing:
https://www.sap.tv.com/video/#/7313/
WHY SAP?

BUSINESS DIGITIZATION IS A NATURAL NEXT STEP FOR THE #1 BUSINESS APPLICATION COMPANY

It took years of innovation, strategic investment, and the forging of new strategic relationships to build the end-to-end digital business platform for agribusiness.
SAP IS COMMITTED TO HELPING THE WORLD RUN BETTER AND IMPROVE PEOPLE’S LIVES

**Vision**
Help the world run better and improve people’s lives

**Mission**
Help our customers run at their best

**Strategy**
Become the cloud company powered by SAP HANA

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**GLOBAL PRESENCE AND RELEVANCE**
- 77K employees representing 120 nationalities
- 300K customers
- SAP operates in 191 countries

**INDUSTRY AND LOB FOCUS**
- Solutions specifically for the agriculture industry
- Separate industry business unit for agriculture

**DIGITAL ECONOMY - READY**
- 95 million business cloud users
- 2.0 million connected businesses
- $740 billion+ in B2B commerce
- 99%+ of mobile devices connected with SAP messaging

**INNOVATION LEADER**
- 2011 SAP HANA launched
- 2012 SAP Cloud launched
- 2014 SAP business networks the largest marketplace in the world
- 2015 SAP HANA Cloud Platform
- 2015 SAP S/4HANA: the most modern ERP system

We strongly believe in the collaboration of all players in the agribusiness value network to sustainably feed the world with fairly produced, healthy, and affordable food. This directly contributes to the UN’s #2 sustainability goal to end hunger, achieve food security, improve nutrition, and promote sustainable agriculture. In addition, we are convinced that all players in the value chain can significantly impact many of the other development goals connected to poverty, environment, both of land and water, health, and education.
END-TO-END DIGITAL BUSINESS SOLUTION

Through our innovations and over $30 billion in strategic acquisitions, SAP has the best solution portfolio and expertise required to enable your digital agribusiness strategy. SAP is the largest cloud company with 80 million+ users and has the fastest growing solution portfolio to support the entire digital value chain. With 74% of the world’s transactions running through SAP, we are the preferred choice to turn your digital vision into reality.

- Solution management team for agribusiness
- SAP Agricultural Contract Management and Sap Commodity Management development unit
- Customer co-innovation and custom development work streams with major players in agribusiness
- Agribusiness customer council
- Strong customer and partner base in all segments along the agribusiness value chain

SAP will bring expertise, assets, and the proven methodologies required to support the development of your digital business strategy. These capabilities will be leveraged throughout SAP’s collaborative value and innovation framework.

EXPERTISE
- Solution management team for agribusiness
- SAP Agricultural Contract Management and Sap Commodity Management development unit
- Customer co-innovation and custom development work streams with major players in agribusiness
- Agribusiness customer council
- Strong customer and partner base in all segments along the agribusiness value chain

ASSETS
- Executive overview for SAP agribusiness offerings
- SAP Solution Explorer content for agribusiness
- Prototyping and Design Thinking with selected customers

METHODOLOGY
- Business case methodology
- Design Thinking
- Benchmarking
- Value partnership framework
- Co-innovation
In the digital economy, simplification and business innovation matter more than ever. SAP has a broad range of services to cover the end-to-end digital transformation journey, ranging from advising on a digital innovation road map and plan, to implementing with proven best practices, to the ability to run across all deployment models, ultimately optimizing for continuous innovation across your digital journey. SAP provides both choice and value within our services, allowing you to tailor the proper approach based on your needs.

Turn to the 30,000 consultants and support professionals who can bring your digital strategy to life. SAP’s Global Service & Support (GSS) organization provides a consistent experience — on premise, cloud, or hybrid. GSS offers the expertise, assets, and the proven methodologies required to accelerate business innovation, reduce TCO, and run a stable platform (on premise or in the cloud).

SAP Activate is a new, simplified consumption experience introduced for SAP S/4HANA and cloud adoption. It provides a combination of SAP Best Practices, methodology, and guided configuration. In addition, our leadership in learning drives quick time to value realization and a solid engagement foundation with SAP MaxAttention, SAP ActiveEmbedded, and SAP Value Partnership across the end-to-end customer lifecycle.
SAP has a strong customer and partner base in all segments along the agricultural value chain. This includes cooperatives, producers of farming input products such as agrichemical companies, machine manufacturers, growers, originators and traders, food processors and producers, and also consumer products companies. We are collaborating closely with many of these companies and partners to reimagine the agribusiness ecosystem.

We also see that industry boundaries are blurring. Our comprehensive ecosystem offers:

- A wide range of business services (transportation, banking, insurance, travel, etc.)
- Open architecture: choice of hardware and software
- Complementary and innovative third-party solutions
- Reach – partners to serve your business of any size anywhere in the world
- Forum for influence and knowledge
- A large pool of industry experts with broad and deep skill sets

Our partner ecosystem includes, among others:

**BUSINESS NETWORK**
- 2 million suppliers
- Fieldglass manages 1.5 million temporary workers/yr.
- 200 major travel partners (air, hotel, car)

**INFLUENCE FORUMS AND EDUCATION**
- 32 user groups across all regions
- 40+ industry councils
- SAP community >24 million unique visitors per year
- 2,650 SAP University Alliances

**INNOVATION**
- 1,900+ OEM solution partners to extend SAP solutions
- 2,700 startups developing SAP HANA apps

**IMPLEMENTATION SERVICES**
- 13.3 K partner companies
- 3,200 service partners
- Delivering 1,300+ industry-specific solutions

**PLATFORM AND INFRASTRUCTURE**
- 1,400 cloud partners
- 1,500+ platform partners

**CHANNEL AND SME**
- 4,800 channel partners
ADDITIONAL RESOURCES

Outlined below is additional external research that was used as supporting material for this white paper.

36. “ESA and SAP cooperate in using satellite data”, ESA, 2016 http://www.esa.int/Our_Activities/Observing_the_Earth/Copernicus/ESA_AND_SAP_cooperate_in_using_satellite_data
ADDITIONAL RESOURCES

Outlined below is additional external research that was used as supporting material for this white paper.


46. “Talking Points agriculture - Hans Joehr”, Nestlé IR, August 2013 (video) approx. 2:20 https://www.youtube.com/watch?v=Vk0cT5MyOL0


Note: All sources sited as “SAP” or “SAP benchmarking” are based on our research with customers through our benchmarking program and/or other direct interactions with customers. Note: Some images used under license from Shutterstock.com. Note: Logos contained in this document are used with the permission of SAP’s partners.