Autonomous Tractors are in Fields Today!

2019 Info Ag
Tim Norris / Smart Ag
Business Director – Eastern Region
Let me introduce you to who I am.

• I have had a passion for Ag from the time I was a little boy growing up on a 400 acre beef farm.
• I also have had a strong passion for technology.
• I was first exposed to Grid Soil Sampling in 1996 at a co-op in Illinois.
• I knew if it could work in Central Illinois, it could work wonders in central Ohio.
Let me introduce you to who I am.

• I have over 23 years of experience in Precision Ag.
• 15 years ago I started a company called Ag Info Tech.
• Farm and custom plant and harvest 1,000 acres of Corn & Soybeans in Central Ohio.
• About 4 or 5 years ago I felt that God told me he had something else instore for me, so I should prepare to be able to walk away from Ag Info Tech in 5 years.
Let me introduce you to who I am.

• So I didn’t know what he had in store for me, but I put a exit plan in motion.
• I just sold my company to two key employees at the beginning of 2019.
• About 10 days after we had decided to make this transaction happen, I received a call from Smart Ag!
• It’s amazing how Gods plans work out if you trust Him!
So Here I am, the Eastern Region Business Director US for Smart Ag

• My responsibilities are to strategically develop the dealer network for a successful commercial launch of our Autonomous Farming Platform.

• With Great Dealers like the ones we have obtained, that won’t be hard.

• The exciting part is being on the ground floor of another exciting new technology.
I want you to think back to when you first heard of auto steer

- What was your reaction?
- Did you see the need for it?
  - Many Did Not!
- How many people in this room have auto steer on your farm?
- Did you really think it would become a standard feature?
Think about Autonomous Vehicles

• What is your reaction?
• Is it different than it was for Auto Steer?
• I typically here “Not if, but when.”

• Autonomous Vehicles are Here!!!
There are several companies that have researched and prototyped Autonomous Vehicles.
John Deere ITEC Pro 2008
Fendt Guide to Connect - Trimble
Unveiled 2011 Agritechnica Farm Show
Kinze Autonomous Grain Cart Field Tested 2013
OSU Autonomous Research I saw this in 2016
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CNH Autonomous Project Unveiled 2016
DOT Technology Corp.
Limited Release 2018 & 2019
Yanmar 2018
2019 Sabanto - Custom Planting Service
SmartAg AutoCart, Beta Tested 2018
What is Smart Ag?
The autonomous platform of the future!
Executive Team of Smart Ag

COLIN HURD
Founder & CEO

MARK BARGLOF
Chief Technology Officer

JUSTIN HEATH
Chief Strategy Officer
the platform of today

AUTOCART®

smart ag autonomous farming platform
Ag Info Tech became a dealer for SmartAg

- Autonomous platform
  - AutoCart is the first software released.
  - More platforms to come.
- We had one BETA system in the fall of 2018.
Beta System Platform

- John Deere 8XXXR Series
  - 8245R, 8270R, 8295 & 8320R
- Works with Power Shift or IVT Transmissions
- Does not work with RT or 9XXX Series Deere Tractors
I am a CNH guy so I couldn’t use it on my farm!

- We had to find a tractor.
- I chose a friend who uses all John Deere and had a 8270R tractor for his grain cart.
- I was impressed with all the components and the ease of installation for a Beta product.
What does it take to make a tractor Autonomous?
Radar
Communication Antennas

• 3 modes of communication
  • Cellular
  • 900mhz.
  • Wireless
  • Bluetooth
Safety Disconnect & Remote EStop
We can control almost everything electronically

• We can control the engine, transmission and even the SV remotes can be controlled electronically.

• There is one major component that we can’t electronically control without modifications.
Brakes!!!

- That’s a fairly important process to control.
- Here is how we did it.
Electronic Extendable Brake Rods
Electronic Extendable Brake Rods
That Completes the Tractor
Combine Components
Smart NX & Free Wave
Emergency EStop & iPad
Smart Ag Ipad App Controls the Operation
Our first test of the system.

- We set a stage point to send the tractor to the other side of the field.
First Sync

• We called the tractor to sync with the combine.
Here is a video of it in Nebraska
What happens when it sees an obstacle?
The vision system utilizes AI to detect people, animals, and obstacles.

- The more data that is tagged, the smarter the system is.

20 Frames Per Second
2018 Was a Beta Year

• We had 12 systems out in the field.
• We learned a lot!
What are we doing in 2019?

• We have a system in Michigan that is getting ready to run this week in Cucumber and then Sugar beet harvest.
• We also have one installed on a combine in a Wheat harvest crew and we are following it as it works its way north.
• Then in September we will have 10 to 15 additional systems in the field.
• We intend to have a full commercial release of the system in April of 2020.
• Price is yet to be determined but estimated around 50K
Autonomy the next step

• Getting the tractor autonomous is the first step.
• We also have to have the implements autonomous as well.
• Precision Planting planters are very close, but not quite ready.
Autonomy the next step

• I feel size will be different in different parts of the country.
• I see larger implements, similar to today's equipment out west and much smaller implements in the east and mid-west.
Autonomy the next step

• I feel the implements themselves will be compact and we can haul 3 or 4 of them to the field on a semi.

• I think the implements will all be connected to the cloud and run by a common controller.

• AI will be utilized on the implements to detect mechanical problems, nutrient deficiencies, weeds or pests.
Needs that I hear from farmers

• It’s hard to find good seasonal help.
• I have too many jobs that need to be done all at once.
  • Autonomy will reduce the amount of help that you need.
  • It will allow an operator to perform more jobs at once.
Needs that I hear from farmers

• My planting window is way too small.
• I need to get more done in a day.
  • Autonomous equipment never tires and in the future can run 24 hrs. a day allowing you to get more done in a day and in the optimum window for harvest or planting.
  • Using more smaller machines could be more efficient than using one larger machine.
Needs that I hear from farmers

- I can’t find right conditions to spray.
  - With autonomy the system can wait at the field until conditions are correct.
  - Small autonomous systems can spray when it’s too wet for a traditional sprayer.
Needs that I hear from farmers

• I am compacting the soil with this large equipment.
  • With autonomy we can utilize smaller machines which will create much less compaction.
Needs that I hear from farmers

• I need to make more profit.
  • Reducing/Reallocating labor will either reduce cost or improve efficiency.
  • Coupling AI with autonomous implements can greatly reduce input costs and maximize yields.
People Fear New Technology. Some fear is good but don’t dismiss the idea.

- I remember hearing that people were saying they wouldn’t trust hydraulic steering or hydraulic brakes.
- I remember people not wanting Auto Steer.
- I know people are worried about autonomy.
- I actually think it will be safer and way more efficient than humans.
Summary

• Autonomy is a reality in Ag
• I feel it will be a mainstream technology in as little as 10 years.
My Father Clyde Norris

- 1911 - 2007
- Farmed with horses growing up.
- Saw my tractor with Auto Steer before he died.
I never thought I would see the changes in agriculture that he saw!

I now think I will see even greater changes!
Thanks for your Time!

• We will have a booth and be doing a live demos at the Farm Progress Show in August.

• We will have a display at Ag Info Tech’s and Precision Agri Service’s booths and doing field demos at the Farm Science Review in September.

• Thanks for your Attention!