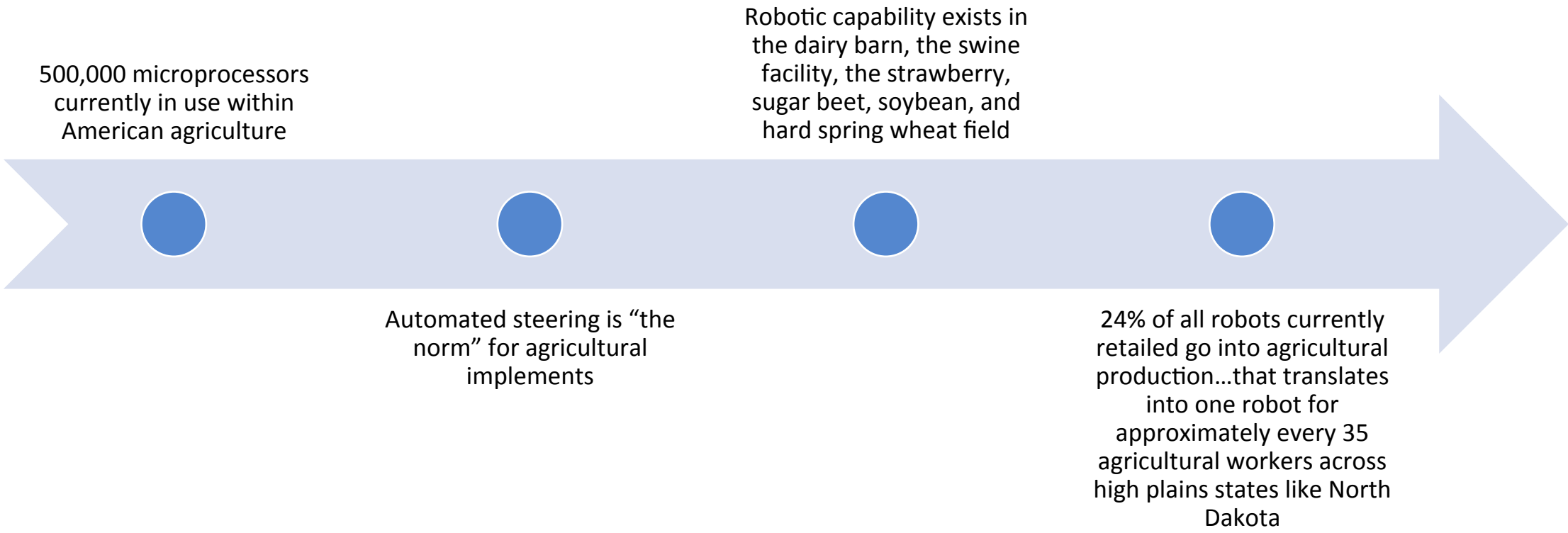
The Future of Agriculture

Or

“The Automation of On-farm/Ranch Production”

Today's Context:



But…there is another context to this dimension:

- The leading agent of untimely death among agricultural producers in North Dakota is machinery
- The leading agent of non-fatal agricultural injury in North Dakota is the interaction between humans and livestock
- Farm/ranch size per operator has grown dramatically since 1980 while the total number of economically viable agricultural enterprises has shrunk to its smallest number in American history

What are the dimensions of current U.S. agricultural production?

- Approximately 330,000 farms and ranches produce 85% of all fiber, food, and biofuel in the U.S.
- The average operating size of a farm/ranch on the northern high plains is 5,500 acres
- The average annual operating loan for this farm/ranch is $1,650,000
- Virtually all are “connected”

What is meant by “connected”?

- All entities employ fiber optic or satellite communications
- Inputs are typically sourced regionally
- Equipment repairs are totally dependent upon visual recognition and fault code analysis
- Field agronomy and crop science decision-making is dependent on satellite imagery (limited use currently of unmanned aerial vehicles)
- Robotized technology performs crop protection activity, weed removal, and livestock tracking
- Harvesting technology is trending toward automation and robotic control

This has all been enabled due to convergence of…

- Availability of new steels, plastics, ceramics, and composites for the manufacture of machine components
- Visual componentry (keen and miniaturized optical sensing,)
- Touch sensing
- Sophisticated software with integrated detection, learning and communication modules
- Agricultural task standardization

What has been the result?

- The American farm or ranch of today harnesses the “Internet of Things” into its production activity, linking microprocessors and other devices on the farm/ranch to one another in real time (agricultural kinematics), and via the internet to input suppliers, repair vendors, and production output destinations such as grain terminals, livestock feedlots, or biofuel processors.
- For an American or Canadian agricultural producer, the goal is to automate so as to eliminate “down-time”. This is accomplished by connectivity…machines monitor themselves, spotting potential problems before they emerge.

Robotic Milking!

These tasks are performed by this robot…

- Individual teat preparation/cleansing
- Teat fore-stripping stimulation
- Cup attachment to each teat
- Milking
- Post-milking dipping
- Automatic removal
- Automatic back-flushing between individual cow milkings
- Automatic reading of the RFD neck tag
- Automatic dispensing of feed specifically formulated for each cow

Farming/Ranching Sustainably…Means that Producers must:

- **Create capital and preserve it,**
- **Preserve operator/employee time, and**
- **Cultivate environmental sensitivity.**

Here is today…