

Adopting Modern Technology for Improved No-Till Profits

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19th Annual National No-Tillage Conference

Cincinnati, Ohio * Jan. 12-15, 2011



We're Not at the End of the Earth.



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- I farm with my father, uncle and two employees in Northwest Kansas and Southwest Nebraska.
- Low annual rainfall (21in.), low humidity and wide seasonal and diurnal temperature variations. Typical High Plains climate.
- Our soils are mostly deep, silt loams.

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- Traditionally a wheat-fallow, full conventionally tilled area.
- No-till was introduced in the late 1980's and today dominates the landscape.
- We are on the edge of continuous no-till cropping (removing all long “summer” fallow periods)

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- Modern Rotations
 - Wheat, corn, milo, fallow
 - Wheat, corn, milo, yellow peas
- Like most, our family has always adopted new technology (although sometimes while kicking and screaming).
- We spend considerable time researching, evaluating and integrating new technologies.



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- Modern Technology comes in to play in all aspects of our farm.
 - Business management (computers, software)
 - Communications (smartphones, internet)
 - Equipment (machine control, yield monitors)
 - Logistics (spreadsheets, maps, remote access)
 - Agronomy (no-till, VRT fertilizer, research)
 - Marketing (fancier dart board with digital display)

OK, enough fluffy stuff; lets get rolling



History

- Technology adoption is as much a part of agricultural history as are the crops we grow.
- Example of technological gains:
 - In 1830, 300 man hours were required to obtain 100 bushels of wheat
 - 100 years later, it only took 20 hours!



History

- Technology adoption in agriculture has been the primary driver in achieving the world we find ourselves in today.
- Technology adoption never seems as overwhelming in “real-time” as it does looking through historical goggles.



Technology

- Definition: The application of science to industrial or commercial objectives.
- Broadly, agricultural technologies are those processes, systems or machines that impact production agriculture.
 - Lower costs or increase revenues



Technology

Technology adoption requires an investment of both labor and capital; so, the natural question is:

Will it Pay?



Technology

- How much is the investment?
- How fast is the payback or return on the investment?
- How confident am I that this will happen?



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Types of Technology Adoption



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- Obvious (belly-button) technologies
 - Small \$ advantage but easy to assess
 - Quickly capitalized into land
 - Can't distinguish managers (all use it)
 - Small but sure gains mean fast adoption
 - Must adopt, but not long run profit enhancing
 - Auto Guidance, RR beans, Section control

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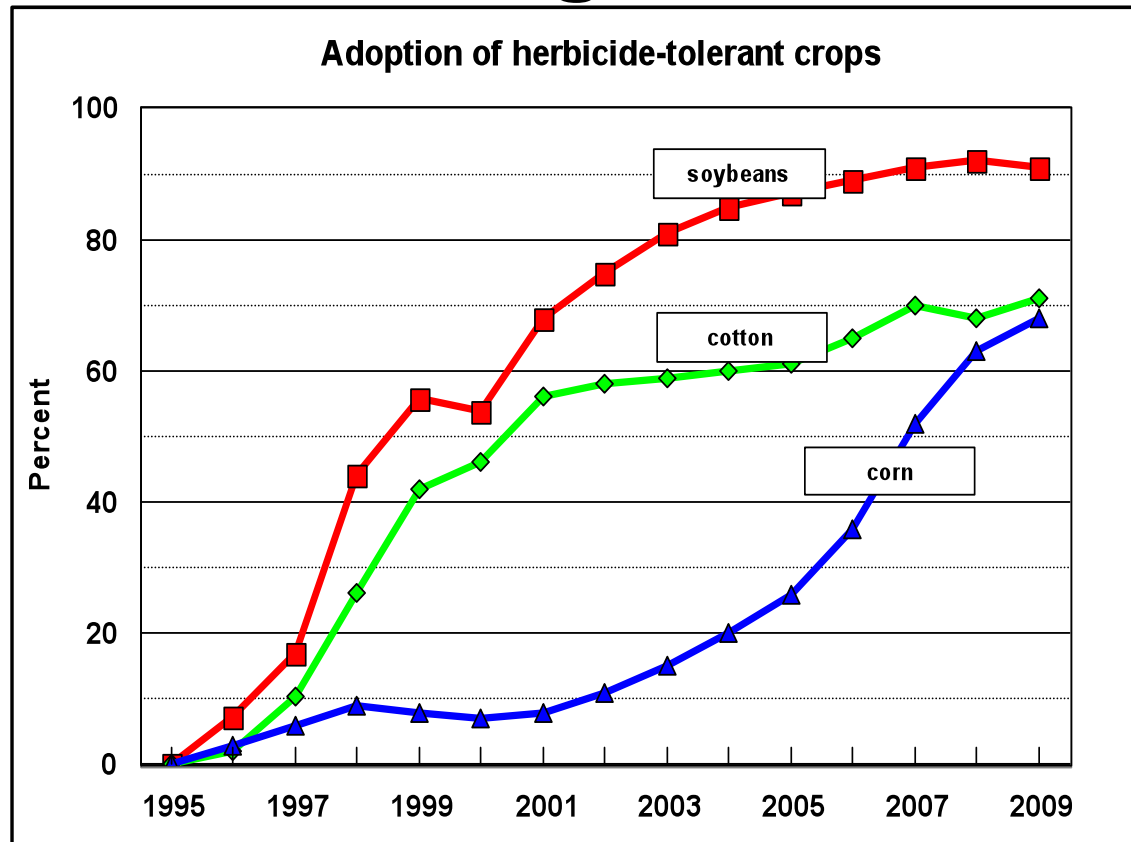


- Less-Obvious Technologies
 - \$ advantages may not be evident early
 - Requires significant investment in manager education, labor, capital
 - Requires long-term commitment
 - NOT capitalized into land quickly
 - Adopting managers have an edge for years
 - Tractors, fertilizer, no-till, VRT

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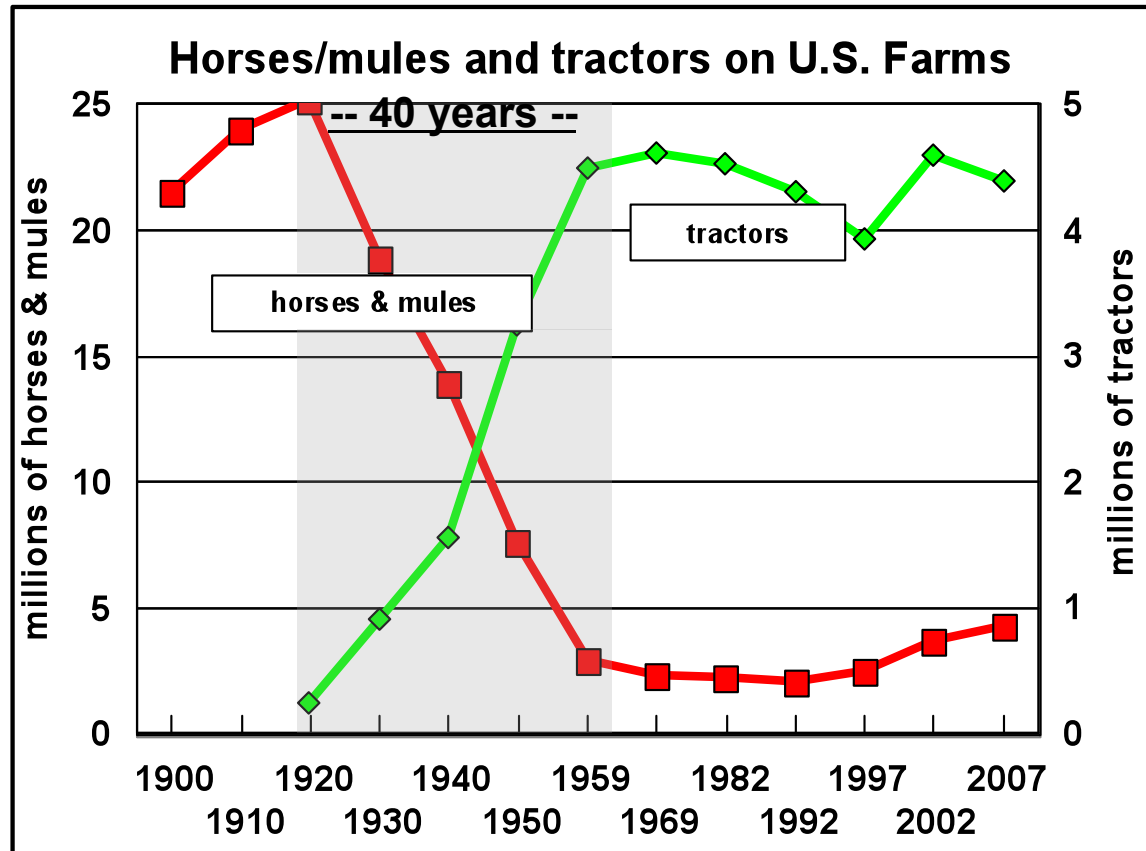
Some technologies are obvious



Source: USDA/ERS



Some technologies are NOT



Source: U.S. Census of Agriculture



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Some technologies are “in-progress”

Moldboard plow (pre-1930)



One-way disk plow (1930-1960)



Undercutter, sweep, v-blade (1960-2000)



Sprayer (2000+)



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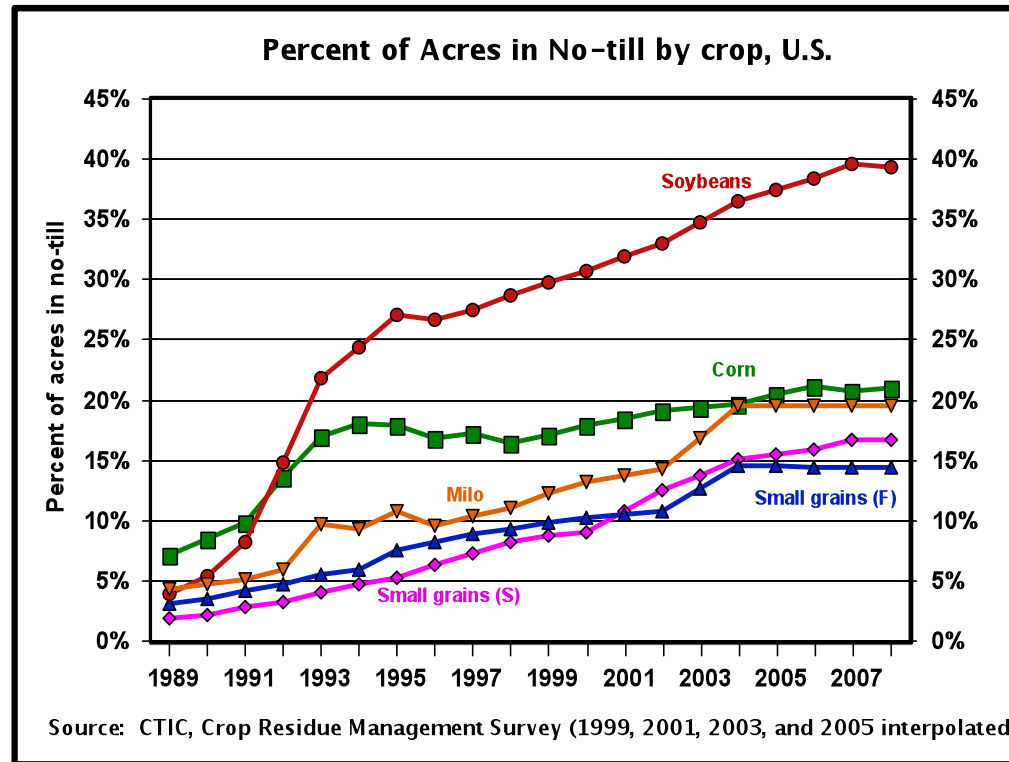


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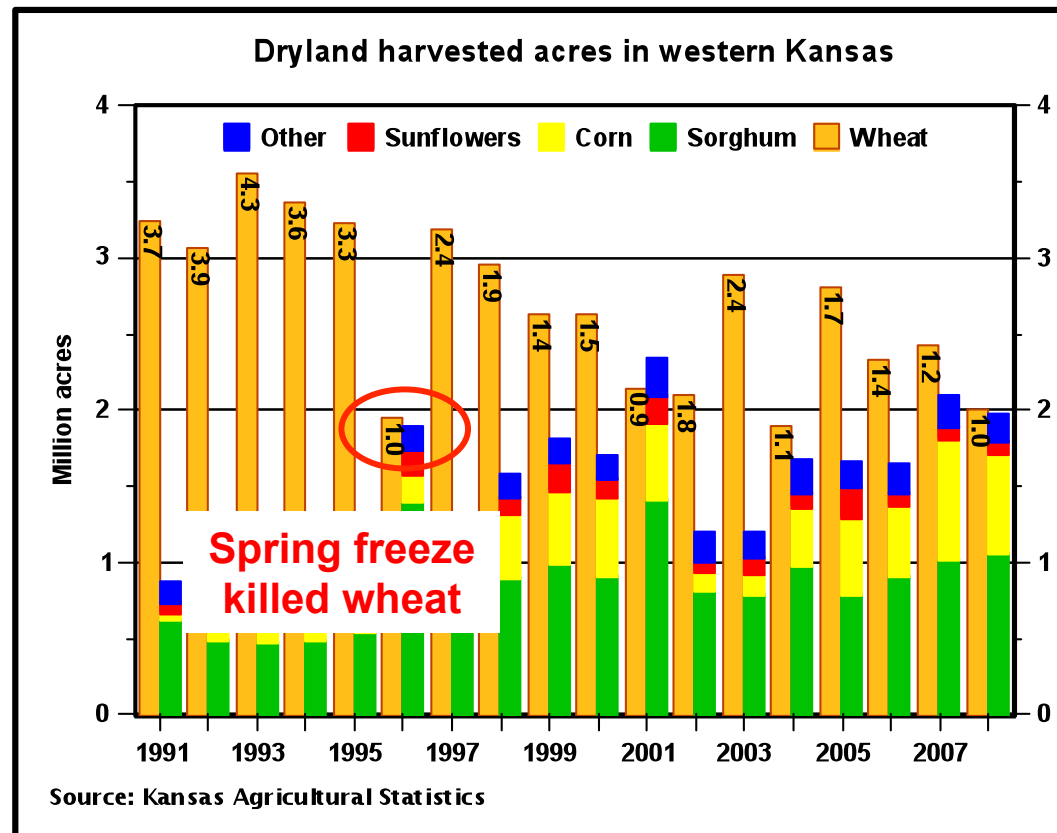
Some technologies are “in-progress”



... but, more prevalent with corn and soybeans than wheat.



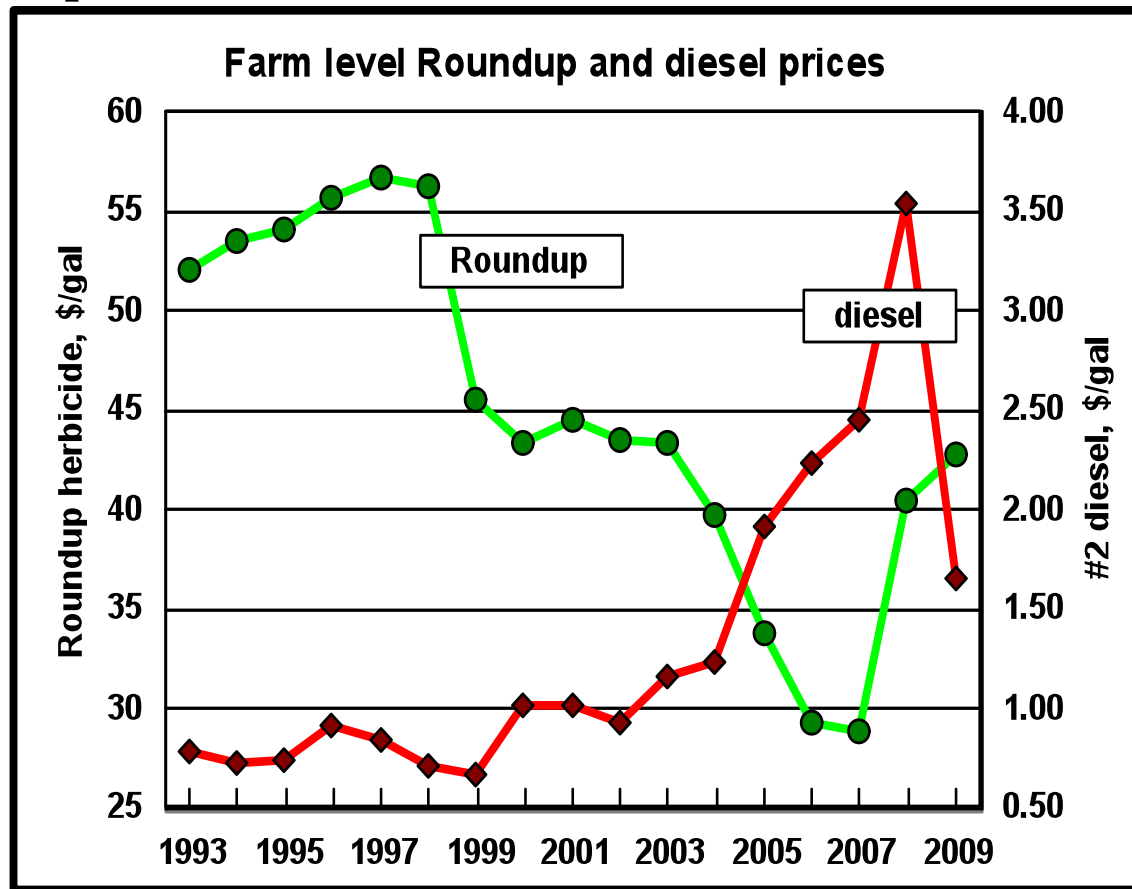
Unexpected factors drive adoption



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Unexpected factors drive adoption



Adoption Obstacles Less Obvious Technologies

- Labor intensive
- Endless possibilities
 - Mental overload and un-attained goals
- Managers wish they could analyze data better
 - Lack of education or training
 - Can't find trustworthy people to do it for them



Adoption Obstacles Less Obvious Technologies

- Who is going to “figure this stuff out”
 - Someone is going to learn new skills,
 - Going to bring new skills in-house
 - Going to “farm” out these kinds of activities
- How will the technology be evaluated?
 - Wait for University
 - On-farm or in-house research



Adoption Obstacles Less Obvious Technologies

- Adoption of these technologies will not happen quickly (or will they?) like with “belly button technologies” but rather will occur in small steps gradually over a long time frame.



Less Obvious Technologies

Think about the slow adoption of tractors or fertilizer

- It took decades to get these technologies fully adopted
- History shows us that those farms using horses in the late 1940's and early 1950's ARE NOT in business today
- Precision Ag and Notill technologies are following a similar adoption curve.



Early Adopters Get The Profit

- New technologies are constantly being bid into land values and rents
- Rents rise and folks have to adopt just to breakeven
- Non-adopters don't break even, they find themselves fading away as they are unable to expand due to higher land costs.

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Early Adopters Get The Profit

- It is almost as though land markets anticipate new technologies
- Government Programs could be tied to site-specific adoption (Think about CSP, or N in Europe)

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Late Adopters Adopt for Survival

- Late adopters adopt for survival
 - Trade-off, can skip certain steps of adoption (light bar vs. auto-steer). Timing risk
- Early adopters adopt for profit
 - Trade-off , higher risks when on the cutting edge

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Late Adopters Adopt for Survival

- Speed of adoption is important only relative to your neighbors
- Neighbors, in this case, include anyone who will be competing with you for land and resources

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Technology and Farm Size

- Large farms adopt technology more quickly
 - Because of investment (economies of size)
- If technologies come out ever faster, then farms will get larger ever faster
- Rapid growth in farm size may become the norm
- End result (intended or not): consolidation



Scale Neutral Technologies?

- Roundup-ready soybeans?
- Robotic milkers
 - A robot station is rated at 60 cows
 - Will I get a discount if I buy multiple robots?
 - New semi-robots coming out for large dairies
- Farm machinery
 - Maxes out at some size so is it scale neutral beyond?
 - Multi-unit discounts?
 - Multi-unit tracking and servicing?



How Do I Know?

- How to I know what to adopt and when to adopt it?
 - Most fast moving (obvious) technologies become evident quite quickly after release.
 - Most slow moving (less-obvious) technologies have already been with us for years and are readily identified.
- For folks that like to be on the cutting edge, this can be an annual challenge with the potential “obvious” technologies coming at us each year.



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- Think SCIENCE
 - No magic
 - Stay away from foo-foo dust
- Think MARKETS
 - If the returns sound too good to be true they probably are
- Think ENGINEERING
 - What will the technology actually do?
 - What is a technology's potential (opportunity)?

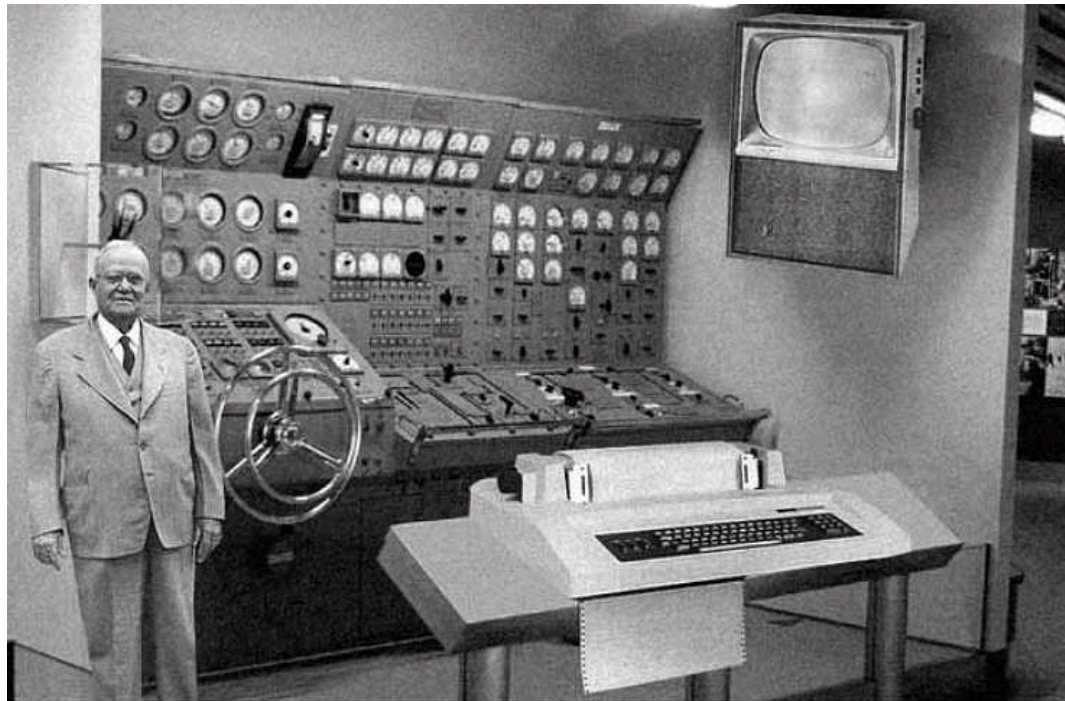


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Predicting technologies isn't easy



Scientists from the RAND Corporation have created this model to illustrate how a "home computer" could look like in the year 2004. However the needed technology will not be economically feasible for the average home. Also the scientists readily admit that the computer will require not yet invented technology to actually work, but 50 years from now scientific progress is expected to solve these problems. With teletype interface and the Fortran language, the computer will be easy to use.

Popular Science, 1954

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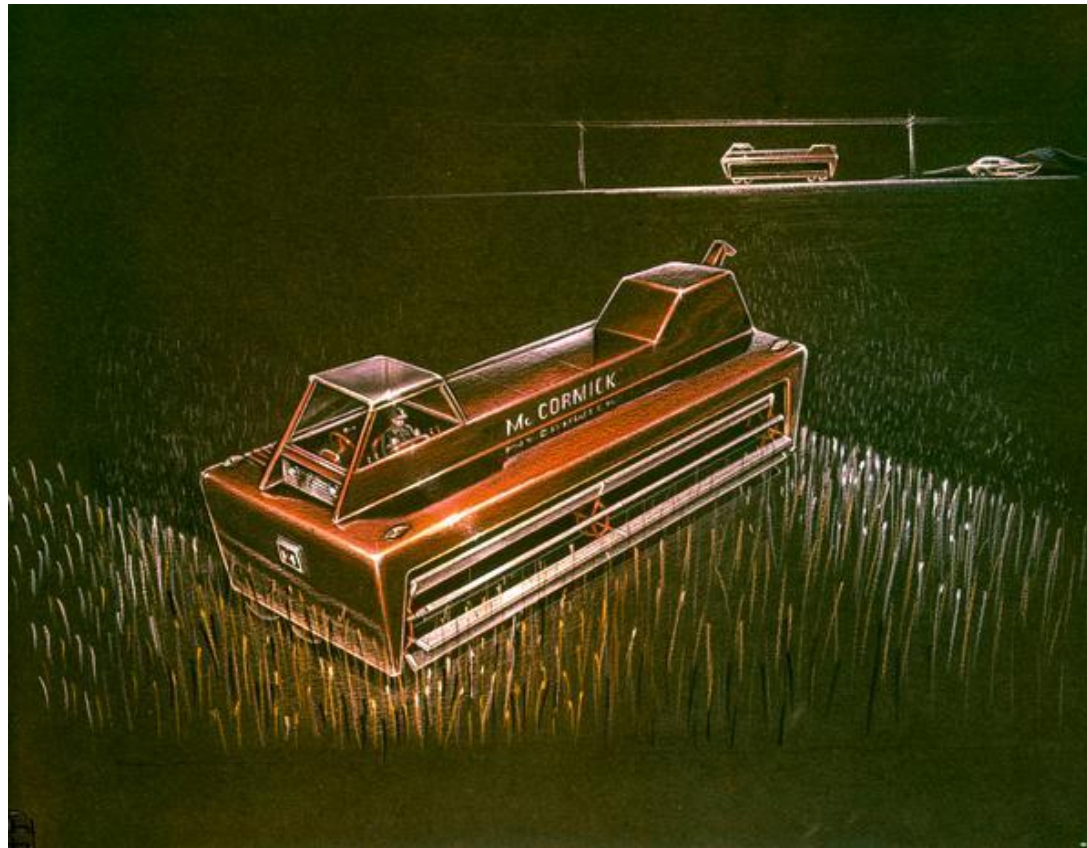


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1960 Oliver future tractor (bubble cab, retractable ladder, auto gate opener)

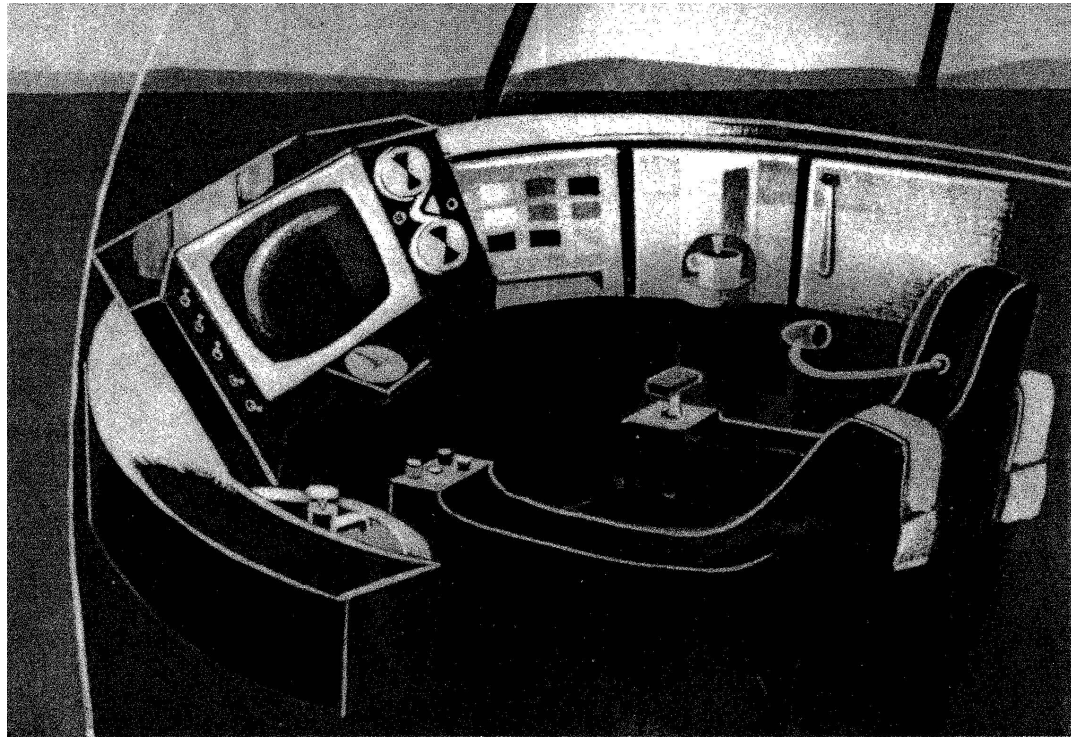


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Predicting technologies isn't easy



COMFORTABLE CAB. Predictions from Ford also indicate tractors of the future will be distant cousins of today's farm vehicles and their cabs will be just as advanced. This illustration depicts the cab of a tractor projected for the year 2000. Starting at the driver's right, and moving left, are a refrigerator, coffee maker, food warmer, a television set which is connected either to the farmer's headquarters or to other vehicles, there's even a sink. All controls are within arm's length of the driver so he can perform his jobs quickly and easily. This illustration is from "Agriculture 2000," a study conducted by Ford Motor Company's U. S. Tractor and Implement Operations to project the look of agriculture at the turn of the century.

Courtesy, Ford Tractor Co.

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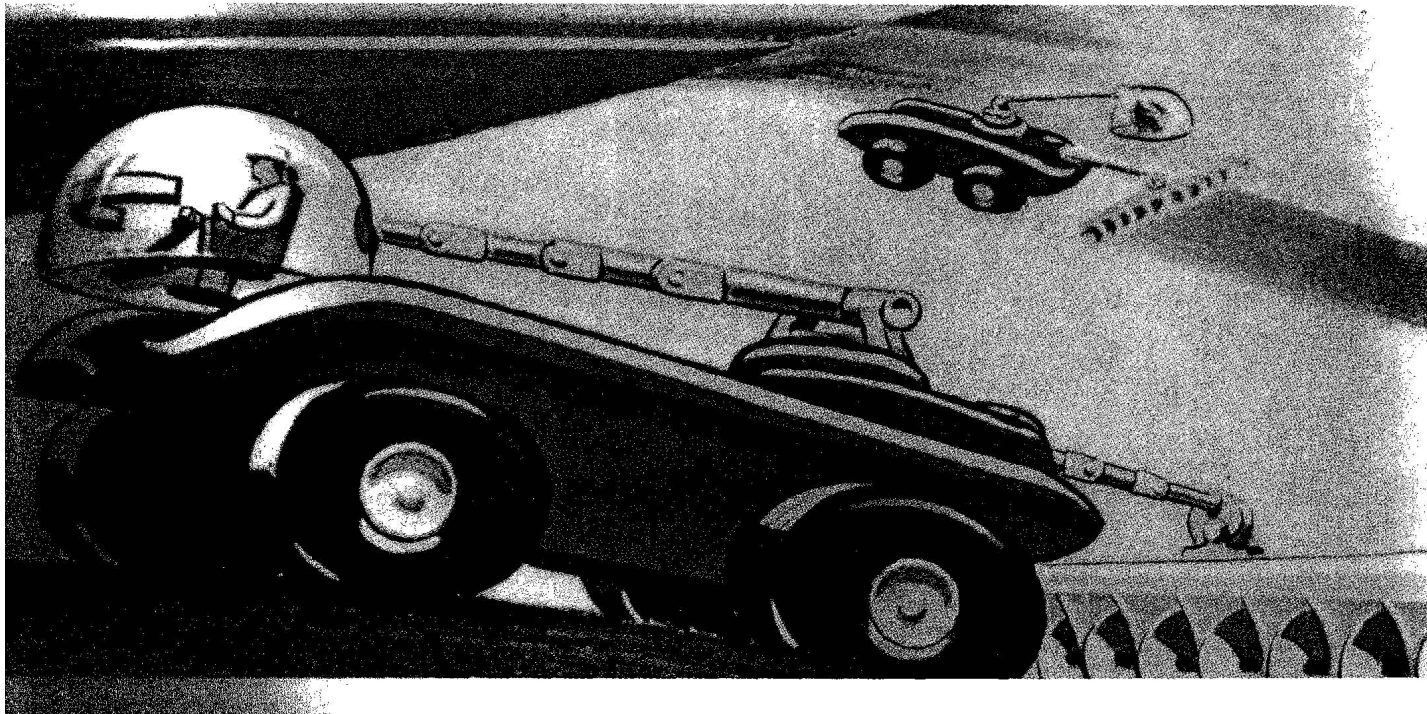
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TRACTORS THAT DON'T LOOK LIKE TRACTORS. Another look at what tomorrow's tractors will look like came from the Ford study. The artist's conception shows an air-conditioned bubble-type cab that can be moved back over the equipment to check any problems.

Courtesy, Ford Tractor Co.



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What 2000 will look like from vantage point of 1960s



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Predicting technologies isn't easy



I guess New Holland things we'll be farming on Mars in the future

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Technology: how to get an edge

- Invest in the “duh” technologies quickly
 - You don’t have a choice
- Invest in the slow moving technologies
 - The profits will last for years
- Invest in technologies that DO NOT save labor
 - Most people do not; hence the gains last for years



Technology Adoption

- Don't ignore new technologies because they seem to be only "luxuries". True luxuries (like \$50,000 farm pickups) DON'T make money.
- Evaluate technology on what it can gain you. There are lots of spreadsheets and discussion forums out there to help evaluate this stuff.



Technology Adoption

- Don't get behind on the fast adopting technologies. Gains in production efficiency are bid into rent quite quickly these days.
- Who on your farm is going to take the “lead” on discovering, evaluating and integrating new technologies?



Technology Adoption Resources

- University resources like
 - www.agmanager.info (Kansas State University)
- Private organizations like
 - www.ksagresearch.com (Kansas Agricultural Research Assoc.)
- Public discussion forums like
 - talk.newagtalk.com
 - <http://www.no-tillfarmer.com>



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Questions?



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