AGRICULTURE PRECISION FARMING: WHO OWNS THE PROPERTY OF INFORMATION? IS IT THE FARMER, THE COMPANY WHO HELPS CONSULTS THE FARMER ON HOW TO USE THE INFORMATION BEST, OR THE MECHANICAL COMPANY WHO BUILT THE TECHNOLOGY ITSELF?

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I. INTRODUCTION

For many years, farmers used their own judgment and guesswork to guide their tractors. This judgment and guesswork as based on the bushels they brought to the mill and their own manual movements to guide their tractors, until precision farming technology began in the 1960s.[1] "Precision farming is a method which links information about growing conditions to sophisticated, computer-run farm equipment, which allows farmers to treat areas within a single field differently."[2] Precision farming uses tools such as yield mapping and global positioning systems (GPS) to gather information which allows the farmer to make informed decisions for next year's season.[3] The computer systems which power precision agriculture "have been programmed with the exact parameters of all fields and are synced up with one another . . . . [T]he seed drill knows what last year's harvest was from each inch of land, thanks to data recorded by the combine, and can seed and apply fertilizer accordingly."[4]

Precision agriculture has been noted as one of the top technological advances in engineering of the twentieth century.[5] Precision farming originated with the geographic information system (GIS), and has advanced the guidance systems and variable rate technique through technological development technology.[6] Consequently, the information provided by the technology is valuable; not only to farmers, but to co-ops, and seed companies.

This information can be used to help farmers "find patterns not visible to the naked eye and make better decisions."[7] As a result, farmers can make better decisions and obtain higher profit margins for next year's season. However, it could

1. Terry Brase, *Online Companion for Precision Agriculture*, DELMAR CENGAGE LEARNING, http://www.delmarlearning.com/companions/content/140188105X/trends/introduction.asp (last visited Feb. 10, 2015).

2. J. Kim Kaplan, et al., *High-Tech Fattens the Bottom Line*, AGRIC. RES., Apr. 1996, at 4, *available at* http://www.ars.usda.gov/is/AR/archive/apr96/tech0496.pdf.

3. *See* Brase, *supra* note 1.

4. Chrystia Freeland, *The Triumph of the Family Farm*, THE ATLANTIC, June 13, 2012, *available at* http://www.theatlantic.com/magazine/archive/2012/07/the-triumph-of-the-family-farm/308998/.

5. Peter Murray, *Precision Agriculture – High Technology Invades the Farm*, SINGULARITY HUB BLOG (Mar. 13, 2011, 9:11 AM), http://www.singularityhub.com/2011/03/13/precision-agriculture-high-technology-invades-the-farm/.

6. *See* Brase, *supra* note 1.

7. Christy Couch Lee, *Data's Double Edged Sword*, FARM FUTURES, Mar. 2013, at 26, *available at* http://www.farmfutures-digital.com/farmfutures/201303?pg=26#pg26; *see* USDA NAT. RES. CONSERVATION SERV., CONSERVATION PRACTICES THAT SAVE: PRECISION AGRICULTURE (2006), *available at* http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_023626.pdf (detailing cost savings, increased yields, and

also give certain companies access to information which could be used for other purposes.[8] Once the information is released to a company without a confidentiality agreement or any privacy document, it is permanently available for anyone to view.[9] Farmers who generate such data are recommended to sign a contract (with the counsel of an attorney) before releasing such sensitive information, but this protection may not be enough.[10] The act of sharing precision agriculture data raises the question of control.[11] An inventor does not expose how he created his invention, because it would create the risk of his work being duplicated or redistributed.[12] Data from precision agriculture travels over wires and electric waves, and is therefore "hard to control since their use is dependent on third party infrastructure and software."[13] Only certain companies, such as John Deere, have a "guarantee" for farmers that their precision agriculture technology data is private and will not be released to retailers.[14] Monsanto recently purchased Precision Planting, an Illinois corporation, to increase their efforts to expand beyond seed technologies.[15] Many farmers are worried this new technology will be used to take advantage of them for the benefit of Monsanto.

This article analyzes the data privacy rights of farmers who engage in precision agriculture. Part II provides a detailed background, description, and history on precision agriculture technology. Part III will discuss the importance of the information provided by precision agriculture. Part IV will detail the current efforts of companies to keep the ownership of data held privately by farmers. Comparatively, Part V explores the issues which arise with farmers and the agriculture companies' confidentiality agreements. Further, Part VI addresses the possible solutions to problems with data privity and confidentiality agreements which will keep data rights with the farmer. Additionally, part VI discusses the policy and implementation of government policies and legislation. Part VI contemplates an

environmental benefits when advance technologies are used to aid farmer's decision-making with "nutrient and pesticide application, tillage and irrigation.").

8. *See* National Research Council, *Precision Agriculture in the 21st Century: Geospatial and Information Technologies in Crop Management* 108-109 (Washington DC: The National Academies Press 1997) (noting the concern with misappropriation and data rights).

9. *See id.* at 109.

10. Lee, *supra* note 7

11. Joseph Russo, *Data Privacy, Ownership in Precision Agriculture*, PRECISIONAG (Sept. 3, 2013), http://www.precisionag.com/opinion/joe-russo/data-privacy-ownership-in-precision-agriculture/.

12. *Id.*

13. *Id.*

14. Lee, *supra* note 7.

15. *See* Ian Berry, *Monsanto Buying Precision Planting*, DOW JONES NEWSWIRE, (May 23, 2012, 8:09 AM), *available at* http://www.agriculture.com/news/business/monsto-buying-precision-plting_5-ar24245.

effective solution and means of improving the data privacy in regards to precision agriculture with the Precision Agriculture Information Protection Accountability Act (PAIPAA). Part VII concludes with insight into precision agriculture and a projection of its future.

II. THE BACKGROUND, HISTORY, AND DESCRIPTION OF PRECISION AGRICULTURE TECHNOLOGY

Before engaging in any discussion of the legal issues and current policies regarding precision agricultural data rights, it is important to understand the history of the tools, how they work, and their background. The legal issues cannot be appreciated without this knowledge and understanding.

A. Description and Workings of Precision Technology

There are several tools used in precision agriculture, but there are only five major tools of technology: yield mapping, guidance and global positioning systems (Global National Satellite System, GPS), variable rate technology (VRT), controlled traffic farming (CTF), and geographic information systems (GIS).[16]

1. Yield Mapping

The first important technology to understand is yield mapping. For farmers, the purchase and use of a yield monitor is often the first step into the field of precision farming.[17] Before yield mapping was available farmers manually calculated their bushels per acre by weighing the amount of grain from the field and factored in variables such as moisture and field size.[18] Yield monitors are precision tools made up of a series of electronic sensors and a computer which, when coupled with a combine, are able to gather, calculate, display, and record crop yields in real time during harvest.[19] As the combine works the field, the yield monitor will show the

16. *See* Brase, *supra* note 1; *Controlled Traffic Farming*, PRECISIONAGRICULTURE.COM.AU, (2013), http://www.precisionagriculture.com.au/controlled-traffic-farming.php (last visited Feb. 10, 2015).

17. *See* JoAnn Hays, *First Hands in Technology*, SUCCESSFUL FARMING, Dec. 1996, at 43; MARK MORGAN & DAN ESS, THE PRECISION FARMING GUIDE FOR AGRICULTURISTS 30 (John E. Kuhar ed., John Deere Publishing 1997).

18. MARK MORGAN & DAN ESS, THE PRECISION FARMING GUIDE FOR AGRICULTURISTS 30-1 (John E. Kuhar ed., John Deere Publishing 1997).

19. *See* DAVE FRANZEN, ET AL., YIELD MAPPING AND USE OF YIELD MAP DATA (N.D. State Univ. Extension Office 2008), *available at*

farmer approximately how many bushels per acre are harvested.[20] The yield monitor is also useful for developing nutrient strategies so nitrogen for application of nitrogen so that it can be applied effectively to maximize harvest yields for the next year.[21]

2. Geographic Information System (GIS)

The Geographic Information System uses multiple components to develop its analysis, including: maps, photographs, field observations, topography, testing results, climate data and previous agronomic data.[22] This information and data are combined and processed together to provide serviceable information.[23] The GIS "is about collecting timely geospatial information on soil-plant-animal requirements, and prescribing and applying site-specific treatments to increase agricultural production and protect the environment."[24] The GIS provides a way to combine the vast amount of data in a way which is easy to understand and utilize.[25]

3. Global Positioning System (GPS)

"Global Positioning System (GPS) receivers provide a method for determining location anywhere on Earth."[26] GPS was originally developed by the United States Department of Defense, and utilized twenty-four satellites in orbit 11,000 miles above the Earth.[27] GPS was first initiated in 1973, and was developed to

http://www.ag.ndsu.edu/pubs/plantsci/soilfert/sf1176-3.pdf (last visited Feb. 28, 2015).

20. *Id.*

21. *Id.*

22. Michael Rasher, *The Use of GPS and Mobile Mapping for Decision-Based Precision Agriculture*, ASIAN GPS CONFERENCE 2001, *available at* http://www.geospatialworld.net/paper/application/ArticleView.aspx?aid=120 (last visited Feb. 28, 2015).

23. *See id.*

24. NAT'L COORDINATION OFFICE FOR SPACE-BASED COORDINATION, NAVIGATION, AND TIMING, OFFICIAL U.S. GOVERNMENT INFORMATION ABOUT THE GLOBAL POSITIONING SYSTEM AND RELATED TOPICS, http://www.gps.gov/applications/agriculture/ (last modified Nov. 25, 2014).

25. *See* Rasher, *supra* note 22.

26. DONALD PFOST ET AL., PRECISION AGRICULTURE: GLOBAL POSITIONING SYSTEM (GPS) 1 (Univ. of Mo. Extension Serv. 1998), *available at* http://www.extenstion.missouri.edu/explorepdf/envqual/wq0452.pdf.

27. Lori Keesey, *Navigator Technology Takes GPS to A New High*, NASA (Apr. 9, 2010), http://www.nasa.gov/topics/technology/features/navigator-gps.html.

facilitate troop movements.[28] In 1995, GPS was made available for public use, free of charge.[29]

GPS allows farmers to automatically record data in the fields as they are working.[30] GPS, along with variable rate technology, can be combined to apply variable rates of inputs to smaller areas within larger fields.[31] Guidance systems and auto-steering, which use GPS data to notify farm equipment operators of their exact field position, have become increasingly popular tools for farmers because of their potential to relieve fatigue and reduce error.[32] The increased accuracy of input application makes GPS an efficient way for farmers to yield higher profits.[33]

4. Variable Rate Technology (VRT)

Variable rate technology (VRT) is also referred to as variable rate application (VRA). VRT allows farmers to apply different rates of fertilizer at different locations across their fields.[34] "VRT combines a variable rate control system with application equipment to apply inputs at a precise time and/or location to achieve site-specific application rates of inputs."[35] Instead of covering the field with a uniform amount of seed, fertilizer, or herbicides, this technology assists farmers in

28. Jay Snivley, *GPS History – How It All Started*, http://www.maps-gps-info.com/gps-history.html (last updated May 3, 2011).

29. *Id.*

30. Pfost, *supra* note 26.

31. *Id.*

32. James Taylor & Brett Whelan, *A General Introduction to Precision Agriculture*, Grain Research and Dev. Corp. 2 (Australian Center for Precision Agriculture), *available at* http://www.agriprecisione.it/wp-content/uploads/2010/11/general_introduction_to_precision_agriculture.pdf (last visited Feb. 10, 2015); *see* ROBERT EBEL & DAVID SCHIMMELPFENNIG, THE INFORMATION AGE AND ADOPTION OF PRECISION AGRICULTURE, USDA ECON. RESEARCH SERV (2011), *available at* http://www.ers.usda.gov/amber-waves/2011-december/the-information-age.aspx#.VNqVAuPZ_gl.

33. *See* Taylor & Whelan, *supra* note 32; ROBERT EBEL & DAVID SCHIMMELPFENNIG, THE INFORMATION AGE AND ADOPTION OF PRECISION AGRICULTURE USDA ECON. RESEARCH SERV. (2011), *available at* http://www.ers.usda.gov/amber-waves/2011-december/the-information-age.aspx#.

34. *Variable Rate Technology*, N.D. STATE UNIV. EXTENSION SERVICE, http://www.ag.ndsu.edu/agmachinery/precisionagriculture/variable-rate-technology (last visited Feb. 10, 2015). [hereinafter VRT NDSU].

35. *Variable Rate Technology*, ALABAMA COOPERATIVE EXTENSION SYSTEM, http://www.aces.edu/anr/precisionag/VRT.php (last visited Feb. 10, 2015).

determining the right amount to spread on each plot of the field.[36] Once a machine is properly equipped with VRT and GPS, the machine can draw upon the farm map created by GIS and apply a predetermined amount to each acre of the field.[37]

5. Controlled Traffic Farming (CTF)

Lastly, controlled traffic farming (CTF) reduces the input costs—time, fuel and machinery—while increasing yield results.[38] "Both of which are done sustainably and increase farm profit."[39] CTF "involves confining all field vehicles to the least possible area of permanent traffic lanes;" tractors follow the same wheel tracks for every operation.[40] This system "avoids the extensive soil damage and costs imposed by normal methods."[41]

B. Background and History

The development of precision agriculture technology started in the 1960s.[42] The fundamental concept of precision agriculture was "collecting data and making decisions based on that data."[43] The first version of agriculture technology was geographic information system (GIS).[44] In turn, the advances in precision agriculture became more and more relevant. These technological tools include yield monitors, GPS mapping, controlled traffic farming, light bar row aligner, guidance system, and the variable rate technique.[45]

Around 1990, the NAVSTAR Global Positioning System (GPS) became available for a limited number of farmers.[46] In 1993, the NAVSTAR GPS was fully operational, and allowed farmers to view and utilize precision monitoring and mapping of yield results while harvesting in the field.[47] The light bar system was, a part of the NAVSTSAR GPS, used to indicate the accuracy of the line of travel

36. *See* VRT NDSU, *supra* note 34.
37. *See Id.*
38. *What is CTF?*, CONTROLLED TRAFFIC FARMING EUROPE (2013), http://www.controlledtrafficfarming.com/WhatIs/What-Is-CTF.aspx.
39. *Id.*
40. *Id.*
41. *Id.*
42. Brase, *supra* note 1.
43. *Id.*
44. *Id.*
45. *Id.*
46. Taylor & Whelan, *supra* note 32.
47. *Id.*

in row spacing.[48] The early majority of farmers used this tool because it was much less of a risk, easier to operate, and provided more comfort for farmers.[49]

Since 1999, NAVSTAR has added additional satellites, and has made advances in the Global National Satellite System.[50] "Guidance systems and auto-steering, which use GPS data to notify farm equipment operators of their exact field position, have become increasingly popular and were used on roughly 35 percent of U.S. wheat acreage in 2009."[51]

These advances have helped farmers use machinery guidance in their tractors and combines, in auto steering, and in controlled traffic farming (CTF).[52] CTF has provided many benefits.[53] These benefits include: "sustainable benefits (such as minimization of soil compaction); economic benefits (by minimizing input overlap and improving timeliness of operations); and social benefits (such as reducing driver fatigue)." Additionally, CTF increases the accuracy of row spacing.[54] CTF eventually became more advanced, and in turn these tools are now more accessible, smaller, easier to use, and available at a lower cost.[55] Due to all of these advances and benefits, there was a rapid rate of adoption of CTF in the first decade of the 21st century.[56]

While this technology may help farmers with their operations decision-making, the issue at hand revolves around the question of what happens to this information after it is collected? Who owns this information? How can farmers keep this information private and away from retailers?

III. IMPORTANCE OF AGRICULTURE PRECISION DATA

Through the use of precision technology, farmers are creating a databank with many years' worth of constructive information. Farmers will be able use this information to make informed management decisions in the areas of marketing, production, and growth with dramatic economic results.[57] This information could

48. Brase, *supra* note 1.
49. *Id*.
50. Taylor & Whelan, *supra* note 32.
51. EBEL & SCHIMMELPFENNIG, *supra* note 32.
52. Taylor & Whelan, *supra* note 32.
53. *Id.*
54. *Id*; Brase, *supra* note 1.
55. Brase, *supra* note 1.
56. *See* Taylor & Whelan, supra note 32.
57. *Power & Politics of Information*, FARM INDUSTRY NEWS, Special Issue 1996, at 14 (special report sponsored by DowElanco).

be used for self-protection as well.[58] Farmers can use the information to guard themselves from over using the soil, as well as protecting themselves economically. Farming "is in the midst of a startling renaissance."[59] The farming industry is made of farmers that "are sophisticated businesspeople who use GPS equipment to guide their combines, biotechnology to boost their yields, and futures contracts to hedge their risk."[60] The technology advances and data which follows is rebuilding the farming industry.[61]

Farmers are beginning to appreciate the tremendous potential value of this data raising the question of who owns or controls the data.[62] These questions surface as the implications and effects of sharing this information becomes more and more apparent.[63] Farmers enjoy the benefits which precision agriculture provides them, but fear that once their information is given out, it's gone for good.[64] Farmers are afraid that this information will be passed to the retailers of crop inputs and seed companies.[65] They are afraid the retailers will take advantage of the information and use it to drive up the prices, therefore losing one of the biggest advantages of precision agriculture.[66]

IV. CURRENT EFFORTS BY COMPANIES TO KEEP THE DATA PRIVATE

After establishing how important and valuable this information is—not only to the farmer and precision agriculture technology companies but to the retailers too—it is crucial to know what is currently being done to keep data private or solely. The most common effort to keep data private in the precision technology

58. *Id*.

59. Freeland, *supra* note 4.

60. *Id.*

61. *See Id.*

62. Lee, *supra* note 7.

63. Grant Mangold, *Precision Farming Modernizes Conventional Techniques*, GEOWORLD, Feb. 1998, at 46, 50, *available at* http://www.innovativegis.com/basis/present/GW98_PrecisionAg/GW98_PrecisionAg.htm.

64. Lee, *supra* note 7.

65. *See Id.*

66. *See* Jack Zemlicka, *Dealer Development: Monsanto Deal Making Precision Equipment Dealers Nervous*, PRECISION FARMING DEALER, 2013, *available at* http://www.precisionfarmingdealer.com/content/dealer-development-monsanto-deal-making-precision-equipment-dealers-nervous#sthash.snM6F8xx.dpuf (last visited Feb. 10, 2015).

industry is utilizing contracts with farmers, often using confidentiality agreements.[67] These agreements, offered by corporations like John Deere and HarvestMax, are attempts to assuage farmers' fears about misappropriation of their data.[68] Many farmers and attorneys are concerned that these confidentiality agreements are not enough.

Confidentiality agreements "are contracts entered into by two or more parties in which some or all of the parties agree that certain types of information that pass from one party to the other or that are created by one of the parties will remain confidential."[69] Confidentiality agreements are also known as secrecy or non-disclosure agreements.[70] Confidentiality agreements can provide several functions including protecting sensitive information, preventing the forfeiture of valuable patent rights, and defining specifics regarding what information can and cannot be disclosed.[71] The type of information which can be included in such an agreement is unlimited.[72] A confidentiality agreement may be a useful bandage, but it does have issues which should be discussed.

V. ISSUES OF CURRENT CONFIDENTIALITY AGREEMENTS AND DATA PRIVACY

Confidentiality agreements have risks. These risks are key to understanding why confidentiality agreements are insufficient for property data rights with respect to precision agriculture. The risks and issues include third party inquiry, confidentiality versus use, and change of purpose.[73]

First, an issue may arise when a third party, such as a litigant or a governmental agency, makes requests or demands for confidential information.[74] "Most [confidentiality agreements] fail to address the difference between a government agency request and a subpoena and fail to provide the receiving party with much guidance as to when it can and cannot disclose information and how much information is permitted to be disclosed."[75] As a receiving party (John Deere or HarvestMax), it is important to understand what the confidentiality agreement obliges

67. *See* Lee, *supra* note 7.

68. *See* Lee, *supra* note 7.

69. David V. Radack, *Understanding Confidentiality Agreements,* 46 J. OF MINERALS 68 (1994), *available at* http://www.tms.org/pubs/journals/jom/matters/matters-9405.html.

70. *Id.*

71. *Id.*

72. *Id.*

73. *Id.*

74. *Id.*

75. *Id.*

before such a situation arises.[76] The disclosing party (farmer/producer) should know how the receiving party would respond to such a situation.[77]

The second risk which can arise with confidentiality agreements lies in the difference between confidentiality of the information and use of the information.[78] "Not all [confidentiality agreements] impose restrictions on the use of the confidential information."[79] It may not be necessary for a company to disclose the confidential information in order to exploit it.[80] It is important that the confidentiality agreement expressly restricts *any* use of the confidential information/data if it is important to the disclosing party.[81]

The third possible problem with confidentiality agreements is exacting the purpose of the specific confidentiality agreement.[82] The parties to a confidentiality agreement can make the mistake of signing the contract for one purpose, but later relying on it for a different purpose.[83] A new confidentiality agreement may be required with additional transactions between the parties.[84]

VI. THOUGHTS AND IDEAS TO FIX DATA PRIVACY IN PRECISION AGRICULTURE WITH GOVERNMENT POLICIES AND LEGISLATION

Precision agriculture technology is a valuable asset to farmers which will continue to be used regardless of privacy risks. Farmers take on many risks already—such as the weather and price fluctuations in crops and animals—but these risks are protected with shelters such as crop insurance and subsidies. Farmers could be protected from privacy violations of their precision agriculture technology with government acts similar to PIPEDA and HIPAA.

A. Personal Information Protection Electronics Document Act (PIPEDA)

Usually, ownership of something is synonymous with possession of that thing, but problems arise with data because of the possibilities of sharing and dual

76. *Id.*
77. *Id.*
78. *Id.*
79. *Id.*
80. *See id.* (providing the example that a company may use customer lists internally without ever disclosing it to a third party in violation of the agreement).
81. *Id.*
82. *Id.*
83. *Id.*
84. *Id.*

ownership of information.[85] A governmental policy should be adopted by the U.S. to prevent the leak of data produced by precision agriculture to maintain privacy, and to retain ownership of data in the hands of the farmers. One example of such a similar policy is the Personal Information Protection Electronics Document Act (PIPEDA), which was adopted in Canada.[86]

PIPEDA was adopted to prevent the exposure of private data in commercial activities.[87] The main goals of PIPEDA were to reassure those engaged in e-commerce, and to eliminate the problems of information theft on the internet.[88]

PIPEDA contains a code for protecting personal information in commercial activities, and it consists of ten privacy principles.[89] "The 10 principles are: accountability; identifying purposes; consent; limiting collection; limiting use, disclosure and retention; accuracy; safeguards; openness; individual's access; and challenging compliance."[90] PIPEDA requires a business or other organization to hire and designate an individual to oversee the organization's compliance with the principles.[91]

The individual assigned to oversee the business' compliance with these principles has specific professional requirements.[92] The first duty of the designated individual is to make sure the information is used for the purposes intended and with the consent of the owner.[93] Secondly, disclosure and retention of collected information (data) must be limited to the stated purposes.[94] Third, the information must be accurate and protected with safeguards so as not be distributed or used beyond the stated purposes.[95] The fourth principle requires informing the owner of the information that they have access to their information, and are informed of its existence, use, and disclosure.[96] The last key duty of the designated individual is to inform the owner that they have the right to challenge a company's compliance by complaining to the designated individual responsible for compliance.[97]

85. *See* Russo, *supra* note 11.

86. Russo, *supra* note 11.

87. *Backgrounder: The Personal Information Protection and Electronic Documents Act*, OFFICE OF THE PRIVACY COMMISSIONER OF CANADA, https://www.priv.gc.ca/leg_c/legislation/02_06_07_e.asp (last modified Apr. 1, 2014).

88. *Id.*

89. Russo, *supra* note 11.

90. *Id.*

91. *Id.*

92. *Id.*

93. *Id.*

94. *Id.*

95. *Id.*

96. *Id.*

97. *Id.*

If the field data from the farmer was covered by a policy similar to PIPEDA, and was used for purposes outside its designation or without consent, a corporation like John Deere would be held liable for its actions under a governmental policy similar to PIPEDA. John Deere and Monsanto could designate an individual to be a liaison between the corporation and the farmers.

The liaison assigned as the "designated individual" would have similar duties to those outlined in the PIPEDA policy, and would also have the opportunity to create a relationship with farmers. Farmers tend to trust the law *and* the people they work with. If the designated individual can create a sustaining relationship, this policy and legislation could be very effective.[98]

B. Health Insurance Portability and Accountability Act

Another consideration to protect data privacy is to adopt legislation and governmental policy similar to the health care act adopted in the U.S. called the Health Insurance Portability and Accountability Act, or HIPAA.[99] HIPAA provides the ability to change and transfer health coverage when people lose jobs, reduces health care fraud and abuse, implements mandatory, industry-wide standards for health care information, and requires the protection and confidential handling of protected health information.[100] The HIPAA Privacy Rule provides federal protections for personal health information held by physicians, and gives a proportionate amount of rights to both patients and physicians with respect to that information.[101]

The information protected by HIPAA include: (1) information which doctors, nurses, and other health care providers put in a patient's medical records; (2) conversations a doctor has about care or treatment of a patient with nurses and others; (3) information about a patient in the patient's health insurer's computer system; (4) billing information about a patient at the patient's clinic; (5) most other health information about a patient held by those who must follow these laws.[102]

98. *See id.*

99. Health Insurance Portability and Accountability Act of 1996, Pub. L. 104-91, Aug. 26, 1996; *see What is HIPAA?*, CAL. DEPT. OF HEALTH CARE SERV., http://www.dhcs.ca.gov/formsandpubs/laws/hipaa/Pages/1.00WhatisHIPAA.aspx (last visited Feb. 11, 2015).

100. *What is HIPAA?*, *supra* note 99.

101. *See Privacy Standards*, AMERICAN MEDICAL ASSOCIATION, *available at* http://www.ama-assn.org/ama/pub/physician-resources/solutions-managing-your-practice/coding-billing-insurance/hipaahealth-insurance-portability-accountability-act/hipaa-privacy-standards.page? (last visited Feb. 11, 2015).

102. *What Information Is Protected*, U.S. DEPT. OF HEALTH & HUMAN SERV., http://www.hhs.gov/ocr/privacy/hipaa/understanding/consumers/index.html (last visited Feb. 11, 2015) [hereinafter *Protected*].

This information is protected because the covered entities, such as life insurers, employers, and schools, are required to put safeguards into place to protect health information, and ensure they do not use or disclose that health information improperly.[103] The covered entities must also reasonably limit uses and disclosures of this information to the necessary minimums in order to accomplish their intended purpose.[104] Additionally, covered entities must have procedures in place to limit who can view and access patient health information, as well as implement training programs for employees about how to protect patient information.[105] The fourth protection requires business associates or third party contractors to put into place safeguards to protect patient health information, and ensure they do not use or disclose your health information improperly.[106]

The rights granted by HIPPA give patients the ability to see and get copies of their health information, and gives them the right to consent to sharing their health information for certain purposes, such as marketing.[107] HIPPA sets limits on who can view a patient's health information. No one is permitted to view a patient's medical information, unless it is used to provide health care.[108] Patient's health information cannot be used or shared without written permission, unless allowed by HIPPA.[109]

If Congress adopted an act similar to HIPPA for the protection of precision agriculture data, it would ensure the data is properly protected. Ideally, the information protected by an agriculture data protection act would include: (1) information that salesman, contractors, and other business associates put in field data records; (2) conversations between agriculture salesmen and associates of the business about their care or treatment of their fields; (3) information about field and history in agriculture business' computer system; (4) billing information about the field at the farmer's business co-op; and (5) most other field data information about the farmer's field.

If legislation similar to HIPAA was enacted for precision agriculture, it may

103. *Who Must Follow These Laws*, U.S DEPT. OF HEALTH & HUMAN SERV., http://www.hhs.gov/ocr/privacy/hipaa/understanding/consumers/index.html (last visited Feb. 11, 2015).

104. *Id.*

105. *Protected*, *supra* note 102.

106. *Id.*

107. *What Rights Does the Privacy Rule Give Me*, U.S DEPT. OF HEALTH & HUMAN SERV., http://www.hhs.gov/ocr/privacy/hipaa/understanding/consumers/index.html (last visited Feb. 11, 2015).

108. *Who Can Look At and Receive Your Health Information*, U.S DEPT. OF HEALTH & HUMAN SERV., http://www.hhs.gov/ocr/privacy/hipaa/understanding/consumers/index.html (last visited Feb. 11, 2015).

109. *Id.*

include policies such as: (1) the covered farm's field data policy receives safeguards to ensure the businesses or persons who obtain data do not use or disclose the covered farm's field data improperly; (2) the disclosed farm's field data must reasonably limit the uses, and disclosures, to the minimum necessary to accomplish the uses and disclosures intended purpose; (3) covered farm's field data policies must have procedures in place to limit who can view and access farmers field data information, as well as implement training programs for employees about how to protect your information; and (4) business associates who receive or cover the farm's field data must also put in place safeguards to protect your field and crop information, and ensure they do not use or disclose the farm's field data information improperly.

Legislation with a privacy rule would provide more protection for a farmer's precision agriculture data than a farmer would have with a confidentiality agreement. A precision agriculture data privacy rule which limits who can view data and ensures that no person can use or share that information or data without written permission would be significantly better than the standard confidentiality agreement. An agriculture data privacy rule would create trust between farmers and businesses by assuring farmers that their data will not be used without consent.

C. Policy and Legislation Implementation and Issues

The process of the policy implementation is critical to the success of the policy.[110] "Failure to anticipate implementation problems when a policy is being enacted may lead to failure to achieve the program's objectives, excessive costs and even a political backlash from the farmers and businesses."[111] The sources of implementation problems include interpretation issues, organizational mission issues, organizational coordination issues, resource and organizational capacity constraints, timeline issues, political interference issues, program operator issues, and target compliance issues.[112]

It must be noted the policy implementation is critical for a policy similar to HIPPA or PIPEDA to be accepted in the U.S.[113] The implementation process

110. *See* R. Kent Weaver, *But Will It Work?: Implementation Analysis to Improve Government Performance*, 32 ISSUES IN GOVERN. STUDIES 1, 2 (Brookings Institute 2010), at 2, *available at* http://www.brookings.edu/~/media/research/files/papers/2010/2/implementation%20analysis%20weaver/02_implementation_analysis_weaver.pdf.

111. *Id.*

112. *See id.* at 3-7.

113. Russo, *supra* note 11; *Health Information Survey*, U.S. DEPT. OF HUMAN SERV., *available at* http://www.hhs.gov/ocr/privacy/hipaa/understanding/consumers/index.html (last visited Feb. 11, 2015).

would be key to whether these types of legislation would be a viable option. Take for instance the 2014 Farm Bill, which took over two years to pass through the chambers.[114] Delayed timelines of this magnitude create an opportunity for more data to be shared, hacked, or improperly disclosed by businesses. Thus implementation of legislation similar to HIPAA or PIPEDA pertaining to data for precision agriculture is critical, and must be thoroughly and correctly implemented.

D. "Precision Agriculture Information Protection Accountability Act" (PAIPAA)

With an understanding of particular legislation and regulatory acts, what would precision agriculture data privacy look like? The name of the model legislation would be the "Precision Agriculture Information Protection Accountability Act (PAIPAA)."

The Precision Agriculture Information Protection Accountability Act (PAIPAA) should incorporate sections of both HIPAA and PIPEDA. PAIPAA should contain a code for protecting personal information in activities collected in the fields. It should consist of the ten privacy principles from PIPEDA. The ten principles are: accountability, identifying purposes, consent, limiting collection, limiting use, disclosure and retention, accuracy, safeguards, openness, individuals' access, and challenging compliance.[115] The principles would give corporations like John Deere a code or guideline with which to comply when dealing with farmer's precision agriculture information.

PAIPAA would designate an individual to oversee the corporation's compliance office to ensure implementation of the ten principles. The designated individual would verify the information (data) is used only for the intended purposes, and with the consent of the owner. The designated individual would enforce the use, disclosure, and retention of collected information (data). The designated individual would understand that the information (data) is accurate and protected with safeguards, so as not to be distributed or used beyond the state purposes. The designated individual would inform the farmer of the information (data), and that the farmer has access rights to their existence of the information (data). Lastly, the designated individual must inform the farmer that they have the right to challenge a corporation's compliance by complaining to the designated individual responsible for such compliance.

PAIPAA would include a privacy rule. The PAIPAA privacy rule would be in place to protect the information. The information protected by the PAIPAA

114. *U.S. Farm Bill: Chronology of Coverage*, N.Y. TIMES, http://www.topics.nytimes.com/top/reference/timestopics/subjects/f/farm_bill_us/index.html (last visited Feb. 11, 2015).

115. Russo, *supra* note 11.

privacy rule would include: (1) information that salesman, contractors, and other business associates put in your field data records; (2) conversations agriculture salesmen have about their care or treatment of their fields with associates of their business and others; (3) information about field and history in the agriculture corporation's computer system; (4) billing information about the field at the farmer's business co-op; (5) most other field data information about the farmer's field held by those who must follow these laws.

PAIPAA would require: (1) the covered farm's field data policy to be protected by putting in place safeguards to protect this data, and ensure the businesses or persons do not use or disclose the covered farm's field data improperly; (2) the disclosed farm's field data must reasonably limit the uses and disclosures to the minimum necessary to accomplish the uses and disclosures intended purpose; (3) farm's field data policies must have procedures in place to limit who can view and access farmers field data information, as well as implement training programs for employees about how to protect this information; and (4) business associates who receive or cover the farm's field data also must put in place safeguards to protect health information, and ensure they do not use or disclose the farm's field data information improperly.

PAIPAA would give a sense of ownership back to the farmers. This ownership could start a rapid adoption of precision agriculture technology by farmers previously concerned with the privacy of their information. Additionally, there would likely be an increase in the number of farmers working with co-ops and corporations like John Deere, Monsanto, and Crop Production Services to maximize their productivity through use of precision agriculture.

VII. CONCLUSION

Precision agriculture is now an intricate and essential part of successful farming. The data and information produced by precision agriculture technology is worth millions of dollars.[116] The ownership of the data produced by precision agriculture technology is vital for the efficiency and profitability of farmers.[117] The lack of an acceptable business practice, policy, or legislation in precision agriculture leaves farmers unsure of who owns the data they produce through the use of precision agriculture technology.

It is essential for legislation similar to HIPAA or PIPEDA to be adopted in

116. Lee, *supra* note 7.

117. Jack Zemlicka, *Data Management: Waking the "Sleeping Giant" in Precision Farming, Precision Farming Dealer*, Precision Farming Dealer, *available at* http://www.precisionfarmingdealer.com/content/data-management-waking-sleeping-giant-precision-farming (last visited Feb. 11, 2015). [hereinafter Sleeping Giant].

the U.S. An adoption of policy or legislation similar to these acts (as applicable to data privacy in precision agriculture) would create more clarity of ownership for farmers, as well as increase their trust in corporations which operate and handle the precision agriculture technology. This trust between farmers and corporations like John Deere and Monsanto could also create a greater demand for precision technology. The greater the number of farmers using the precision agriculture technology, the more efficient farming practices.[118] Due to the fact that ownership rights are not effectively guaranteed by signing a confidentiality agreement, the most plausible guarantee for farmers to have ownership over the data produced on their fields is adoption of legislation, with similar traits of HIPAA or PIPEDA.

118. *See* Sleeping Giant, *supra* note 117.