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Open Agriculture and the Right-to-Repair Community Movement

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ABSTRACT

Technological changes in the agriculture industry cause shifts in the roles and power relations of stakeholders. As stakeholders vie for control of intellectual property and increased revenue, tensions can be observed through the emergence of open agriculture and the right-to-repair community movements. The goal of this research-in-progress paper aims to explore these tensions and offers a background of current research, providing a road map for our continued work. Research investigating information technology use in agriculture, precision farming, agriculture decision support, and analytics is relevant and important for the Information Systems discipline because it continues to push the investigation of the changing nature of work due to technology.

Keywords
Right-to-repair, open source, open agriculture, precision farming

INTRODUCTION

Agriculture contributes trillions of dollars to the US economy each year (Lepley, 2019). Increasingly, farmers are utilizing technology to increase efficiency and productivity. For example, technologies like global positioning systems (GPS), geographical information systems, decision support systems, Internet of Things (IoT) devices, and mechanical automation allow for precision farming (Power & Hadidi, 2019). Historically, agriculture technology has been proprietary, which means that farmers need to rely on the company that built the technology for modification, maintenance, and repair. As agriculture technology becomes enmeshed with the day-to-day activities of most farms, this has immense implications for innovation, productivity, and ownership rights of agriculture technology.

Modern agriculture equipment often includes computer technology. Due to End User License Agreements (EULA), when the technology does not perform as expected, repairs can only be made by the manufacturer (Bollier, 2017). Specifically, these licenses prohibit the owner from taking the equipment to an independent repair shop or fixing it themselves (Bollier, 2017). EULAs also prevent the owner from modifying the equipment for innovation - performance upgrades or new features. EULAs place control on the lifecycle of technology into the hands of manufacturers, who can then determine when updates and repairs will no longer be supported. These scenarios may be favorable to agriculture companies, who are moving to hardware and software as a service (HaaS and SaaS) business models; however, the best interests of farmers are not always represented.

In information technology, the free software movement was a response to the restrictions of using proprietary software. Free software advocates believe that software should be free to use, modify, and distribute (Raymond, 1999). As the movement became active, and corporations began to engage with the movement, it became known as open source (Fitzgerald, 2006). Open source is a collection of licenses that allow software and technology to be collaboratively developed, used, maintained, and monetized (Scacchi, 2005). Despite the proprietary nature of most agriculture technology, many agriculture companies engage with open source projects to create and maintain software that fits with their corporate design streams. For example, within the Linux Foundation[1], agriculture companies contribute to the Linux Kernel (operating system), Hyperledger (blockchain), and Dronecode (autonomous vehicle software). More specifically, open agriculture projects are open source projects that focus on

[1] https://www.linuxfoundation.org/

the agriculture industry. For example, Farm OS[2] is an open source web-based management system that provides a suite of tools to help farmers manage their enterprises.

Technological changes to the agriculture industry are expected to cause shifts in the roles and power relations of stakeholders (Wolfert et al., 2017). As stakeholders vie for control of intellectual property and increased revenue, tensions may be observable through the emergence of the open agriculture and the right-to-repair community movements. The goal of this research-in-progress is to explore these tensions. Through this work, we will identify business processes, intellectual property concerns, information technology use, and key stakeholders to improve understanding of the open agriculture and right-to-repair community movements. This research will contribute to our understanding of the changing nature of work due to technology. Through engaged field research, we will embed ourselves within right-to-repair and open agriculture communities with the objective of creating a more equitable relationship between stakeholders.

BACKGROUND

Right-to-repair

Farmers face three significant problems concerning repairing the technology they own (Svensson et al., 2018). First, the legal obstacle, whereby the manufacture restricts the right-to-repair the equipment. When farmers purchase or use technology, they are required to accept EULAs (Bollier, 2017). EULAs are "contracts of adhesion – drafted by sellers to give them greater control over how their product is used after its purchase and to limit sellers' legal liability" (Bollier, 2017, pp. 1–2). Manufacturers have the legal right to protect and encrypt their intellectual property. The Digital Millennium Copyright Act classifies bypassing these protections as a breach of copyright, which may make repairing the technology a criminal offense for all but the manufacturer (Perlman, 2015). The repair business is quite profitable for agriculture companies, so it is in their interest to enforce EULAs (Clancy, 2019).

Second, the cost and lack of convenience to repair is an issue for rural communities. Whether it is decision support software, financial software, IoT remote sensors, or autonomous and GPS enabled tractors, farmers are becoming dependent upon these technologies. When these technologies fail, timely repair can reduce downtime and associated costs. Many farms exist in rural areas that do not have abundant access to technology. When technology needs to be repaired, and the nearest manufacturer representative is hundreds of miles away, the cost in downtime and repair increases. The cost and hassle of repairing modern agriculture technology have become an important issue for many farmers such that "an increasing number of farmers are placing greater value on acquiring older simpler machines that don't require a computer to fix" (Perlman, 2015, pp. 1–2).

Third, the consumer preference toward right-to-repair may be at odds with company interests. While agriculture companies are moving towards providing HaaS and SaaS, farmers have shown an interest in ownership, preferring to repair the technology themselves rather than buying new equipment or paying ongoing maintenance and service fees. This interest in repair is evidenced by right-to-repair legislation in many states. From Maine to Massachusetts to Nebraska, right-to-repair laws are being considered that would require manufacturers to make repair resources available to individuals who want to fix the technology that they own (Cangiano & Romano, 2019). Companies like Apple, GM, Cat, and John Deere are lobbying against right-to-repair legislation.

Open Agriculture

Instead of wrestling with proprietary systems, some farmers are transitioning to open source technology. The open source movement was enabled by information technology that allows transparent development practices. Open source contributors collaboratively develop software that satisfies their strategic interests (Dahlander & Magnusson, 2005). End-users of open source software often become contributors, and the contributors become end-users themselves (Scacchi, 2005) in an ongoing and evolving process (Germonprez et al., 2017). Open source software has become so prevalent that much of our software infrastructure is now built on or is dependent on open source projects (Eghbal, 2016).

Information technology in agriculture encompasses a wide variety of hardware and software systems (Weltzien, 2016). It is deeply connected to the concepts of precision agriculture, aiming at the increase of production and sustainability of resources (Yost et al., 2019). Open source technology that focuses on building and controlling agriculture equipment include autonomous vehicles and robots, IoT devices, and GPS. These technologies are used to enhance and automate vehicle safety and movement with geolocation, crop monitoring with GPS, and soil quality monitoring using IoT devices (Bento et al., 2019). Open agriculture software projects have created decision support systems, management information systems, and transaction processing systems to manage financial, climatic, technical, and regulatory information (Bento et al., 2019; Byrum, 2019).

[2] https://farmos.org/

Farm OS is an example of an open source web-based management system that provides a suite of tools to help farmers manage their enterprises.

PROPOSED METHODS

A field study approach will be used to explore the tensions between agriculture stakeholders emergent in the open agriculture and right-to-repair movements (Spradley, 2016). Within the field study, we will make observations *in situ* at farms and agriculture conferences. We will use digital ethnography methods to examine the digital activities and artifacts visible in open agriculture projects and related digital platforms (Kozinets, 2015). Collectively, these methods will be embedded within the engaged field study allowing us to represent the dynamics of the open agriculture and right-to-repair movements through an understanding of the language, concepts, practices, rules, and beliefs of the stakeholders (Dourish, 2014). The project will also include ten interviews with stakeholders, including, farmers, open agriculture contributors, and representatives of agriculture companies - exploring their perceptions around the use and design of agriculture technology. The interview protocol will explore agriculture technology use and intellectual property rights.

CONCLUSION

Research investigating information technology used in agriculture, precision farming, decision support, and analytics is relevant and important for the Information Systems discipline (Power & Hadidi, 2019) because it continues to push the investigation of the changing nature of work due to technology. We believe that this research-in-progress will provide initial observations about the landscape of information technology in the agriculture industry and provide prescriptive guidance for open agriculture and right-to-repair community movements. The paper presented herein offers a background of current research and provides a road map for our continued work.

REFERENCES

1. Bento, C., Cunha, P. R. da, & Barata, J. (2019). Cultivating sociomaterial transformations in Agriculture 4.0: The case of precision viticulture. *AMCIS 2019 Proceedings*.
2. Bollier, D. (2017). *Encrypted tractors and the open source solution*. http://www.bollier.org/blog/encrypted-tractors-%E2%80%93-and-open-source-solution
3. Byrum, J. (2019). Agriculture: Fertile ground for analytics and innovation [Data set]. In *ORMS Today*. https://doi.org/10.1287/orms.2015.06.10
4. Cangiano, S., & Romano, Z. (2019). Ease of repair as a design ideal: A reflection on how open source models can support longer lasting ownership of, and care for, technology. *Ephemera: Theory & Politics in Organization*, *19(2)2*, 441–449.
5. Clancy, H. (2019, June 13). *Tractors, software and the right to repair* [Text]. GreenBiz; GreenBiz Group Inc. https://www.greenbiz.com/article/tractors-software-and-right-repair
6. Dahlander, L., & Magnusson, M. G. (2005). Relationships between open source software companies and communities: Observations from Nordic firms. *Research Policy*, *34*(4), 481–493.
7. Dourish, P. (2014). Reading and interpreting ethnography. In J. Olson & W. Kellogg (Eds.), *Ways of Knowing in HCI* (pp. 1–23). Springer.
8. Eghbal, N. (2016). *Roads and bridges: The unseen labor behind our digital infrastructure*. Ford Foundation. https://www.fordfoundation.org/about/library/reports-and-studies/roads-and-bridges-the-unseen-labor-behind-our-digital-infrastructure/
9. Fitzgerald, B. (2006). The transformation of open source software. *MIS Quarterly*, 587–598.
10. Germonprez, M., Kendall, J. E., Kendall, K. E., Mathiassen, L., Young, B., & Warner, B. (2017). A theory of responsive design: A field study of corporate engagement with open source communities. *Information Systems Research*, *28*(1), 64–83. https://doi.org/10.1287/isre.2016.0662
11. Kozinets, R. V. (2015). *Netnography*. Sage.
12. Lepley, S. (2019). *9 mind-blowing facts about the US farming industry*. Markets.Businessinsider.Com. https://www.businessinsider.com/farming-industry-facts-us-2019-5

13. Perlman, S. (2015). *New high-tech farm equipment Is a nightmare for farmers*. Wired.Com. https://www.wired.com/2015/02/new-high-tech-farm-equipment-nightmare-farmers/

14. Power, D., & Hadidi, R. (2019). Transforming agriculture: Exploring precision farming research needs. *Journal of the Midwest Association for Information Systems (JMWAIS)*, *2019*(2). https://doi.org/10.17705/3jmwa.000049

15. Raymond, E. (1999). The cathedral and the bazaar. *Knowledge, Technology & Policy*, *12*(3), 23–49.

16. Scacchi, W. (2005). Socio-technical interaction networks in free/open source software development processes. In *Software Process Modeling* (pp. 1–27). Springer.

17. Spradley, J. P. (2016). *Participant observation*. Waveland Press.

18. Svensson, S., Richter, J. L., Maitre-Ekern, E., Pihlajarinne, T., Maigret, A., & Dalhammar, C. (2018). The emerging 'Right to repair'legislation in the EU and the US. *Proceedings from Going Green–Care Innovation, Vienna*.

19. Weltzien, C. (2016). Digital agriculture or why agriculture 4.0 still offers only modest returns. *Landtechnik*, *71*(2), 66–68.

20. Wolfert, S., Ge, L., Verdouw, C., & Bogaardt, M.-J. (2017). Big data in smart farming – A review. *Agricultural Systems*, *153*, 69–80. https://doi.org/10.1016/j.agsy.2017.01.023

21. Yost, M. A., Sudduth, K. A., Walthall, C. L., & Kitchen, N. R. (2019). Public–private collaboration toward research, education and innovation opportunities in precision agriculture. *Precision Agriculture*, *20*(1), 4–18.