NWCTI software system design criteria

B. E. Mayfield, C. C. Craige, M. D. Buser, and B. D. Adam

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At the core of Oklahoma State University's OSU's whole chain traceability system is a database with software designed to collect data from stakeholders (producers, feedlots, processors, etc). This system provides data owners (stakeholders who initially entered data into the system) the ability to share or distribute the data they entered into the system to other stakeholders that are members of NWCTI. The right to share different pieces of information, whether it be by individual animal, or specific pieces of information about an individual animal, is solely at the discretion of the data owner.

When the National Whole Chain Traceability Institute (NWCTI) project was first envisioned, it was much broader in scope than the final software product. The long term NWCTI goal is to have a single software system that will work for all agricultural products. Our initial software development phase was focused on accommodating data related to beef cattle production. Further, our team's original plan was to develop a user interface so stakeholders could directly enter their information into the NWCTI system. We quickly realized that stakeholders interested in traceability software were already using stand-alone traceability software, such as CattleMax™ and Cow Sense™ (Figure 1). At this point our team made the decision to focus on developing software that could import data from currently available stand-alone traceability software packages, convert the data into a standard data format, and convert the data to other traceability software data formats so the data could be exported to other parties in the supply chain. Because of this, the project focus shifted from developing a stand-alone application to a system that can serve as an interface between many different cattle management software packages. The function of the NWCTI traceability software is to assemble, care for, and distribute supply chain data.

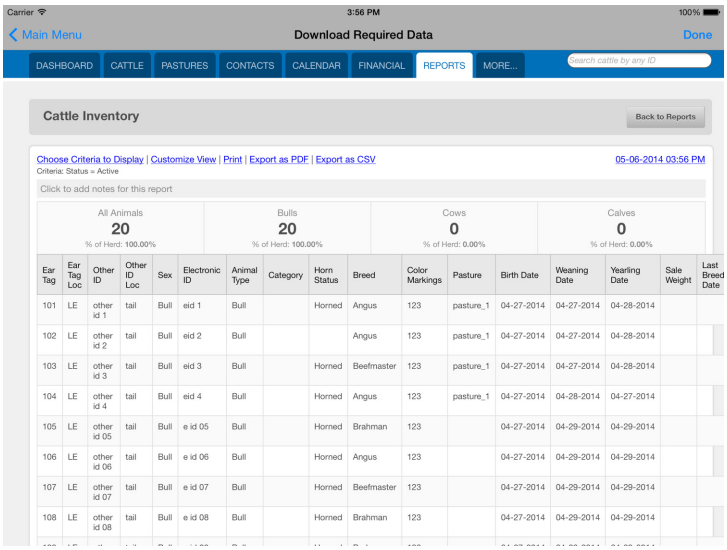

Figure 1. Herd management software, such as CattleMax™, provides a way for producers to record and analyze data to more effectively manage their animals. With the NWCTI interface developed by the OSU team, producers can upload their CattleMax™ information to the NWCTI servers, allowing them to exchange it up and down the supply chain.

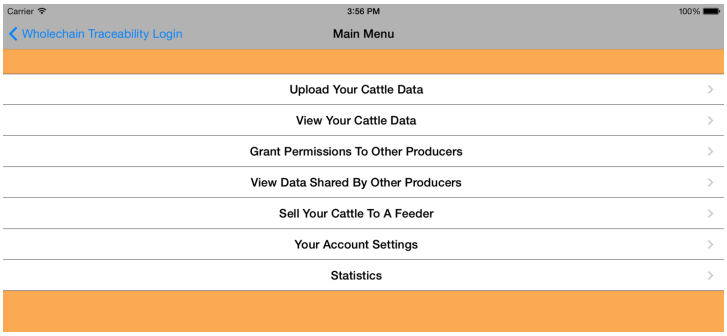

Figure 2. Screen shot of a portion of the NWCTI software application. Users have the ability to view cattle information, share information with other users, or initiate a cattle transaction with another user through an iPad application.

Figure 3. Any changes to information in the NWCTI traceability application are merely appended to the existing information. This creates a change log that helps prevent unauthorized modification to database information in the event of a security breach.

The NWCTI software was developed with mobility in mind. The prototype application is compatible with apple products (Figure 2). In the future, the development team plans to expand the data upload tool to support other mobile platforms, such as Android and Windows 10. A unique feature of the NWCTI system is its implementation of data immutability. This means that certain information cannot be changed once it is entered into the system. As an example, consider that an animal has been transfered from a producer to a feed lot. After the transfer, it is discovered that the original birthdate of the animal entered into the system is incorrect. Rather than changing the birthdate (which is now immutable because of the transfer), a correction record is attached to the original record. Now both the original and corrected history is available about the animal.

Future software development plans include the incorporation of big data analytics to identify patterns in the traceability data, and integration of stakeholder feedback into the system. Being able to spot patterns could provide insight into the cattle markets and could provide additional value to our stakeholders. Answers to questions such as "have cattle weights of sold animals changed recently?", "is it economical to precondition my calves?", "should I wait to sell?", "what feed rations should I use?" could be provided. Based on stakeholder input, other software improvements will be made. One of these changes will be the redesign of the user interface to be more intuitive, an increased font size, and a font style that is easier to read outdoors on electronic screens.

For more information about the NWCTI system, contact Dr. Michael Buser using the information below. YouTube videos related to the NWCTI system can be viewed at https://goo.gl/MwPhoS.

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Visit http://nwcti.okstate.edu/ for more information or contact:
Dr. Michael Buser, Associate Professor
113 Agriculture Hall,
Stillwater, OK 74078
buser@okstate.edu