Proposing a
National Agricultural Product Traceability Center
at Oklahoma State University

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Why a National Agricultural Product Traceability Center?

"The fractured federal food safety infrastructure makes coordination very difficult, and makes very real the possibility that a Katrina-like response could follow a food emergency."[1] Government regulatory agencies and the agricultural industry are experiencing a "global trust bust" in regards to the prevention, detection, and real-time traceability of agricultural food products.[2] There are no national food safety centers addressing the critical issue of whole chain product traceability. There is a critically unmet need for a *National Agricultural Product Traceability Center* at a time when major industry trade associations like the United Fresh Product Association are calling for "whole chain" product traceability.[3] Such a Center would also well intersect with the "DHS National Strategy for Trusted Identities in Cyberspace".[4]

A multi-institutional, multi-disciplinary traceability consortium led by Oklahoma State University and Pardalis, Inc. has coalesced with North Dakota State University, Michigan State University, and the University of Arkansas. It is reasonably expected that with funding proposed herein, the consortium will rapidly grow.

In the context of recent USDA AFRI funding submissions, significant stakeholder letters of support have been provided to the traceability consortium by Wal-Mart Food Safety, GS1 US, National Fisheries Institution, National Center for Food Protection and Defense, Northern Crops Institute, Safe Tables Our Priority, Community Alliance with Family Farmers, Bay Cities Produce, Oklahoma Cattlemen's Association, United Food and Commercial Workers International Union, etc. See Appendix III. It is reasonably expected that with Stage 1 funding (proposed below) these and similar entities will provide significant networking opportunities and funding sources sufficient to satisfy Stage 2 funding (proposed below).

Pardalis, Inc., Stillwater, Oklahoma, is an Oklahoma advanced technology company and a 2004 OCAST/i2E TBFP awardee. Pardalis holds numerous domestic and international patents for an enterprise-class "whole chain" product traceability system previously engineered and deployed to a major agricultural supply chain.

At this moment in time, OSU and Pardalis are well positioned to solicit both private and government funds for establishing a trusted, agricultural product traceability center for (a) anchoring and expanding the traceability consortium, and (b) initiating and sponsoring under the OSU Brand a coherent software development community providing whole chain product traceability systems for global agrifood supply chains.

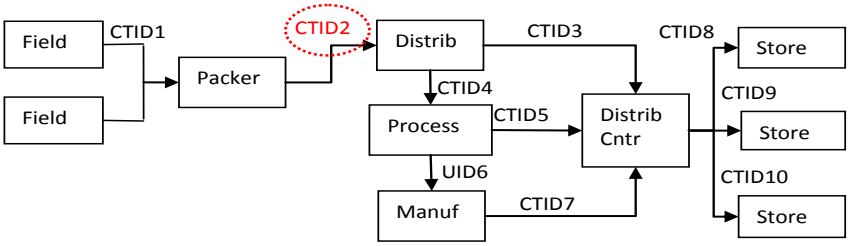
What is the research and/or commercialization opportunity?

- Is the proposed research or technology well enough understood that its potential can be evaluated at a reasonable level of confidence? *Yes.*
- Does it represent an extension or application of the state-of-the-art? *Extension.*
- What is its probability of success? *High.*

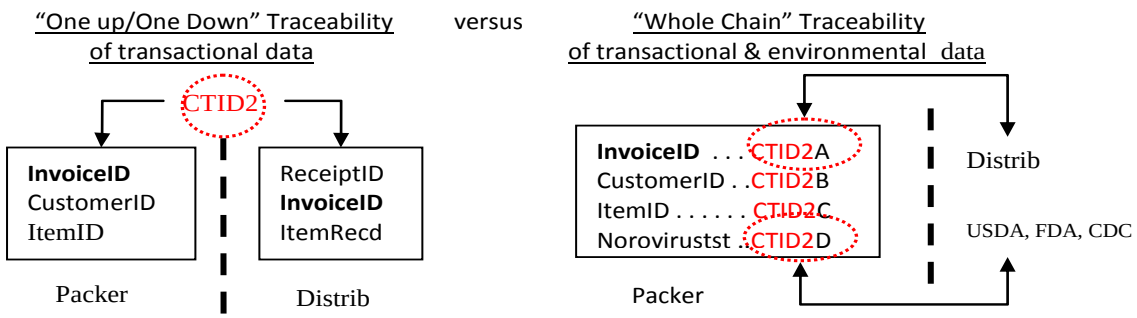
Traceability is a key component in the development of a safe food supply. Recent outbreaks of food borne illnesses attributed to eggs, spinach, peppers, tomatoes, and meats illustrate the importance of a fundamentally sound traceability system in protecting public safety and American agriculture. The identification and standardization of the core information elements of the common "one up/one down" agricultural product tracing systems are critical.[5] Unfortunately, this approach to traceability misses the maximal benefits of real-time, whole chain product traceability.

It is not uncommon during a food illness outbreak for food safety inspectors to find inadequate recordkeeping at point of sale by retail-level businesses and distribution centers, including missing or inaccurate information.[6] Both the USDA and the FDA recognize that enhancing product tracing for food may not be just a matter of keeping more or different records or adding more information to product or packaging, but also a matter of rapidly changing business practices. [7] What is not clearly understood is what can be done to speed the process whereby persons, who have (or should have) product information relevant to a traceforward or traceback investigation, provide the information to regulators.[8] The lack of real-time information available to regulators in traceback and traceforward investigations during a food illness outbreak creates substantial, negative public health and economic impacts.

A useful explanation of the benefits of a "whole chain" produce traceability system over "one up/one down" traceability may be made with critical traceability identifiers (CTIDs), critical tracking events and nodes.[9] Critical tracking events are those events that must be recorded in order to allow for effective traceability of products in the supply chain. A node refers to a point in the supply chain when an item is produced, processed, shipped or sold. Crticial tracking events can be loosely defined as a transaction. Every transaction involves a process that can be separated into a beginning, middle and end.



While important and relevant data may exist in any of the phases of a critical tracking event transaction, the entire transaction may be uniquely identified and referenced by a code referred to as a critical tracking identifier (CTID). Now, with the emergence of biosensor development for the real-time detection of foodborne contamination, one may also envision adding associated real-time environmental sampling data from each node. The challenge is in using even top of the line "one up/one down" product traceability systems (compare CTID2 in the foregoing drawing with CTID2 in the next drawing) that, notwithstanding the use of a single CTID, are inherently limiting in the data sharing options provided to both stakeholders and government regulators. With a stakeholder-driven "whole chain" product traceability system, in which CTID2 is essentially assigned down to the datum level (i.e., CTID2A, CTID2B, etc.), transactional and environmental sampling data may in real-time be granularly placed into the hands of supply chain partners, food safety regulators, or even retail customers.



This is a vision of "whole chain" sharing that goes well beyond "one up/one down" information sharing, and recognizes the need for trustworthy control or "data ownership" by each stakeholder.

How and why does OSU have this opportunity?

The coalescing of the traceability consortium is a significant multi-institutional, multi-state, private/public combination of resources applicable to the areas of agriculture, information technology, biotechnology, sensors (including RFID, Barcode, nanotechnology), biotechnology, energy, weather science (e.g. carbon footprints), etc. While there are national food safety centers in existence such as the Joint Institute for Food Safety and Applied Nutrition[10] (jointly administered by the FDA and the University of Maryland), the National Center for Food Protection and Defense[11] (a DHS Center of Excellence at the University of Minnesota), and the National Center for Food Safety and Technology[12] (a research consortium between Illinois Institute of Technology and the FDA), none of these institutes address the multi-faceted technology and stakeholder issues that affect the real-time traceforward or traceback investigations of foodborne illnesses.

From June, 2003 to August, 2006 Pardalis, Inc. used Microsoft tools (.NET/SQL) to design and developed from its intellectual property its Common Point Authoring (CPA) system. Total salaries (including social security and Medicare payroll contributions) and/or consultant fees of $870, 499 were paid for development of the source code for the CPA system. See Appendix I. As engineered the CPA system is a back-end, enterprise-class system designed for "whole chain" product traceability for "widgets". The current application programming interface (API)[13] is designed with a graphical user interface (GUI) for the beef livestock supply chain but there is seemingly no limit to the numbers of APIs (or GUIs) that may be customized for supply chains. The CPA system critically provides for minimal, precise disclosures of product identity data that are traceable and controllable by authoring end-users. Furthermore, it empowers end-users to asynchronously and granularly author and publish traceable, immutable data objects in competitively-segmented supply chains. Pardalis' global IP for the CPA system has been applied for and secured to date at a cost of approximately $300K. The earliest expiration date of the IP is August 2022.[14] See Appendix II.

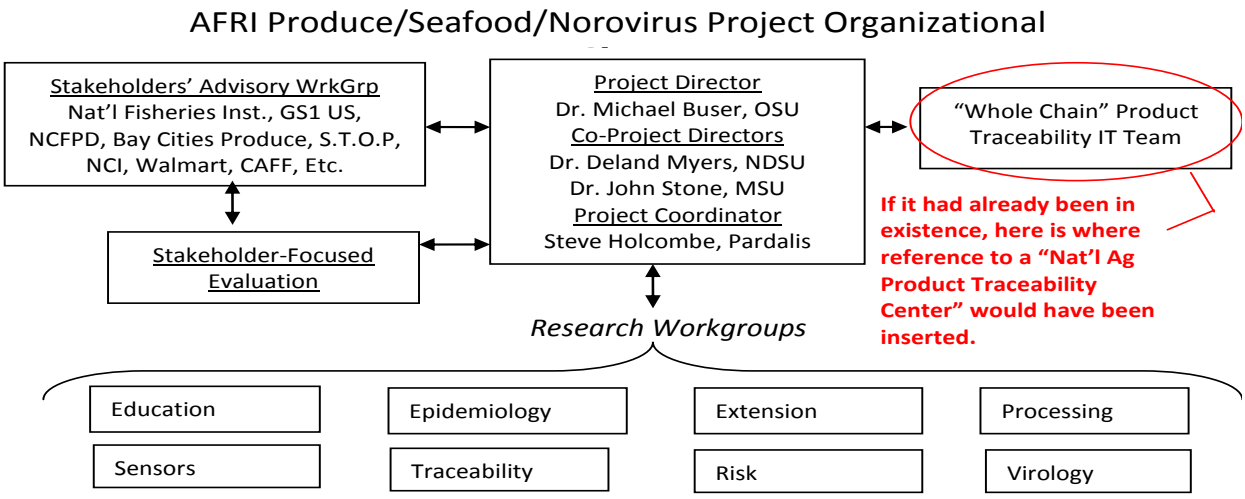
OSU Biosystems and Agricultural Engineering (BAE) is currently conducting traceability research for handling grain and specialty crop oilseeds in Oklahoma; funded by the Anderson Group and USDA IPM. These researchers are interacting and employing several proprietary traceability methods and are positioned to successfully deploy this project and compete with other "silo" software approaches to traceability. These OSU researchers are committed to establishing a national product traceability system and have invested internal funding to establish traceability and food security research in Oklahoma with an emphasis on the efforts being extended both nationally and internationally. Graduate research assistants and laboratory technicians supporting this research are currently developing software, sensing hardware, and process modeling for grain and bioenergy feedstock traceability and quality detection.

Understanding how to enhance product tracing systems for food intended for both humans and animals is a high priority issue for both the USDA and the FDA as seen in the November, 2009 notice entitled *Product Tracing Systems for Food*. Both agencies are seeking to determine what short and long-term steps to take to enhance current tracing systems.[15] Both the USDA and the FDA recognize that enhancing product tracing for food may not be just a matter of keeping more or different records or adding more information to product or packaging, but also a matter of rapidly changing business practices.[16] By implication the context of the references to "whole chain" product tracing systems in the

joint FDA/USDA notice, *Product Tracing Systems for Food*, and an acknowledgement that they are uncommon as compared with "one up/one down" systems, appears to clearly point to the limitations of the latter types of systems. [17] There is high interest in the commercialized emergence of "whole chain" systems. But first there must be a foundation laid with the formation of a National Agricultural Product Traceability Center**.**

The probability for long-term success is high and so the members of the traceability consortium have invested significant time and resources in submitting USDA AFRI Food Safety grant applications. On 1 Sept. 2010, Oklahoma State University, North Dakota State University, Michigan State University, the University of Arkansas, Texas Tech University and Pardalis, Inc. submitted a $24.4M/5YR application under the USDA Agricultural and Food Research Initiative (AFRI) FY 2010 Food Safety Request for Applications for a coordinated agricultural project (CAP).[18] This CAP submission has the long-term goal of combining real-time nano-biosensor collection of environmental samples (i.e., norovirus) with a real-time "whole chain" product traceability system so that the government may more efficiently conduct traceback and traceforward investigations in a food contamination emergency. On 22 Sept. 2010 the traceability consortium filed another similar application, for the prevention, detection and control of shiga toxin-producing e. coli in beef livestock and beef meat supply chains, for $25M/5YRs for a AFRI Food Safety CAP. [19] Between both of these AFRI submissions significant stakeholder letters of support were obtained from Walmart Food Safety, GS1 US, National Center for Food Protection and Defense, Oklahoma Cattlemen's Association, Safe Tables Our Priority, United Food and Commercial Workers International Union, and others. See, again, Appendix III. See also in Appendix IV a representative list of additional stakeholders who will support the AFRI submissions with funding. Both of these lists represent a commitment to a process of directly soliciting and enlisting broad stakeholder involvement and financial support for a National Ag Traceability Center**.**

None of the competitive teams for the AFRI submissions (2 others expected for the Norovirus CAP and 14 others for the E-coli CAP) are known to be proposing a stakeholder-driven, real-time "whole chain" product traceability system as part of their proposals. The traceability consortium, led by OSU BAE and Pardalis, and now connected to significant supply chain stakeholders, is unique. The following organizational chart filed with the AFRI Norovirus CAP submission is illustrative:



The formation of the traceability consortium dynamically blends food sciences, engineering sciences, and sociology to address the critical challenges of traceability relative to specialty crops. The proposed

USDA funding applications are – with funding - expected to provide creative and original answers to three problems inherent to traceability within agricultural produce supply chains: (1) cost effectiveness, efficient data collection from producers at the beginning of a food supply chain, (2) producers' privacy and trust concerns about the data they are asked to contribute into supply chains, and (3) lack of data sharing between the proprietary data silos of supply chains. This is the greatest deliverable so far.

Who specifically is making - or backing - this proposal?

Steve Holcombe is third generation, native born Oklahoman. He is a licensed attorney and from 1987 until 2003 operated a private general law practice in Stillwater. Since 2003 he has devoted his full time to guiding Pardalis, Inc. as its Founder, CEO and General Counsel. Holcombe is the co-inventor (along with Dr. Marvin L. Stone, OSU Professor Emeritus) of the CPA system. From October, 2005 to March, 2006 Pardalis – comprised of 10 fulltime employees - executed a privately financed, market-driven project tracking thousands of calves from a commercial Texas livestock auction. Unfortunately, this promising business model could not be scaled because the USDA reduced its efforts in 2006 to introduce mandatory livestock identification. Holcombe found a 'safe harbor' for the system first in the Dickinson Research Extension Center of NDSU (2006-2009) and now in OSU BAE. Sponsored by Michigan State University, Holcombe has also given food traceability presentations to the AAAS ('07), Beijing Food Traceability Symposium ('07), the Third International IFAS Conference on Nanotech ('07), and the University & Industry Consortium ('08). Currently, Holcombe has been playing a significant role in catalyzing the formation of the traceability consortium.

Dr. Michael Buser is a native Oklahoman who received his Ph.D. in Biological and Agricultural Engineering from Texas A&M University in 2004, MS and BS in Biosystems and Agricultural Engineering from Oklahoma State University in 1998 and 1995, respectively. Dr. Buser worked for the USDA Agricultural Research Service as a Project Leader and Category I Scientist from 1998 to 2009. In this role, Dr. Buser led several multi-million dollar projects funded by federally allocated funds, federal and state grant funds, and private industry funds. In September 2009, Dr. Buser returned home to Oklahoma taking an Assistant Professor position at Oklahoma State University in the Biosystems and Agricultural Engineering Department; 50% research/50% extension appointment. During his career, Dr. Buser has published more than 80 refereed or proceeding manuscripts in industry-related journals or conference proceedings; transferred technology through more than 200 oral presentations; and his work has been highlighted in more than 125 popular press articles. In addition to having the critical application and development expertise and ability to technology transfer, Dr. Buser brings a proven track record of developing and implementing successful national programs.

Dr. Carol Jones is a native Oklahoman who received her Ph.D. in Biosystems and Agricultural Engineering and BS in Agricultural Engineer from Oklahoma State University in 2006 and 1977, respectively. Dr. Jones has managed an Oklahoma farm that produces small grains, feeder cattle, caprine dairy animals and products, and eggs for the past 26 years. In 2006, Dr. Jones joined the Biosystems and Agricultural Engineering Department as Assistant Professor with a 60% research, 25% extension, and 15% teaching split. Dr. Jones has published more than 30 refereed or proceeding manuscripts in industry-related journals or conference proceedings; transferred technology through more than 40 oral presentations. Dr. Jones is an expert in traceability, grain storage, sensor development, and bioenergy. Dr. Jones has a proven track record in research and extension programs.

What kind of funding is needed? (Stage 1 and Stage 2 funding)

Stage 1 – **OSU seed funding**. $100K for 2011 calendar year for contracting with Pardalis Inc. for networking and traveling between and among the universities, stakeholders, technology providers and key agricultural, food, and technology conferences, all for the primary purpose of identifying and soliciting funding from both private and governmental sources. 1 year option to license Pardalis' IP included.

Stage 2 – **Third party funding from private and governmental sources.** Approximately $900K per year for 5 years ($4.53M) commencing January 1, 2012 for full staffing, operations and exclusive IP licensing.

The investment of the following funds are essential in providing Oklahoma with the best opportunity to (a) rapidly expand the number of researchers, technicians, and support services in the area of food safety within the State of Oklahoma, (b) rapidly grow an existing, home-grown advanced technology company in Oklahoma, and (c) accelerate the development and deployment of a *National Agricultural Product Traceability Center* at OSU that will be well positioned to attract $100s of millions in federal research grants and/or privately funded research. Here are the projected contract costs for calendar year 2011:

Stage 1 Funding - Seed Funding (2011)					
Year	*Contract Services*[#]	*Travel**	*Equip & Supplies*[+]	*IP*[^]	*Total*
2011	**$68,750**	$28,850	$2,390	$10	$100,000

Compare to 2012 Cntr Coordinator position below.
* Travel, food & lodging for 15 - 20 domestic and international trips. Includes attendance fees for likely national/international conferences. See Appendix V.
+ Includes smartphone & monthly data service plan ($1650) and office supplies ($750).
^ 1 year (2011) fee for option to exclusively license IP relative to food supply chain.

Here are projected salaries for calendar year 2012:

Nat'l Ag Traceability Cntr Salaries (2012)			
Employees (EEs)	*Sal*	*%*	*Sal + Tax + Contr* [#]
Cntr Director (OSU)	162,000	30	$53,460
Cntr Coordinator (Par)	125,000	50	**$68,750**
Admin Asst (OSU)	32,220	100	$35,442
Chief Tech Officer (Par)	112,210	100	$123,431
Soft Engineer (Par)	66,570	100	$73,227
Soft Engineer (Par)	75,590	100	$83,149
Soft Engineer (OSU)	73,830	100	$81,213
Supp Specialist (OSU)	39,600	100	$43,560
Contractor (Par)*			$20,800
Grad Student (OSU)	29,388	100	$32,327
Grad Student (OSU)	29,388	100	$32,327
Grad Student (OSU)	29,388	100	$32,327
Sub-total			**$680,013**

Includes 10% additional estimated employer contributions for social security (6.20%), Medicare (1.45%), FUTA (0.8%) taxes plus legally required Oklahoma Unemployment Ins. premiums (0.65%) and Workers Comp ins. premiums (1.00%)
* Dr. Marvin L. Stone, OSU Prof Emeritus

Here are total projected Stage 2 Funding numbers of $4.53M for calendar years 1 - 5:

Stage 2 Funding - Nat'l Ag Traceability Cntr*					
Year	*EEs*	*Travel*	*Equip*	*IP*	*Total*
2012	**680,013**	97,350	46,350	75,000	$898,713
2013	694,582	99,351	8,650	76,500	$879,083
2014	709,465	102,006	6,900	78,030	$896,401
2015	724,665	104,712	10,750	79,591	$919,718
2016	740,193	107,484	5,750	81,182	$934,609
Total	**$3,548,918**	**$510,903**	**$78,400**	**$390,303**	**$4,528,524**

*Costs for office space and utilities are not included in these budget estimates. Furthermore, no costs are projected here for technology transfer services that may be provided by the Office of the Vice President of Research at OSU.

Essentials of Pardalis' proposal

It is proposed -

1. That Pardalis' IP be exclusively licensed for 5 years (subject to prior licenses or current licensing negotiations with third parties[20]) at $75K per year (plus a 2% annual COLA) and thereafter for the lifetimes of the patents (See Appendix II) at a mediated/arbitrated royalty price. This license would be limited to the "food supply chain".

    a. Exclusive licensing would create a barrier to any other research institution considering the opportunities for a center similar or competitive to the proposed National Center for Agricultural Product Traceability.
    b. **Food supply chain** (a *working definition*) - the system of organizations, people, activities, information, data and resources involved in originating, producing, processing, manufacturing, transporting, certifying and/or exchanging (including selling, buying and brokering) food or a food product for human or animal consumption.

2. Pardalis, in dealings outside of the food supply chain, will have the right to purchase improvements at market rates to the developed source code it non-exclusively licenses to OSU.
    a. OSU will recognize a credit of $870,499, plus a 2% COLA, for previous developmental costs directly attributable to the engineered CPA system, which Pardalis may first draw down upon to compensate OSU for purchase of source code improvements. See, again, Appendix I.
    b. Pardalis would be pleased to discuss other agreements with OSU that facilitate Pardalis' ability to license its software systems and IP outside of the food supply chain.

3. That Dr. Mike Buser be employed as the Center's Director and Steve Holcombe be employed as the Center's Coordinator during the years of exclusive licensing.

The competitive advantages of a Nat'l Ag Traceability Center in attracting funding

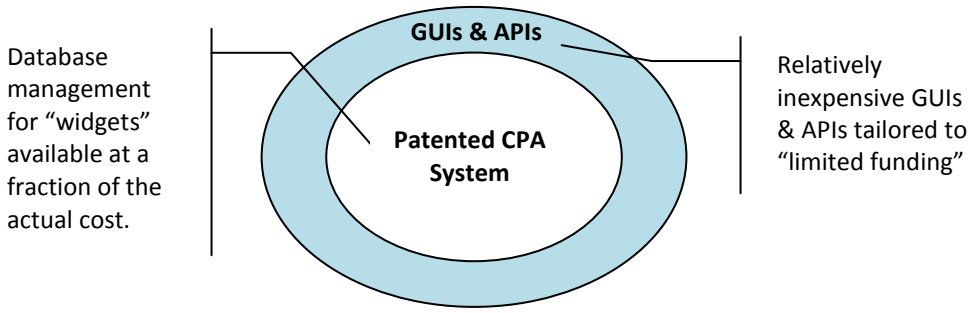
A reviewer's comment from the 2010 SCRI application filed by the traceability consortium is instructive. On a positive note the traceability consortium got its point across about the need for a real-time, stakeholder-driven, traceability system. But the reviewers seemed to want SCRI CAPs to address the research issues of a specific specialty crop, and not that of "you name it" crops. Here's what one reviewer said:

> "Although it addresses a topic area clearly of importance to Homeland Security, the FDA, and of course to USDA, the proposed traceability-system project, as written, could be used just as well for widgets as for fresh produce .... [But what] funding program within USDA or between the interested federal agencies mentioned above could be a better home for this proposal? Should limited SCRI funds for food safety be applied to projects involving specialty crops as part of the project?"

Beyond that comment the most critical missing elements were the lack of identified stakeholders and an advisory panel. This is of course something we already knew was missing but didn't have the time to bring together over the 2009 Holiday Season. Now, as seen with the AFRI applications filed in September 2010, stakeholder involvement has truly become a critical component of the traceability consortium. See, again, Appendices III and IV.

The funding of a National Ag Traceability Center addresses the SCRI reviewer's comments in significant ways. Understanding the relatively high costs in time and money for the architecture, design, and maintenance of large, enterprise-class database management systems designed for "widgets" is not within the purview or field of expertise of either the program area contacts or independent reviewers for the AFRI, OREI, SCRI or other similar USDA calls. In the simplest possible terms, the establishment of a National Ag Traceability Center with the express support of stakeholders and other university research institutions (MSU, UARK, NDSU, etc.) will provide critical validation as to the need for such a system. Furthermore, and even more to the point, the existence of such a Center will limit applied-for funds to

(a) a fraction of the costs of a "widgets" database management system, and
(b) the development of relatively inexpensive GUIs and APIs specific to an agricultural product.



With direct stakeholder involvement, the Center will provide a competitive advantage in various agriculture-related funding opportunities including but not limited to the following:

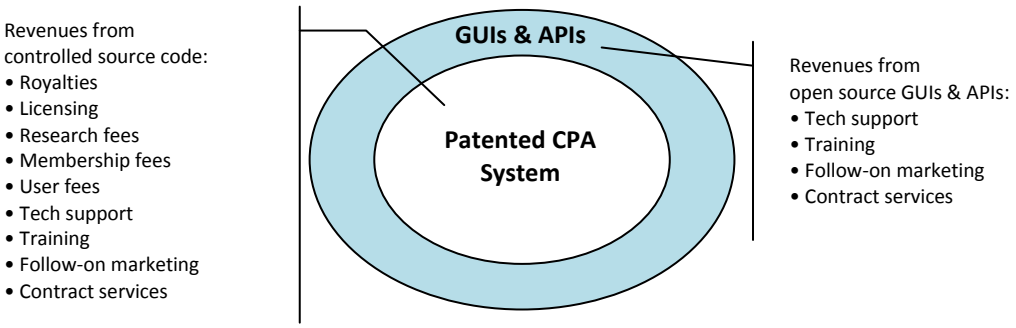
1. **Potential congressional earmarking**
    a. Since 1988 UARK, Kansas State and Iowa State have been receiving congressionally earmarked funding for the Food Safety Consortium.[21] Currently the earmarks for the Food Safety Consortium as a whole amount to $1M per year.[22] Dr. Watson, Director, Ag Exp. Station, OSU, Dr. Mark Cochran, Director, Ag Exp. Station, UARK, and others, will be meeting in Stillwater on November 12, 2010. The prospects for lobbying for additional earmarked funding will be discussed. It is proposed here that the prospects for doing so would be significantly increased with a proposal for a National Ag Traceability Center at OSU.
2. **OSU Foundation's $1B Branding for Success campaign**
    a. In the meeting held on October 11, 2010 at the OSU Foundation, Stillwater, Oklahoma between Dr. Clarence Watson, Dr. Randy Taylor, Dr. Mike Buser, Bob Palmer, Kathy McNally, John Price, and Steve Holcombe, the possibility of prioritizing some "branding for success" dollars for a National Ag Traceability Center was generally discussed – without commitment. Dr. Watson awaits the submission of this proposal before raising this possibility with Dean Whitson.
3. **Long Range Broad Agency Announcement 10-01 for the DHS Science and Technology Directorate - Agro Defense for U.S. Livestock System**[23]
    a. Long Range BAAs exist to ask the following questions: "What research problem do you propose to solve? How is your concept different from and superior to solutions currently available elsewhere, or from the efforts of others to achieve a similar solution? What data and analysis do you have to support the contention that funding your R&D project will result in a significant increase in capability for DHS?" As such they do not have a pre-defined levels of funding allocated. Dr. Paul Weckler, OSU Biosystems, has been in direct contact with Adrian Groth, Management and Program Analyst, Science & Technology Directorate, Department of Homeland Security as recently as 15 October 2010. Groth is encouraging of the submission to the Long Rand BAA particularly if it has the participation of the National Center for Food Protection and Defense (NCFPD), a DHS Center of Excellence. It so happens that Dr. Shaun Kennedy, Director of NCFPD, submitted letters of support for ***both*** of this September's 2010 AFRI submissions. See, again, Appendix III. See also the "DHS National Strategy for Trusted Identities in Cyberspace".[24]
4. **USDA NIFA Specialty Crops Research Initiative**[25]
5. **USDA NIFA Organic Research and Extension Initiative**[26]
6. **USDA NIFA AFRI Food Safety RFAs**[27]
    a. The traceability consortium was the only team filing for ***both*** of the 2010 AFRI Food Safety RFA's described above. The common thread between the two applications was the traceability component. The AFRI submissions were fashioned for reviewers truly looking for holistic "farm to fork" solutions. The irony is that we received a letter of discouragement in the spring regarding the letters of intent submitted for both CAPS because we were perceived to be too much about traceability. The further irony is that - at the encouragement of the same AFRI program area contact who sent the letters of discouragement - our traceability consortium has additionally filed for a funded traceability conference grant.[28] The probability for receiving this funding is very high and will place the traceability consortium first in line for helping the AFRI program area contacts to fashion a significant CAP opportunity focusing on traceability. It is the

opinion of this writer that the establishment of a Center at OSU exclusively licensing Pardalis' IP would keep the traceability consortium first in line, too.

7. **Oklahoma EDGE Fund**[29]
    a. Oklahoma created the EDGE Fund as a public source dedicated to funding the development and commercialization of applied research. The EDGE Policy Board's mission is to make investments in Oklahoma's knowledge infrastructure to bolster the State's long-term economic growth. Technology-based research and development, commercialization and entrepreneurial successes historically attract capital, create more high-paying jobs, expand and diversify the State's economy, and provide greater prosperity for generations of future Oklahomans. Holcombe, Buser and Jones submitted a pre-proposal in May, 2010 entitled "Leveraging SCRI funding to lay the first foundational planks of a conceptual OSU Agricultural Product Traceability Center". The pre-proposal sought $3.1M over 5 years that would have been presumably matched with Specialty Crops Research Initiative funding of $870,499 for a total of $4M/5YRs. Favorable comments were received from EDGE reviewers. A new call will issue in April, 2011. It is the opinion of this writer that Stage 1 funding proposed in the current proposal will significantly increase the opportunities for EDGE funding in 2011.

How a Nat'l Ag Traceability Center would generate long-term revenues

The National Ag Traceability Center would balance the opening of API source code with keeping the core data management CPA source code closed or otherwise controlled. The opening of GUI and API source code would facilitate expansion of the traceability consortium and broad adoption of the core CPA system (i.e., the database management system for 'widgets'). Yet the source code for the CPA system would be sufficiently controlled to bring significant royalties to OSU from food supply chains.[30]



1. **Traceability Consortium Research Fees** (ad hoc) - Participating universities within the traceability consortium (including OSU) will - in their future funding submissions to AFRI, SCRI, OREI, etc. - identify funding for an OSU branded "widget" database management that will be significantly less than would otherwise be the case.
    a. Example: In the current AFRI E-coli application the 'traceability budget' was submitted as $1.05M over 5 years. At just over $200K per year this didn't even come close to the $900K per year projected above for funding an operationally effective traceability center. With an operating Center the 'traceability budget' could conceivably have been cut in half to $500K over 5 years with the lion's

share ($375K) payable to the data Center for use of the 'widget' data management system and a relatively small amount ($125K) sought for specialized API and GUI development and tech support relative to the beef livestock and meat supply chain. That is, the Center would have made possible access to a database management system for widgets with "limited funding". Furthermore, the submission would have been significantly bolstered by additional, validating support letters (in addition to those otherwise submitted[31]) addressed directly to the Center from multiple universities and stakeholders participating in the traceability consortium.

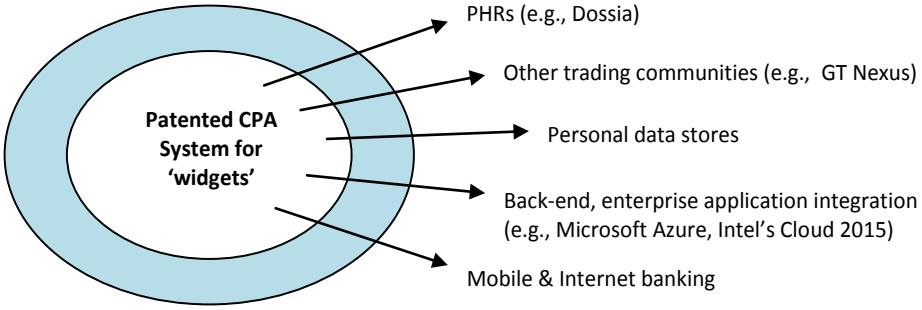
2. **Traceability Consortium Stakeholder Membership Fees** (annual) -
    a. Example: AgGateway[32] provides a comparable organization charging annual membership fees from $125 to over $20K per year.[33] This is a non-profit organization of 87 companies in the agricultural industries, divided into five "councils": seed, crop protection, crop nutrition, fertilizer, and allied providers (traceability solution providers). Member revenue ranges from a million to a billion dollars. Their goal is to improve the agricultural businesses by supporting e-business and improving information connectivity between federated trading partners.
    b. Loyalty contributions – As an incentive to third party universities, stakeholders who are otherwise aligned with a university other than OSU could be provided with an option of designating that a portion of their membership fees (and stakeholder user fees, below) be designated as a "loyalty contribution" to a third party university.
3. **Stakeholder User Fees** – As research - relying on the OSU branded whole chain traceability database management - is executed, stakeholders will be asked to carry some of the costs of database management with cost-effective user fees (if not otherwise covered by annual stakeholder membership fees, above).
    a. What about privacy, application of the open records act to political subdivisions of the State of Oklahoma, and liability? There are options to deal with these issues. For instance:
        i. A database controlled by OSU with end-user licensing absolving OSU and other participating research institutions and entities of all liabilities relative to privacy, etc.
        ii. A separate legal entity controlled by one or more stakeholders (not a political subdivision of the state) who legally control the database while contracting with OSU for cost effective whole chain database services.
            1. Example: The cattlemen's associations of Kansas, Arkansas and Oklahoma form a non-profit traceability entity and contract with the OSU Branded National Ag Traceability Center to provide database and API services.
            2. Example: OSU itself facilitates a multi-stakeholder, multi-crop, non-profit entity that while not a political subdivision of the state nonetheless licenses the OSU Brand in a contract with the OSU Ag Traceability Center for providing database services. <u>In fact, a National Ag Product Traceability Center could conceivably be initially formed as such a non-profit</u>.
4. **Software licensing and patent royalties** – The developed source code, and exclusively licensed patents from Pardalis relative to the food supply chain, provide significant opportunities for licensing fees and patent royalties.[34] Potential licensees and/or collaborators (none of which are providing "whole chain" solutions) include:

a. AgGateway (see reference, above)
b. The FDA's Reportable Food Registry[35] (RFR or the Registry) - This is an electronic portal for Industry to report when there is reasonable probability that an article of food will cause serious adverse health consequences. The Registry helps the FDA better protect public health by tracking patterns and targeting inspections. The FDA Amendments Act of 2007[36] directs the FDA to establish a Reportable Food Registry for Industry.
c. Rapid Recall Exchange[37] - This is an online service applying industry expertise and best practices to standardize product recall and withdrawal notifications between retailers/wholesalers and suppliers, making value chains more visible, secure, and sustainable. The service enables prompt and accurate information exchange to protect customers and save trading partners time and money. Rapid Recall Exchange takes advantage of global GS1 Standards to ensure accuracy and enhance speed of recalls. The Rapid Recall Exchange was commissioned by the Food Marketing Institute (FMI)[38] Associate Member Advisory Board and developed by GS1 US[39] in collaboration with FMI and the Grocery Manufacturers Association[40], as part of their commitment to enhanced food safety, brand protection and consumer confidence. It is also endorsed by the National Grocers Association[41]. Steve Arens, Director of Strategic Partnerships, US GS1, provided letters of support to the traceability consortium for ***both*** 2010 AFRI CAPs submitted to this September. See Appendix III.
d. Recall InfoLink[42] – This is an online, Wizard-driven, product Recall Management System. Roger Hancock, CEO of Recall InfoLink provided a letter of support this summer to the AFRI Norovirus CAP. See Appendix III.
e. FarmVille[43] - This is a real-time farm simulation game available as an application on the social-networking website Facebook and as an App on both the Apple iPhone and Android. The game allows members of Facebook to manage a virtual farm by planting, growing and harvesting virtual crops and trees, as well as raising livestock.[44] More than 60M people are reportedly playing this game. Furthermore, Farmers Insurance Group will be providing virtual crop insurance[45] and McDonalds will lending its brand to a Farmville farm[46].
f. IBM - "Recent product contaminations and recalls coupled with confusion over marketing claims have contributed to an erosion of consumers' trust in Consumer Product manufacturers, according to the IBM survey of 1,676 consumers in the United States and United Kingdom."[47] Pardalis' IP has been distinguished from that held by IBM.[48] The opportunity could be to provide IBM with a win/win pathway to extending their IBM InfoSphere Traceability Server[49] outside of vertically integrated and federated supply chains to address consumers' trust with "whole chain" traceability.

5. **Fees for follow-on marketing opportunities** – That is, tuition and copyright licensing fees from OSU Branded whole chain traceability conferences, training sessions and publications.
    a. Again, AgGateway provides a wonderful comparable in the activities they provide to their community of members. See, e.g., AgGateway 2010 Annual Conference, Achieving Sustainability through E-business Innovation, November 9-11, 2010. [50]
    b. Profit Sharing – Similar to the "loyalty contributions" suggested above, the National Ag Product Traceability Center could share profits with universities participating in the traceability consortium.

Opportunities for marketing outside of food supply chains

Pardalis is offering to exclusively license its global IP relative to food supply chains. This leaves opportunities for Pardalis to independently operate outside of food supply chains, and to purchase source code improvements from the Center.



Again, Pardalis would be pleased to discuss other agreements with OSU that facilitate Pardalis' ability to license market software systems and IP outside of the food supply chain. Examples:

a. Dossia[51] – This is a consortium of major companies (Abraxis Bioscience, AT&T, Applied Materials, BP America, Cardinal Health, Intel, Pitney Bowes, sanofi-aventis, Vanguard Health, and Walmart) dedicated to empowering individuals with personal health records (PHRs) to improve health and healthcare.
b. GT Nexus[52] provides the cloud-based collaboration platform that leaders in nearly every sector rely on to automate hundreds of supply chain processes on a global scale, across entire trade communities.
c. "Personal data stores" (e.g., Bynamite,[53] Statz.com,[54] Mydex[55], Kynetx[56]) – The business interest in personal data stores is being fed by worries about how much personal information marketers collect. Also playing a part are recent outcries after Facebook changed its privacy practices and Google introduced a social networking tool, Buzz, which initially shared information widely without users' permission. Venture capital has been pouring into Web-based monitoring and privacy protection products. "Our view is that it's not about privacy protection but about giving users control over this valuable resource — their information," says Gene Yoon, founder of Bynamite.[57] Mr. Yoon, the leadership of Statz.com, a Mydex co-founder, and Kynetx proponents are among the ~700 members of the Data Ownership in the Cloud[58] networking group on LinkedIn that is managed by this writer. See also *Banking on Granular Information Ownership*[59] authored by this writer.
d. Microsoft – Pardalis' IP has been distinguished from that held by Microsoft.[60] Pardalis is also a Microsoft BizSpark member.[61] For instance, the opportunity would be to provide Microsoft with a win/win pathway to integrating Pardalis' metadata business rules with the business rules found in Microsoft's BizTalk Server[62] to massively connect 10s of millions of small businesses using Azure Office Applications. See *Microsoft Office Applications and Data Ownership*.[63] This writer has made significant contacts with Dan'l Lewin, Microsoft Corporate Vice President, Strategic and Emerging Business Development; Colin Masson, WW

Director, Operations Solution Category at Microsoft; and Don Morton, Site Leader, Microsoft Dynamics. Perhaps a strategic relationship with OSU and a National Center for Ag Product Traceability will tip the balance.

e. Cloud 2015 - Intel's Cloud 2015 vision has three key elements: a "federated" cloud that allows enterprises to share data across internal and external clouds; an "automated" network that automatically allows the secure movement of applications and resources to significantly improve energy efficiency in data centers; and PC and device-savvy "client-aware" clouds that know what types of applications, commands and processing should take place in the cloud or on your laptop, smartphone or other device – thus taking a user and specific device's unique features into account to fully optimize an online experience.[64]
f. Mobile & Internet banking transactions - Better asset transfer capabilities are being more and more required via ambient internet and mobile networks. Significantly better interoperability is needed among automated clearinghouse (ACH), electronic funds transfer (EFT) networks and private networks. AT&T Inc. and Verizon Wireless, the biggest U.S. mobile carriers, are planning a venture to displace credit and debit cards with smartphones, posing a new threat to Visa Inc. and MasterCard Inc.[65] There are current, confidential negotiations between Pardalis and a third party applicable to ACH, EFT and private network banking transactions.

Appendices

Appendix I

CPA System Development Costs

Name	Description	Salary %	Employment Dates	Cumulative Salary
KL	Computer software engineer (applications & management)	100%	Jun 2003 – Mar 2006	$232,111
DM	Computer software engineer (applications)	100%	Nov 2003 – Aug 2006	$228,980
SR	Computer software engineer (applications)	100%	Sep 2005 – Aug 2006	$60,122
TC	Computer software engineer (systems architect)	100%	Aug 2004 – Aug 2006	$149,926
RM	Computer software engineer (systems architect)	100%	Jan 2004 – May 2004	$38,820
LK	Computer software engineer (systems architect consultant)	100%	Irregular dates	$4,092
JC	Computer software engineer (user interfaces)	100%	Jan 2005 – May 2006	$102,006
Holcombe	CEO/Founder (Corporate & inventor management)	20%	Jun 2003 – Aug 2006	$54,442
			Total -	$870,499

Appendix II

Pardalis' Global IP

Country	App/Patent Number	Status	Expiry Date
Australia	2002323103	Granted	12-Aug-2022
Brazil	PI0212087-9	Pending	12-Aug-2022
Canada	2457936	Pending	12-Aug-2022
China (PR)	ZL 02820809.9	Granted	13-Aug-2022
Europe (EU)	02757063.9	Pending	12-Aug-2022
Hong Kong	04108499.5	Pending	12-Aug-2022
India	590/CHENP/04	Granted	12-Aug-2022
Japan	2003-521884	Pending	12-Aug-2022
Mexico	251,221	Granted	12-Aug-2022
New Zealand	531849	Granted	12-Aug-2022
United States	6671696	Granted	24-Mar-2022
Australia	2004282842	Pending	23-Sep-2024
Brazil	PI0415224-7	Pending	23-Sep-2024
Canada	2541329	Pending	23-Sep-2024
China (PR)	0480037094.4	Granted	23-Sep-2024
Europe (EU)	04784834.6	Pending	23-Sep-2024
Hong Kong	07103059.5	Granted	23-Sep-2024
India	1573/CHENP/06	Pending	23-Sep-2024
Mexico	2006/004007	Pending	23-Sep-2024*
New Zealand	546907	Granted	23-Sep-2024*
United States	7136869	Granted	10-Oct-2023
United States	11/595569	Pending	TBD

*presumed

Appendix III

Letters of Support Received for AFRI Food Safety Submissions (Sept 2010)

	Company	Signator	Title	City/State	Category
1	Bay Cities Produce, Inc.	Steve Del Masso	Vice President	San Leandro, CA	Processing and food service
2	Community Allliance with Family Farmers	Bob Corshen	Director, Local Food Systems	Davis, CA	Urban activists and farmers advocating for family-scale agriculture
3	Ferguson Group	Roy Ferguson II	President	Tulsa, OK	Operations Review and Analysis for Farms and Ranches
4	FoodShield	Eric Hoffman	Technical Director	Stillwater, MN	Web portal sponsored by NCFPD
5	GS1 US	Steve Arens	Director, Strategic Partnerships	Lawrenceville, NJ	Global Industry Standards Organization
6	Holcombe Ranch, Inc.	Scot Holcombe	Owner	Bartlesville, OK	Stocker (pre-feeding) Operations. NCBA nat'l summer stocker of the year
7	John Peirce, DVM	John Peirce, DVM	Veterinary Beef Cattle Consultant	Rockport, TX	Formerly DVM for AzTx Cattle Company, a major cattle feeding operation
8	L&H Packing Co.	Neal Leonard	CEO	San Antonio, TX	Meat packer
9	Mull Farms & Feeding	Glenn Mull	Owner	Pawnee Rock, KS	Feeding Operations
10	National Center for Food Protection and Defense (NCFPD)	Shaun Kennedy	Director	Stillwater, MN	A DHS Center of Excellence
11	National Fisheries Institute	Dr. Barbara Blakistone	Dir., Scientific Affairs	McLean, Va	Seafood Industry Advocacy
12	Northern Crops Institute	Brian Sorenson	Executive Director	Fargo, ND	Value-added processing for northern U.S. crops
13	Oklahoma Cattlemen's Association	Scott Dewald	Exec. V.P.	Oklahoma City	State Trade Association
14	Payment Pathways Inc.*	Rick O'Brien (verbal 9/2)	President	Chicago, IL	Search and retrieval of trusted identity information from supply chain transations
15	Recall InfoLink, Inc.	Roger Hanckock	CEO	Boise, ID	Recall Management Systems
16	Safe Tables Our Priority (S.T.O.P.)	Susan Vaughn Grooters	Public Health Specialist	Northbrook, IL	Non-profit consumer group advocating food safety
17	Top 10 Produce, LLC	John Bailey	Exec. Dir.	Salinas, CA	GS1 Traceability & Marketing for Small Producers
18	United Food and Commercial Workers International Union	Jackie Nowell	Director, Occupational Safety and Health Office	Washington, DC	Food workers union
19	Walmart	Adam Johnson	Sr. Dir. Food Safety & Health	Bentonville, AR	Global Retailer
20	WTW, Inc.	Randy Heflin	President & Owner	Derby, KS	Buyer and feeder of natural beef cattle

Appendix IV

Representative List of likely AFRI Stakeholders Advisory Group participants (with funding):

	Company	Contact	Title	City/State	Category
1	Advance Food Company	Kandi Nelson	Board President	Enid, OK	Value-added, proteins for the foodservice industry
2	American Council on Science and Health	Elizabeth M. Whelan, Sc.D., M.P.H.	President	New York, NY	Non-profit advocate for food safety
3	Association of Food & Drug Officials	Jerry Wojtala	Former Exec. Dir.	York, PA	Resolving and promoting public health and consumer protection
5	Capitol Land & Livestock	Jim Schwertner	Owner	Schwertner, TX	Major Stocker Cattle Buyer
6	Center for Public and Corporate Veterinary Medicine	Valerie Ragan, DVM	Director	Washington, D.C.	Trains veterinary students from N. American colleges for careers in public practice
7	Center for Science in the Public Interest	Caroline Smith DeWaal	Food Safety Director	Washington, D.C.	Non-profit advocate for food safety
8	Consumers Union	Ami Gadhia	Policy Counsel	Washington, D.C.	Non-profit advocate for food safety
10	Food & Water Watch	Patricia Lovera	Ass't Director	Washington, D.C	Non-profit advocate for food safety
11	Global Food Protection Network	Jerry Wojtala		Battle Creek, MI	Network advocating adoption of food protection policies
12	Institute of Food Technologists	Jennifer Cleveland McEntire, Ph.D.	Senior Staff Scientist and Director, Science and Technology Projects	Washington, D.C.	A major, global community of food scientists
13	International Food Protection Training Institute	Jerry Wojtala	Exec. Dir.	Battle Creek, MI	Food protection training for state and local food protection professionals
14	Lopez Foods	Richard Lane	VP of Operations	Oklahoma City, OK	High quality further processed protein products for the food service industry
15	Lykes Bros. Ranch	Flint Johns	Best Management Practices (BMP) projects specialist	Okeechobee, FL	Largest cattle ranching operation in Florida
16	McLane Foodservice Distribution	Tom Zatina	President	Dallas/Ft. Worth	Foodservice provider for more than 17,000 chain restaurants throughout the U.S.
17	Premium Natural Beef	Kirk Duff	Owner	Lone Wolf, OK	Branded, provider of Premium Natural Angus Beef from farm to fork
18	Produce Marketing Association	Edmund Treacy	VP, Supply Chain Efficiencies	Newark, DE	Production, retail, distribution, and foodservice sectors
19	Public Citizen	Genevie Gold	Legislative Ass't	Washington, D.C.	Non-profit advocate for food safety
20	Texas Cattle Feeders Association	Ross Wilson		Amarillo, TX	Major trade association for cattle feeders
24	U.S. Premium Beef	Brian Bertelsen	Director of Field Operations	Kansas City, KS	Major U.S. packer and marketer of value-added **beef** products
25	United Fresh Produce Association	Dr. David Gombas	Sr. VP, Food Safety & Technology	Washington, D.C.	Produce trade association
26	Wheeler Brothers Grain Company	Austin Lafferty & Ladd Lafferty	Co-owners	Watonga, Oklahoma	Grain merchants and cattle feeders since 1917

Appendix V

Representative List of 2011 Conferences:

Annual Conference or Workshop Description	Registration*	Location
International Association for Food Protection – http://www.foodprotection.org/events/iafp-annual-meeting/	750	Milwaukee
GS1 U Connect Conference – http://uconnect.gs1us.org/REGISTERNOW/tabid/381/Default.aspx	2000	Orlando
Global Food Safety Initiative Conference – http://www.mygfsi.com/events/internationalfood-safety-conference.html	2750	London
China Intl Food Safety & Quality Conference – http://www.chinafoodsafety.com/conference_e.htm	2750	China
Institute of Food Technologists Annual Mtg + Food Expo – http://www.am-fe.ift.org/cms/	750	New Orleans
Internet Identity Workshop (semi-annual) http://www.internetidentityworkshop.com/iiwxi-11-in-mountain-view/	500	Silicon Valley
Kynetx Impact Conference (VRM) http://kynetximpactspring2010.eventbrite.com/	200	Silicon Valley/Utah
Arkansas Association for Food Protection – http://arkafp.org/default.aspx	100	Springdale, AR
* Estimated per person in US$.		

Endnotes

[1] Smith Dewaal C., Food Protection and Defense: Preparing for a Crisis. MINN. J.L. SCI. & TECH. 2006;8(1):187-198. http://mjlst.umn.edu/uploads/Ne/l7/Nel7F6maClu2xtpVgX-0ng/81_dewaal.pdf

[2] Presentation by Frank Yiannas, Vice President of Food Safety, Walmart, at the second annual meeting of the Arkansas Association of Food Protection, Springdale, Arkansas, Sept 29, 2010.

[3] *Food safety is a cost of doing business*, The Farm Press News, 27 Aug 2010 (http://southwestfarmpress.com/news/food-safety-0830/index.html).

[4] http://www.dhs.gov/xlibrary/assets/ns_tic.pdf . "Imagine a world where individuals can seamlessly access information and services online from a variety of sources – the government, the private sector, other individuals, and even across national borders – with reduced fear of identity theft or fraud, lower probability of losing access to critical services and data, and without the need to manage many accounts and passwords. Individuals can conduct a wide variety of transactions online and trust the identities of the entities with which they interact. Individuals know what information service providers are collecting about them and how they are using it. They have choice in the number and types of user-friendly identity credentials they manage and use to assert their identity online. They have access to a wider array of online services to save time and effort. In this user centric world, organizations efficiently conduct business online by trusting the identity proofing and credentials provided by other entities as well as the computing environment in which the transactions occur. They are able to eliminate redundant processes associated with collecting, managing, authenticating, authorizing, and validating identity data. They reduce loss due to fraud or data theft through identity assurance efforts appropriate to the types of transactions they conduct, and they are able to offer additional services and higher risk transactions online. This ideal online world is within reach; however, we must first overcome barriers in the current environment. This Strategy and its associated implementation actions aim to transform the current identity landscape to the desired target state – the Identity Ecosystem. The Identity Ecosystem comprises a combination of transaction participants and interoperable infrastructure to foster trusted digital identities. The Identity Ecosystem is an online environment where individuals, organizations, services, and devices can trust one another through proper identification and authentication." Id. Page 4.

[5] Product Tracing Systems for Food, Department of Health and Human Services, Food and Drug Administration, 74 FR 56849, 56853-56854 (Nov. 3, 2009) (published in conjunction with USDA FSIS).

[6] Product Tracing Systems for Food , 74 FR 56847.

[7] Product Tracing Systems for Food , 74 FR 56853.

[8] Product Tracing Systems for Food , 74 FR 56853.

[9] The following is heavily influenced by Appendix I of the IFT/FDA Traceability in Food Systems Report, Vol. 1, http://www.ift.org/knowledge-center/focus-areas/food-safety-and-defense/~/media/Knowledge%20Center/Focus%20Areas/Traceability/IFT223042503TO6v1technical103009.pdf

[10] http://www.jifsan.umd.edu/

[11] http://www.ncfpd.umn.edu/

[12] http://www.iit.edu/ncfst/

[13] An application programming interface (API) is an interface implemented by a software program that enables it to interact with other software. It facilitates interaction between different software programs similar to the way the user interface facilitates interaction between humans and computers. http://en.wikipedia.org/wiki/Api

[14] Furthermore, CPA's methods have been distinguished worldwide from object-oriented, runtime efficiency patents held by these leaders in back-end, enterprise application integration: *Method and system for network marshalling of interface pointers for remote procedure calls (*US Patent 5,511,197 - Microsoft), *Reuse of immutable objects during object creation* (US Patent 6,438,560 - IBM) and *Method and software for processing data objects in business applications* (US Patent 7,225,302 - SAP).

[15] Product Tracing Systems for Food , 74 FR 56843-56855.
[16] Product Tracing Systems for Food , 74 FR 56853.
[17] See C. Considerations for an Effective Product Tracing System, Product Tracing Systems for Food , 74 FR 56849.
[18] Filed under Program Area Code A4121 - Prevention, Detection and Control of Food-borned Viruses in Food: a Focus on Noroviruses.
[19] Filed under Program Area Code A4101 – Prevention, Detection and Control of STEC from Pre-Harvest through Consumption of Beef Products.
[20] There are no outstanding IP licenses. There are current, confidential negotiations with a third party applicable to ACH, EFT and private network banking transactions.
[21] http://www.uark.edu/depts/fsc/
[22] Conversation with Dr. Steve Ricke, September 28, 2010 at the annual meeting of the Arkansas Food Protection Association, Sringdale, AR.
[23] https://www.fbo.gov/download/e5d/e5dc40b7dbb61c7bcf692e4a50e9e652/2010_LRBAA_PART_I_FBO_FINAL.pdf and https://www.fbo.gov/download/6fc/6fcb3cc01e840fafd75e04c1324f03b5/2010_LRBAA_PART_II_FBO_FINAL.pdf. Open-ended funding. White paper due by 31 Dec. 2010.
[24] See footnote 4, above.
[25] http://www.csrees.usda.gov/fo/specialtycropresearchinitiative.cfm. Next call – Nov 2010 for $5M/5YR CAPs.
[26] http://www.csrees.usda.gov/fo/organicagriculturereserarchandextensioninitiative.cfm. Next call – winter 2011 for $5M/5YR CAPs.
[27] http://www.csrees.usda.gov/fo/agriculturalandfoodresearchinitiativeafri.cfm
[28] A "Beef Sector Whole Chain Traceability Conference" filed on Sept. 22, 2010 by Dr. John Stone, Michigan State University.
[29] http://www.ok.gov/edge/. These solicitations seek projects that may be funded and issued by the EDGE Policy Board under the authority of statute (Title 62 O.S. Supp.2007 §47, §52).
[30] Pardalis is by no means averse to using open source licensing for helping to spread the OSU Brand when such licensing will generate royalties. See footnote 34, below, and accompanying text regarding the CDDL for open source.
[31] See, again, Appendices III and IV.
[32] See http://www.aggateway.org/Home.aspx
[33] See http://www.aggateway.org/Membership/2010MembershipDues.aspx
[34] What type of license might be used? A *Common Development and Distribution License (CDDL)* (or other license leveraging Pardalis' global IP) could be employed under the OSU brand to distribute Pardalis' globally secured patent rights to food supply chains with released source code. While the CDDL is an open source license it could nonetheless be modified to provide royalties back to OSU and restrict the openness of the source code as between OSU and the licensee. See http://hub.opensolaris.org/bin/view/Main/licensing_faq.
[35] http://www.fda.gov/food/foodsafety/foodsafetyprograms/rfr/default.htm
[36] Pub. L.110-085, Section 1005
[37] http://www.gs1us.org/solutions_services/i-z/product_recall_withdrawals
[38] http://www.fmi.org/
[39] http://www.gs1us.org/about_us
[40] http://www.gmabrands.org/
[41] http://www.nationalgrocers.org/
[42] http://recallinfolink.com/about_us.php
[43] http://www.farmville.com/
[44] http://en.wikipedia.org/wiki/FarmVille
[45] http://content.usatoday.com/communities/ondeadline/post/2010/10/virtual-crop-insurance-comes-to-virtual-farmville/1
[46] http://www.usatoday.com/tech/news/2010-10-07-mcdonalds07_ST_N.htm
[47] IBM Survey Reveals Eroding Consumer Confidence in Packaged Goods Brands, http://www-03.ibm.com/press/us/en/pressrelease/21803.wss
[48] See footnote 14, above, and accompanying text.
[49] http://www-01.ibm.com/software/data/infosphere/traceability-server/
[50] http://www.aggateway.org/Events/2010AnnualConference.aspx
[51] http://www.dossia.org/about-dossia/an-introduction-to-dossia
[52] http://www.gtnexus.com/
[53] http://www.bynamite.com/
[54] https://www.statz.com/Statz/StartPage.aspx
[55] http://mydex.org/
[56] http://www.kynetx.com/
[57] "You want my personal data? reward me for it" by Steve Lohr, New York Times, 21 July 2010 (http://www.nytimes.com/2010/07/18/business/18unboxed.html?_r=5)
[58] http://tinyurl.com/datacloud
[59] http://www.scribd.com/doc/4848196/Banking-on-Granular-Information-Ownership
[60] See footnote 14, above, and accompanying text.
[61] http://www.bizspark.com/bsdb/search.aspx?id=113
[62] http://www.microsoft.com/biztalk/en/us/roadmap.aspx
[63] http://pardalis.squarespace.com/blog/2008/12/31/microsoft-office-applications-and-data-ownership.html
[64] http://newsroom.intel.com/docs/DOC-1384#multimedia
[65] http://www.bloomberg.com/news/2010-08-02/at-t-verizon-said-to-target-visa-mastercard-with-smartphones.html