

# **Forming a Food Safety & Whole Chain Food Product Traceability Center**

**Brian D. Adam, Professor, Agricultural Economics,  
Oklahoma State U.**

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# **Food Safety & Whole Chain Traceability Center**

- ❖ **Why Whole Chain Traceability?**
- ❖ **Why a Center?**
- ❖ **Why should FAPC be involved?**
- ❖ **Vision of Global “Whole Chain” Ag Product Traceability Center of Excellence**
- ❖ **Proposed Next Steps**

# Why Whole Chain Traceability?

## ❖ Food safety is critical issue

- Current regulations and industry practice - one-up and one-down tracing and tracking
  - Limited information sharing
  - Investigations still take weeks and months
  - Innocent parties damaged by negligence of others

# Why Whole Chain Traceability?

## ❖ Food safety is critical issue

- Technology is now available for whole-chain traceability
  - Benefits consumers
    - Faster tracing of problems
    - Improved consumer safety and confidence
    - Protection of innocent parties in supply chain
  - Benefits firms
    - Improved supply chain management → more economical use of resources



# Why a Center?

## ❖ *No such center exists in the world*

- "Despite all the work in academic research there is currently no industry solution that fully supports tracking of items across independent organizations."

Source – [Microsoft and IBM White Paper](#).

- Existing centers are focused on specific areas
  - Food safety & nutrition ([JIFSAN](#))
  - Food safety, food defense & nutrition ([IIT IFSH](#))
  - Food protection & defense ([NCFPD](#))
  - Food safety & toxicology ([MSU NFSTC](#))
  - Produce Safety ([UC Davis CPS](#))

# Why a Center?

- ❖ **There is a need for a center that crosses disciplines to solve system-wide problems**
  - *“Food safety professionals need to break with tradition and to be more imaginative and creative in dealing with food safety issues.”* Frank Yiannas, WalMart, at Global Food Safety Conference in London.

# Current Traceability Consortium



# Current Traceability Consortium

## ❖ Oklahoma State University

### ■ Ag Econ

- Ag Marketing
- Economics of Stored Products
- Supply Chain Management
- Risk Analysis
- Food Demand
- Food Processing and Marketing



# Current Traceability Consortium

## ❖ Oklahoma State University

- Biosystems & Ag Engineering
  - Process Engineering
  - Stored Product Engineering
  - Precision Ag and Sensors
  - Biomass engineering and renewable energy
  - Homeland Security
- Computer Science
  - Computer networking
  - Mobile technology

# Current Traceability Consortium

## ❖ **Michigan State University**

- Food Marketing
- Societal and Agricultural Standards
- Supply Chain Management
- Nanotechnology
- Packaging Science
- Chinese Relations

# Current Traceability Consortium

## ❖ North Dakota State University

- Food Systems & Post-harvest Processing
- Workforce training & education
- Ag Economics
- Risk Management
- Ag Extension

# Current Traceability Consortium

## ❖ **University of Arkansas**

- Food Quality & Safety
- Sustainability & Environmental Impacts
- Microbiology & Virology
- Food Safety Consortium
- Sam Walton College of Business RFID Research Center



# Potential Center Participants - Research

- ❖ **Michigan State U.**
- ❖ **U. of Arkansas**
- ❖ **North Dakota State U.**
- ❖ **Xerox/Palo Alto Research Center (PARC)**
- ❖ **Oklahoma State U.**
  - Food & Ag Products Center
  - Ag Econ
  - Biosystems & Ag Eng
  - Computer Science
  - OSU Multi-Spectral Labs
  - NIMFFAB

# Potential Center Participants - Industry

## ❖ Representative Large Entities

- Nestle, Syngenta, Walmart, Tyson, Chiquita, GS1 US, National Fisheries Institute, Oklahoma Cattlemen's Assoc., Northern Crops Institute, UFCW Union, Monsanto, Kellogg's, General Mills, Cargill, Anheuser-Busch

## ❖ Representative Small Entities

- Bay Cities Produce Co. (CA), Top 10 Produce (CA), Community Alliance with Family Farmers (CA), Holcombe Ranch (OK), WTW Cattle Feeding (KS), L&H Packing Co. (TX), Mull Farms & Feeding (KS)

# Possible Roles for FAPC

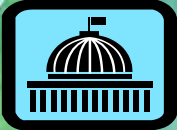
- ❖ **Support to Public and Private Funding Efforts**
  - Experience with Cross-Disciplinary, Applied Research and Extension in Food Processing, and existing facilities
- ❖ **Introduction of state-of-the-art social, mobile and retail technologies**
- ❖ **Create “whole chain” marketing opportunities for small, medium and large supply chain participants**



# Cadre of U.S. Research PhD's

- ❖ Dr. Mike Buser, Assistant Professor, Biosystems and Ag Engineering, OSU
- ❖ Dr. Jacque Fletcher, Sarkeys Distinguished Professor, Department of Entomology and Plant Pathology, OSU
- ❖ Dr. Chanjin Chung, Professor, Department of Agricultural Economics, OSU
- ❖ Dr. Paul Weckler, Associate Professor, Biosystems and Ag Engineering, OSU
- ❖ Dr. Brian Adam, Professor, Department of Agricultural Economics, OSU
- ❖ Dr. Jean-Francois Meullenet, Head & Prof., Dept. of Food Science, UARK
- ❖ Dr. Steve Ricke, Professor, Donald Wray Chair in Food Safety, UARK
- ❖ Dr. Phil Crandall, Professor, Department of Food Science, UARK
- ❖ Dr. Lawrence Busch, Professor & Director, Center for the Study of Standards in Society (CS3), MSU
- ❖ Dr. John Stone, Co-Director & Senior Research Scientist, CS3, MSU
- ❖ Dr. Paul Thompson, Professor, W.K. Kellogg Chair in Agricultural, Food and Community Ethics, MSU
- ❖ Dr. Peter Muriana, Professor, Animal Science and FAPC, OSU
- ❖ Dr. Tim Bowser, Extension Specialist, Biosystems and Ag Engineering, OSU
- ❖ Dr. Carol Jones, Assistant Professor, Biosystems and Ag Engineering, OSU
- ❖ Dr. Randy Taylor, Professor and Interim Department Head, Biosystems and Ag Engineering, OSU
- ❖ Dr. Deland Myers, Professor and Director, School of Food Systems, NDSU
- ❖ Dr. Saleem Shaik, Asst Prof., Dept. of Agribusiness & Applied Econ., NDSU
- ❖ Dr. Steven Pueppke, Director of Ag Experiment Station, MSU
- ❖ Dr. D. C. Coston, V. Pres. of Ag Extension, NDSU





# What US regulators want ...

**“[T]he regulators want a traceability system that is consistent, speedy, covers the entire supply chain, has electronic records, has interoperable systems, and covers domestic and imported foods. On top of that, the FDA wants the industry to develop the tools and to pay for the system.”\***

**What regulators want is “whole chain” traceability ....**

\* IFT Special Edition Weekly: U.S. Food Safety Legislation (10 Jan 2011)



# The Vision of Walmart's Frank Yiannas



**"In the field of food safety today, there is not much published or discussed related to human behavior and culture - often referred to as the "soft stuff". However, if you look at foodborne disease trends over the past few decades, it's clear to me that the soft stuff is the hard stuff. **We won't make dramatic improvements in reducing the global burden of foodborne disease until we get much better at influencing and changing human behavior (the soft stuff).**"<sup>1</sup>**

Food safety professionals need to break with tradition and to be more imaginative and creative in dealing with food safety issues Yiannas told the delegates at the Global Food Safety Conference in London. He identified several trends in food safety including:

- ❖ Increased surveillance and the use of more technologies in surveillance of foodborne disease outbreaks
- ❖ The importance of ingredients as a cause of half of the disease outbreaks in the United State in recent years
- ❖ **The significance of social media is giving early warning of foodborne illnesses,<sup>2</sup> and**
- ❖ The role that human behavior played in causing and preventing food-linked diseases.

**"We need to change behavior and cultures and use the new technologies to achieve better food safety ...."<sup>3</sup>**

<sup>1</sup> [Food Safety Culture: Creating a Behavior-Based Food Safety Management System](#) by Frank Yiannas (Springer Publishing, ©2009) ISBN:

978-0-387-72866-7

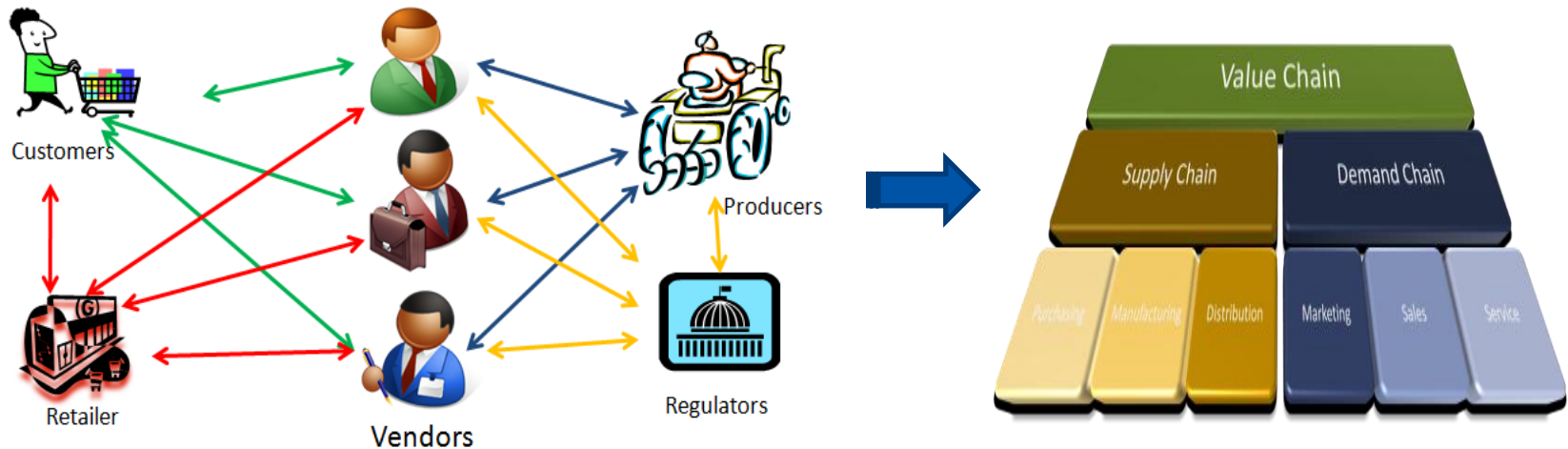
<sup>2</sup>. [Walmart purchases Kosmix for \\$300M & forms @walmartlabs](#)

<sup>3</sup>. From an article posted February 22, 2011 to Meatingplace.com by John Strak



# “Whole Chain” Traceability

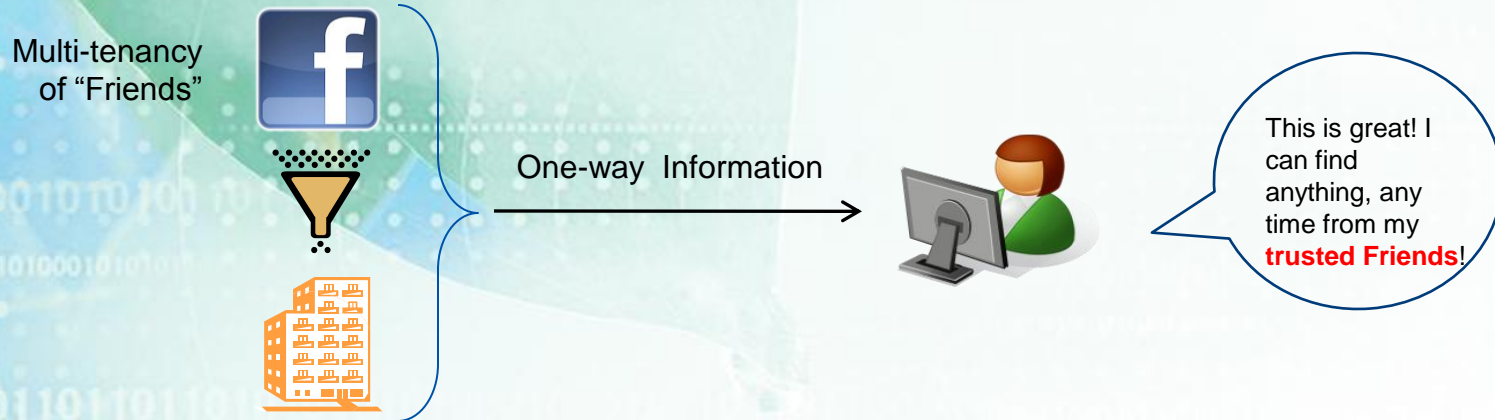
A starting point for the Supply/Demand Chain



**“Whole Chain” Traceability is technically achievable now.** As a supplement to this presentation, see [“A New Way of Looking at Information Sharing in Supply & Demand Chains”](#).

# Broadly Perceived Benefits of the Internet

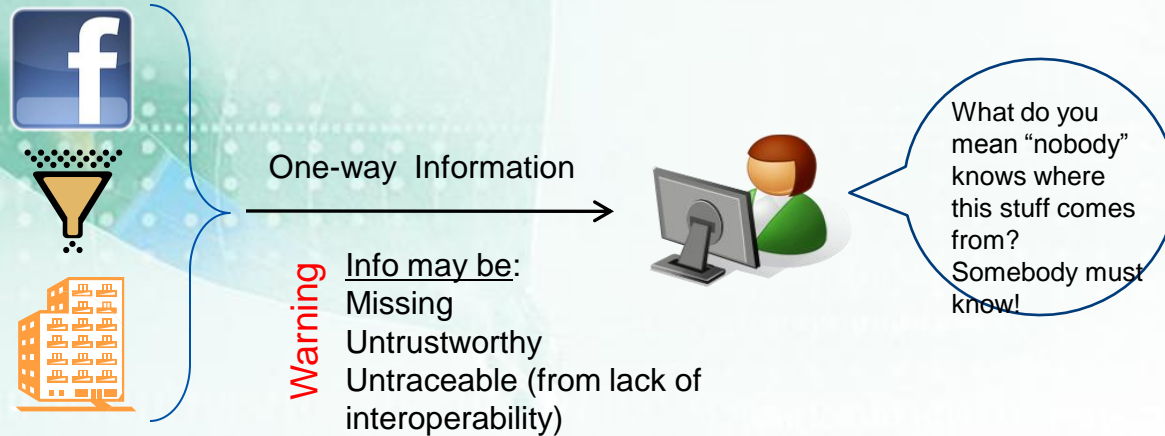
Facebook has turned the concept of user-centric information sharing into a product that ordinary computer users can understand. Because of Facebook, **consumers and supply chain participants are now conditioned to believe that they can directly find information about anything, anytime from their “trusted Friends”**.





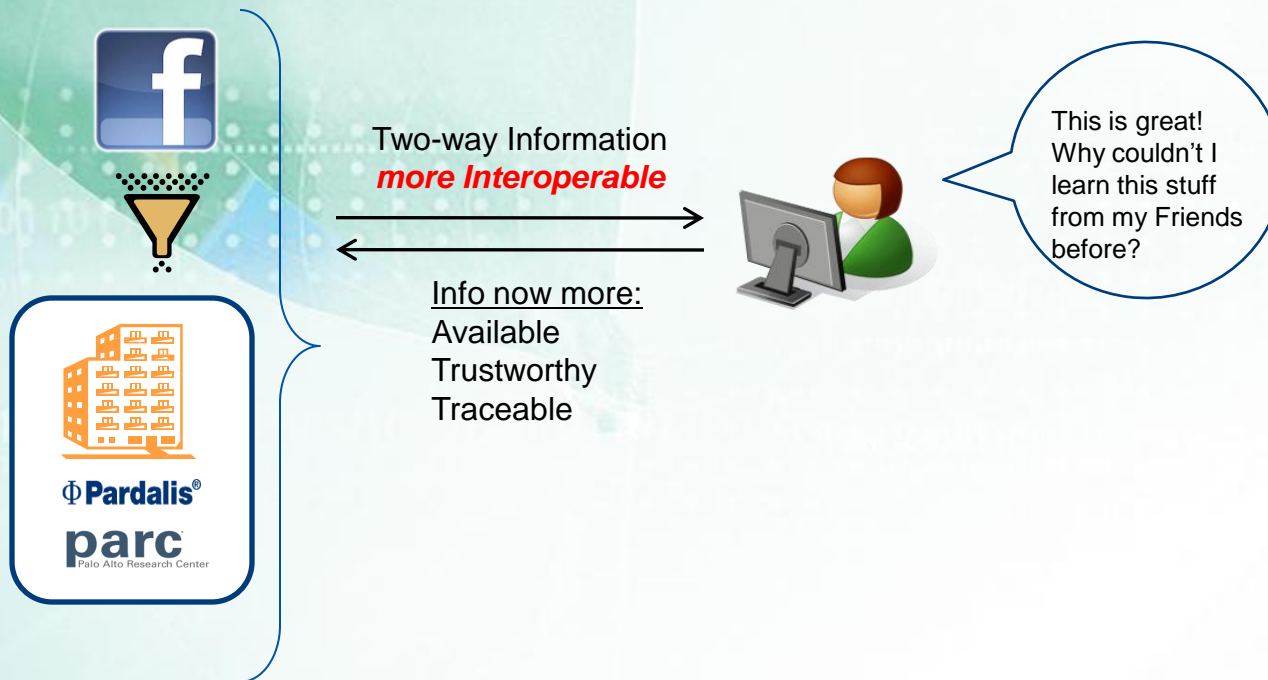
# Limitations of the “Facebook Effect”

Notwithstanding the “Facebook Effect” there is nothing user-centric in Facebook’s implementation of information sharing. **It remains a one-way conversation that exploits the advantages of the Internet as it exists. Facebook dictates the quality of service and makes billions of dollars doing so.**



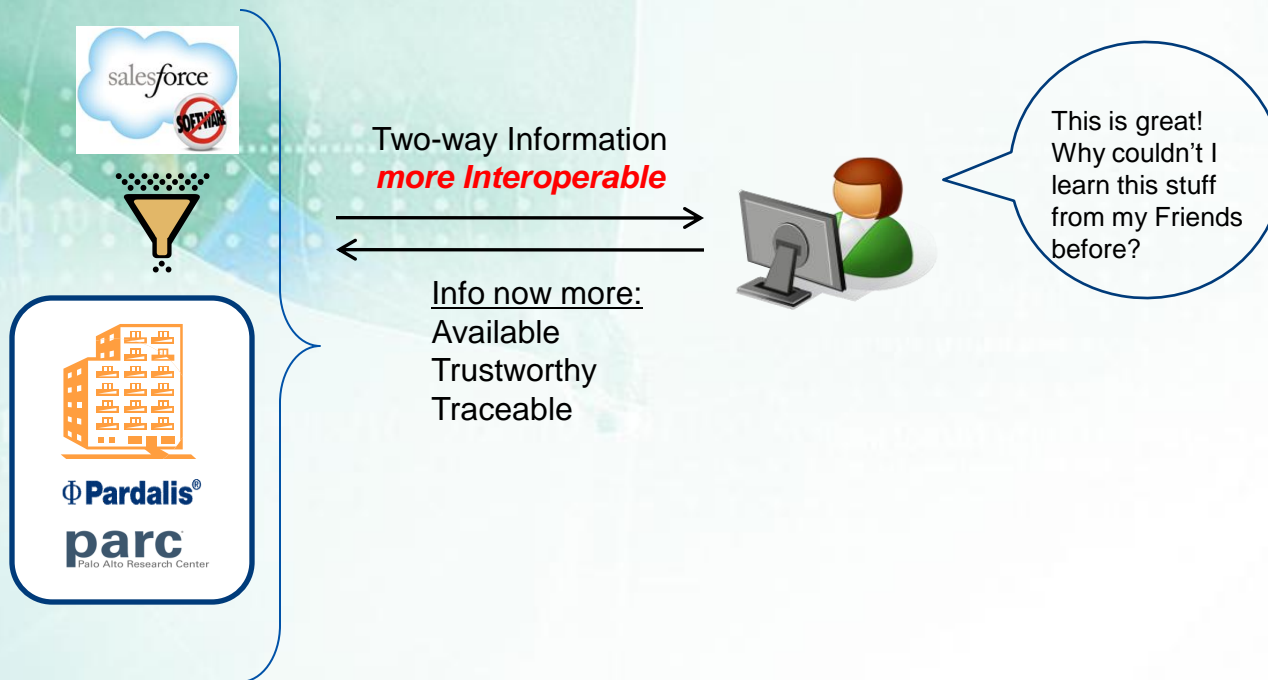
# Beyond the “Facebook Effect”

Pardalis’ and PARC’s protocols provide ordinary users – including supply chain participants along the whole chain – with greater control over their information **that incentivizes increases in the quality and availability of new information leading to new business models!**

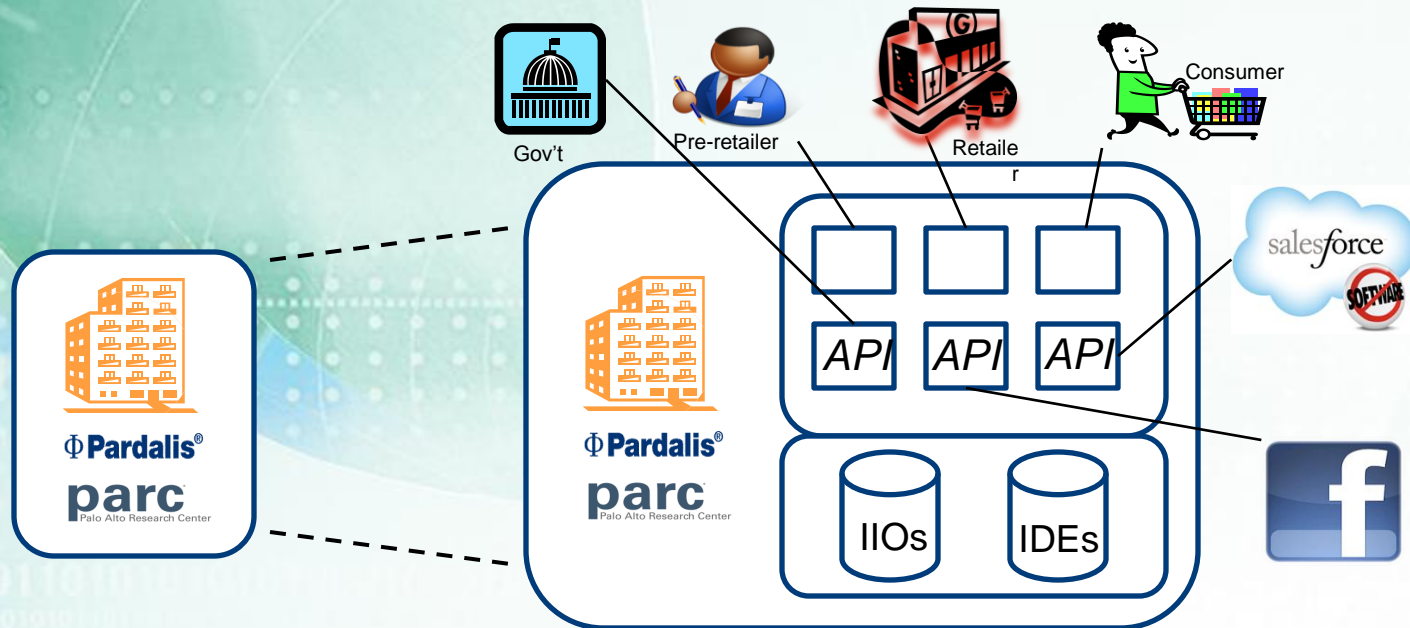


# Beyond the “Salesforce Effect”

Again, Pardalis’ and PARC’s protocols provide ordinary users – including supply chain participants along the whole chain – with greater control over their information.



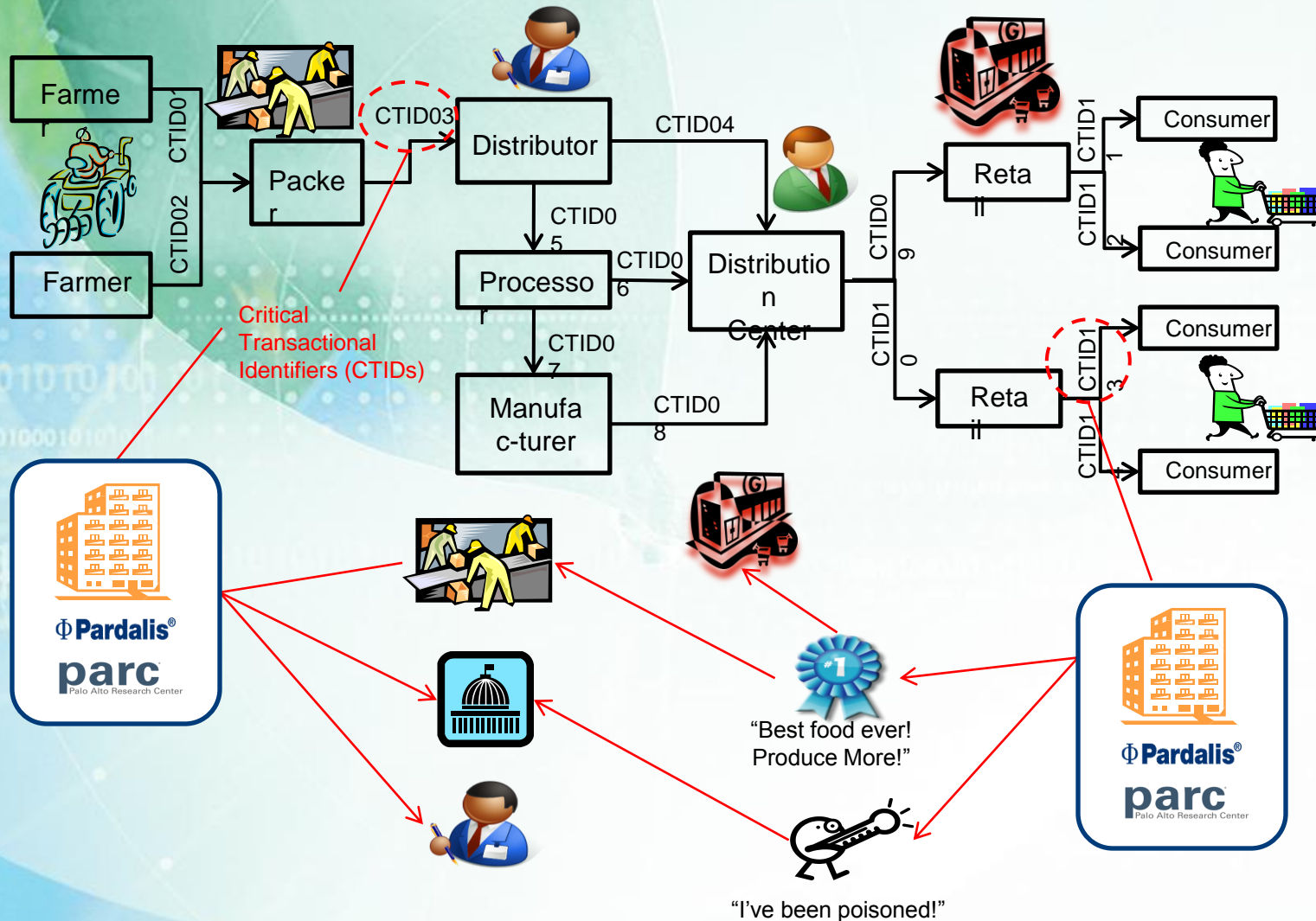
# What Pardalis and PARC make possible



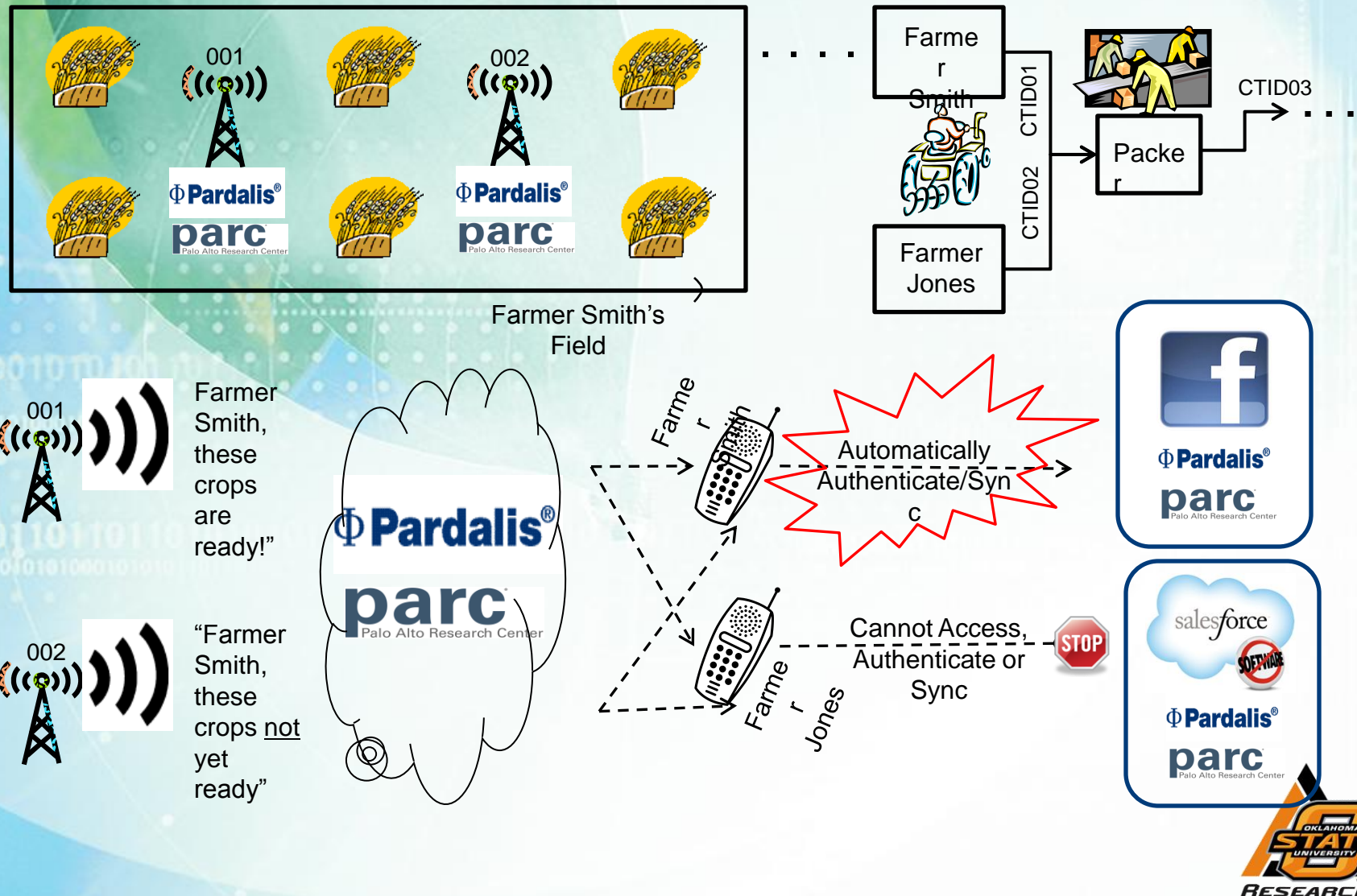
User tenancies individually controlled for data privacy coupled with two-way sharing. Application Programming Interfaces (APIs) provide these two-way sharing benefits to tenants of third party systems for overcoming “silo effects” of supply/demand chains.



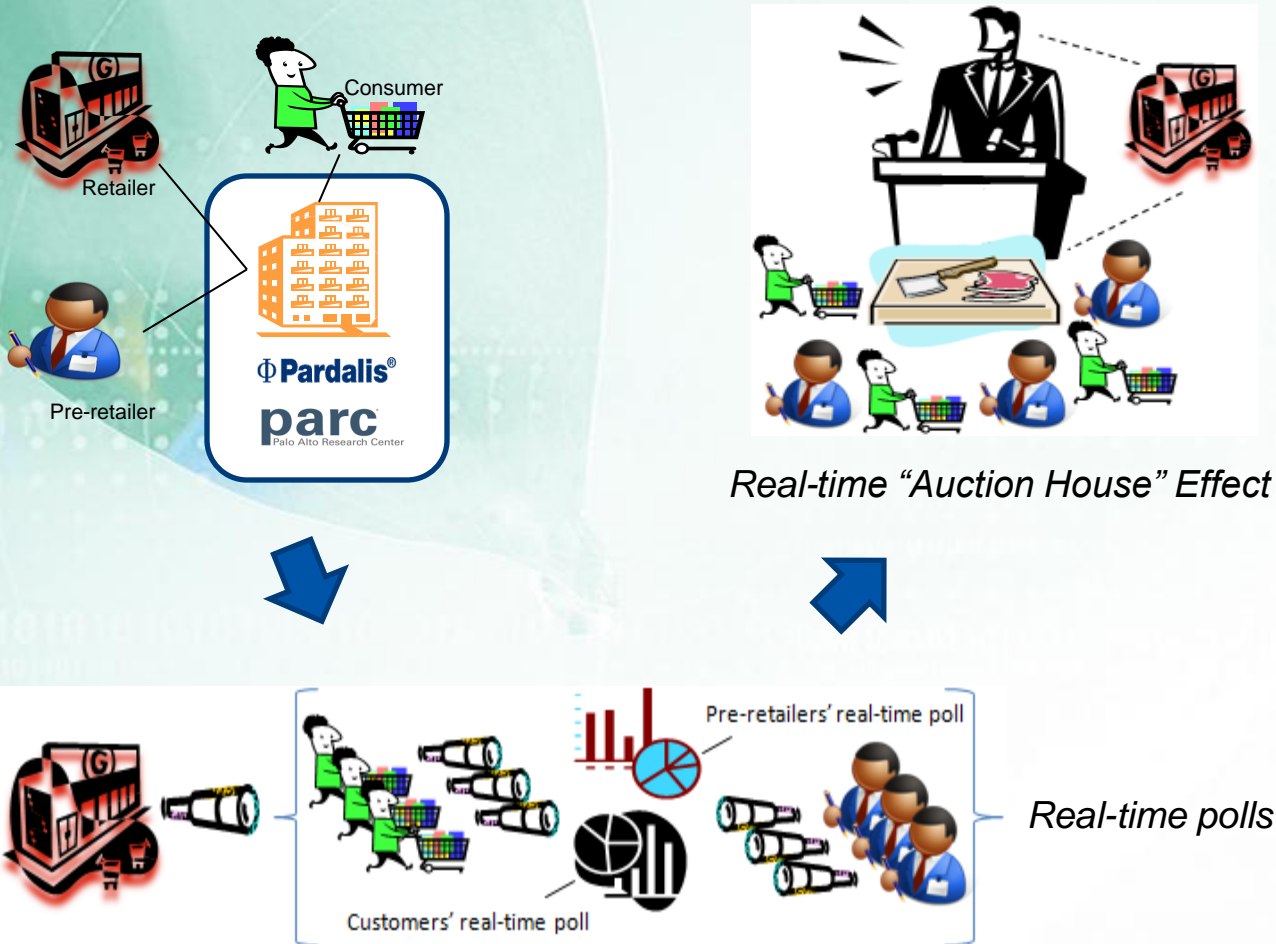
# Transactional Interoperability in Supply/Demand Chains



# Precision Agriculture: "Data Ownership" over Wireless Broadcasts



# Real-time Test Marketing in the Supply Chain



For more information, see ["Real-time, supply chain test marketing of new product lines"](#)



# Beyond GS1's Architecture Framework

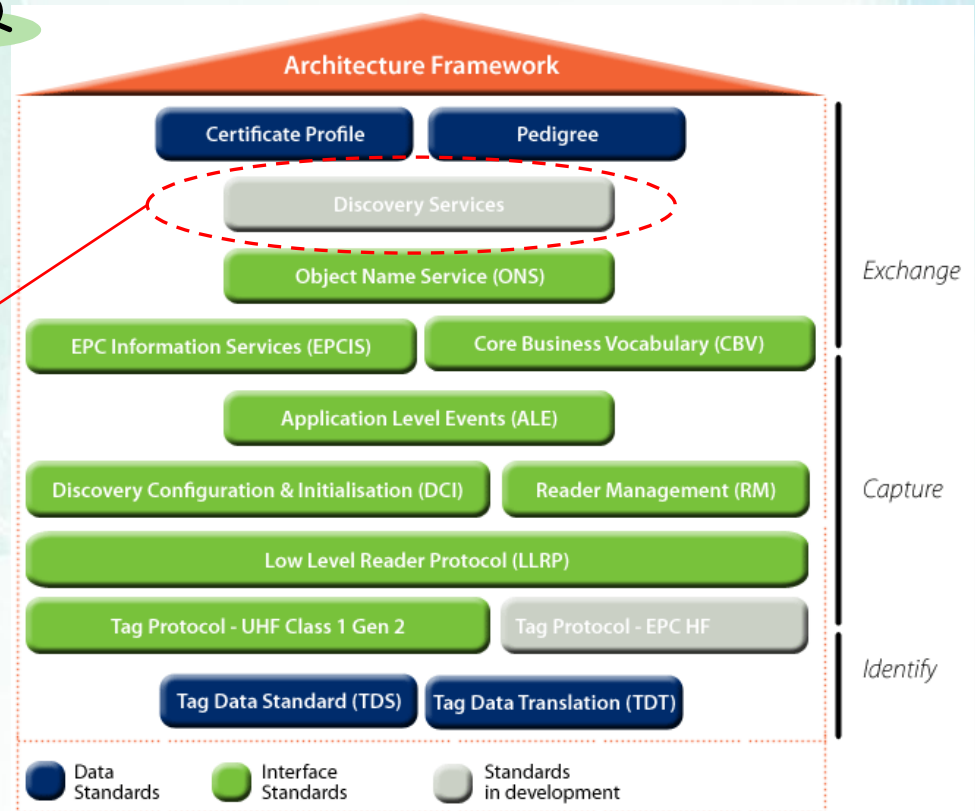
Whole chain  
Traceability



Without Pardalis' & PARC's protocols, industry initiatives will continue to focus on *limited* one-up/one-down information sharing. GS1's "Discovery Services" – has been *grayed out* for years and, even when implemented, is **not designed for use by consumers**.



GS1 Architecture Framework



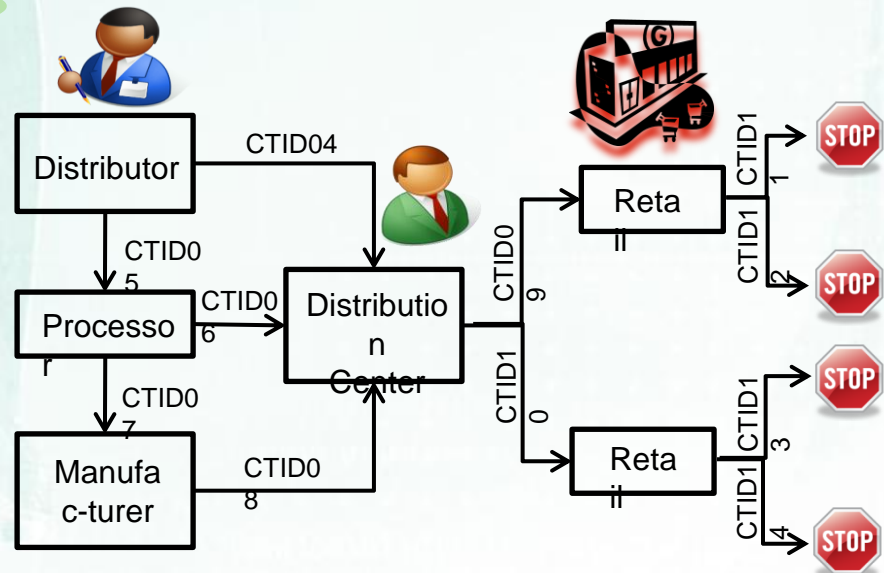


# Beyond GS1's Rapid Recall Exchange

Whole chain  
Traceability



Supply/Demand Chain  
Coverage of RRE



GS1's Rapid Recall Exchange  
designed to connect retailers and  
distributors, **but not to connect to  
consumers.**



# Funding Comparables

## ❖ The EU's TAS3 project

- TAS3 trusted personal data store project
- Multi-university, 3YR/€12.91M research project ending Dec 2011

## ❖ The EU's OKKAM project

- OKKAM internet of things project
- Multi-university, 30MTH/€7.4M research project ended June 2010
- Now being commercialized

## ❖ University of Illinois at Urbana-Champaign

- ADM Gives US\$10 Million to Found Institute to Reduce Global Postharvest Loss of Grains, Oilseeds

## ❖ NSF funded “Named Data Networking” Project

- NSF awards grant of \$8M/3YR for future internet architecture to Colorado State University, PARC, University of Arizona, University of Illinois/Urbana-Champaign, UC Irvine, University of Memphis, UC San Diego, Washington University, and Yale University
- Announced August, 2010

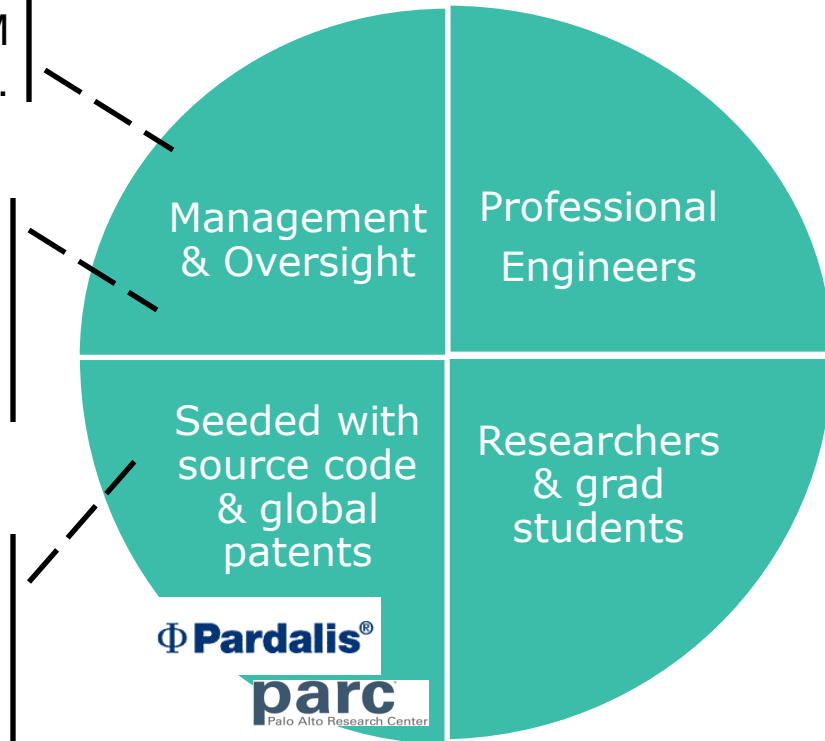


# Global “Whole Chain” Ag & Food Product Traceability Center

Industry & technology stakeholders: 10 - 15 companies from US, EU and Asia investing US\$1M to \$2M for total investment of \$10M to \$30M.

Universities: Oklahoma State University, University of Arkansas, Michigan State University, North Dakota State University, Others(?)

Pardalis and PARC provides source code and IP under master joint development agreement. May further include seeding of Third Party technologies under appropriate technology transfer agreements.

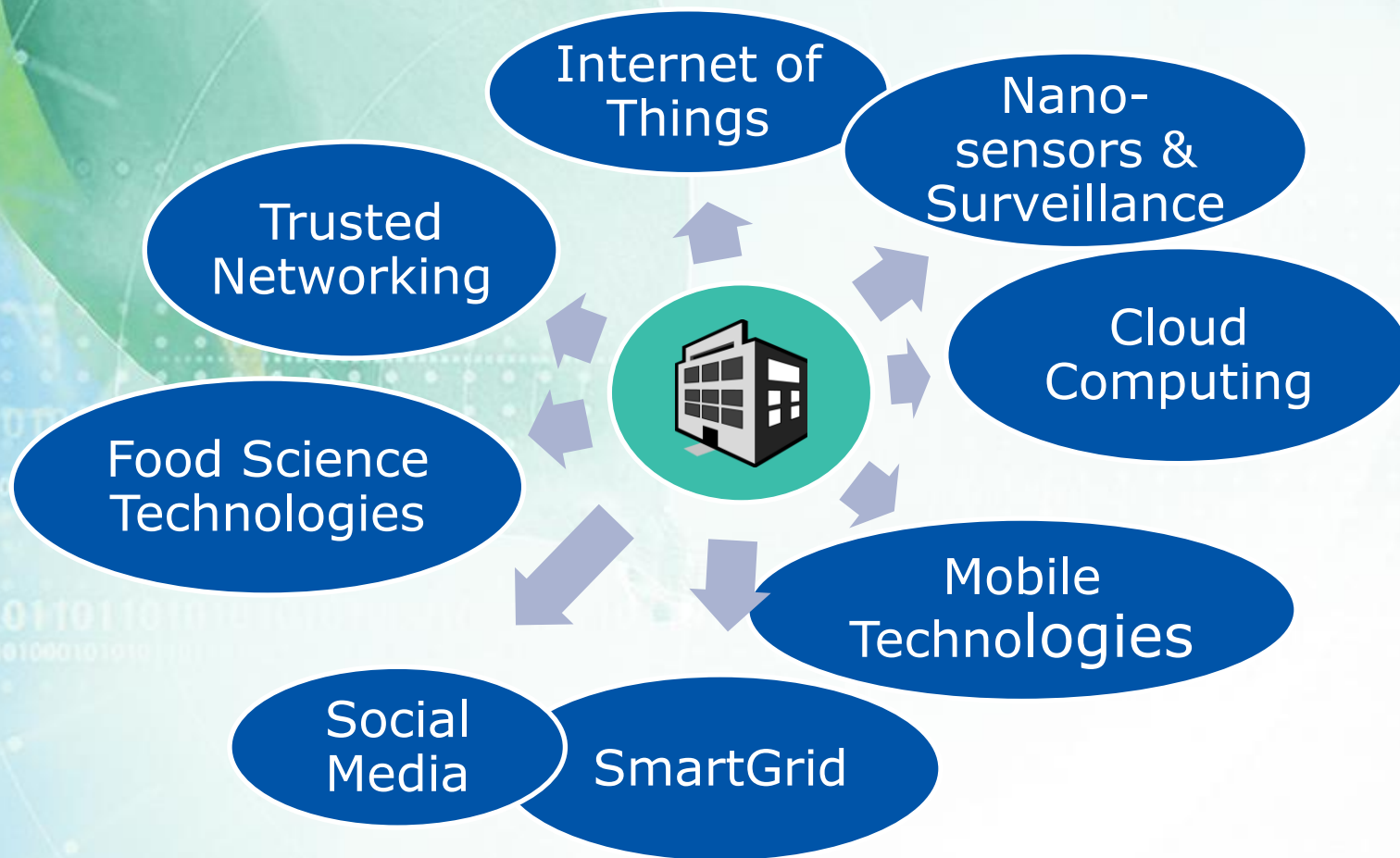


*Projected formation -  
Q1 2012*





## Industry Stakeholder Benefits (Technology Transfers)







# Global, Multi-university, Multi-disciplinary Research

A Global “Whole Chain” Ag & Food Product Traceability Center will uniquely connect the dots between these research activities. It will position participating universities for global renown and leadership in their respective disciplines.





# Current Funding Opportunities/Sources

## ❖ AGree Foundation

- ❖ AGree is funded by Ford Foundation, Bill & Melinda Gates Foundation, The William & Flora Hewlett Foundation, The David and Lucile Packard Foundation, W.K. Kellogg Foundation, The McKnight Foundation, Rockefeller Foundation and The Walton Family Foundation

## ❖ Content-Based Mobile Edge Networking (CBMEN)

- ❖ Solicitation Number: DARPA-BAA-11-51

## ❖ Oklahoma EDGE Fund

- ❖ 2011 EDGE Funding Competition

## ❖ US DHS S&T Long Range Broad Agency Announcement (BAA 10-01)

- ❖ A Department of Homeland Security Science and Technology Directorate (1 Jan 2010)

## ❖ Walmart to buy social-media firm Kosmix to beef up mobile, Web retail

- ❖ A \$300M purchase by Walmart and the establishment of @walmartlabs



# Proposed Next Steps

- ❖ **Joint efforts between FAPC and Whole Chain Traceability Consortium to identify additional funding opportunities and sources, and to discuss industry stakeholders to approach**
- ❖ **FAPC Joins Meeting [as yet unscheduled] with Dr. Stephen McKeever, OSU Vice President of Research, regarding the opportunities presented by the Whole Chain Traceability Consortium, and to seek advice and guidance regarding the establishment of a Whole Chain Traceability Center that is anchored at OSU**