Using stakeholder input to develop multi-institutional graduate education programs in food defense

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Need

- There is a need for an inter-disciplinary, evidence-based food safety and defense information/curriculum for both graduate students and “professionals” that work in the general area of food protection and defense
Risk Reduction: Inherent vs. Intentional

- **Inherent (for probable)**
  - Focus on what hazards are likely to occur
  - HACCP
  - GMP’s, SOP’s, Sanitation
  - Supplier approval, ingredient specifications, audits
  - Training

- **Intentional (for improbable)**
  - Is a new approach needed? Dual use?
  - Points of vulnerability, prevention, intervention, response, recovery, threat detection, crisis management, media interactions, industry communication, public health communication?
Food Industry Wants

- Develop an approach that can help us prepare better for food defense

- Find a balance...

PREVENTION
- FOOD SAFETY
- food defense

RESPONSE
- FOOD DEFENSE
- food safety
Our Journey...

- **OBJECTIVE 1**: Development of *National Food Defense Knowledge Domain* using stakeholder input

- **OBJECTIVE 2**: Development and organization of an applied national educational food safety and food defense *curriculum at the graduate level*

- **OBJECTIVE 3**: Development and coordination of a food safety and food defense *outreach program for key stakeholders* involved in food safety and food defense

- **OBJECTIVE 4**: Development of a *capstone experience*, involving food defense stakeholders and graduate students, to complement learning concepts from the educational curriculum
Our Vision...

**Process & Outputs**


**Inputs**

- FD Stakeholders
  - Food industry
  - Academia
  - Food Defense Specialists
  - Regulatory
  - Communication Specialists
- Pre-existing Knowledge
  - FS & FD Curriculum / Courses
  - Extension Bulletins

**Impacts**

- Creation of FD Network
- National FD Knowledge Domain
- New Generation of FD Professionals
- New Generation of FD Graduate Students
- Strengthening FD Stakeholder Knowledge & Communication

**Abbreviations**

- FD = Food Defence
- FS = Food Safety
- FDCS = Food Defence Computer Simulation
Who are the End Users?

The “Food Defense Professional”

- Students (graduate and undergraduate)
- Food industry – farm to fork
- Regulatory – federal, state, local
- First responders
- Academia
- Healthcare
- Other key stakeholders
Stakeholder Input
What is a “food defense professional?”

What should they know??

What should we teach?

- What we know best?
- What we were taught?
- What we enjoy teaching?
- What we have experience with?
- What the textbook happens to include?
- What the student/worker needs for successful employment?
What is taught

DACUM

What should be taught

Academia

Real World
**DACUM**

- An Acronym for **Developing A Curriculum**.
- Originated at The Ohio State University

- A research-based process to recruit, gather, and integrate **stakeholder input** to maximize educational curriculum development
DACUM Operates on Three Premises

1. Any occupation can be described in terms of skills required to perform specific tasks.

2. Expert practitioners can describe their occupation better than anyone else.

3. All tasks, in order to be performed correctly, require certain knowledge, skills, tools and worker behaviors.
Steps in a DACUM Process

1. Select an occupation to be described.
2. Select a panel of experts in that occupation.
3. Select a skilled facilitator to work with the panel.
4. Facilitator and panel develop a DACUM chart in a 2-3 day workshop.
5. Verify the contents of the DACUM chart by other experts not on the panel.
6. Translate and apply the DACUM chart to instructional strategies, materials and evaluation instruments.
The DACUM Workshop

- 3-day process led by a trained facilitator (Dr. Cynthia Woodley, PTI)
- Panel of 13 food safety & defense experts
The DACUM workshop produces a matrix that describes the occupation in terms of **DUTIES** (general areas of competence), and **TASKS**, as well as associated **knowledge domains**.

The contents of the chart represent the consensus of the expert panelists.
Key Duties Identified

- Preventing,
- Detecting & diagnosing,
- Responding to, and
- Recovering from food system incidents.

- Communication
- Research & Development
Validation of DACUM Chart

- Within these duties and tasks, more than 100 knowledge areas were identified.

- The relevance of these knowledge areas was validated using an online survey instrument.

- More than 300 survey participants rated the knowledge domains with respect to importance and frequency of use.
Survey participants by sector
Capstone (more later)
The results of the DACUM process can be used for:

- curriculum development,
- training materials development,
- training needs assessment,
- career counseling,
- job descriptions, and
- competency test development.
The case for collaborative, multi-institutional graduate education initiatives in food defense

“…no one entity has the financial capacity, the experience or the knowledge base to completely address the potential threats facing the nation’s food supply.”

Graduate Certificate in Food Safety & Defense

Certificate-like program for Food Protection and Defense Professionals
AG*IDEA Program

- Established through 2005 USDA Higher Ed Challenge Grant
- Uses GPIDEA / AGIDEA platform
- Four participating institutions
- Students select one as their home institution, but take classes from all four universities
NCFPD Program

- leverage and fuse outstanding course offerings and/or initiatives from many institutions without formal inter-institutional agreements
- accommodate various course formats (online, traditional classroom setting, short course, etc.)
- make the program accessible to students anywhere
- feature flexibility to meet the needs and interests of individual students
- plan for and embrace change as the needs of food defense professionals evolve
Leveraging the DACUM Process

Multi-institutional programs can leverage the DACUM process because it is an effective method to develop a comprehensive set of *knowledge domains* and *critical core educational competencies* related to food safety and food defense that can serve as a *foundation for educational curricula*. 
Capstone
Capstone Experience

Food Defense Computational Simulation
Overall Thinking

Economic World

Farm → Transport → Storage → Processing → Distributing Center

Transport → Restaurants → Retail → Household

Data Fusion / Mining

Radiological, Chemical, Biological

Real World Lessons Learned

Public Health

People, Chemical, Air, Water, Machine

Real World

Lessons Learned
General Approach for Simulation

1. Collect economic, public health, and food distribution data
2. Develop computational model to forecast economic and public health information
3. Establish teams representing food industry, government, media, etc.
4. “Play” the simulation
5. Facilitate discussion of decision making rationale and impacts with after action reviews
Data Collection

- **Information type (examples)**
  - *Economic data* (retail prices, market share, recall effects, cost of testing)
  - *Public health data* (biological and chemical agent characteristics, foodborne illness statistics, etiological agent testing, infective dose, morbidity/mortality rates, intervention strategies)
  - *Ingredient and food distribution data* (processing plant locations, production information, product information, distribution networks)

- **Accessing information**
  - Literature searches, company financial statements, personal communication with members of the food industry
Simulation “Teams”

- Human Players - Make Decisions
  - Ingredient Suppliers (4-5 teams)
  - Food Processors (4-5 teams)
  - Food Retailers (4-5 teams)
  - Food Transportation/Distribution (4-5 teams)

- Human Players – Provide Information
  - Government (State/Local, USDA, FDA, CDC, FBI)
  - Other first responders (i.e. emergency management)
  - Media
  - Consumers (hotlines, complaints)

- Computer Players – Data collection/output
  - Food Distribution
Simulation Setting
Simulation Setting

Financial Report

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<th>Type</th>
<th>Location</th>
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SALES

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TOTAL

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Node Information

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SALES COST | SALES UNITS | SALES DOLLARS
$100        | $100        | $100

TOTAL COST | TOTAL UNITS | TOTAL DOLLARS
$100        | $100        | $100

INVENTORY

Current Day: 3
Simulation Setting
## Simulation Setting

### Main Interface

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- **Tax Code**: [Data]
- **TYPE**: [Data]
- **Processor**: [Data]

#### Simulation Setting

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<th>Value3</th>
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<tr>
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Lessons Learned

- **Communication**
  - Communication up and down the food flow chain is critical and challenging
  - Media plays an important source of information

- **Approach differs from food safety**
  - Response, prevention, control, and thought process is different for inherent vs. intentionally added contaminants.
  - Computer models to help decision making capabilities can be useful for food safety and food defense risks

- **Human resource screening**
  - Procedures should be put in place for new hires including in-depth background checks, character evaluations, and performance surveys
  - Policies for dealing with disgruntled employees should be updated to include their threat to bioterrorism as well
Project Funding

- **Primary Funding | USDA-CSREES**
  National Integrated Food Safety Initiative Grant

- **Additional Support | National Center for Food Protection and Defense**
Our Next Program

- **2-day program (15 1-hour modules)** | September 22-23, 2009
- **1-day simulation activity** | September 24, 2009
- For more information | Contact Richard Linton at: **linton@purdue.edu**
THANK YOU!

Questions...