Imagining a Road Map for Training

The Development of a National Curriculum for Regulatory Food Safety Professionals
ADVANCEMENT OF THE SCIENCE
Examination of the Association Between Announced Inspections and Inspection Scores ............... 8
Food Safety Training Needs at Evacuation Shelters Operated by Faith-Based Organizations .......... 14
Promoting Healthy School Environments: A Step-by-Step Framework to Improve Indoor Air Quality in Tangipahoa Parish, Louisiana ................................................................. 22
International Perspectives: Listeria monocytogenes Strains Isolated From Dry Milk Samples in Mexico: Occurrence and Antibiotic Sensitivity ....................................................... 32

ADVANCEMENT OF THE PRACTICE
The Development of a Standards-Based National Curriculum Framework for Regulatory Food Safety Training in the United States ................................................................. 38
Direct From CDC: InFORM: An Innovative, Integrated Food Safety Meeting ................................. 44

ADVANCEMENT OF THE PRACTITIONER
Demystifying the Future: Hi, I’m a Robot and I’m Here to Take Your Job .................................. 46
Legal Briefs: Food Safety and the Global Supply Chain ............................................................. 48
Career Opportunities .................................................................................................................. 50
EH Calendar ................................................................................................................................ 52
Resource Corner ......................................................................................................................... 54
Accredited Environmental Health Science and Protection School Listing ............................... 56

YOUR ASSOCIATION
President’s Message: An Evolution of Environmental Health: NEHA Adapts and Embraces Change ................................................................. 6
Special NEHA Members ............................................................................................................. 59
Special Listing ............................................................................................................................. 60
NEHA News ................................................................................................................................. 62
NEHA 2014 AEC .......................................................................................................................... 66
NEHA’s Annual Financial Statement ......................................................................................... 68
Managing Editor’s Desk: Pivoting Toward a Younger NEHA Membership .................................. 70
Abstract
In response to the recognized need for a training system to support an integrated food safety system in the U.S., the International Food Protection Training Institute (IFPTI) in Battle Creek, Michigan, designed a career-spanning curriculum framework. IFPTI collaborated with a national curriculum team consisting of regulatory officials and university academics. The curriculum framework encompasses and organizes existing professional development for the estimated 45,000 federal, state, and local food regulators in the U.S. into efficient, standards-driven learning paths. This article describes the development process leading to an integrated national food protection training curriculum framework.

Introduction
The need for a consistent and accessible standards-based training regimen for regulatory food protection professionals has been determined to be of national strategic importance as a result of a renewed focus by the Food and Drug Administration (FDA) in creating an Integrated Food Safety System (IFSS) (FDA, 2009). Additionally, the Food Safety Modernization Act (FSMA) of 2011, the first major national legislation on food protection in more than 70 years, recognizes and calls for training for state and local regulatory officials. FSMA also directs FDA to invest in food safety programs for its state and local partners, which supports the IFSS strategy of joining food safety efforts at all levels of government into one unified system.

The success of IFSS is dependent on the nation’s ability to properly and consistently train the estimated 45,000 federal, state, local, tribal, and territorial regulatory food protection professionals responsible for protecting the vast majority of our food system. Besides creating an assurance that these employees are doing comparable and competent work, consistently training regulatory food protection professionals to a competency-based model would potentially reduce the burden of foodborne illnesses in the U.S. and thereby improve the public confidence in the food supply.

In the absence of a vision such as IFSS, a clear, career-spanning training plan or system for regulatory food protection professionals has not existed. Nor has centralized information been available on training or processes for ensuring the content, quality, and instructional effectiveness of available courses. Additionally, although a variety of food safety training courses are offered by public agencies, educational institutions, and private companies, a certification process has not existed to indicate that the regulators have achieved competency in performing the responsibilities of their jobs. In the current environment of budget constraints and job cuts, efficient use of resources is more important than ever.

To provide a vision and roadmap for an integrated, open-source, career-spanning food safety regulatory training system, a curriculum framework for an IFSS was developed over the past three years by the International Food Protection Training Institute (IFPTI) in Battle Creek, Michigan. This training vision received financial and technical support from FDA.

The framework was originally designed as an open-source cataloging system to help identify 1) content areas in which regulatory food protection professionals should receive...
training, 2) competencies associated with each content area, and 3) food safety courses available across the U.S. As a result of invento-
torying existing food safety courses, IFPTI
completed a compilation and categorization of
over 700 currently available training and
educational courses leading to the develop-
ment of the Food Protection Course Cata-
log (International Food Protection Training
Institute, 2011).

Critical Issues
To develop a competency-based integrated
training system and ensure its scientific integ-
rrity, the critical developmental issues were
addressed as follows:
1. Developing terminal learning objectives
   for four professional levels.
2. Mapping general and technical competen-
ties (knowledge, skills, and abilities
[KSAs]) to the terminal learning objectives.
3. Identifying content areas in which regu-
   lators should receive training throughout
   their careers.
4. Mapping general and technical competen-
ties to the curriculum framework.
5. Mapping existing food safety and protec-
tion courses to the framework.

The Development Method
IFPTI used a custom development process
to develop the curriculum framework. This
process 1) helped create a framework to
guide food protection professionals’ indi-
vidualized career-spanning learning paths;
2) allowed a gap analysis of existing train-
ing opportunities; 3) informed course
development prioritization to address unmet needs; and 4) identified the need for,
and guided the development of, a course
review process for food safety course own-
ers or providers who want their courses
included in the framework.

The development of the curriculum
framework utilized a back-mapping curricu-
ulum design process that is commonly used
to plan results-based professional development
(U.S. Department of Education, 2006). The
process involves determining desired train-
ing outcomes and then designing a system
to achieve those outcomes. IFPTI initiated
the back-mapping process by periodically
convening a curriculum team of national
leaders in regulatory food protection. The
team identified terminal learning objectives
for each of four professional levels (entry,
journey, technical, and leadership) and
among four performance dimensions (tech-
nical, programmatic, communication, and
management/leadership).

As part of the development process,
IFPTI instituted a number of curriculum
evaluation and assessment efforts to mea-
sure curriculum-associated outcomes.
IFPTI emphasized the development of the
curriculum against a set of quality practices
that comply with the American National
Standards Institute/International Associa-
tion for Continuing Education and Train-
ing (ANSI/IACET) 1-2007 Standard for
Continuing Education and Training (ANSI/
IACET, 2011). The steps undertaken, start-
ing with the back-mapping process, enabled
IFPTI to take an analytic approach to iden-
tifying and analyzing quality learning
events, establishing appropriate assessment
criteria, and monitoring and improving the
learning process.

The framework went through contin-
uous refinement by the curriculum team, the
IFPTI Stakeholder Advisory Council, and
Association of Food and Drug Officials
members. Several competencies and content areas
were eliminated while others were added. The
final framework comprised 58 technical
and general competencies and 133 content
areas, encompassing both general and tech-
nical areas of expertise.

The Curriculum Framework Structure
The curriculum framework was designed to
demonstrate the interrelationship between,
among, and the possible progression
through, four professional levels as well as
to represent content areas within the profes-
sional levels and tracks. The professional
levels reflect the hierarchy of the cognitive
domain of Bloom’s Taxonomy (Huitt, 2009),
which is an established model that helps
educators develop training and education
for specific audiences.

The basic structure of the framework (Figure 1), depicted in a multi-tiered, color-
coded grid, consists of the following:

1. Content areas: each box of the curriculum
framework represents a topic, or subject,
in which regulatory food protection profes-
sionals should receive training. Each con-
tent area can contain multiple courses from
any training provider across the nation. The
content areas provide a means to map com-
petencies and to catalog and sequence any
available courses.

2. Professional levels: four levels of content
areas and competencies relevant to job
responsibilities.
   a. Entry level—new hires (regulators who
are green for the majority of their careers).
   b. Journey level—a more experienced level
at which many regulators spend the
majority of their careers.
   c. Technical specialist level—regulatory
food protection professionals with spe-
cific, focused areas of expertise, such as
pasteurization or emergency response.
   d. Leadership level—middle- and upper-
management positions.

3. Professional tracks: specific areas of
specialization.
   a. Unprocessed—raw food product pro-
duction (i.e., farms).
   b. Manufactured—processing raw ingredi-
ents into ready-to-consume food.
   c. Retail—distribution of ready-to-con-
sume food, including restaurants.

4. Spanning content areas: content areas that
cover multiple professional levels or tracks.
   a. Level-spanning (vertical)—content areas
that are pertinent to more than one pro-
fessional level, e.g., the IFSS implemen-
tation content area pertains to journey,
technical, and leadership levels.
   b. Track-spanning (horizontal)—content
areas that are pertinent to more than one
professional track, e.g., at the journey
level, the IFSS content area is relevant
for all three tracks (unprocessed, manu-
factured, and retail), and the imports
content area is applicable to the manu-
factured and retail tracks.

Within the professional levels are con-
tent areas that regulatory food protection
professionals at those levels should master
as well as content areas relevant only for
certain professional tracks. For example, all
journey-level regulators would take courses in
communication skills, food emergencies,
food transportation, law, and risk analysis,
among others. Only someone in the manu-
factured track, however, would need to take
courses in areas such as additives, animal
food processing, and packaging, and only
someone in the retail track would have to
take courses in catering and food prepara-


September 2013 • Journal of Environmental Health 39
tion techniques. All technical specialists would learn about risk analysis and food emergency response, but only those in the unprocessed track would be required to learn about animal drugs and medicated feed. By the time regulators reach leadership positions, they could have potentially taken career-spanning courses in content areas such as advocacy, legislative affairs, policy making, and change management.

At all four levels, professionals would receive training in emerging food safety issues (level-spanning content area) such as new scientific findings and legislation/regulations with a bearing on their work such as FSMA.

The benefits of the curriculum framework are numerous. The framework can, for example:

1. Provide guidance to food protection professionals in planning their career paths and receiving the necessary training as their jobs evolve.
2. Help supervisors create career improvement paths for their employees.
3. Foster the efficient use of resources—money can be spent to develop courses that address competencies.
4. Provide a road map and standards for public, private, and academic outfits seeking to offer food safety training.
5. Assure federal agencies like FDA and the U.S. Department of Agriculture that regulators are being trained consistently and systematically, thereby boosting the agencies’ ability to rely on these regulators and prevent duplication of services.
6. Foster integration of the food safety system by encouraging greater collaboration among all stakeholders (government agencies, industry, agriculture, and academia).
7. Improve understanding of food safety by elected officials who make legislative decisions affecting the system.
8. Help food protection professionals prepare for certification exams.

**Alignment With Federal Initiatives**

FDA emphasizes that training should meet the ANSI/IACET 1-2007 Standard for Continuing Education and Training. In addition to designing and developing training to specific standards, FDA has also moved in the direction of meeting outside accreditations. For example, FDAs New Hire Investigator Certificate Program is accredited under ANSI and the American Society for Testing and Materials International E2659 Standard Practice for Certificate Programs.

In accordance with this standard, FDA designed a certificate program for new investigators using the results of a job task analysis (JTA), a formal process used to determine the tasks, activities, major job functions, and attributes that a person must have to fulfill the work requirements and responsibilities of a position. The FDA has already conducted a series of JTAs for various regulatory food protection professional positions. The results of these JTAs will enable FDA and other training and certification organizations such as NEHA to meet best practices in training and certification identified within FSMA by providing a common body of knowledge upon which both training and certification can be based. Additionally, these analyses will be mapped to the IFPTI curriculum framework to inform the regulatory food protection profession of where competencies can be addressed and where efficiencies in training can be achieved.

Additionally, the results of the JTAs complement the back-mapping process. The JTA approach strengthens the curriculum framework by identifying the tasks, KSAs, and competencies important for each professional level, track, and content area. Mapping the JTA outcomes will validate the curriculum framework, identify areas for modification, and provide a body of knowledge that can be used to develop future training.

A clear indicator of the validity and usefulness of the final version of the curriculum framework is its relationship to FSMA. Multiple sections of FSMA call for increased training of regulatory food protection professionals. When FDAs Partnership for Food Protection mapped the training requirements that are identified in FSMA onto the curriculum framework, the mapping process revealed that the framework addresses all of the training goals that the new law is designed to achieve.

**Training Applications for Food Regulators**

Eventually, the curriculum framework is expected to provide the basis for competency testing and certification, currently the focus of NEHA under an FDA grant, with IFPTI continuing to work on sequencing courses in the various content areas to map out a clear and logical progression of learning objectives toward competency and certification. The curriculum team catalogued more than 700 food safety courses offered by universities, colleges, industry, training institutes, and government agencies in the Food Protection Course Catalog. By mapping those existing courses to the curriculum framework, the team was able to identify gaps in the training infrastructure and create a prioritized training development plan.

For example, at least 50% of the framework content areas did not contain any courses. Of the 50% of the content areas that did contain courses, only a small percentage of the courses was directly relevant to food safety regulatory job tasks and skills other than providing a general base of knowledge. Most of the courses relevant to regulatory food protection professionals were designed for entry-level regulators. The framework development process clearly showed that a need exists for new courses to fill certain gaps. IFPTI is working with multiple organizations and educational institutions to develop new courses that will fill these training gaps. With current budgetary situations, many states have out-of-state travel restrictions, which require training organizations to use strategies to make training readily available within each state. As the effort to improve regulatory food safety training progresses through the use of the curriculum framework, distance learning may play a key role. Many states no longer have regional offices for food safety inspectors, and as a result, inspectors are often a mobile and distributed workforce with unique training requirements. Distance- and blended-learning solutions could allow field-based inspectors to receive necessary training through online access, minimize time away from their job, and maximize in-classroom training time.

The curriculum framework can be used to identify content areas that should be covered within competency- and standards-based training programs. As a result of a competency analysis for future leaders, IFPTI developed the Applied Science, Law, and Policy: Fellowship in Food Protection, a national training program accredited by ANSI and ini-
FIGURE 1

International Food Protection Training Institute Curriculum Framework

CEU = continuing education unit; BSE = bovine spongiform encephalopathy; HACCP = hazard analysis and critical control points; ICS = incident command system.
tially funded by FDA. This unique 12-month certificate program is aimed at improving the critical-thinking, problem-solving, and decision-making skills of midcareer food regulators, boosting their leadership potential and strengthening the capacity for IFSS.

Conclusion
Potential applications of the curriculum framework extend to academia, other public and private sectors, and beyond the U.S. to food safety professionals abroad. The adoption of the framework has the potential to significantly shape secondary and higher-education programs leading into the profession of food safety and protection in both the regulatory (public) and industry (private) sectors. Currently, people entering the regulatory food protection profession tend to have science degrees such as microbiology or chemistry but no specific knowledge of how their academic concentrations apply to food safety and defense. As colleges and universities are increasingly adding more courses related to food science and food safety to their curricula, the framework can help these institutions determine the content and sequencing of the courses and better prepare their graduates for the workforce.

Just as the current curriculum framework lays out core competencies for food protection regulatory professionals, the curriculum framework could be customized for public sector health professionals such as veterinarians, laboratory workers, and epidemiologists. Such curriculum frameworks could help foster greater consistency and availability of training opportunities in those fields and truly address the training needs of IFSS.

The curriculum framework could also be customized for private sector professionals in the unprocessed, manufactured, or retail tracks, and could lay out the core competencies required for employees throughout the supply chain: growers, harvesters, line workers, equipment installers, sanitarians, managers, and food service workers.

Additionally, the curriculum framework can be modified to fit the needs of food protection professionals internationally. In response to international interest, the framework has already been translated into Arabic, Armenian, Chinese, Russian, Spanish, and Turkish. While the framework will require customization depending on the country, the current content areas constitute a good foundation for discussing competency-based food protection training for food safety regulators in a global food safety system.

By establishing a competency- and standards-based training vision for regulatory food protection professionals, the curriculum framework is helping the U.S. make the goal of an IFSS a reality. Working with other food protection professionals in public and private sectors in the U.S. and other countries to adapt the framework to their needs may also help realize the possibility of a safer global food supply.

Summary
The need for a consistent and accessible standards-based training regimen for food protection regulators is well established in FSMA, the first major national legislation on food protection in more than 70 years. IFPTI and partners, through a roadmap process, have developed a competency-based, career-spanning food protection training curriculum framework for regulatory and public health officials in all jurisdictions (federal, state, local, tribal, and territorial). The curriculum framework provides career pathways, fosters efficient use of resources, and ensures consistency and collaboration in an open-source training environment. Potentially, if food protection regulatory professionals are consistently trained to establish competencies utilizing the integrated food safety system curriculum framework, the burden of foodborne illnesses in the U.S. may be lessened, and as a result, the public may have more confidence in the food supply.

Disclaimer: This article reflects the views of the authors and should not be construed to represent FDAs views or policies.

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