



FOOD DEFENSE AND PROTECTION

Securing the Supply Chain from Farm to Fork

A Global Perspective of Food Protection

Highland College – April 26, 2017

A Report from the Field / Framing Threat & Mitigation

By Joe Zaccaria, CFDC

In the Interest of Common Terminology



In the Interest of Common Terminology

FOOD SECURITY

World Health Organization (WHO) – Global access to food, food quality, and sustainability of the food supply chain

FOOD SAFETY

Unintentional Contamination (Adulteration) – FDA & USDA-FSIS

Hazard Analysis & Critical Control Points (HACCP)

FOOD FRAUD & Economically Motivated Adulteration (EMA)

Deliberate adulteration or misrepresentation of foods or food ingredients for economic gain



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FOOD DEFENSE

Intentional Contamination (Adulteration) – Food Safety Modernization Act (FSMA)

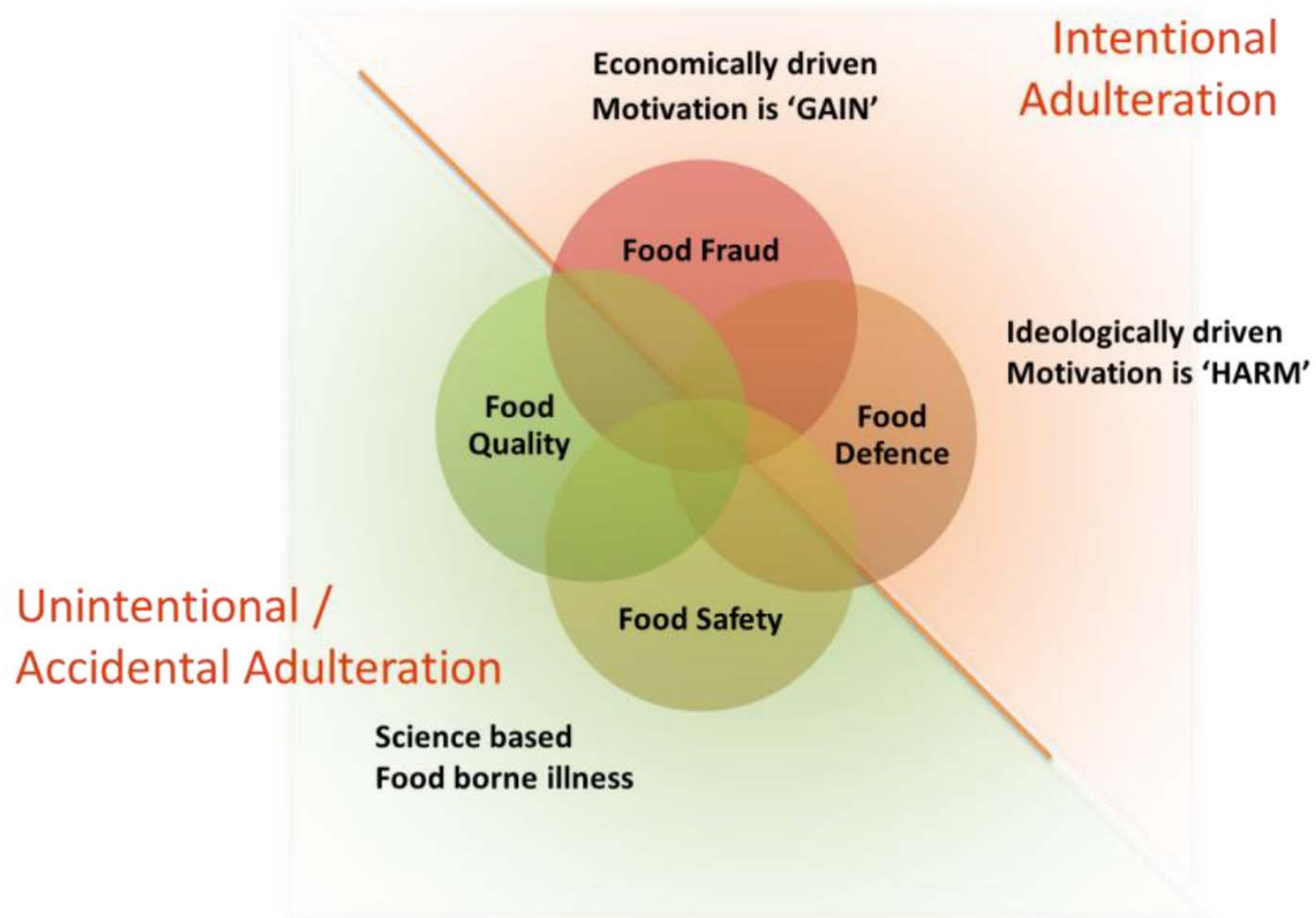
FOOD PROTECTION

Food Defense (FSMA) and Food Safety (HACCP)

BIOTERRORISM

Deliberate release of viruses, bacteria, fungi or toxins to cause illness or death – (Bioterrorism Act)





In the Interest of Common Terminology

AGROTERRORISM

A subset of bioterrorism – The deliberate introduction of an animal or plant disease to cause fear, economic loss or undermining social stability

Farm Security - “Treat it Seriously”

Security for Plant Agriculture: On-Farm Assessment and Security Practices

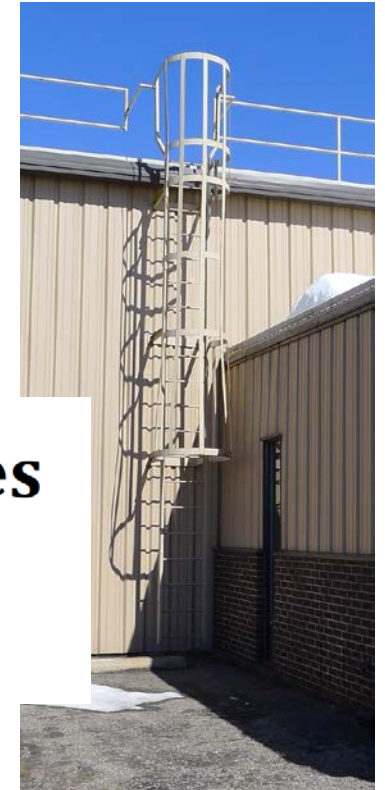
Scott Hagood Extension Specialist, Plant Pathology, Physiology and Weed Science, Virginia Tech

Patricia A. Hipkins, Assistant Coordinator, Virginia Tech Pesticide Programs



Policing farm crime in England and Wales

Jane Jones and Jen Phipps, *Aberystwyth University*



Food Fraud & Economically Motivated Adulteration

Dilution – Juices and Olive Oil

Substitution – “Species Swapping” with consumer fish products being sold

Origin Masking – Imported Honey

Addition of Approved Additives – Antibiotics or Dyes

Goal: To make money \$\$\$

They do not intend to cause illness or death, but mistakes are made...



Food Fraud & EMA

Case Examples:

1980's – Wines from Austria adulterated with diethylene glycol for sweeter taste and body (used to manufacture resins and antifreeze)

2008 – Adulteration of milk in China with Melamine resulting in hundreds of thousands of ill infants and 6 deaths



Important Practices and Legislation

FEDERAL FOOD, DRUG AND COSMETIC ACT (FD&C) - 1938 – Distinction between adulterated added and natural ingredients. Intentional Adulteration (IA) not addressed with penalties.

HAZARDS ANALYSIS AND CRITICAL CONTROL POINTS (HACCP) – Hazards analysis and critical control points – A systematic approach to food safety from biological, chemical and physical hazards of the food chain from food production and preparation, including packaging, distribution, etc. FDA and USDA regulated. Originated in the 1960's in Defense industries (non-food). IA not addressed with penalties.

Public Health Security and Bioterrorism Preparedness and Response Act or “Bioterrorism Act” (2002) – Following Sept. 11, 2001 attacks and the discovery of an Al-Qaeda “Playbook” in Eastern Afghanistan that detailed techniques for launching food adulteration attacks. Introduction of “Presents a threat of serious adverse health consequences or death to humans or animals (SAHCODHA), “credible evidence” and reasonable belief” for FDA enforcement. IA still not “required” following the passage of this Act, with regards to risk assessments and fines for non-compliance.



Important Practices and Legislation

FOOD SAFETY MODERNIZATION ACT (FSMA) – 2011 added to or amended FFDCA. Final rules issued and now requires programs to address Intentional Adulteration (IA).

FSMA IA Rule:

The rule applies to the owner, operator or agent in charge of a domestic or foreign food facility that manufactures/processes, packs, or holds food for consumption in the United States and is required to register under section 415 of the Federal Food, Drug, and Cosmetic Act (21 USC 350d) unless subject to an exemption. Compliance dates for the IA rule are staggered by business size.

Very small: July 26, 2021 (\$10M Annual Sales*)

Small: July 27, 2020

All others: July 26, 2019

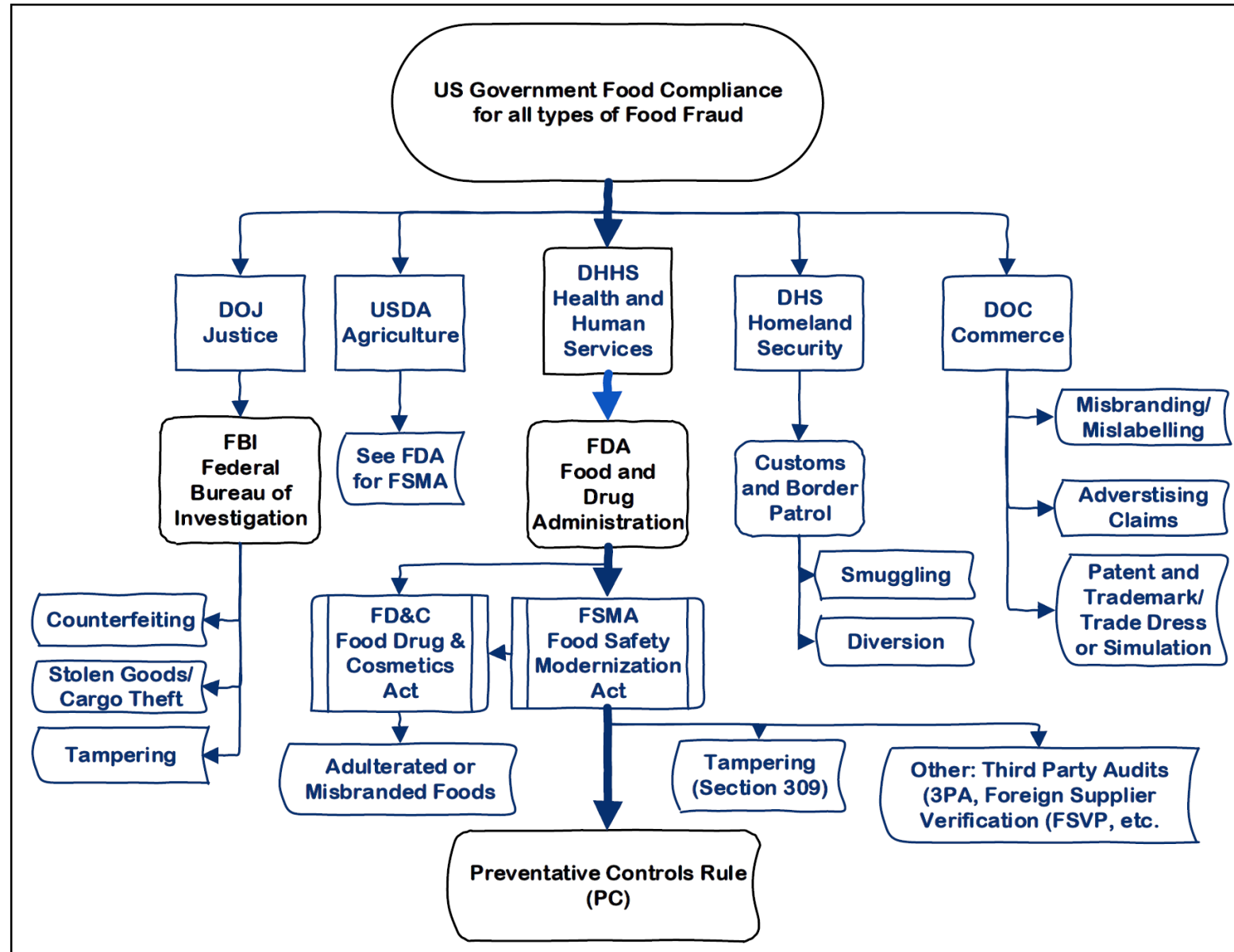


Requirement	Effective Date	Scope
FD&C Act (U.S.)	1938	All types of food fraud
Sarbanes-Oxley Act (U.S.)	2002	All types of business fraud that could lead to a negative economic impact on revenue or equity
FSMA PC rule (U.S.)	September 2016	All types of food fraud that lead to a "hazard that requires a preventive control" (to determine this, all food fraud types must be assessed)
GFSI Issue 7	February 2017	All types of food fraud that lead to a vulnerability that could lead to a hazard (this is more of a quality management step than a purely food safety risk-based approach)
BRC Version 7	July 2015	Defined to meet the GFSI scope, so technically must cover all types of fraud
FSSC 22000 Version 4	December 2017	Defined to meet the GFSI scope, so technically must cover all types of fraud; a separate assessment is required for food fraud and another for food defense

Table 1. Summary of Compliance Requirements Regarding Food Fraud



Courtesy: MSU



Are these incidents of:

Unintentional Adulteration?
Intentional Adulteration?
Lapse in Food Safety?
Lapse in Food Defense?

The average person wants to believe these incidents are “Accidental” and therefore “Unintentional”.

Sometimes judgement is a self-fulfilling prophecy. As we will see, how our Food Defense Team is structured, along with our corporate culture, will help us to make these determinations.

Which SME's do we value?

List of Notable Incidents

Ancient times

- Roman Empire – There is speculation that the Romans, in particular the elite, suffered chronic to severe lead poisoning due to the ubiquity of this metal in e.g. lined pots in which acidic foodstuffs were boiled, over and above any mere exposure to lead in water pipes. They also used [sugar of lead](#) to sweeten their wines.^[2]

Middle Ages

- Europe - numerous incidents of human poisoning due to the consumption of rye bread made from grain [infected with ergot fungi](#)

19th century

- 1850s - [Swill milk scandal](#) in New York
- 1857 – adulteration of bread with [alum](#) in London, causing rickets^[3]
- 1857 - poisoning of bread with arsenic in Hong Kong targeting the colonial community.^[4]
- 1858 – [sweets poisoned with arsenic](#) in Bradford, England.

1900 to 1949

- 1900 – Beer contaminated with [arsenic](#). Traced to sugar manufactured with sulphuric acid that was naturally contaminated with arsenic from Spanish [pyrites](#). An epidemic of 6070 cases in London, including 70 deaths^[5]
- 1910–45 – [Cadmium](#) from mining waste contaminated rice irrigation water in Japan. Illness known as [Itai-itai disease](#) affected more than 20% of women aged over 50 years^[6]
- 1920 – In South Africa, 80 people suffered poisoning from eating bread contaminated with naturally occurring [pyrrolizidine alkaloids](#).^[7]
- 1900–47 – Severe and widespread [neurological disorders](#) due to bleaching of bread flour with the [agene](#) process for bleaching of flour with nitrogen chloride, a process no longer in use. The denatured protein in the treated flour is toxic and causes a condition of hysteria in dogs eating biscuits made from the flour.^[8]
- 1930s – A striking example of OPIDN [Organophosphate poisoning](#) occurred during the 1930s



List of notable incidents [edit]

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- 1930s – A striking example of **OPICN Organophosphate poisoning** occurred during the 1930s Prohibition Era when thousands of men in the American South and Midwest developed arm and leg weakness and pain after drinking a "medicinal" alcohol substitute. The drink, called "**Ginger Jake**", contained an adulterated Jamaican ginger extract containing tri-ortho-cresyl phosphate (TOCP) which resulted in partially reversible neurologic damage. The damage resulted in the limping "Jake Leg" or "Jake Wink" which were terms frequently used in the blues music of the period. Europe and Morocco both experienced outbreaks of TOCP poisoning from contaminated abortifacients and cooking oil, respectively^[a]

1950 to 2000 [edit]

- 1951 - 1951 Pont-Saint-Esprit mass poisoning in France, probably caused by Ergot.
- 1950s – **Mercury** poisoning in fish in Japan, contaminated by industrial discharge. **Mimata disease**. By 2010 more than 14,000 victims had received financial compensation.^[a]
- 1958 – **Arsenic** in milk powder in Japan. **Disodium inosinate** additive was inadvertently contaminated with sodium arsenate. The incident later known as the "Morning star milk poisoning". By 2002 there were an estimated 13,400 cases and over 100 deaths attributed to consumption of the milk powder.^[12]
- 1957 – Chinese tea and tea/coffee drinkers were contaminated with **diuretics** from polychlorinated biphenyls in the United States. 300,000 drinkers were killed or destroyed to avoid consumption^[11]
- 1959 – Moroccan oil poisoning disaster: several thousand people in the city of **Meknes** suffer facial **paralysis** caused by deliberate contamination of cooking oil with jet engine lubricating oil containing **trichloro phosphate** obtained as surplus from a US airbase at **Nouasseur**.^[12]
- 1960 – mass poisoning resulting from contamination of flour with 4,4'-**diethylendiamine** in Epping, Essex, United Kingdom
- 1960 – **Yusho disease**, mass poisoning resulting from contamination of rice bran oil with PCBs in Kyōto, Japan
- 1972 – **mercury poisoning** in Iraq kills 100 to 400 as seeds treated with mercury as a fungicide that are meant for planting are used as food^[12b] "informed travelers from Baghdad say Iraq is in the grip of a severe mercury-poisoning outbreak. The travelers, who arrived last night, reported that 100 to 400 people had died since the outbreak began early in February."
- 1973 – **Widespread poisoning** of people following **Mittlerer** cattle contamination following feed contamination with **fungi** related to **SDS**^[13]
- 1974–1976 – **Afghanistan**: widespread poisoning (an estimated 7000 people affected with hepatic veno-occlusive disease (liver damage) and about 1600 deaths) was attributed to wheat contaminated with weed seeds known as **chamaec** (*Holoptopus popovii*, H Riedl) that contain **pyrrolizidine alkaloids**.^[7]
- 1976 – **Sewage** disinl contamination in Italy
- 1981 – **Spanish Toxic Oil Syndrome**. Thousands permanently damaged due to eating industrial **coiza** oil denatured with aniline acid as olive oil. There was strong suspicion that the cause was in fact insecticide in Spanish tomatoes, and that official agencies actively supported the contaminated oil position, suppressing evidence contradicting it.^[14]
- 1980 – **Adulteration of Australian wines with diethylene glycol**.^[15]
- 1980 – **Adulteration of Italian wines with ethylene glycol** killed more than 18 people^[a]
- 1987 – **Beach-Nut Nutrition Corporation** paid \$2.2 million, then the largest fine issued, for violating the **Federal Food, Drug, and Cosmetic Act** by selling artificially flavored sugar water as apple juice. John F. Lavery, the company's vice president for operations was convicted in criminal court and sentenced to a year and a day in jail; Niels L. Hoystad, the president of the company, also convicted, served six months of **community service**. Each of them also paid a \$100,000 fine^[16]
- 1989 – **Milk** contamination with **diol** in Belgium^[17]
- 1994 – **Ground paprika** in Hungary was found to be adulterated with **lead oxide**, causing deaths of several people, while dozens of others became sick.^[22]
- 1990 – in New **Dehli**, India adulteration of edible **mustard oil** with ***Argemone mexicana*** seed oil caused **epidemic dropsy** in thousands of others became sick.^[23] **Epidemic dropsy** is a clinical state resulting from consumption of edible oils adulterated with ***Argemone mexicana*** seed oil that contains the toxic alkaloids **kangurharine** and **ohydrosanguinarine**. The epidemic in 1990 at New Dehli is the largest so far, in which over 60 persons lost their lives and more than 3000 victims were hospitalized. Even after that the epidemics occurred at alarming frequency at **Gwalior** (2000), **Kannauj** (2002) and **Ludhiana** (2005) cities of India.^[24]
- 1990 – in Germany and the Netherlands, meat and milk were found with elevated **diol** concentrations. The diol was traced to citrus pulp from Brazil that has been neutralized with diol-contaminated lime. 92,000 tons of citrus pulp was discarded. The citrus pulp market collapsed in some European countries. A tolerance level for diolins in citrus pulp was set by the European Commission.^[24]
- 1999 – in Belgium, animal feed contaminated with diolins and polychlorinated biphenyls affected more than 5000 poultry and pig farms. This incident led to the formation of the **Belgium Federal Food Safety Agency**. The loss to the Belgium economy was estimated at €1000-€2000M.^[24b]
- 1999-2000 – in Afghanistan, there were an estimated 400 cases of liver damage and over 100 deaths due to **pyrrolizidine poisoning**. The food source was not identified.^[7]

2001 to present [edit]

- 2001 – Spanish olive pomace oil was contaminated with **polycyclic aromatic hydrocarbons**. Contaminated product was recalled.^[25]
- 2002 – in Northern Ireland, nitrofurans were detected in 4 (of 44) samples of chicken imported from Thailand and Brazil. The product was withdrawn and destroyed.^[26]
- 2002 – in the UK, nitrofurans were detected in 16 (of 77) samples of prawns and shrimps imported from SE Asia. Affected batches were withdrawn and destroyed.^[26]
- 2002 – in the UK and Canada, the banned antibiotic, **chlorsamphenicol**, was found in honey from China^[21]
- 2002 – **diolins** were found in animal feed that was contaminated with bakery waste that had been orried by firing with waste wood.^[7]
- 2002 – The banned veterinary antibiotic **nitrofurans** were found in chicken from Portugal. Poultry from 43 farms was destroyed. Nitrofurans are banned from food because of concerns including a possible increased risk of cancer in humans through long-term consumption.^[22]
- 2004 – **Organic** free-range chicken was found to contain traces of the banned veterinary drug, **nitrofurans**. Up to 20 tonnes of affected chicken, originating from a farm in Northern Ireland, was distributed to supermarkets across the UK resulting in a voluntary product recall and consumer warnings.^[23]
- 2004 – The Canadian Food inspection Agency (CFIA) detected **chlorsamphenicol** in honey labelled as product of Canada. **Chlorsamphenicol** is banned for use in food-producing animals, including honey bees, in Canada as well as in a number of other countries. The Canadian Food inspection Agency (CFIA) informed Health Canada that the lots of honey labelled as "Product of Canada" were distributed in British Columbia and were found to contain residues of the banned drug **chlorsamphenicol**. A voluntary food recall occurred.^[24]
- 2004 – New Zealand *soy milk* manufactured with added **leip** contained toxic levels of **sofne**. Consumption of this product was limited to the cases of **hypothyroidism**. The manufacturer ceased production and re-formulated the product line.^[24b]
- 2004 – New Zealand **cornflour** and cornflou-containing products were contaminated with **lead**, thought to have occurred as a result of bulk shipping of corn (maize) contaminated by previous cargo in the same storage. Affected product was distributed in New Zealand, Fiji and Australia. Four products were recalled.^[27]
- 2004 – **Aflatoxin**-contaminated maize in Kenya resulted in 317 cases of **hepatic failure** and 125 deaths.^[28]
- 2004 – **EHEC O104:H4** in South Korea, researchers pointed at contaminated hamburgers as a possible cause.^[29a]
- 2005 – **horsemeat** scandal in the UK was found to contain the banned food colouring, Sudan I dye, that was traced to imported adulterated chicken powder. 576 food products were recalled.^[32a]
- 2005 – **Farmed salmon** in British Columbia, Canada was found to contain the banned fungicide **malachite green**. 54 tonnes of fish was recalled. The incident resulted in an estimated \$2.4-13M (USD) lost revenue.^[43]
- 2006 – **Pork**, in China, containing **clenbuterol** when pigs were illegally fed the banned chemical to enhance fat burning and muscle growth, affected over 300 persons.^[44]
- 2007 – **Pet food** recalls occurred in North America, Europe, and South Africa as a result of Chinese protein export contamination using **melamine** as an adulterant.
- 2008 – **Baby milk scandal** in China. 300,000 babies affected. 51,900 hospitalisations and 6 infant deaths. Lost revenue compensation-\$30M, bankruptcy, trade restrictions imposed (by 66 countries, 60 or more arrests, two executions, one life sentence, and loss of consumer confidence.^[43a]^[44] **Melamine** from the contaminated protein worked into the food chain a year later.^[47]
- 2008 – **Wheat** flour contaminated with naturally-occurring **pyrrolizidine alkaloids** is thought to be the cause of 38 cases of **hepatic veno-occlusive disease** including 4 deaths in Afghanistan^[7]
- 2008 – **min pork** crisis of 2008: min pork and pork products exported to 33 countries was traced and much was recalled when animal feed was contaminated with diolins in the feed drying process. The cost of cattle and pig culling exceeded €4M, compensation for lost revenue was estimated to be €200M.^[48a]
- 2008 – it was discovered that additives included substances like **sulfuric acid** and **hydrochloric acid** had been used to dilute wines in **Taiwan**.^[6]
- 2009 – **Pork**, in China, containing the banned chemical **clenbuterol** when pigs were illegally fed to enhance fat burning and muscle growth. 70 persons were hospitalised in Guangzhou with stomach pains and diarrhoea after eating contaminated pig organs^[44]
- 2009 – **Hoodia** Pods from Mexico contaminated with **lead**^[51]
- 2009 – **Bonase-brand Soy milk** in Australia, enriched with **Komro**, seaweed resulted in high levels of iodine, and 45 cases of thyroid problems. The product was voluntarily recalled and a settlement of 25 million AUD was later reached with the victims.^[32b]
- 2010 – **Soybean** in China were contaminated with **clenbuterol** when fed piglets treated with clenbuterol. 13 people were hospitalized after eating contaminated steak. There were 113 prosecutions in 2011 relating to clenbuterol, with sentences ranging from three years imprisonment to death.^[34b]
- 2011 – **Poor-quality illegal alcohol** in West Bengal has resulted in an estimated 135 deaths. The alcohol may have contained **ammonium nitrate** and/or **methanol**.^[58]
- 2011 – **German E. coli O104:H4 outbreak** was caused by EHEC O104:H4 contaminated **fenugreeek** seeds imported from **Egypt** in 2009 and 2010, from which sprouts were grown in Germany.
- 2011 – Vinegar from China contaminated with **ethylene glycol** when stored in tanks that previously contained **antifreeze**, led to 11 deaths and an estimated 120 cases of illness.^[67]
- 2011 – Meat, eggs and egg products in Germany contaminated from animal feed containing fat contaminated with **diolins**. A 700 German farms affected. 8,000 hens and hundreds of pigs were culled. Imports from Germany to China were banned.^[63a]
- 2012 – More than a quarter of a million chicken eggs were recalled in Germany after in-house testing discovered "toxicative levels" of the poisonous chemical, **diol**.^[60]
- 2012, June – A Brazilian household discovered an apparently used condom at the bottom of a can of Knorr brandy paste. Unlabeled was found €3,100 (\$4,800) by the Supreme Federal Court. She was awarded €1,110 (\$1,700) for moral damages, as she and her family had consumed a meal prepared with the paste.^[61a]
- 2012, July – Around 1 million pots of herbs had to be destroyed in North Rhine-Westphalia after treatment with an **apparently organic plant growth strengthene**r^[6] was found to contain **DDAC (didecyl dimethyl ammonium chloride)** which resulted in contamination levels above the EU MRL of 0.01 mg/kg. This has resulted in significant additional costs to member states across the EU who put in place a **monitoring programme**.^[6] until February 2013 for DDAC and other quarternary ammonium compounds across a wide range of commodity groups.
- 2012, August to September – Multiple **American Litorina Company** black locust products recalled due to high lead levels in the products. Consuming a bag of product could give children lead levels as high as 13.2 micrograms/daily limit, double the amount regulators consider adtolable.^[63]
- 2013, January – It was disclosed that **ABP Food Group** and **Liflay Meats**, had supplied various supermarkets with contaminated **own brand** burgers from their meat factories in the U.K. and Ireland.
- 2013, February – in Germany 300 farms are suspected of eating eggs as "organic" but not adhering to the conditions required for the label.^[64]
- 2013, March – A batch of 1500 **amoxic** cases with **liver** chnres and **subacute** chnres from the Swedish supplier, **Amoxby**, on its way to the **HCA** store in Shanghai were found by Chinese authorities to have a too high amount of **coiform bacteria** and were subsequently destroyed.^[65]
- 2013, March – A vegetable seller in western Germany, Rhine Main, realized that the lettuce he had been eating throughout the day contained **rat poison**. The poison appears as small blue kernels.^[66]
- 2013, February–March – Contamination with **aflatoxins** results in a milk recall in Europe and a dog food recall in the United States. See 2013 **aflatoxin** contamination for further details.
- 2013, May – A Chinese crime ring was found to have passed off **rat, mink, and small mammal** meat as **mutton** for more than 1 million USD in Shanghai and Jiangsu province markets.^[67]
- 2013, May – **Halal Lamb Burgers** contained samples of **Pork DNA**, affected schools 19 schools in Leicester, UK.^[68]
- 2013, July – **Bihar school meal poisoning** incident, India.^[69]
- 2013, October – 2013 Taiwan food scandal
- 2014, May – **CHN** Frozen Foods recall
- 2014, September – 2014 Taiwan food scandal
- 2015, April – Contaminated milk has resulted in the deaths of two individuals and affected another^[70] in Sampalco, Manila.^[71]^[72] the cause of which was determined to have been **oxalic acid** being deliberately laced at more than the **lethal oral dose**.^[72a] **Murder** charges were filed against Lloyd Abrego, son of the milk tea shop owner who was among those killed in the incident; Abrego denied the allegations.^[74] and the charges were later dropped.
- 2016, July – 2016 Caraga candy poisonings in the Philippines
- 2016, November–December – 2016 United States E. coli outbreak^[76]
- 2016, February–March – **Mari** Chocolate contamination incident, in which plastic found in candy bars lead to a recall affecting 55 countries.^[78]
- 2016, April–May – 2016 Purija sweet poisoning



Incidents of Intentional Adulteration - Examples

January 15, 1857 - Hong Kong

Chinese bakery supplying the colonial community supplies bread that was adulterated with arsenic

Hundreds Sick – 2 Deaths



Incidents of Intentional Adulteration

August 29 – October 10, 1984 – The Dalles, Oregon



By Cacophony, CC BY 3.0, <https://commons.wikimedia.org/w/index.php?curid=3566424>

Incidents of Intentional Adulteration

Followers of Guru Bhagwan Shree Rajneesh believed that if they incapacitated the voting population, their candidate would win the 1984 Wasco County elections. The first and single largest bioterrorist attack in US history.

1. Glasses of water containing Salmonella enterica Typhimurium given to two County Commissioners
2. Mass, large-scale intentional adulteration of area salad bars with the same agent at 8 area restaurants

751 People Contracted Salmonellosis – 45 Hospitalized and No Deaths

IT TOOK 1 YEAR TO DETERMINE THIS WAS A CASE OF INTENTIONAL ADULTERATION!!



Incidents of Intentional Adulteration

1989

- The threat of grapes from Chile being contaminated with cyanide resulted in \$200M in lost revenue.
- The threat alone of intentional adulteration can have serious effects on Public Health and the Economy.

One person who intentionally contaminates the food supply can have a major impact on the lives of people...



Incidents of Intentional Adulteration

1996

- Disgruntled laboratory employee at a Texas hospital intentionally tainted a tray of donuts and muffins with a foodborne pathogen - 12 People became very ill
- The laboratory where the employee worked was found to have very lax security and the right conditions for housing the pathogen.

2003

- Michigan supermarket worker contaminated 200 pounds of ground beef with an insecticide – 92 People fell ill



Incidents of Intentional Adulteration



June, 2012 - Brazil

Brazilian housewife Cintia Mayerle opens a can of tomato paste and finds a used condom at the bottom of the can. A multinational food company is fined US\$ 4,800 by the Supreme Federal Court and the housewife is awarded US\$ 1,700 for “moral damages” after her and her family consumed a meal prepared with the paste.

Intentional or Unintentional Adulteration??



April 21, 2017 - USA

McCain Foods USA, Inc. announced a voluntary recall of retail frozen hash brown product that may be contaminated with extraneous golf ball material.



McCain says that despite their stringent supply standards, the golf ball material may have been inadvertently harvested with potatoes used to make these product.

Is Intentional Adulteration A Credible Threat?

We Have Historical Evidence of IA Incidents

2002 Al-Qaeda Playbook – An Intentional Adulteration How To

December, 2010 – The FBI & DHS Receive Materials from a US Military Raid In Afghanistan and Other Intelligence Uncover Al Qaeda's "Operation Hemorrhage"

"Death to America By A Thousand Cuts" - including...

- Multiple and Simultaneous Attacks on US Restaurants and Hotels
- Use of Poisons – Ricin & Sodium Cyanide (250 mg of Ricin is fatal)
- How to Make Poisons - All Over the Net - Terrorist Manuals & Videos



Is Intentional Adulteration A Credible Threat?

- International Terror Organizations
- Home-Grown, Local Terrorists, Criminals, Ideologists or Subversives
- Threats to Farms and Agriculture Including Protestors, Extremists and Thieves
- Supply Chain Thefts – Warehousing/Trucking/Cargo/Rail, etc. - Internationally
- Commercial Thieves & Trespassers
- Insider Threats
 - ❑ Visitors, Job Applicants, Sales People
 - ❑ Downsizing – Disgruntled Employees, Temporary Employees & Interns
 - ❑ More work / Less Pay & Benefits, The Impacts of Automation, The Only Good Job in Town
 - ❑ Increased Stress, Mental Illness, and Imminent Termination
 - ❑ Outsourcing & Contracting – Truck Drivers, Cleaners, Pest Control, etc.



Is Intentional Adulteration – A Credible Threat?

- Trespassers
- Visitors
- Truck Drivers
- Cleaning Crews
- Contractors
- Temporary Employees
- Disgruntled Employees
- Organized Terrorists or Activist Groups
- Members of Terrorist Organizations posing as employees or some of the above



THE SEVEN SIGNS OF TERRORISM

7

1. Surveillance:

Someone recording or monitoring activities. This may include the use of cameras (either still or video), note taking, drawing diagrams, annotating on maps, or using binoculars or other vision-enhancing devices.

2. Elicitation:

People or organizations attempting to gain information about military operations, capabilities, or people. Elicitation attempts may be made by mail, fax, telephone, or in person.

3. Tests of security:

Any attempts to measure reaction times to security breaches or to penetrate physical security barriers or procedures in order to assess strengths and weaknesses.

4. Acquiring supplies:

Purchasing or stealing explosives, weapons, ammunition, etc. Also includes acquiring military uniforms, decals, flight manuals, passes or badges (or the equipment to manufacture such items) or any other controlled items.

5. Suspicious persons out of place:

People who don't seem to belong in the workplace, neighborhood, business establishment, or anywhere else. Includes suspicious border crossings and stowaways aboard ship or people jumping ship in port.

6. Dry run/Trial Run:

Putting people into position and moving them around according to their plan without actually committing the terrorist act. This is especially true when planning a kidnapping, but it can also pertain to bombings. An element of this activity could also include mapping out routes and determining the timing of traffic lights and flow.

7. Deploying assets:

People and supplies getting into position to commit the act. This is a person's last chance to alert authorities before the terrorist act occurs.

Courtesy: US Department of Homeland Security



Additional Contributors to these Threats Becoming Reality

- Focus on Increased Production In Food Operations
- Contain Costs – Invest in RoI Generating Activities
- Target Budgets on Production and Distribution Efficiency
- Potential IA Cases Documented as Unintentional – Full Team of SME's Not at the Table
- We Already Have Substantial QC, Food Safety & EHS Programs – Why Corporate Security?
- Corporate Security is Redundant and Undervalued – A “Cost Center”



Food Defense



A Worthy Roadmap

Moving Towards Organizational Maturity

Level 0 – Ostrich with Head in Sand

Level 1 – Reactive

Level 2 – Proactive

Level 3 – Predictive - Big Data

Level 4 – More Sensors & Creativity

Level 5 - Disruptive



The Traditional Methodologies Must Be Reinvented

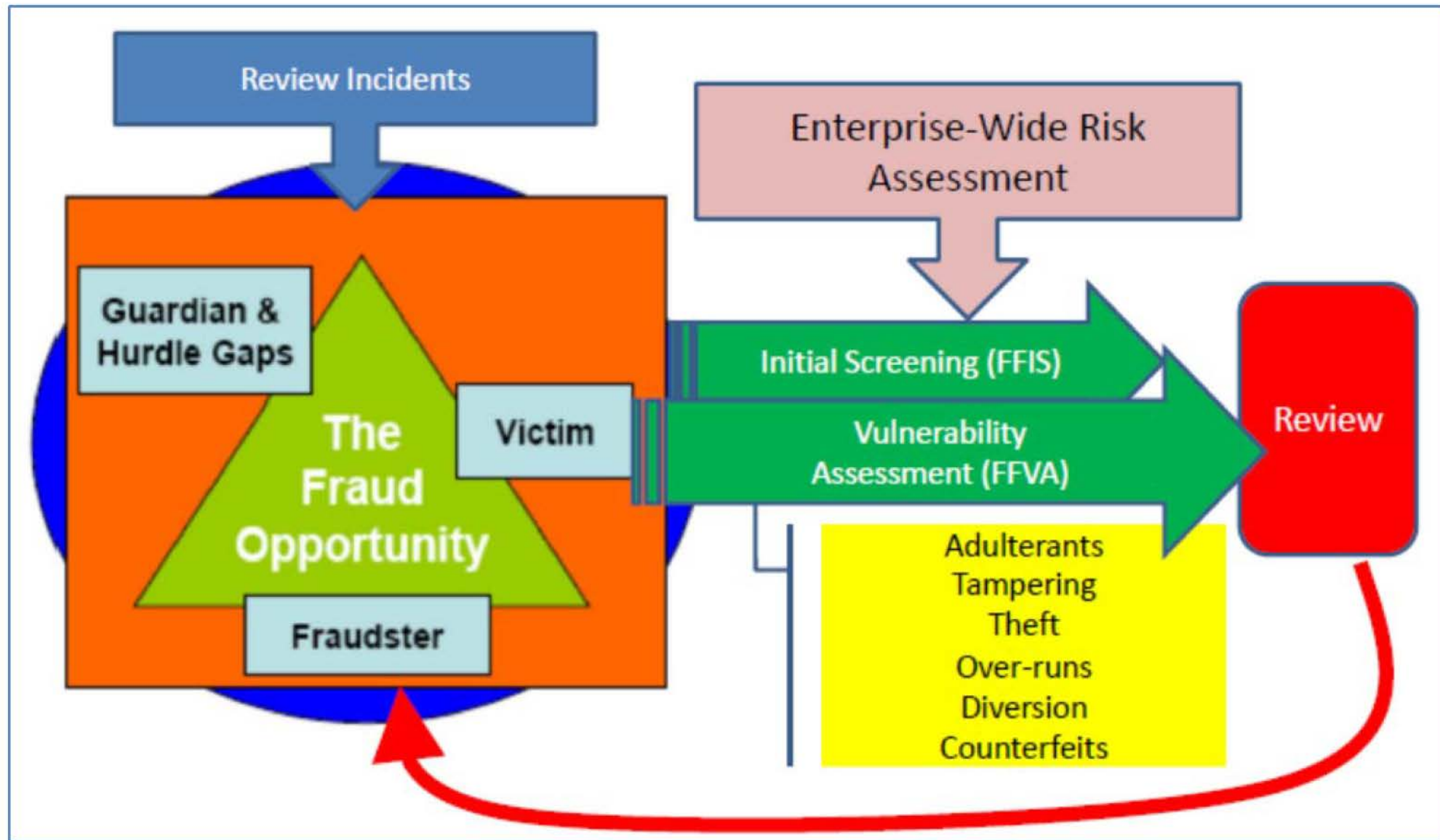
- Threat, Vulnerability and Risk Assessment
- Business Continuity & Resiliency
- Convergence
- Enterprise Risk Management (ERM)

Probability	Threats					Opportunities				
	Risk Score = Probability x Impact					High (RED) / Med (YEL) / Low (GRN)				
0.90 Very Likely	0.05	0.09	0.18	0.38	0.72	High	High	High	Med	Low
0.70 Likely	0.04	0.07	0.14	0.28	0.56	High	High	Med	Med	Low
0.50 Possible	0.03	0.05	0.10	0.12	0.40	High	High	Med	Low	Low
0.30 Unlikely	0.02	0.03	0.06	0.12	0.24	High	Med	Med	Low	Low
0.10 Very Unlikely	0.01	0.01	0.02	0.04	0.08	Med	Low	Low	Low	Low
	0.05	0.10	0.20	0.40	0.80	Very High	High	Med.	Low	Very Low
Example Impact Definitions – May Be Tailored to Each Project Objective Impact on an Objective (e.g. Cost, Schedule, Scope, Quality)										

Risk Event Probability	Interpretation	Rating
> 0 - <= 0.05	Extremely sure not to occur	Low
> 0.05 - <= 0.15	Almost sure not to occur	Low
> 0.15 - <= 0.25	Not likely to occur	Low
> 0.25 - <= 0.35	Not very likely to occur	Low
> 0.35 - <= 0.45	Somewhat less than an even chance	Medium
> 0.45 - <= 0.55	An even chance to occur	Medium
> 0.55 - <= 0.65	Somewhat greater than an even chance	Medium
> 0.65 - <= 0.75	Likely to occur	High
> 0.75 - <= 0.85	Very likely to occur	High
> 0.85 - <= 0.95	Almost sure to occur	High
> 0.95 - < 1	Extremely sure to occur	High

Probability				
Frequent	Likely	Occasional	Seldom	Unlikely
A	B	C	D	E
S E V E R E I T Y	Catastrophic I	Extremely		
	Critical II	High	High	
	Moderate III		Medium	
	Negligible IV			Low
Risk Levels				

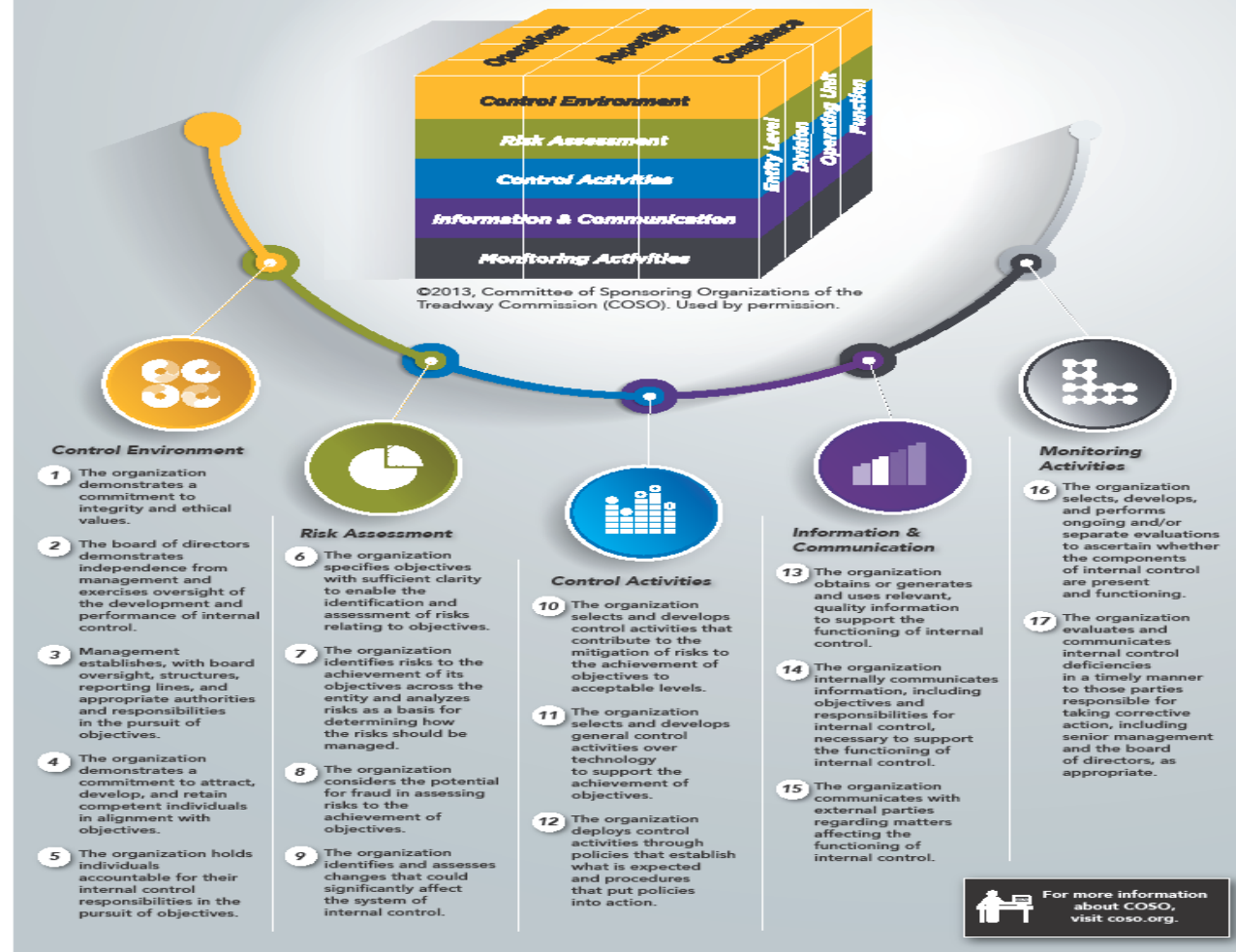




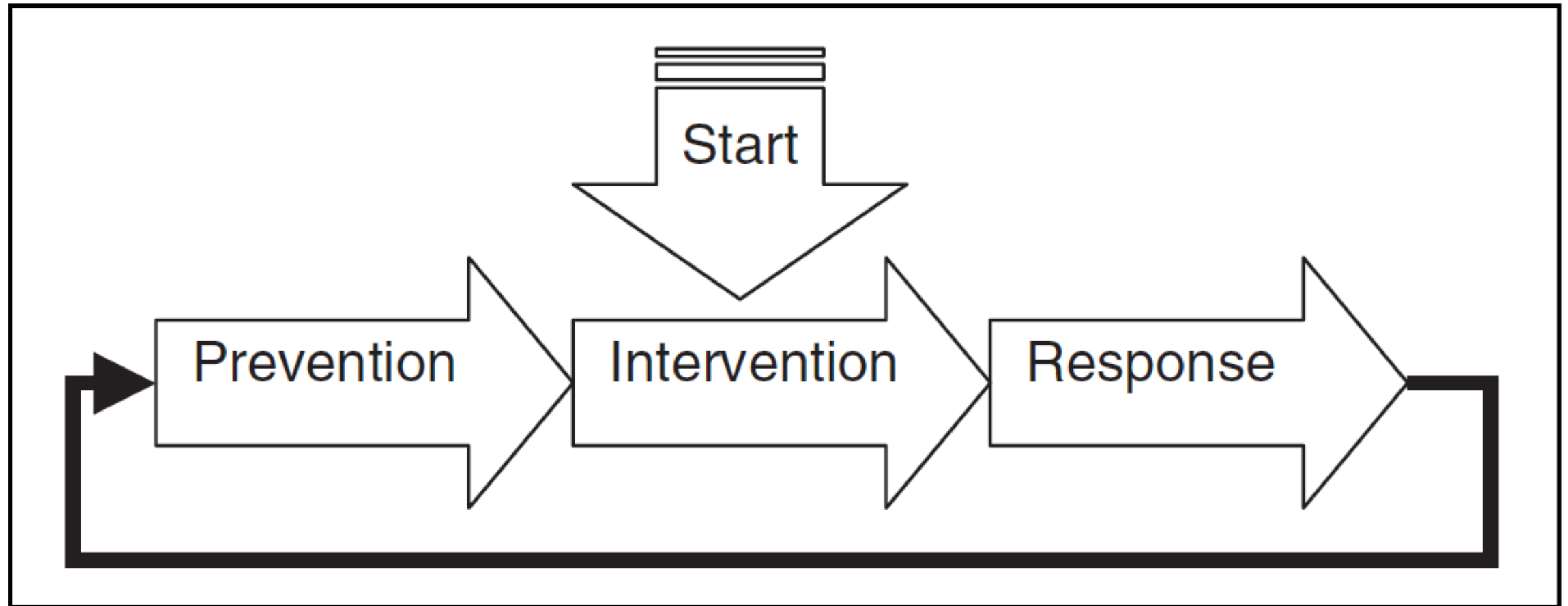
Courtesy: MSU



COSO Internal Control — Integrated Framework Principles

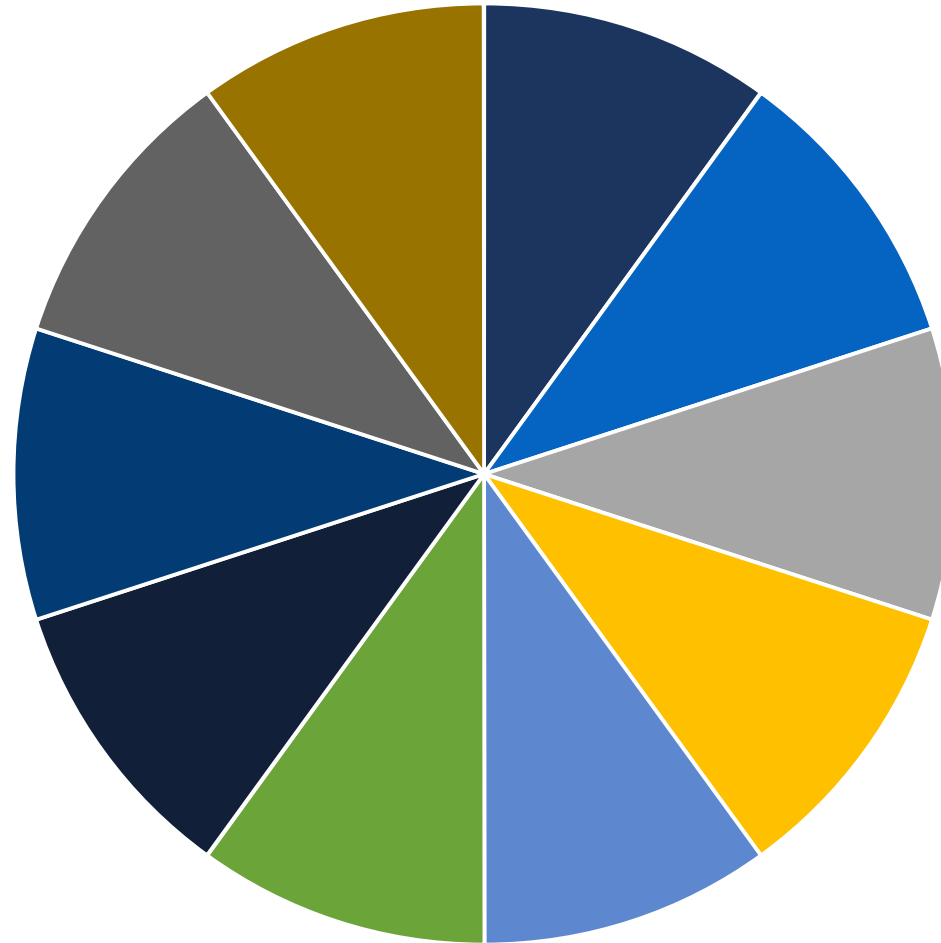


Courtesy: COSO



Courtesy: Journal of Food Science Vol. 76, Nr. 9, 2011

THE SECURITY PIE



■ Security Policies & Procedures ■ Security Training ■ Security Officers ■ Electronic Security ■ Mechanical Security
■ IT Security ■ Information Security ■ Executive Protection ■ Investigation ■ Analysis, Audit & Re-Evaluation



Training, Certification and Verification



Training & Certification

- Formal New Hire Security Orientation
- Food Defense Awareness Training for Frontline
- Certified Food Defense Managers
- Training for Security Personnel
- Documentation
- Annual Refreshers
- Table top Exercises



Assessments & Audits

- Assess Requirements
- Assess Needs
- Develop Formal Program
- Select whether internal or external
- Types of Assessments and Audits
- How often and how many conducted
- Partnership with Quality & Security

Policy Controls



Company Policies, Standards & Requirements

- Food Defense Policy
- Food Defense Standard
- Food Defense Requirements
- Food Defense Processes
- Food Defense Training & Awareness
- Corporate Food Defense Committee
- Certified Food Defense Managers

Plan and Remediation



Food Defense Plan

- What is Required
- Who should be Involved
- Develop Team & Plan
- Communicate Plan
- Manage Plan
- Test Plan
- Update Plan Annually



Remediation Plan

- Proper Team, Culture & Strategies
- Actions & Accountability
- Technology & Creativity
- Documentation
- Tracking Success
- Partnership
- Update Regularly

Chance The Rapper





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RISK SOLUTIONS
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THANK YOU!