Food Safety in The Dairy Industry

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Early Beginnings

The Standard Milk Ordinance, which became the basis for the modern Pasteurized Milk Ordinance (PMO), was established in **1924** by the U.S. Public Health Service. It was developed to ensure safe, standardized milk production, with Alabama being the first state to adopt it that same year.

Early Beginnings

Origin: The 1924 Standard Milk Ordinance was created to reduce foodborne illnesses, which were previously tied to 25% of all foodborne disease outbreaks.

Early Beginnings

Transition: The ordinance officially transitioned into what is recognized today as the Grade “A” Pasteurized Milk Ordinance in 1965.

Updates: The PMO is updated every two years through the National Conference on Interstate Milk Shipments (NCIMS) and the FDA.

Food Safety Time - Line

In 1971, Pillsbury presented the concept at National Conference on Food Protection

HACCP consisted of three principles:

1. Identification and assessment of hazards from farm to fork
2. Determination of Critical Control Points (CCP)
3. Establishment of a system to monitor CCPs

In 1974, FDA incorporated HACCP principles into low acid and acidified food regulations

In general, HACCP interest waned, but was still being implemented by some large food manufacturing companies

Food Safety Time - Line

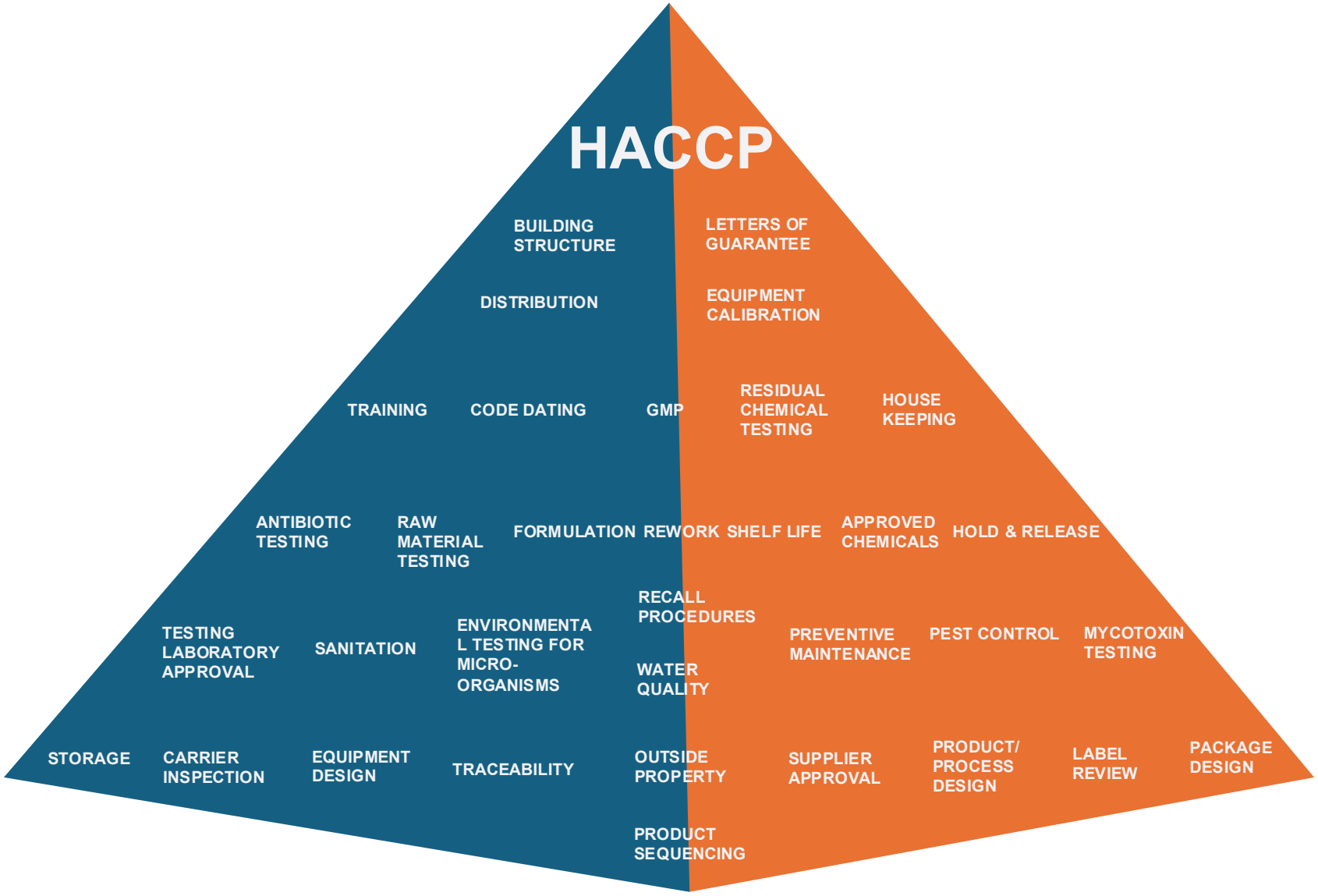
In 1980s, HACCP was driven by the marketplace and not regulations

In 1989, NACMCF published it's first HACCP document

•Standard codified the practice of HACCP

Also in 1989, ICMSF published a book containing the description of the application of HACCP for entire food chain

•Included CCP1 and CCP2 (now considered CCPs and prerequisite programs)


HACCP
BUILDING STRUCTURE
LETTERS OF GUARANTEE
DISTRIBUTION
EQUIPMENT CALIBRATION
TRAINING
CODE DATING
GMP
RESIDUAL CHEMICAL TESTING
HOUSE KEEPING
ANTIBIOTIC TESTING
RAW MATERIAL TESTING
FORMULATION
REWORK
SHELF LIFE
APPROVED CHEMICALS
HOLD & RELEASE
RECALL PROCEDURES
TESTING LABORATORY APPROVAL
SANITATION
ENVIRONMENTAL TESTING FOR MICRO-ORGANISMS
PREVENTIVE MAINTENANCE
PEST CONTROL
MYCOTOXIN TESTING
WATER QUALITY
STORAGE
CARRIER INSPECTION
EQUIPMENT DESIGN
TRACEABILITY
OUTSIDE PROPERTY
SUPPLIER APPROVAL
PRODUCT/ PROCESS DESIGN
LABEL REVIEW
PACKAGE DESIGN
PRODUCT SEQUENCING

Food Safety Time - Line

In 1993, Codex issued its first HACCP standard

- Codified the five preliminary steps and seven principles of HACCP

In 1996, USDA implemented the “Mega-Reg”

Main components

- Hazard Analysis Critical Control Point
- Sanitation Standard Operating Procedures (SSOP)
- Must develop, implement and maintain written SSOPs
- Generic E. coli testing and performance standards for Salmonella

Food Safety Time - Line

In 1997, Codex and NACMCF revised their standards

- Harmonizing the US definition of HACCP to Codex

In 2003, Codex revised its current HACCP document

- The Codex document is the basis for HACCP in the GLOBAL FOOD SAFETY INITIATIVE (GFSI) and many other third party audits such as SQF and BRC

Food Safety Time - Line

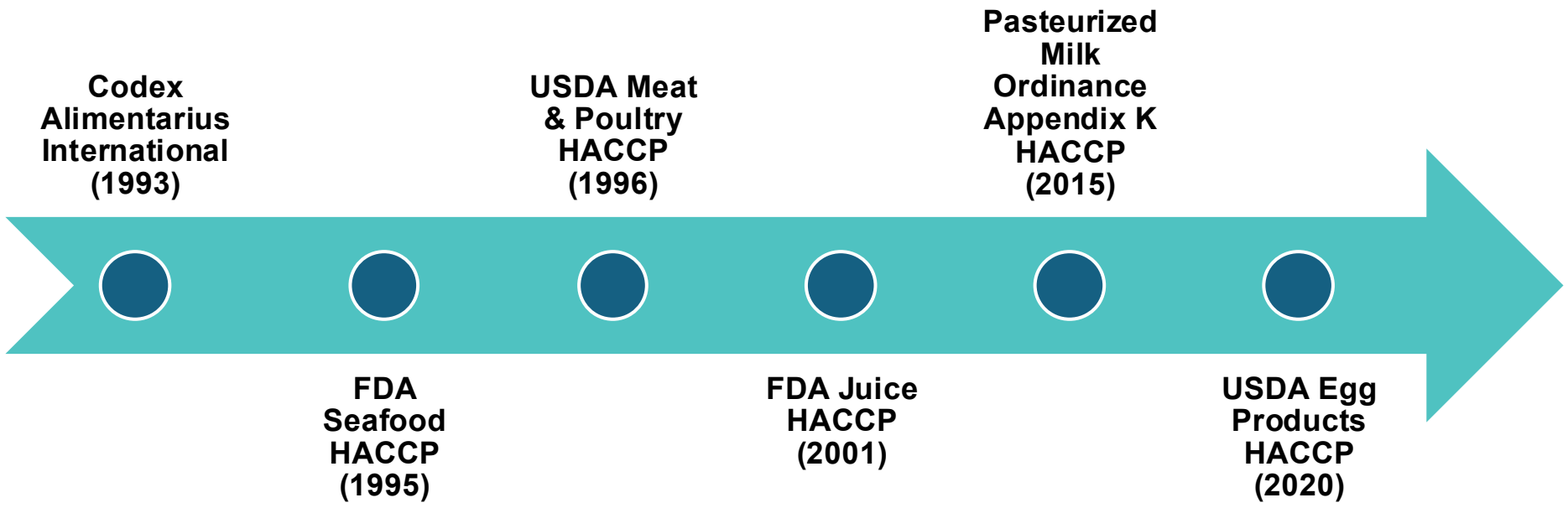
In 2011, the Food Safety Modernization Act (FSMA) was signed into law

- Most significant update to FDA regulations since the 1930s

- In General.--The owner, operator, or agent in charge of a facility shall, in accordance with this section, *evaluate the hazards* that could affect food manufactured, processed, packed, or held by such facility, *identify and implement preventive controls to significantly minimize or prevent the occurrence of such hazards and provide assurances that such food is not adulterated* or misbranded, monitor the performance of those controls, and maintain records of this monitoring as a matter of routine practice.

Risk-Based Controls – Evolution of HACCP

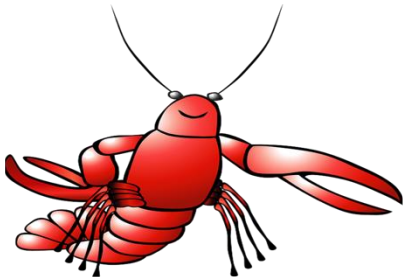
- Initially, the concept was conceived in conjunction with the NASA Space program in the 1960s.
- Through time, HACCP was voluntarily adopted or became required as part of regulations or standards.



Other Risk-based Food Safety Programs

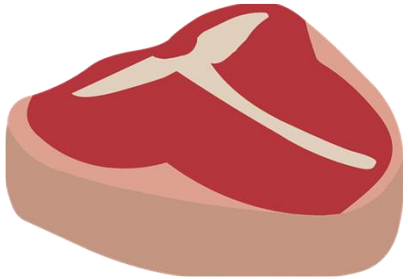
US Space program

Low-acid canned food regs



FDA Seafood HACCP regs

FDA Juice HACCP regs



USDA HACCP regs

Codex HACCP Annex

NCIMS Dairy HACCP

IS HACCP MANDATORY?

Product	Mandatory?	Date
Meat and Poultry	Yes	1998-2000
Juice	Yes	2001
Seafood	Yes	1997
Dairy	Voluntary	1999
Food Safety Modernization Act (FDA)	Yes (Preventive Controls)	September 2016 (for some)

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WHO CAN FORGET PEANUT CORPORATION OF AMERICA

PEANUT BUTTER AND PEANUT BUTTER PRODUCTS: 2008-2009

First listed a product advisory on January 9, 2009

714 illnesses and 9 deaths across 46 states

Over 2,000 products recalled

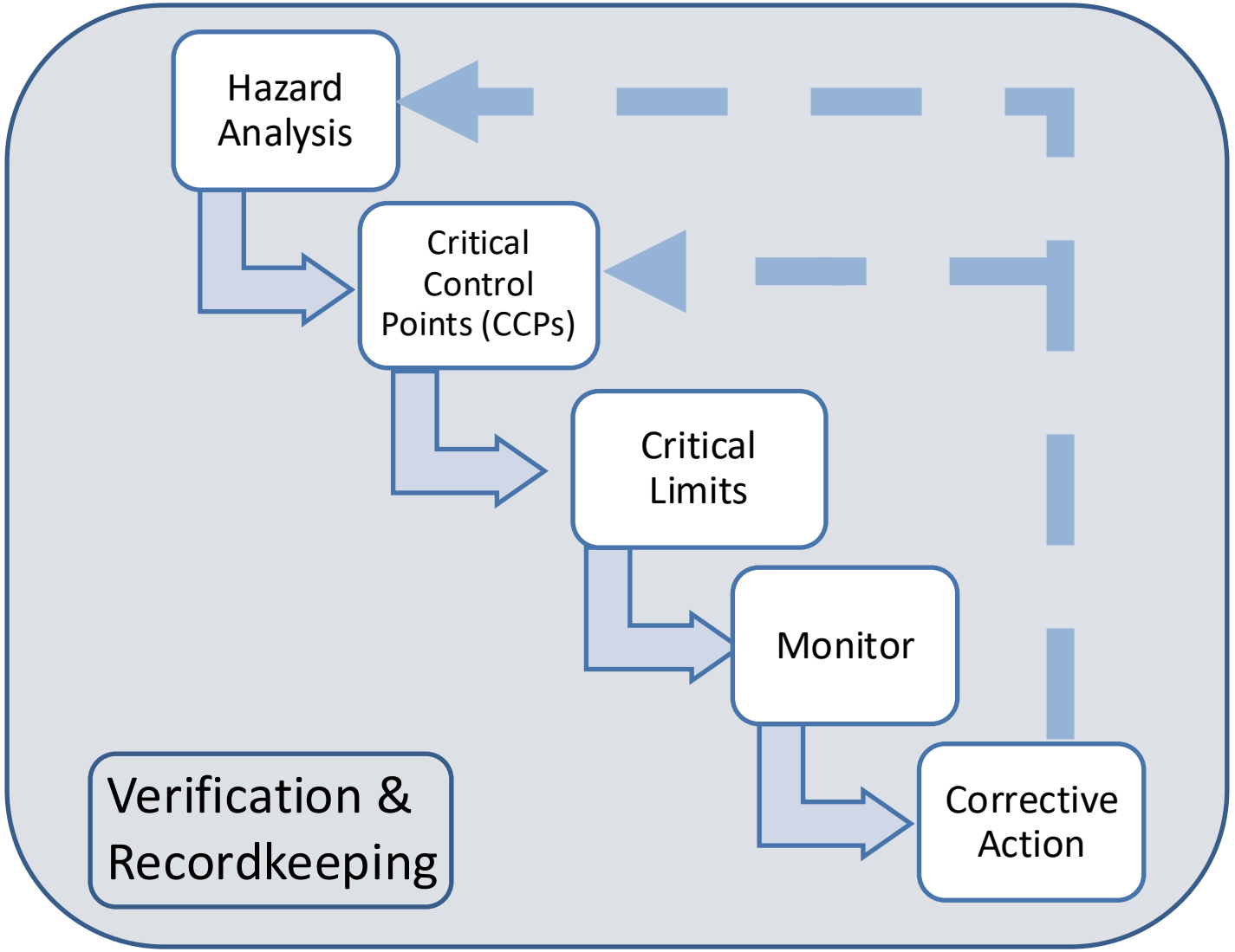
President of company charged with felonies

Convicted to 28 years in prison

Filed for bankruptcy February 2009

Fined 14.5 million by state of Texas

Historically HACCP Focuses on the Process

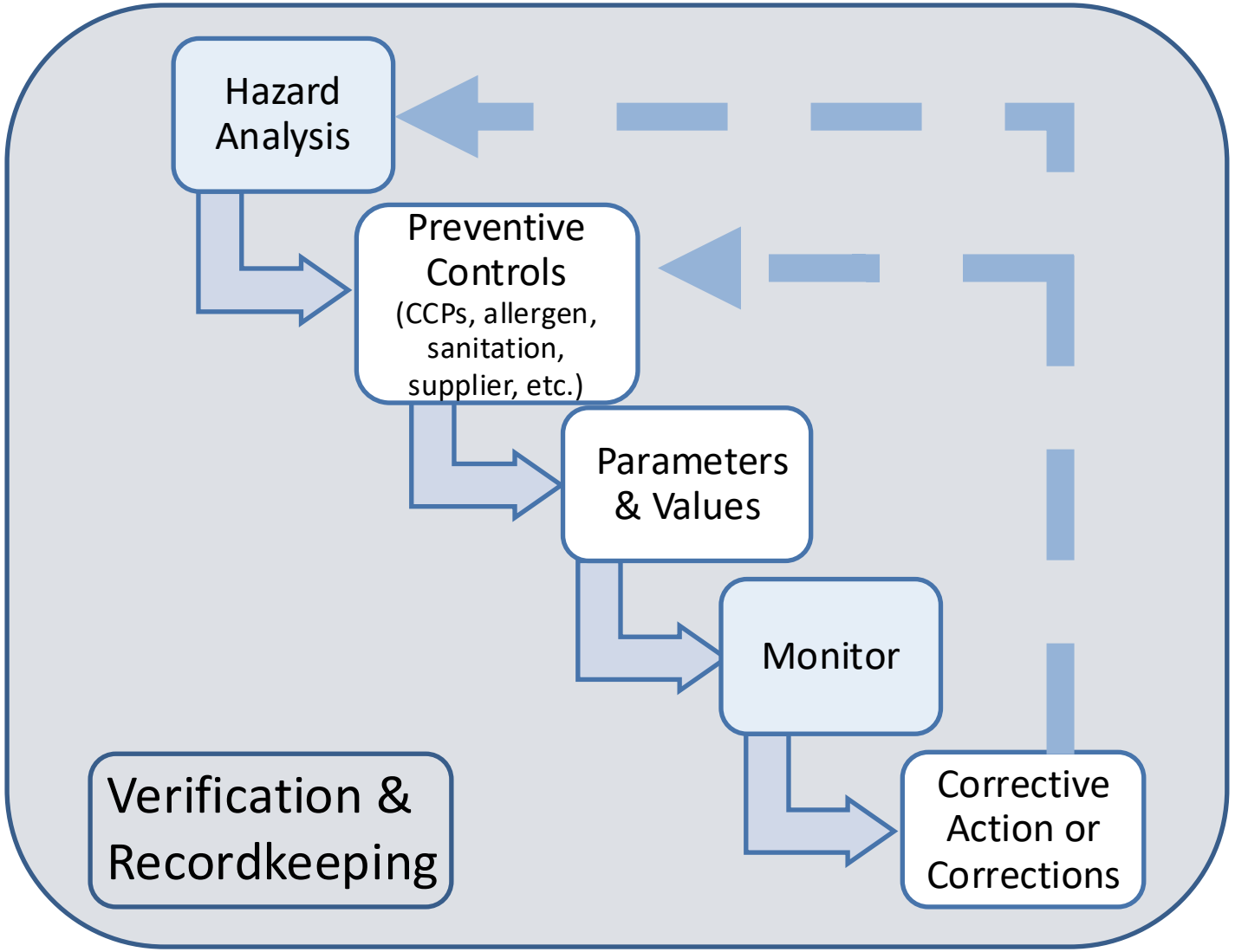


FSPCA
FOOD SAFETY PREVENTIVE CONTROLS ALLIANCE

HACCP – Focused on Process Controls

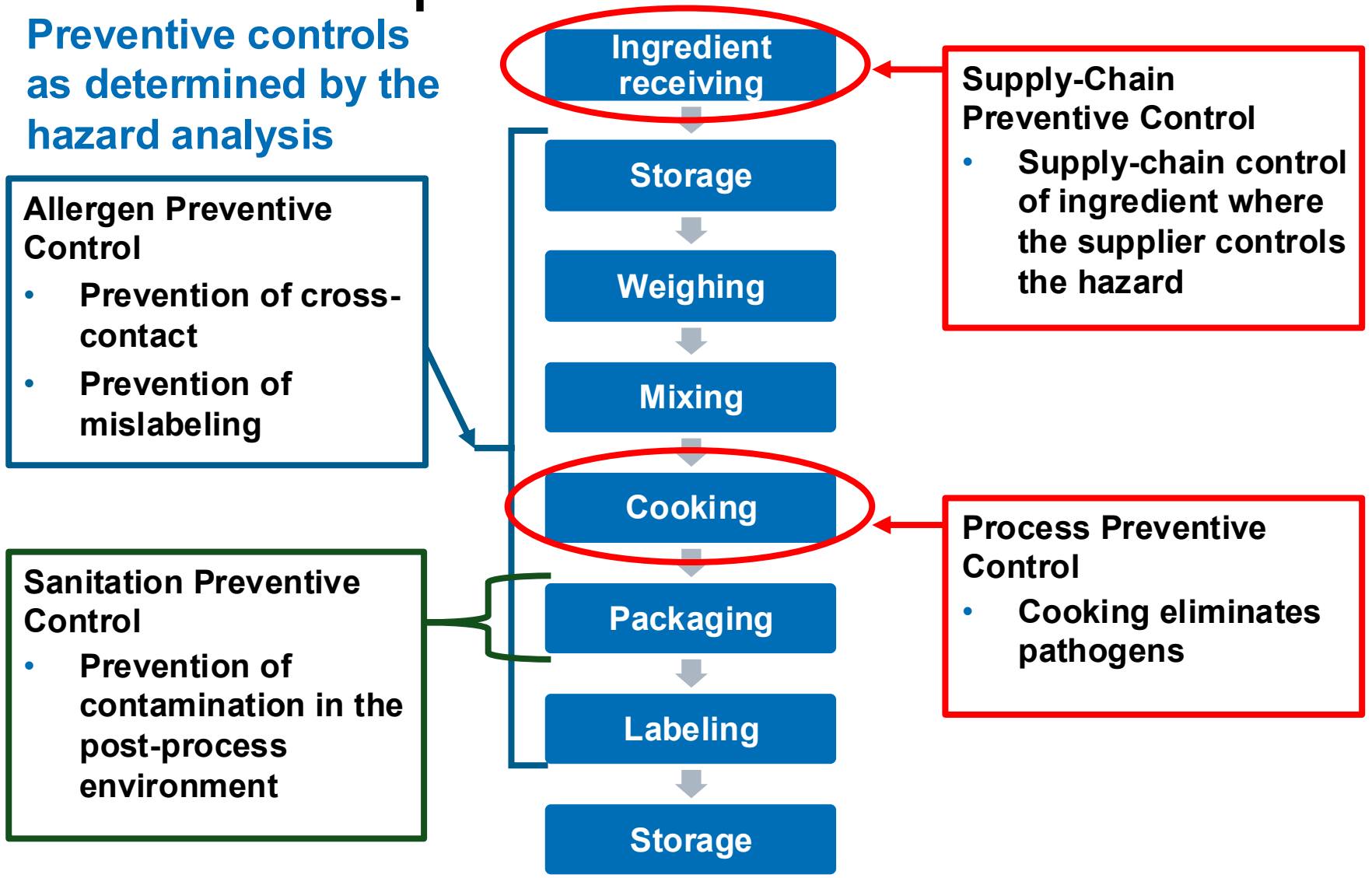
1. **Hazard Analysis** (e.g., pathogen in ingredient)
2. **Critical Control Point (CCP)** (e.g., cooking)
3. **Critical Limit** (e.g., 165ºF for 15 seconds)
4. **Monitoring** (e.g., time and temperature at cooking)
5. **Corrective Action** (e.g., recook)
6. **Verification** (e.g., calibration of instrument)
7. **Recordkeeping** (e.g., cook log)

Preventive Controls Include More Than HACCP



FSPCA
FOOD SAFETY PREVENTIVE CONTROLS ALLIANCE

Preventive Controls – Focused on Process and Associated Components



From HACCP to Preventive Controls

- HACCP focuses primarily on controlling hazards associated with the process through implementing controls at Critical Control Points, or CCPs.
- Preventive Controls expands on the concept to include a focus on significant hazards associated with the process such as:
  - Allergens (cross-contact and mislabeling),
  - Sanitation (processing equipment and environment), and
  - Supply-Chain (raw materials and other ingredients).

Need for a Preventive Controls Approach

Allergen Control

- Numerous recalls – undeclared allergens account for nearly one-half of FDA food recalls*

Sanitation Control

- *Listeria monocytogenes* in cheese (2022)
- *Salmonella* in peanut butter (2022)

Supply-Chain Control

- *Salmonella* in leafy greens in salad mixes (2021)

**FDA.gov. (2016). The Reportable Food Registry: A Five-Year Overview.*

Sanitary Operations – Condition and Cleanliness of Food-Contact Surfaces

Food-contact surfaces must be:

Smooth and easy to clean

Cleaned and sanitized as necessary to protect against allergen cross-contact and cross-contamination of food

Images source: IFPTI IFS-CS course

Holding of Human Food By-Product

- Human food by-products sent for animal food use must comply with GMPs during holding and distribution
- Human food by-products must be held under conditions that will protect against contamination:
  - Ensure the safety of containers,
  - Avoid contamination from trash or garbage, and
  - Identify the material through labeling

Manufacturing/Processing of Human Food By-Products for Animal Food

Human food facilities that further manufacture/process their human food by-products for use as animal food must:

- Comply with CGMPs and preventive control requirements in 21 CFR Part 507,

or

- If subject to the CGMPs and preventive control requirements in 21 CFR Part 117, comply with those requirements, ensuring the Food Safety Plan addresses animal food specific hazards

How Safe Is Our Food

- **Major Foodborne Outbreaks and Trends (2017–2024)**
- **2024 Outbreaks (Key Highlights)**
  - **Boar's Head Deli Meats:** A major *Listeria* outbreak linked to 60 hospitalizations and 10 deaths across 19 states.
  - **McDonald's Quarter Pounder Onions:** *E. coli* O157:H7 outbreak linked to Taylor Farms onions, resulting in over 100 cases and one death.
  - **Other 2024 Outbreaks:** Contaminated cucumbers, charcuterie meats, and organic carrots.
  - **Overall Trend:** Food recalls actually decreased in number, but illnesses linked to these recalls rose, highlighting increased severity in contaminated products.

Image source: Microsoft clip art

How Do We Look Since FSMA

- **2017-2023 Notable Trends**
  - **2019-2023 Period:** *Norovirus* remained the top cause of illness, while *Salmonella* and *Campylobacter* remained major causes of hospitalizations.
  - **2017-2019:** CDC's NESS reported 800 outbreaks at retail food establishments (restaurants, catering) over this three-year period.

How Do We Look Since FSMA

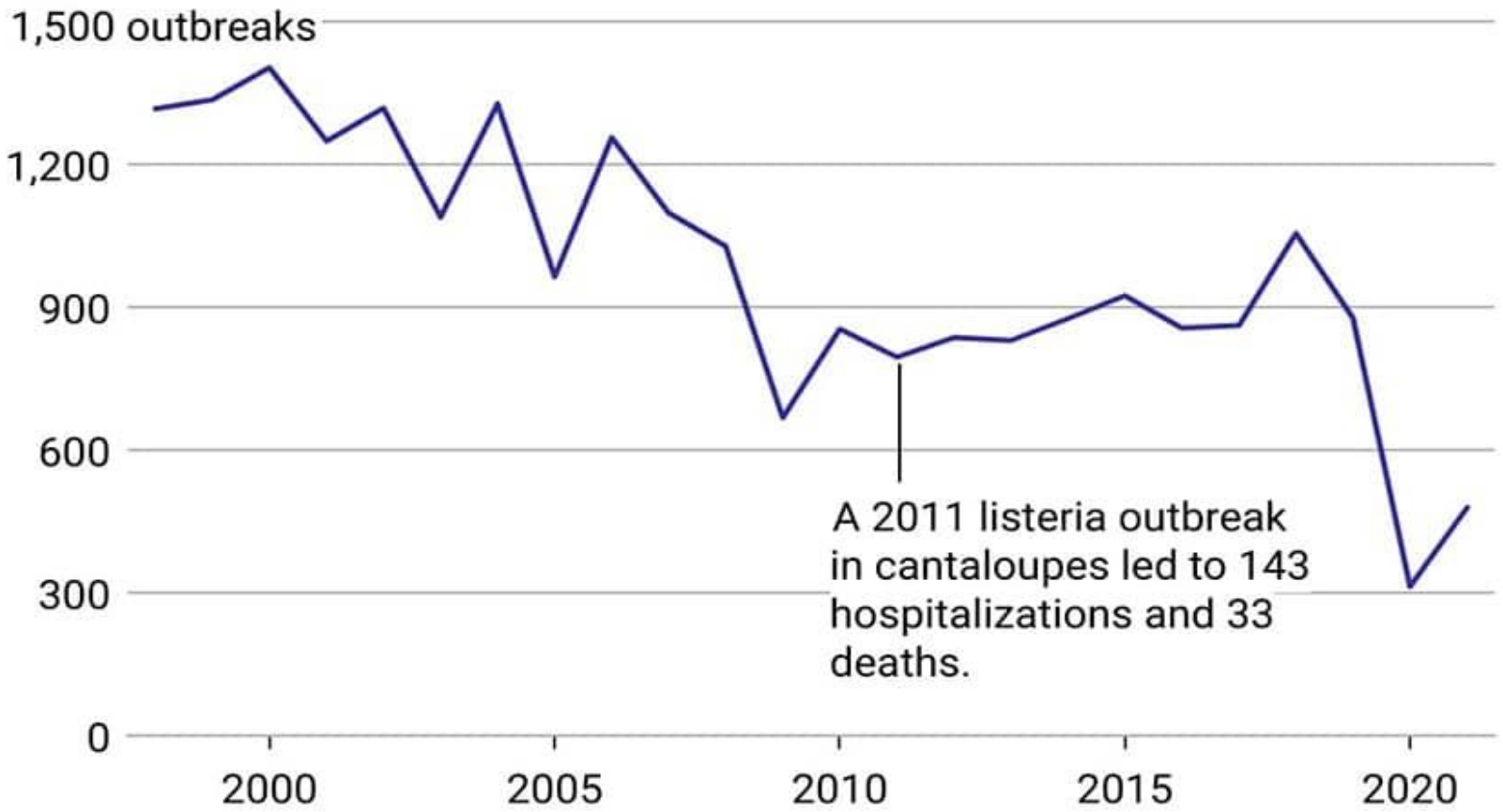
- **Key Pathogens Responsible for Outbreaks**
- **Salmonella:** Frequently linked to poultry, produce, and processed foods.
- **Listeria monocytogenes:** A major threat in deli meats, cheeses, and produce, with significant, severe cases in 2024.
- **E. coli (STEC):** Commonly associated with leafy greens and contaminated beef/produce.
- **Norovirus:** Top cause of foodborne illnesses, often spread in restaurant settings.

How Do We Look Since FSMA

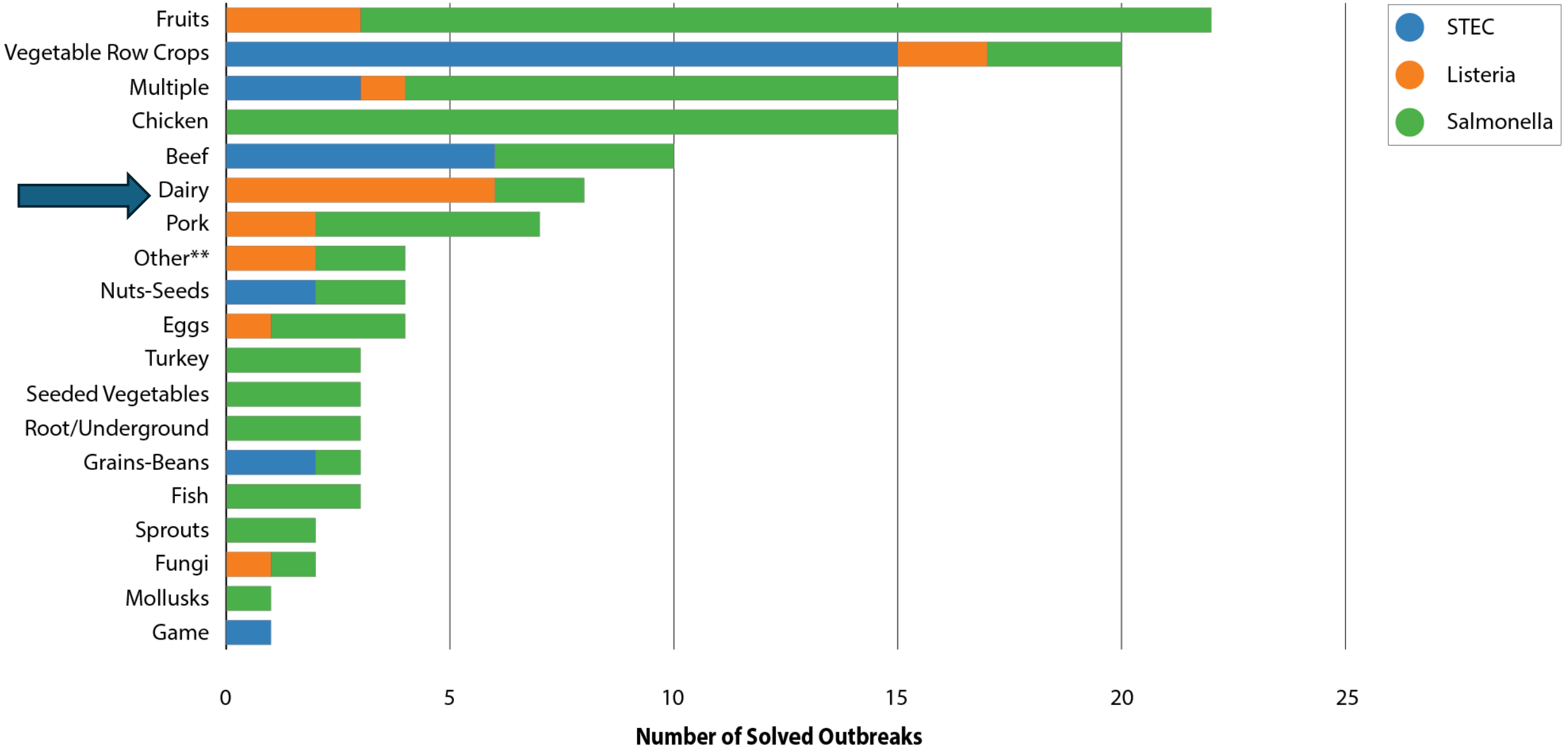
- **2024 Foodborne Illness Surveillance Data**
- **Total Illnesses:** 1,392 people fell ill from recalled foods, an increase from 1,118 in 2023.
- **Hospitalizations:** More than doubled, from 230 in 2023 to 487 in 2024.
- **Deaths:** Increased to 19 in 2024 from 8 in 2023.
- **Primary Causes:** 39% of all food recalls were due to *Listeria*, *Salmonella*, or *E. coli*.

Hundreds of foodborne outbreaks occur annually

Foodborne illnesses fell during the COVID-19 pandemic as restaurants shuttered and events were postponed. Fewer outbreaks may have been detected as people visited hospitals less often.



Data source: National Outbreak Reporting System

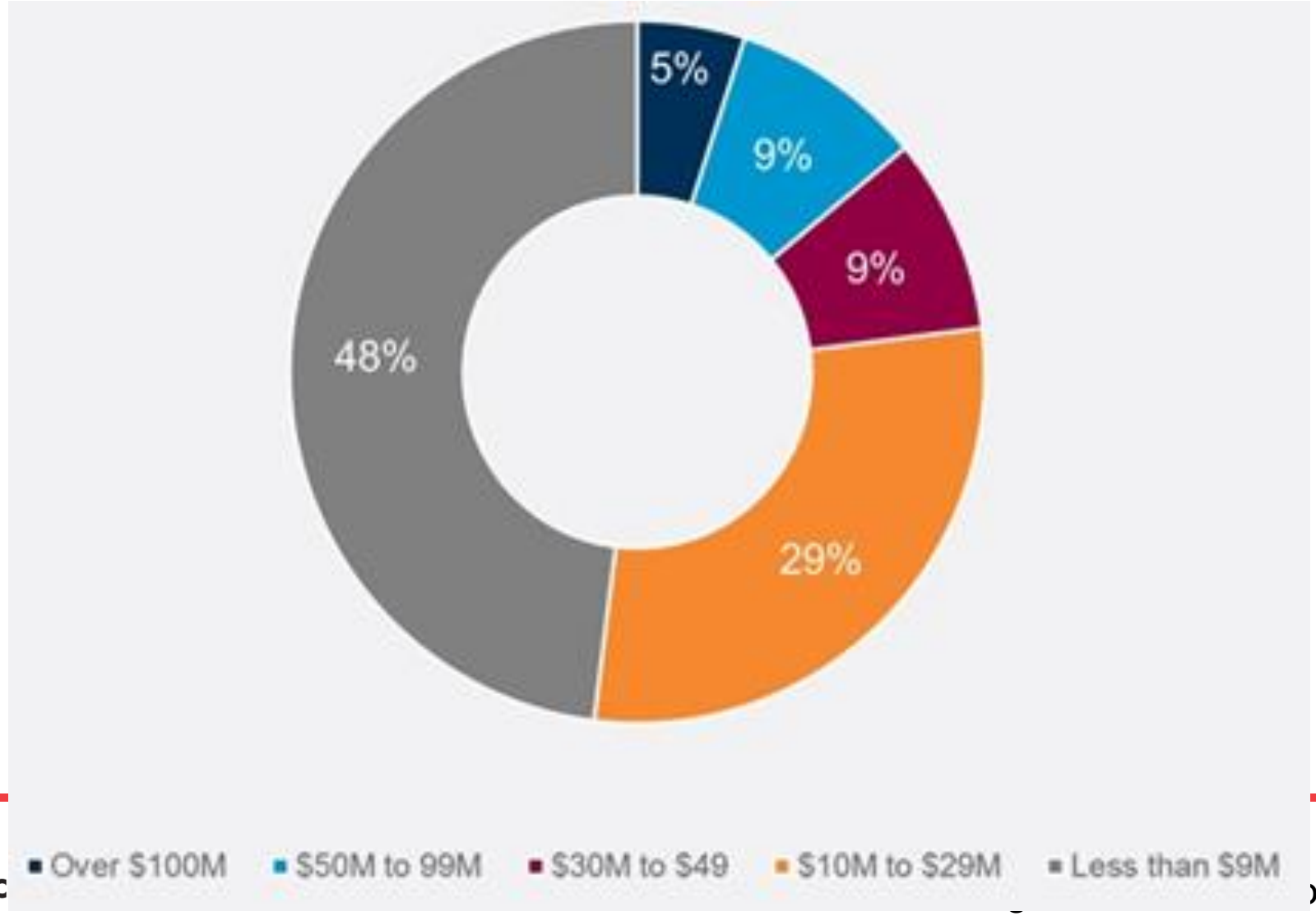

Fruits
Vegetable Row Crops
Multiple
Chicken
Beef
Dairy
Pork
Other**
Nuts-Seeds
Eggs
Turkey
Seeded Vegetables
Root/Underground
Grains-Beans
Fish
Sprouts
Fungi
Mollusks
Game
STEC
Listeria
Salmonella
0
5
10
15
20
25
Number of Solved Outbreaks

ALLERGENS

9 FOODS CAUSE > 90% OF ALLERGIC REACTIONS AND THEREFORE REQUIRE PROPER LABELING

- Peanuts
- Tree nuts (walnuts, pecans, Brazil nuts, etc.)
- Eggs
- Dairy (milk)
- Soy
- Wheat
- Fish (salmon, tuna, halibut)
- Shellfish (shrimp, crayfish, lobster, crab)
- Sesame

COST OF A RECALL



COST OF A RECALL

- **Consider not just the cost of recalling and disposing of the product**

  - Business interruption and lost profits
  - Liability
  - Reputation damage or loss of brand equity
  - Legal Ramifications
  - Job Loss

WHO IS YOUR MOST IMPORTANT CUSTOMER? Is it the one that pays you the most? Is it the one that is the largest and most influential? Your shareholders?

YOU ARE!!!

Dairy Controls

Starts on the Farm

- Proper Cleaning Procedures
- Keeping Cow Being Treated With Antibiotics Properly Segregated
- Raw Milk Storage
  - ≤ 45 F, ≤ 72 hours

Transportation

- Grade A Inspected
- Wash Tag Maintained 15 days, washed every 24 hours
- Truck Sealed

Dairy Controls

At Receiving

- Checking Temperature at Time of Receipt ≤45 F
- Beta Lactam Screening
- Reject and Report Positive Findings
- Technicians Certified for Screening Tests

Although these are PMO requirements, most companies will list as a CCP or Process Preventive Control in Their Food Safety Plan

Dairy Controls

Production

- Storage Temperature ≤45 F
- Pasteurize 161 F ≥ 15 seconds - **CCP/PPC**
- Cooled Immediately ≤45 and maintained
- Timed and Sealed with proper records.
- Consider Redundant System to Prove Legal Pasteurization

REMEMBER PASTEURIZATION DOES NOT EQUAL STERILIZATION

WHY HOLDING TEMPERATURES MATTER

Growth from 0 minutes (5 kernels) to 3 hours and 40 minutes (10,240 kernels)

Dairy Controls

Environmental Monitoring Program to Support Sanitation Preventive Controls.

Metal Detection of Your Final Product - CCP/PPC.

Ensure Container or Packaging State CONTAINS MILK – Allergen Control.

Any Ingredient Other Than Raw Milk May Require A Supply Chain Preventive Control.

Dairy Controls

As Part of FSMA, if you determine a hazard during your hazard analysis that requires a Preventive Control, then you must have a documented RECALL PLAN.

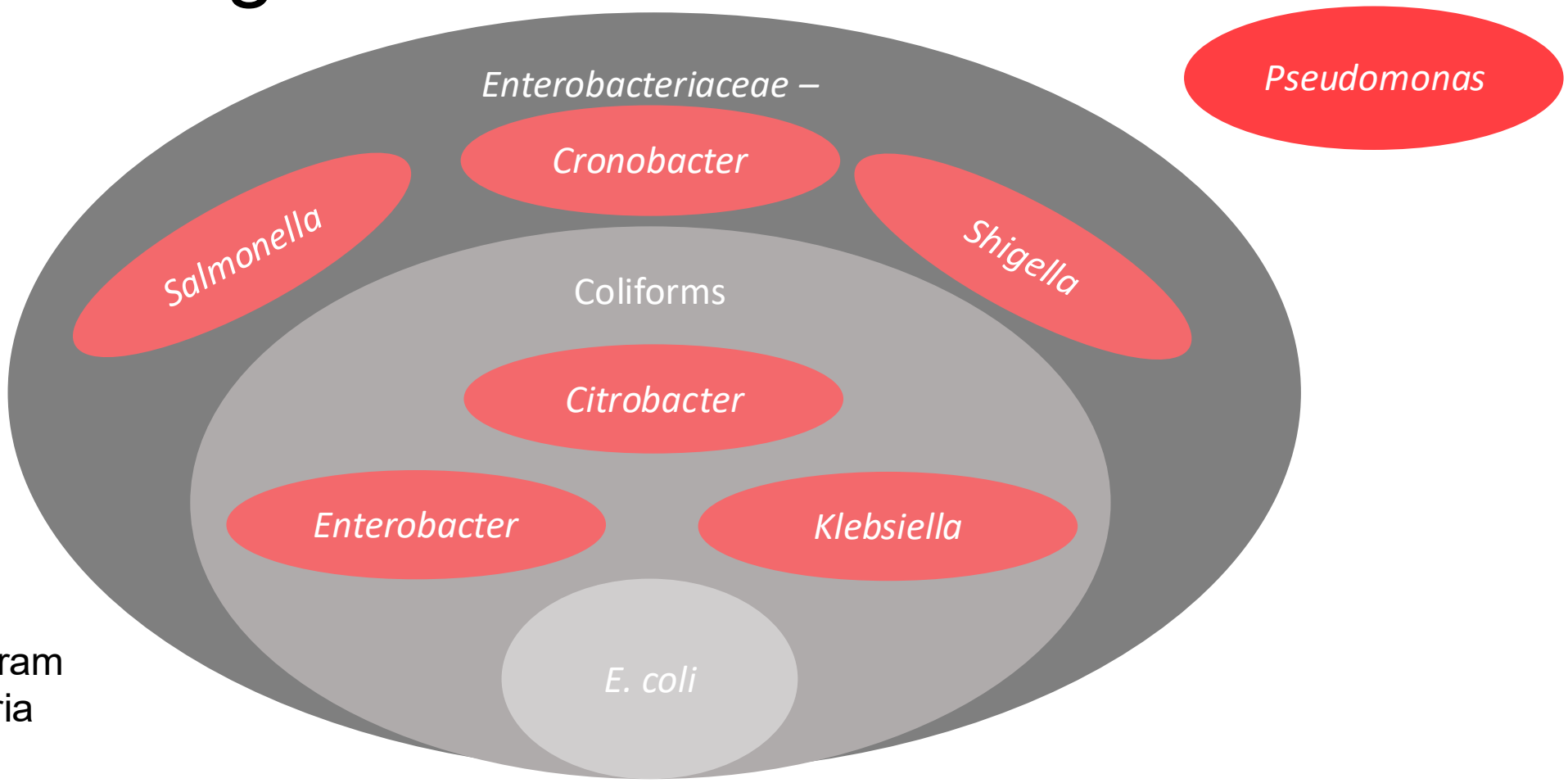
21 CFR 117

Dairy Controls

PMO Historical Testing for Post Pasteurization Contamination is Coliforms

Consider Other Indicators Like Enterobacteriaceae A.K.A. EB Testing

Indicator Organisms – *Enterobacteriaceae*



Large family of gram negative bacteria

Dairy Controls

When It Comes To Food Safety, Sanitation Has To Be The Number One Step And Most Important Step In Production.

Dairy Controls

What we did yesterday, we can't do today. What we do today, we may not be able to do tomorrow.

Dairy Controls

Food Safety starts with upper management and must trickle down to the very bottom of production employees.

Who is your most important customer?

YOU ARE!!!

Thank You!

“My sincerest apologies for not being able to present to you today”

Steve T.

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