



THE
SANITARY
DESIGN
WORKSHOP

BEMA





Equipment & Plant Design
For Allergen/Pathogen Control in Low Moisture Foods

Part 4:

Early Management

Presented by:
Karl Thorson, General Mills

Sanitary design is integral to food safety.

Early Management Objectives

1. Understand the **hazards / risks** to be managed
2. Align on **success criteria**
3. Identify food safety **control methods**
4. Communicate **expectations** to key stakeholders
5. Identify and engage **resources**
6. Define **timelines and budget** needs
7. Debrief and share **lessons learned**

Project Roadkill: Meat Cereal

Objective: *Deliver a high protein breakfast cereal designed for modern convenience and food values for both you and your pet*





✓ NO HIGH FRUCTOSE CORN SYRUP

✓ NO COLORS FROM ARTIFICIAL SOURCES

✓ NO ARTIFICIAL FLAVORS

Crispy, Sweetened Corn Cereal

French Toast Crunch

BURSTING WITH **meat**



ENLARGED TO SHOW DETAIL

NET WT 11.6 OZ (328g)

110 CALORIES	0 SAT FAT g	140 SODIUM mg	9 SUGARS g
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PER 1/2 CUP SERVING

SEE NUTRITION FACTS FOR '43 PROPERTIES

Project Roadkill: Meat Cereal



Objective: Deliver a high protein breakfast cereal designed for modern convenience and food values

Competitive Context

There are no other products in this category. A meat cereal would be disruptive to the category. Based on consumer trends such as *Paleo* and others, we believe there would be significant consumer interest.

Scope

- 2027 launch to drive awareness and prepare 2-3 SKUs for a national launch in Q3 2027

How is this product Different?

- Disruptive savory cereal option that does not currently exist in the marketplace
- Consumer research indicates high interest
- Concepts are being shared on Instagram and other social media outlets
- We will offer a cereal that is meal-enabling and can also be consumed as a high protein snack

In Scope

PRODUCT DESIGN PRINCIPLES

- New packaging
 - Single serve,
 - Multi-serve
- Shelf stable
- Hero ingredient = meat (chicken, pork, or seafood)
- Target 18-20g protein per serving
- Capital Needs
- USDA Requirements
- Gluten-free Claims
- Nut-containing

Out of Scope

PRODUCT DESIGN PRINCIPLES

- Cold supply chain / Refrigerated product

OTHER Claims

- Organic, kosher

Resources to Next Step

RESOURCES NEEDED FOR NEXT STEP

- R&D/Engineering – Define product & packaging options
- Marketing/CI - Review consumer interest
- Finance – Understand cost implications for production
- Ops – Explore feasibility of using existing systems

CRITICAL QUESTIONS TO BE ANSWERED BEFORE STEP 1

- What packaging format will we use?
- What meat(s)/flavors are most compelling?
- What are cost and time implications?
- What are the regulatory considerations?

Project Roadkill: Meat Cereal



Objective: Deliver a high protein breakfast cereal designed for modern convenience and food values

Overview

Job: Exciting and unique meat cereal that provides an easy path to protein for the health-conscious consumer.

Product Principles: Shelf stable, dense, chewy, multiple components, chunky, filling but not heavy, protein source

Key Competitors: bacon and eggs, & oatmeal

Different/Better: Only meat-containing cereal on the market.

Volume: \$780M in Western Region

Business Model

	2017	2018	Total
Volume (Cases)	40,000	60,000	100,000
Volume (Units)	480,000	720,000	1,200,000
Net Sales	\$25.00	\$25.00	
Sales Target	\$ 1,000,000	\$ 1,500,000	\$ 2,500,000

Risks

RISKS

- Tight timeline
- Meat Quality & Handling
- Volume Demand
- System Changeovers

MITIGATION PLAN

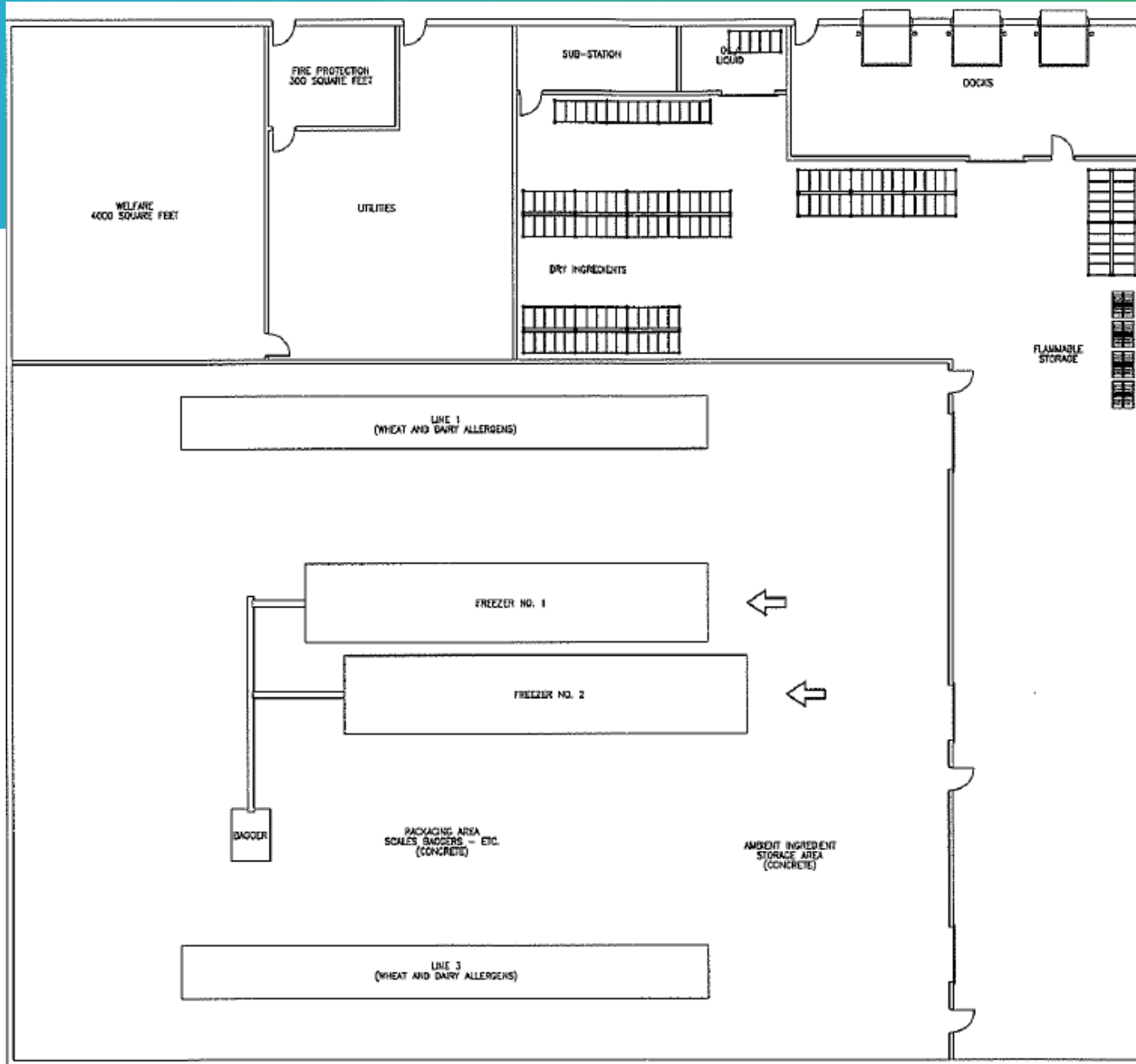
- Detailed Capital Project
- Environmental Controls
- Maximize Facility Infrastructure
- Superior Sanitary Design

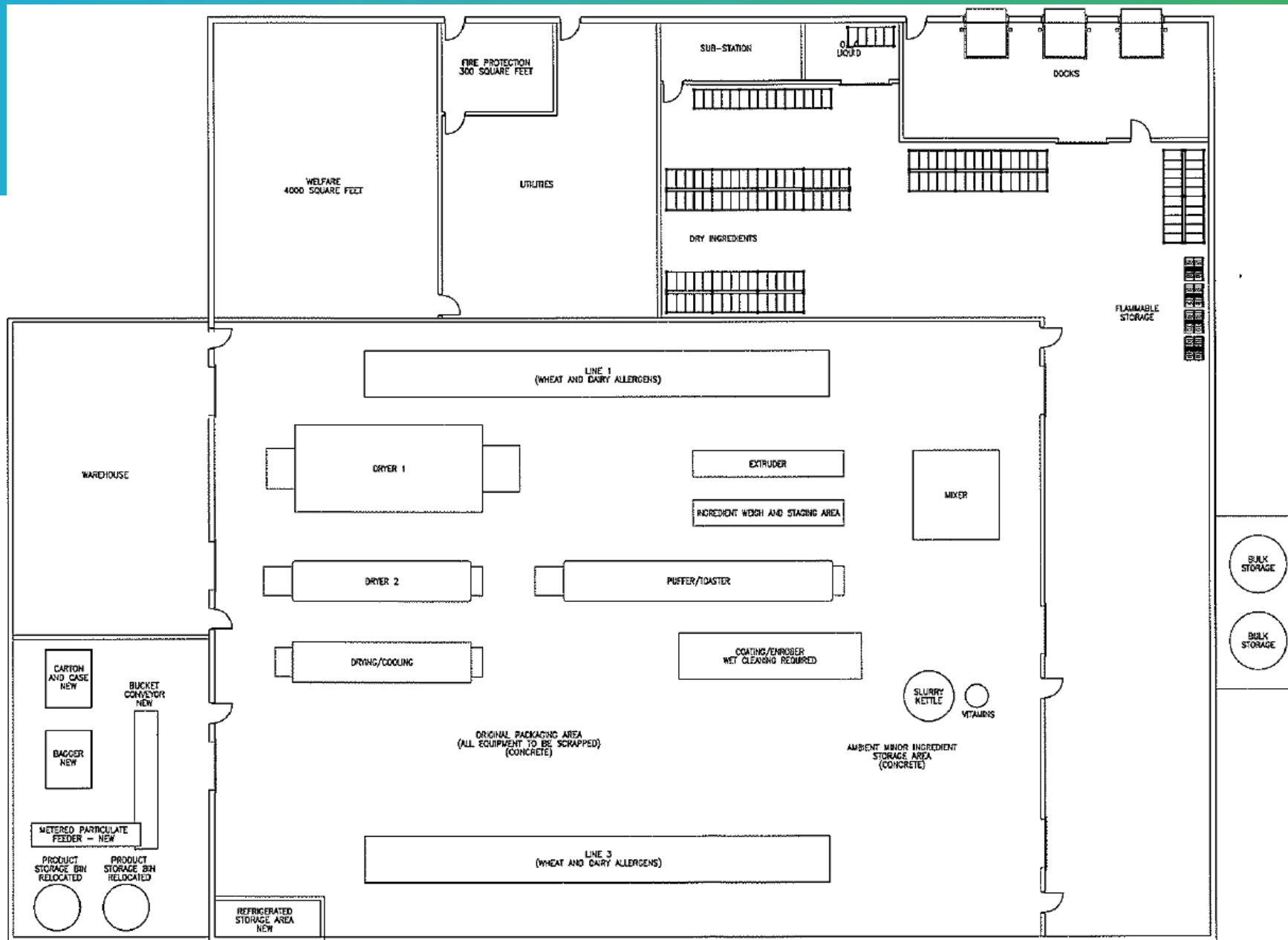
Critical Questions

- Finalize System Design – how to run meat on a cereal line?
- Commit to Volume - how efficient does the line need to run?
- Determine Product Varieties – how many changeovers are needed?

RESOURCES NEEDED FOR NEXT STEP

- R&D / Engineering resources: Demolition, Installation & Start-up
- Ops: Sanitation and Changeover Practices
- Sales/Marketing/Finance resources – Final contract





How do you prepare for Project Roadkill from a food safety and sanitary design standpoint?

Roles and Responsibilities

	Operations	Outside Services		FSQ	Sanitation		Engineering		Maintenance	R&D	HSE	L&D	Suppliers	
		Temps	3rd Party Cleaners		Contractors	Corporate	Plant	Corporate					Plant	Chemical
MSS														
Writing Job Tasks														
Escalation and Report-outs														
Planned Losses														
ERS														
SAM														
CO														
Sanitation Procedures/SSOPs														
Special Event Management														
Bloodborne Pathogen														
Roof Leak														
Construction														
GBPC														
Janitorial/Housekeeping														
Janitorial (outside of GMP areas)														
Housekeeping (GMP areas)														
CIL														
VVM														
Validation														
Verification														
Monitoring														
Regulatory Compliance														
FDA, USDA, GFSI, etc														
Pest Control														
Sanitary Design														
Essential Capital														
Chemical Control														
Chemical Hazard Safety														
Chemical Usage and Inventory														
Sanitation Optimization/SOAP														
War on Water														
Supplier Relationships														
Chemicals and Sanitation														
Sanitation Equipment Management														
Food Safety Budget														
Operational Food Safety Budget														
Food Safety Essential Capital														

Key	
P	Planning/Approval
Ex	Executing
Ed	Education
M	Maintaining/Updating/Auditing/Reporting

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Food Safety and Sanitary Design Early Management Checklist								
Proces	Action	R&D Involvement	Accountabilit	Hazard	Completed By	Completion Da	Resources	
1	Initiation	Inform SCOPE of project	triggered by PSA	FSQ	All		go/SCOPE	
2	Initiation	All GMI FSQ, Engineering, and Sanitation leads complete Sanitary Design Principles course		FSQ	All		Sanitary Design Principles Training on go/Learn One Voice - Hygienic Equipment Low Moisture Food	
3	Initiation	Host a Food Safety and Sanitary Design kick off meeting		FSQ	All		Food Safety and Sanitary Design Kick-Off Meeting Agenda	
4	Initiation	Request and budget for sanitation related equipment (e.g. new foamers, hoses, air drops, COP tank, hand sinks, etc.)		FSQ	All		Ecolab, Goodway Industry	
5	Initiation	Inform chemical supplier about project scope and update supplier's annual objectives with needs from vendor		FSQ	Chemical		Chemical Recommendation Process	
6	Initiation	Inform pest control supplier about project scope and update supplier's annual objectives with needs from vendor		FSQ	Pest		3rd party pest control provider	
7	Initiation	Determine the appropriate cleaning method (e.g. dry, wet, controlled, etc.) for all equipment	What kind of cleaning method is being targeted? What kind of sanitation does the product	FSQ	Micro		Changeover Cleaning Decision Tool	
8	Initiation	Food safety is included in project budgeting (e.g. increased swabbing, increased cleaning, increased supplies, passivation, etc.)		Engineering	All			
9	Initiation	Perform certification and food safety risk assessment on used equipment	Any equipment coming from JFB or another facility	FSQ	Regulatory		add link to transferred equip	
10	Planning	Identify potential hazards on new system and design plans to control them	What hazards are inherent to the ingredients? Equipment?	FSQ	All		basic food safety training link, risk assessment	
11	Planning	Design for food safety and sanitation utilities needs (hot water, steam, high pressure water, vacuum system, etc.)		Engineering	All		Chemical Recommendation Process	

What are the hazards / risks?

FSMA Hazards

- Physical
 - Intrinsic: seeds, bones, shells, over processed product
 - Extrinsic: wood, plastic, metal, glass, stones, cloth, packaging
 - Compatibility – ingredient or chemical interactions (deterioration)
 - Equipment parts, coatings
- Biological
 - Pathogens
 - Spoilage organisms
 - Pests
- Chemical
 - Allergens, gluten, pesticides
 - Unapproved additives such as sanitizers, lubricants
 - Materials of construction, odors



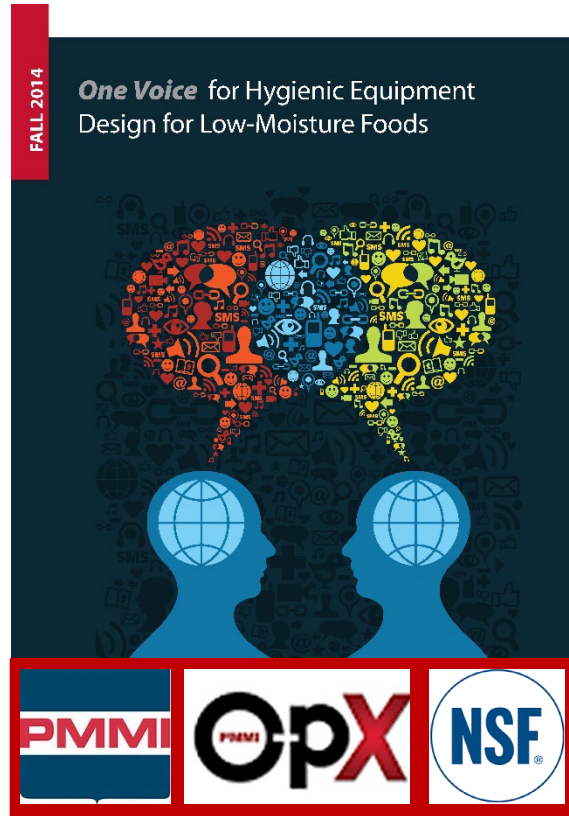
Risks

- Compliance to customer and corporate requirements
- Claims: “free of ...”, Kosher, Organic, Halal

What are the key success criteria for delivering a project that has good sanitary design?



OpX: One Voice



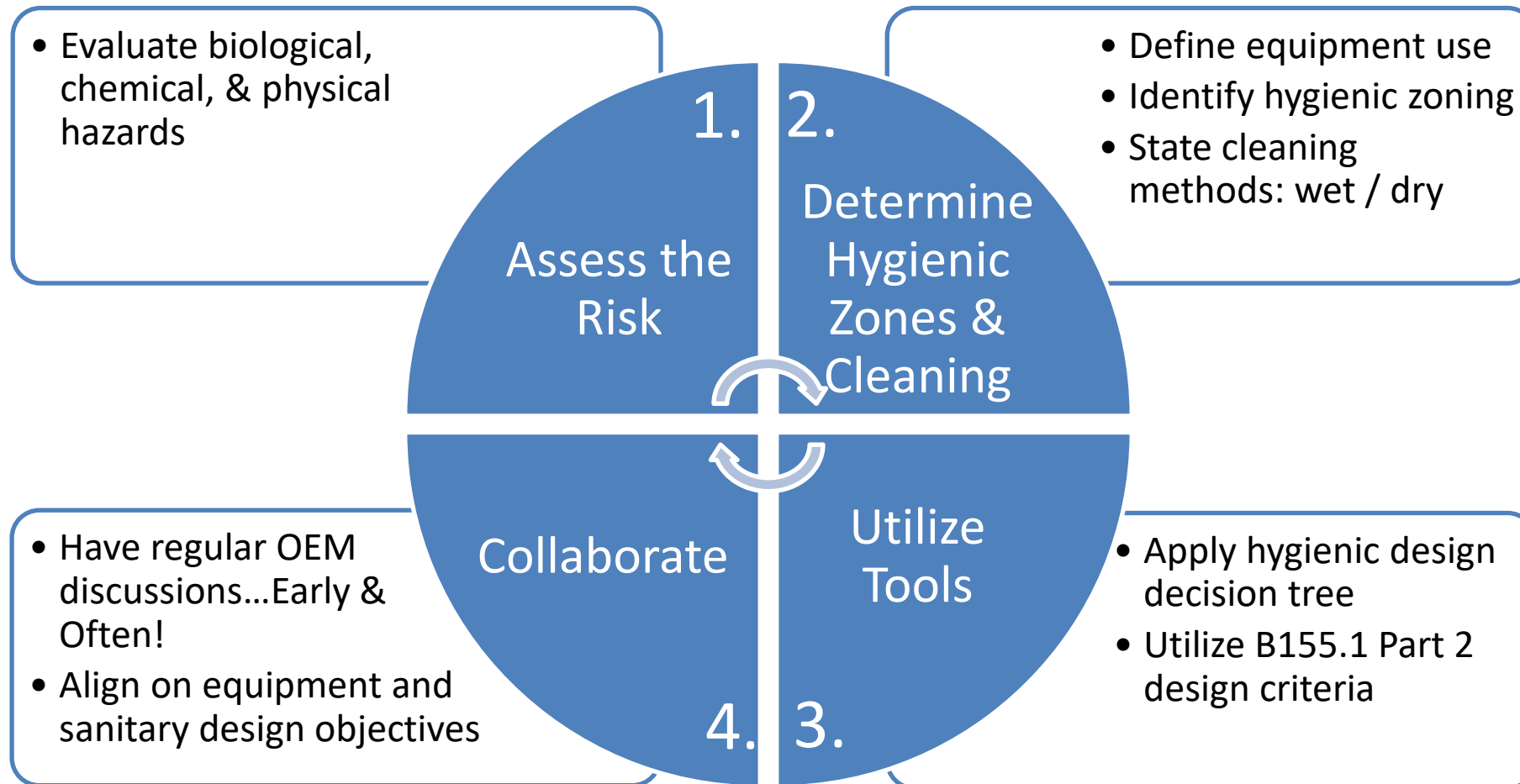
Utilizing existing industry standards, guidelines and information to define a process that will allow consumer packaged goods (CPGs) and original equipment manufacturers (OEMs) to reach **consensus of design criteria for hygienic equipment for low-moisture food manufacturing.**

Collaboration of CPGs & OEMs resulting in ONE VOICE© for the industry.

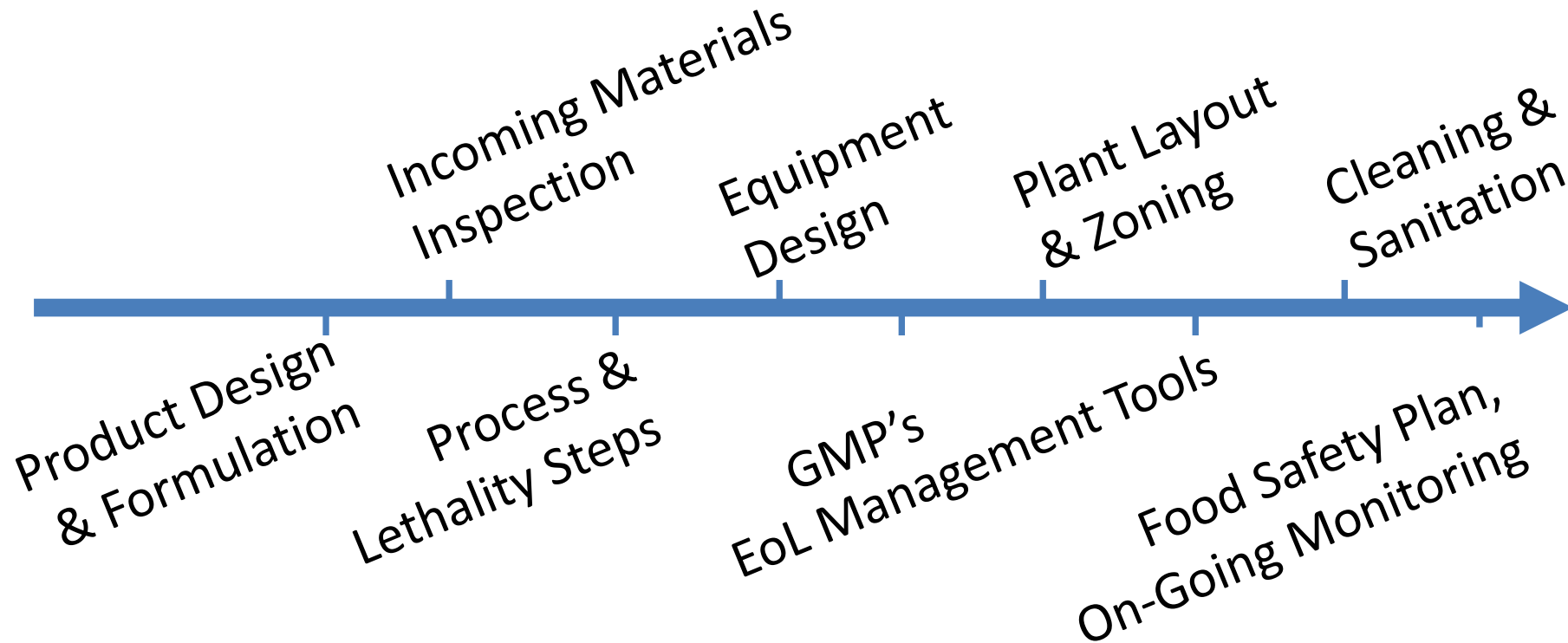
<https://www.opxleadershipnetwork.org/>

OpX: One Voice

Joint Collaborative Process (JCP)

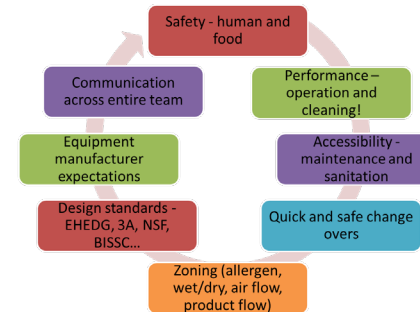


What are some food safety control methods?



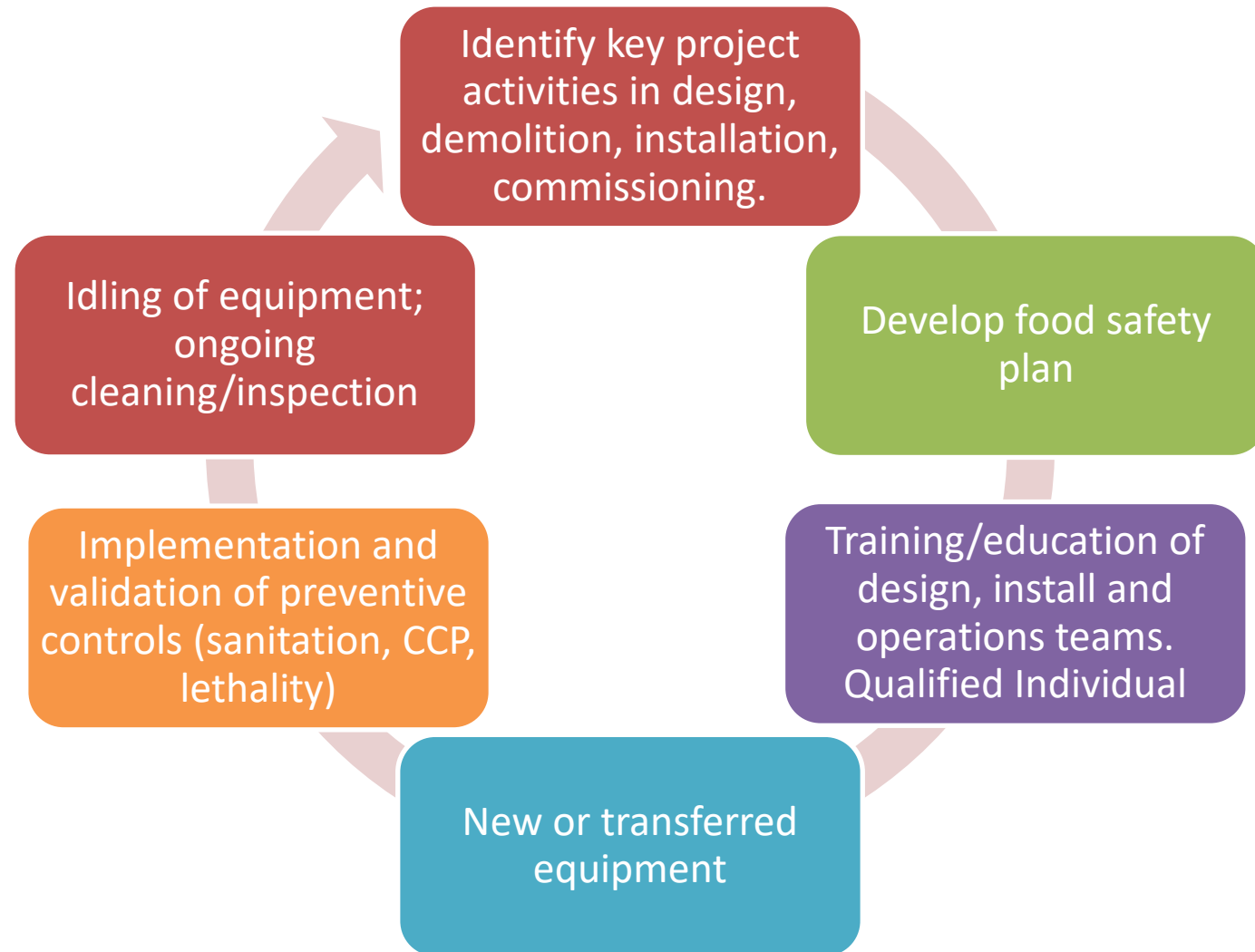
Who are the key stakeholders? What do they need?

- R&D, Marketing
- Engineering
- Quality
- Operators, Maintenance
- Sanitation
- Safety
- Raw Material Supplier
- Chemical Supplier
- Equipment Manufacturer
- Installer / Contractor



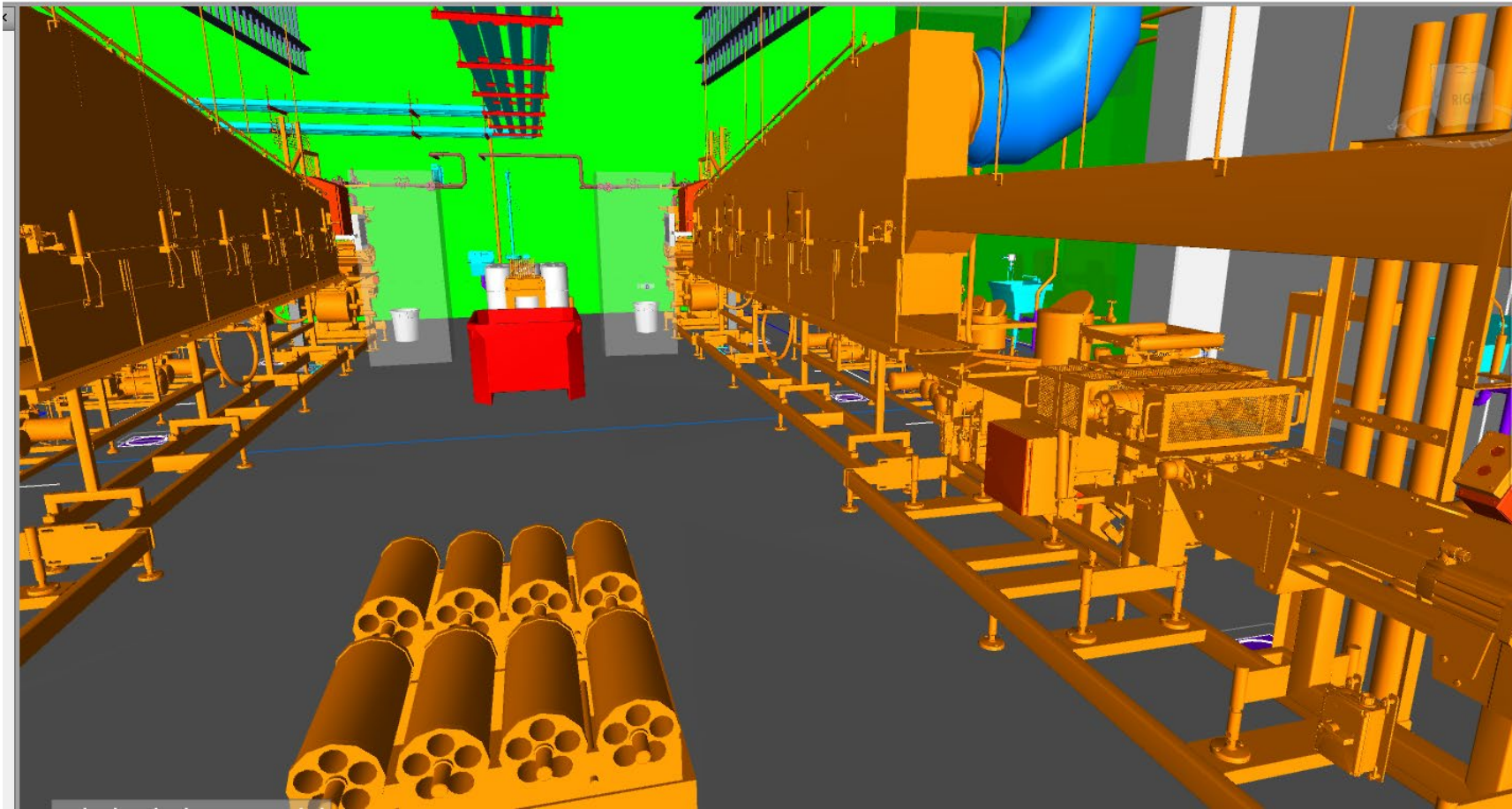
- Educate/communicate success criteria & food safety focus
- Regular design reviews
- Acceptance test criteria
- Execution plan
- Start-up and food safety plan

What are some key tasks related to the project?





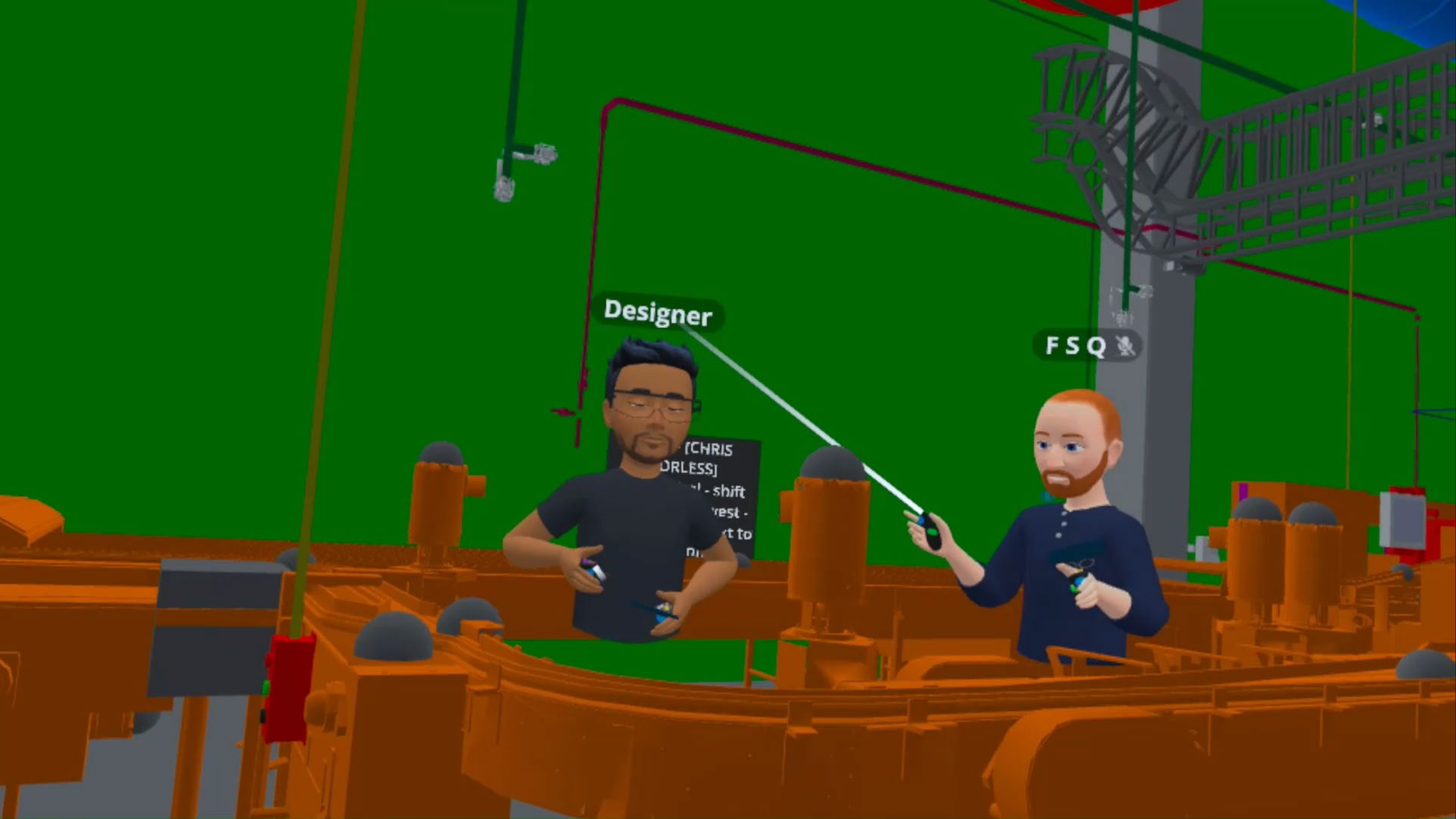
VR – Virtual Reality



Designer

FSQ

(CHRIS
ORLESS)
- shift
- rest -
- t to
- n

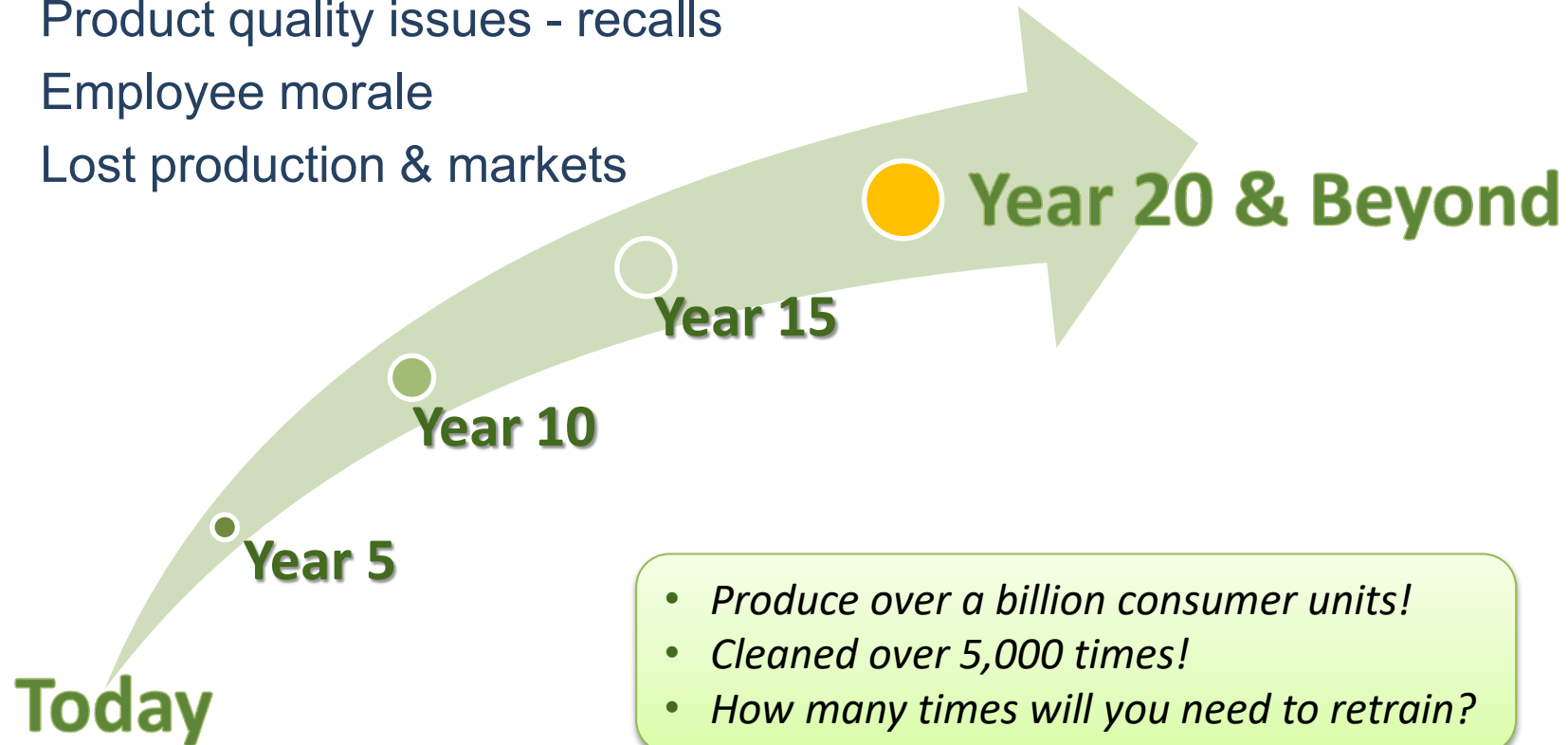


What budget considerations need to be made?

- Cleaning - CIP or semi automated?
- Utility needs (hot water, steam, HVAC, cold storage, etc)
- Testing (micro, quality verification, allergen, etc)
- Food safety controls/methods (specialized equipment)
 - X-ray
 - Metal detector
 - Bar code scanner
 - Vision
 - Lab equipment

Consequences of Poor Sanitary Design

- Sanitation inefficiencies
- Product quality issues - recalls
- Employee morale
- Lost production & markets



Plant Sanitary Design Team Suggested Practices

- Every plant should have a team to act as the SD Gate Keeper
- The plant team should be chartered by the plant manager.
 - *Plant sanitary design teams are a policy requirement in some organizations.*
 - *The plant sanitation lead is the logical lead of the team.*
- Standing meeting / agenda
 - New capital projects
 - Relocation/refurbishment / optimization of existing assets
 - Troubleshooting support; line and environmental monitoring
 - Opportunities for improvement of the sanitary design culture

Plant Sanitary Design Team

On Going Activities

- Review product formulation projects
 - Changes in density, viscosity, inclusions, process temperatures can affect equipment and sanitation requirements
- Review productivity projects
 - Changes in product flow, worker traffic, packaging material can lead to cross contamination
- Review maintenance practices
 - Changes in maintenance frequencies, repair parts and materials
- Regularly audit equipment and practices to original or approved condition.

Designing Layouts to be Cleanable / Installing in a Sanitary Manner

Designing Layouts to be Cleanable = Appropriate amounts of space for

- Cleaning
- Inspection
- Maintenance

Installing = Actual Construction done in a sanitary manner

- Training
- Containment
- Control

Incoming / Outgoing Items

- All parts & equipment:
 - Clean, tag, sanitize, inspect, cover

Limited Access for Sanitation



Stop contamination in its tracks

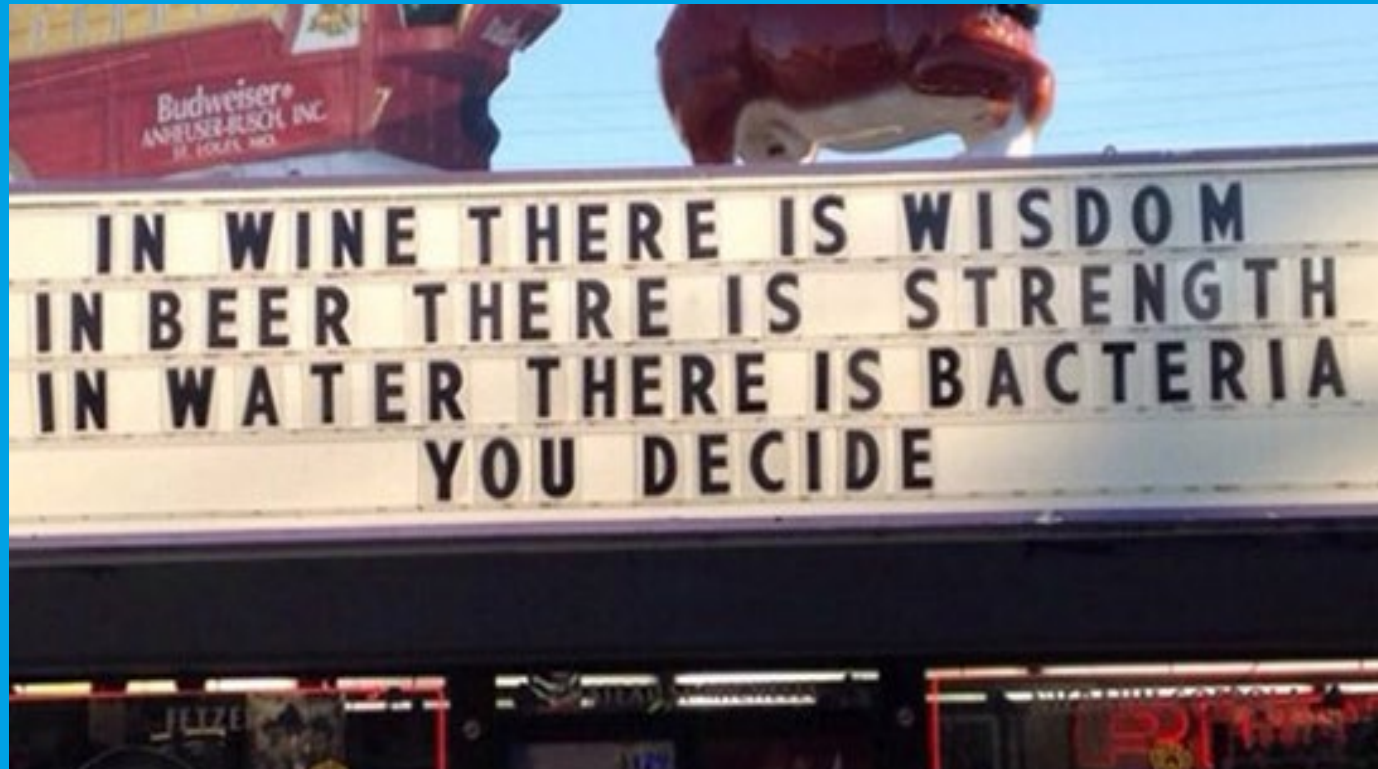


Portable foamer, sticky mats; Quat crystals, extraction fans w/ HEPA inlet, new PPE each time, shrink wrap anything being removed, inspect often, controlled access ...



Post Construction Cleanup

- Before containment comes down
 - Initial cleaning/sanitizing
- Then before startup:
 - Final cleaning/sanitizing
 - Update Sanitation Records – MSS, SSOP, etc.
 - Inspect the system
 - Document the final inspection and approval



Case Study #3

My friend showed me how they fixed the water stain on the ceiling in their office.





**TREAT WATER LIKE
GLASS**

From a microbiological standpoint...

Unnecessary water is like gasoline for a fire.

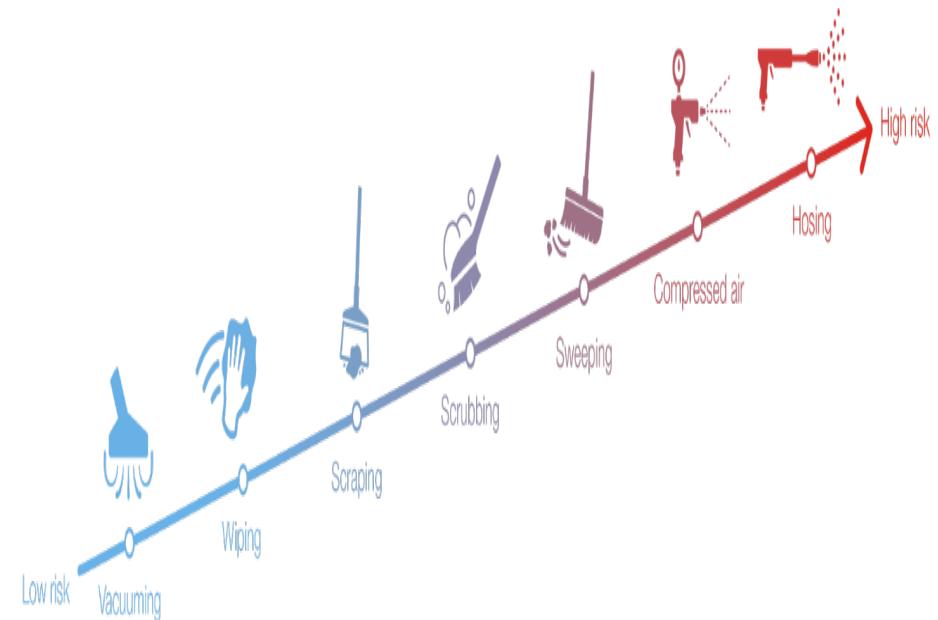
Water should be by exception only.

Why is the WOW (War On Water) important?



- Leads to significant microbiological growth in our product environments
 - Pathogens – *Listeria*, *Salmonella*, etc.
 - Spoilage – Yeast, Mold, etc.
- Human safety hazard
 - Chemical usage
 - Slip hazards
- Equipment reliability and function
 - Electrical issues
- Regulatory focus
- Environmental and sustainability goals

- Contamination risk
 - Chemical
 - Physical
 - Microbiological
 - Regulatory



Control Water/Moisture



Necessary Water

- Process water
- **Wet washing**

Minimize/Manage
Eliminate/Reduce

Unnecessary Water

- Condensation
- Leaks
 - Ingress
 - Internal
- Drains (leak or back-up)

Fix Root Cause
Fix Root Cause
Fix Root Cause
Fix Root Cause
Fix Root Cause

Action plan

- Find it
- Fix it
- Prevent it



- Water Audit
 - Uncontrolled water
 - Condensation
 - Wet Cleaning
 - Leaks
 - Drips
 - Pooling
 - Ice/frost
 - steam



- Corrective action Plan
 - Guidance documents
 - Insulate Surfaces
 - Heat Surfaces
 - Dry Air
 - Dry Surfaces
 - Seal Spaces
 - Ventilate
 - Pressurize Spaces
 - Isolate
 - Maintain as Sanitary



- Early Management
 - Discuss uncontrolled water risk early and often
- Engineering focus > Design it out
 - Facility and system
 - HVAC
 - Plumping



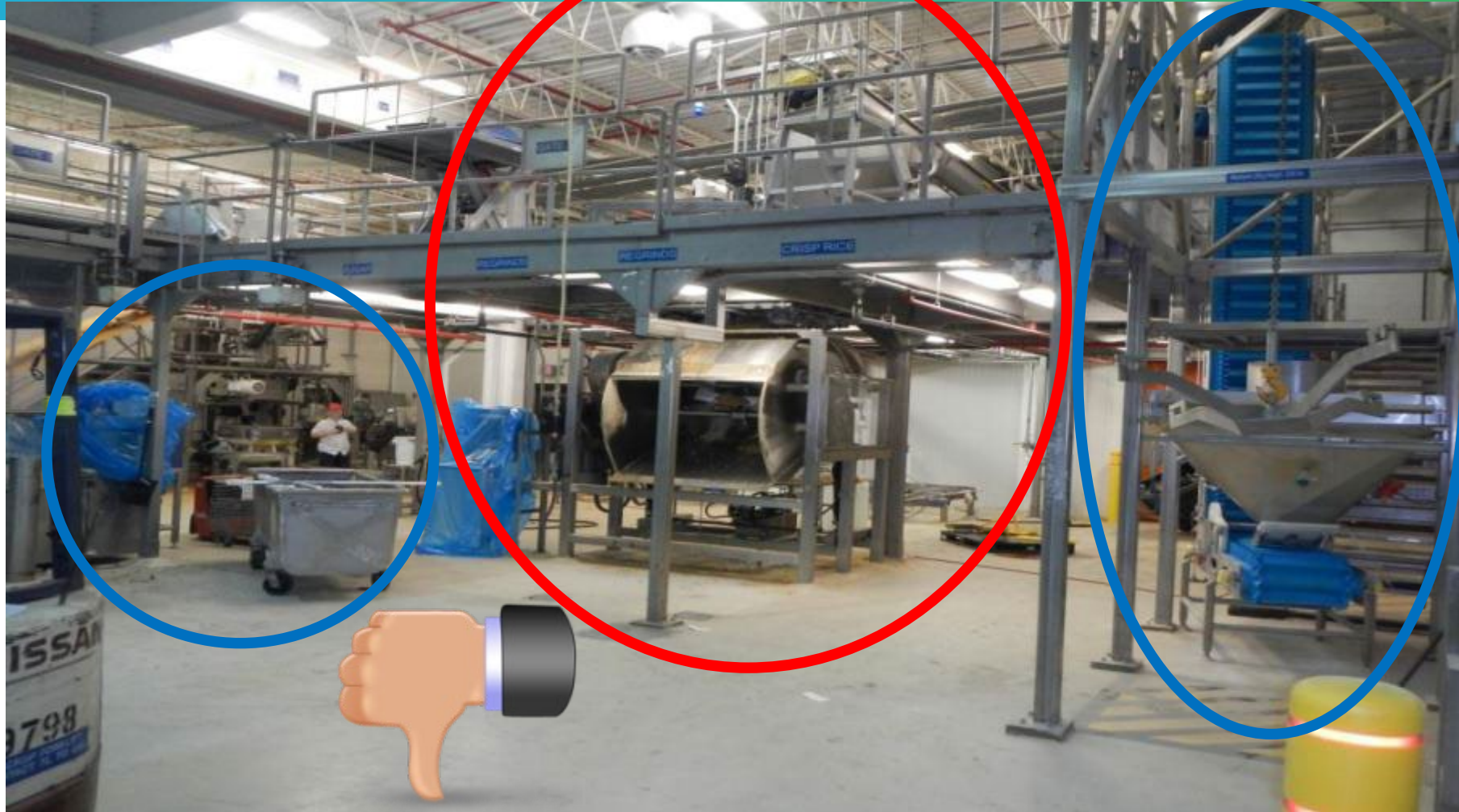
Equipment & Plant Design
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Granola Bar Case Study

Presented by:
Karl Thorson, General Mills

Sanitary design is integral to food safety.

Wet/Dry Zoning Conflict



Wet/Dry Zoning Conflict



Baked Product Cooler Wet/Dry Zoning Conflict



Dry Design + Wet Clean = Micro Risk



Principle 1

Early Management Key Takeaways

1. Clearly **identify the risks** to be minimized/eliminated.
2. Develop **success criteria** with the cross functional team.
 - a. Compliance to policy, standards, regulations
 - b. Adherence to QCO (quick change over) principles
3. Agree to all **food safety control methods** including cleaning method(s).
 - a. Control of moisture plans developed
 - b. Hygienic zoning for allergens, moisture, air flow, open product, material and employee flow
 - c. Preventive Controls [Sanitation, Allergen, CCP (critical control point)]
4. Develop a plan for **ongoing food safety** communication and training.
5. Utilize GMA **checklists**, One Voice, design standards, SMEs (both internal and external).
6. Plan for **key events & budget** for food safety activities (testing, cleaning, etc.)
 - a. Focus on life cycle costing vs. low cost capital option
7. **Debrief** with the goal of continuous improvement & institutionalizing fixes.

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