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CARVER+Shock

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CARVER

+ shock

Mission-Driven Laboratory

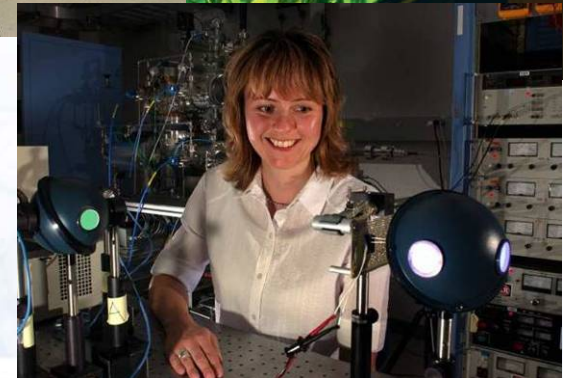
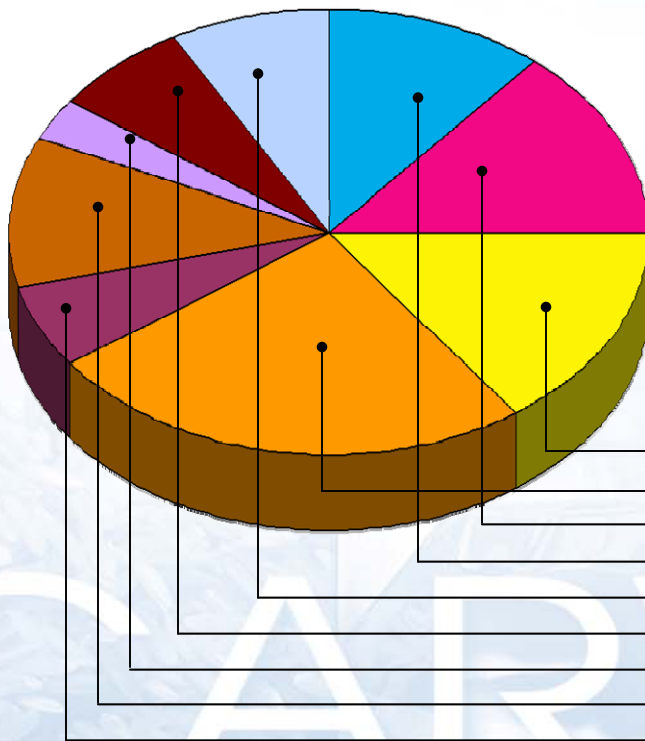
We serve many agencies of the US Government with:

- Design and development: nonnuclear portions of US nuclear weapons
- Production: advanced components
- Safety, security, use control
- Treaty verification, nonproliferation, counterproliferation
- Advanced military technologies
- Energy and environment
- Homeland security, countering weapons of mass destruction



Highly Skilled Workforce

- More than 8,600 full-time employees
- More than 1,500 PhDs and 2,700 MS/MAs
- 2,200 on-site contractors
- \$2.33 billion FY06 total budget



- Mechanical Engineering - 16%
- Electrical Engineering - 22%
- Other Engineering - 15%
- Other Science - 6%
- Physics - 6%
- Chemistry - 6%
- Math - 2%
- Computing - 16%
- Other Fields - 6%

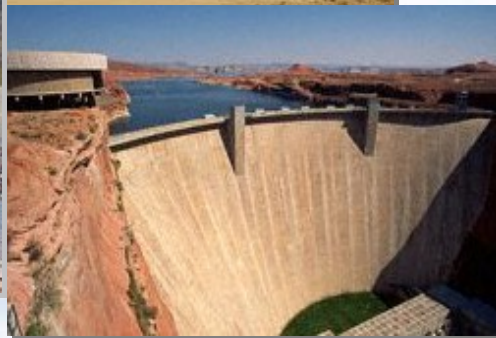
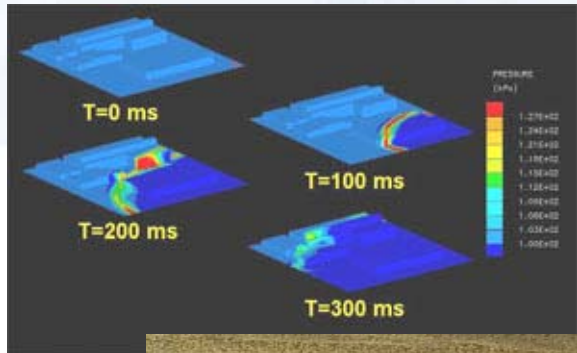
Energy, Resources, and Nonproliferation

Energy, Water, and Security Enabled by Science & Technology

- Secure energy supplies for national security
- Clean, abundant and affordable energy
- Water research
- Infrastructure protection



Risk Management and Critical Infrastructure Protection Program



- Physical security solutions for DOE and other federal agencies
- Critical infrastructure protection
- Systems analysis for risk management

CARVER+Shock Defined

C – Criticality

Public health and economic impacts

A – Accessibility

Ability of an attacker to reach a target

R – Recognizability

Ease of identifying a target

V – Vulnerability

Analyzes the potential success of an attack

E – Effect

Direct loss of production

R – Recuperability

Ability of the system to recover

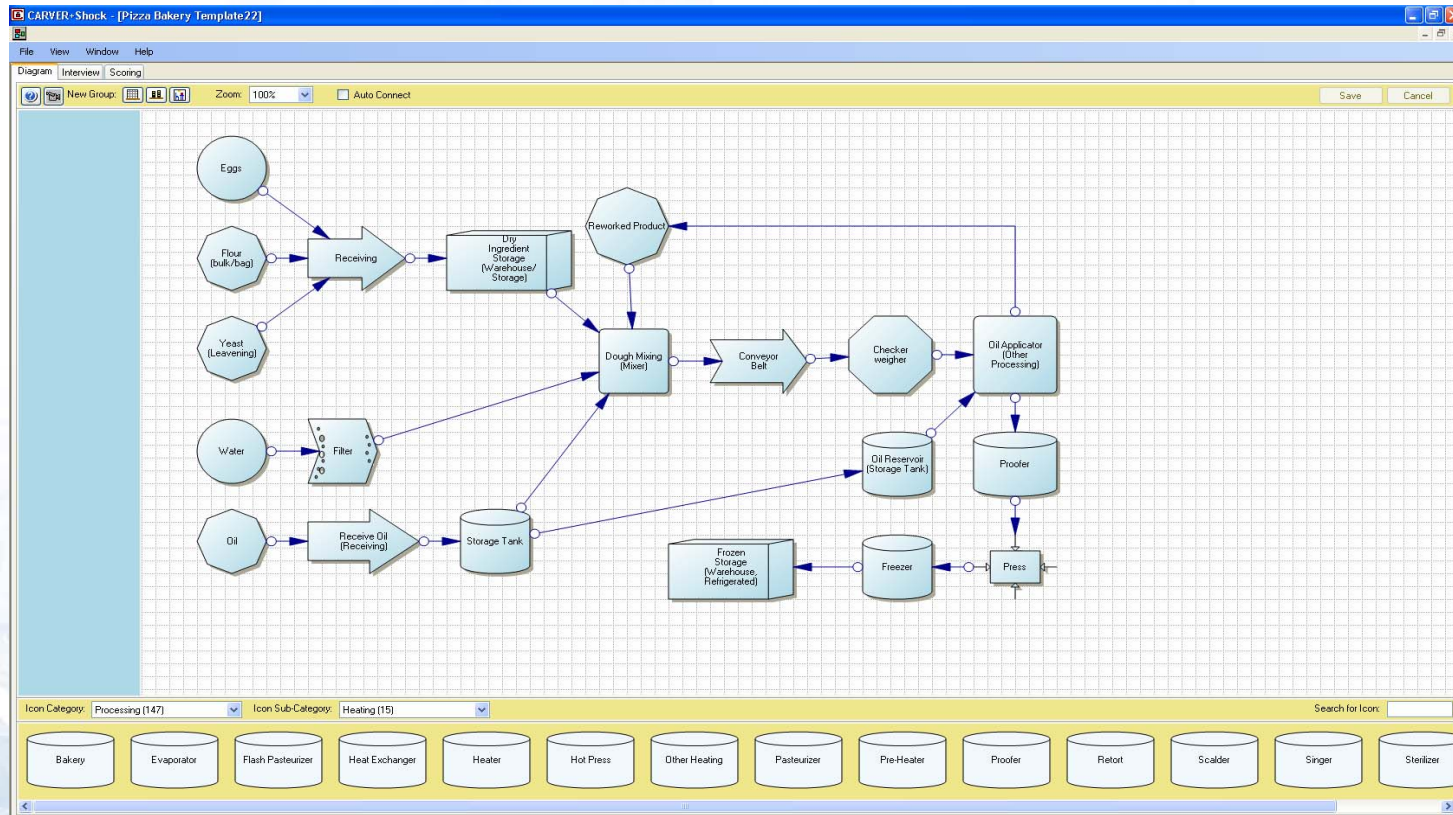
Shock – Combined health, economic and psychological effects

CARVER + shock

CARVER+Shock Functions

- Three main steps

1. Develop a process flow diagram



CARVER+Shock Functions

- Three main steps

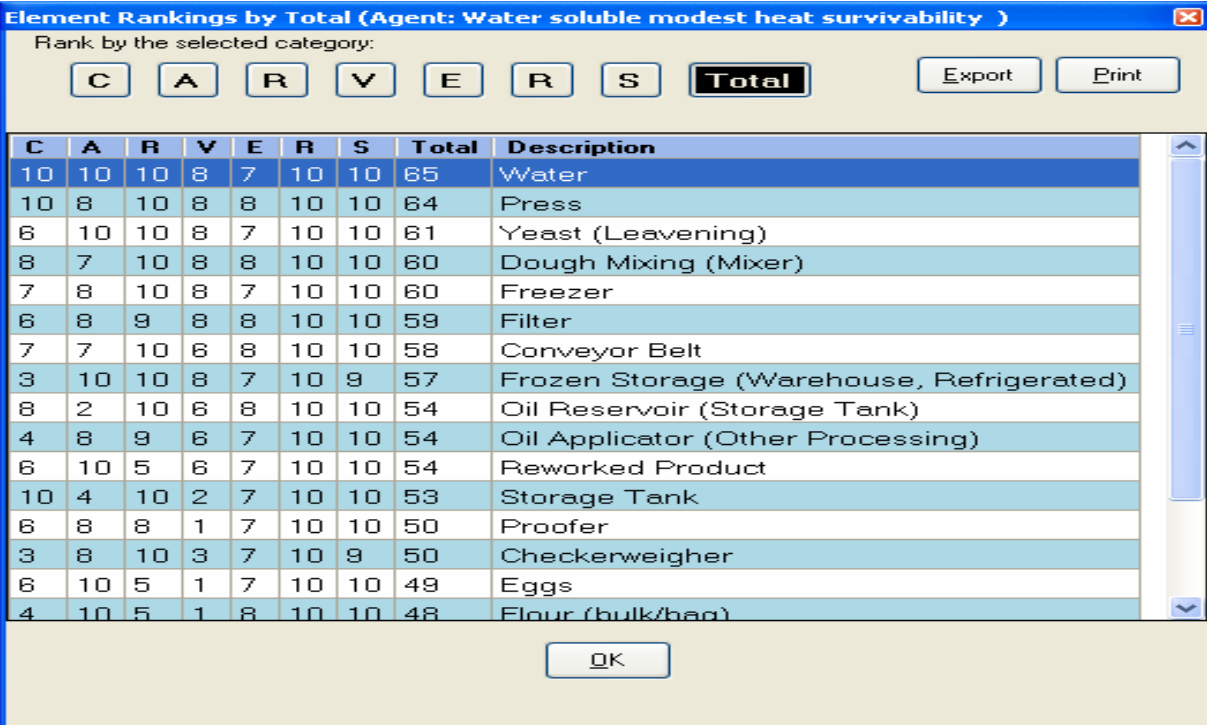
1. Develop a process flow diagram

2. Interview questions

1. Are vehicles allowed to enter the fenced area?
2. Do you control all access points through fixed guards, limited-rate gates (e.g. revolving gates), or detection-activated surveillance?
3. How do you control access to the building? (check all that apply)
4. What kinds of security do you have inside the building during working hours? (check all that apply)

CARVER+Shock Functions

- Three main steps
 1. Develop a process flow diagram
 2. Interview questions
 3. Scoring



Element Rankings by Total (Agent: Water soluble modest heat survivability)

Rank by the selected category:

C	A	R	V	E	R	S	Total	Description
10	10	10	8	7	10	10	65	Water
10	8	10	8	8	10	10	64	Press
6	10	10	8	7	10	10	61	Yeast (Leavening)
8	7	10	8	8	10	10	60	Dough Mixing (Mixer)
7	8	10	8	7	10	10	60	Freezer
6	8	9	8	8	10	10	59	Filter
7	7	10	6	8	10	10	58	Conveyor Belt
3	10	10	8	7	10	9	57	Frozen Storage (Warehouse, Refrigerated)
8	2	10	6	8	10	10	54	Oil Reservoir (Storage Tank)
4	8	9	6	7	10	10	54	Oil Applicator (Other Processing)
6	10	5	6	7	10	10	54	Reworked Product
10	4	10	2	7	10	10	53	Storage Tank
6	8	8	1	7	10	10	50	Proofer
3	8	10	3	7	10	9	50	Checkerweigher
6	10	5	1	7	10	10	49	Eggs
4	10	5	1	8	10	10	48	Flour (bulk/bag)

Objectives

- Reduce time and effort required to meet food defense goals
- Prepare food defense software for all food processors
- Bring established security principles to the food industry

Features

- Identify protection techniques from 5 major chemical/biological agent categories
- User friendly and universally understood
- Based on CARVER military targeting methodology
- Microsoft Windows 98 and newer Microsoft Windows operating systems

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Operational Features

- Potentially over 250 questions
- Over 290 pre-programmed processing steps (icons)
- Ability to define new processing steps
- 14 pre-programmed processes
- Relative scoring between processing steps
- Mitigation text embedded

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Agents

	Max Temperature Degree C	Solubility	Relative Toxicity
Agent 1	80	Water	High
Agent 2	100	Water & oil	Medium
Agent 3	100	Oil	High
Agent 4	All temps	Water	Low
Agent 5	All temps	Water	Very high

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User Session (Mitigation)

Score Detail for Agent: Water soluble modest heat survivability

Storage Tank

The following shows the detailed score for the process (click on the bar to get the mitigation measures):

Category	Score
C	10
A	4
R	10
V	2
E	7
R	10
S	10

The following shows the score detail for each category (max per category = 10):

- Criticality Score = 10**
- Accessibility Score = 4**
- Recognizability Score = 10**
- Vulnerability Score = 2**
- Effect Score = 7**
- Recuperability Score = 10**
- Shock Score = 10**

TOTAL SCORE = 53 of 70

Mitigation Measures - Criticality

A node is critical when introduction of threat agents into food at this location would have significant health or economic impact. Other factors that significantly affect Criticality include product traceability and recall policies and procedures.

* Product cannot be traced to distribution centers and retail outlets. Consider establishing traceability procedures such as matching product code dating with destinations. Accurate traceability will decrease the potential scope and effect of a contamination event and decrease product recall time.

* Consider establishing product codes. Coding should include a process to match codes with distributions pathways.

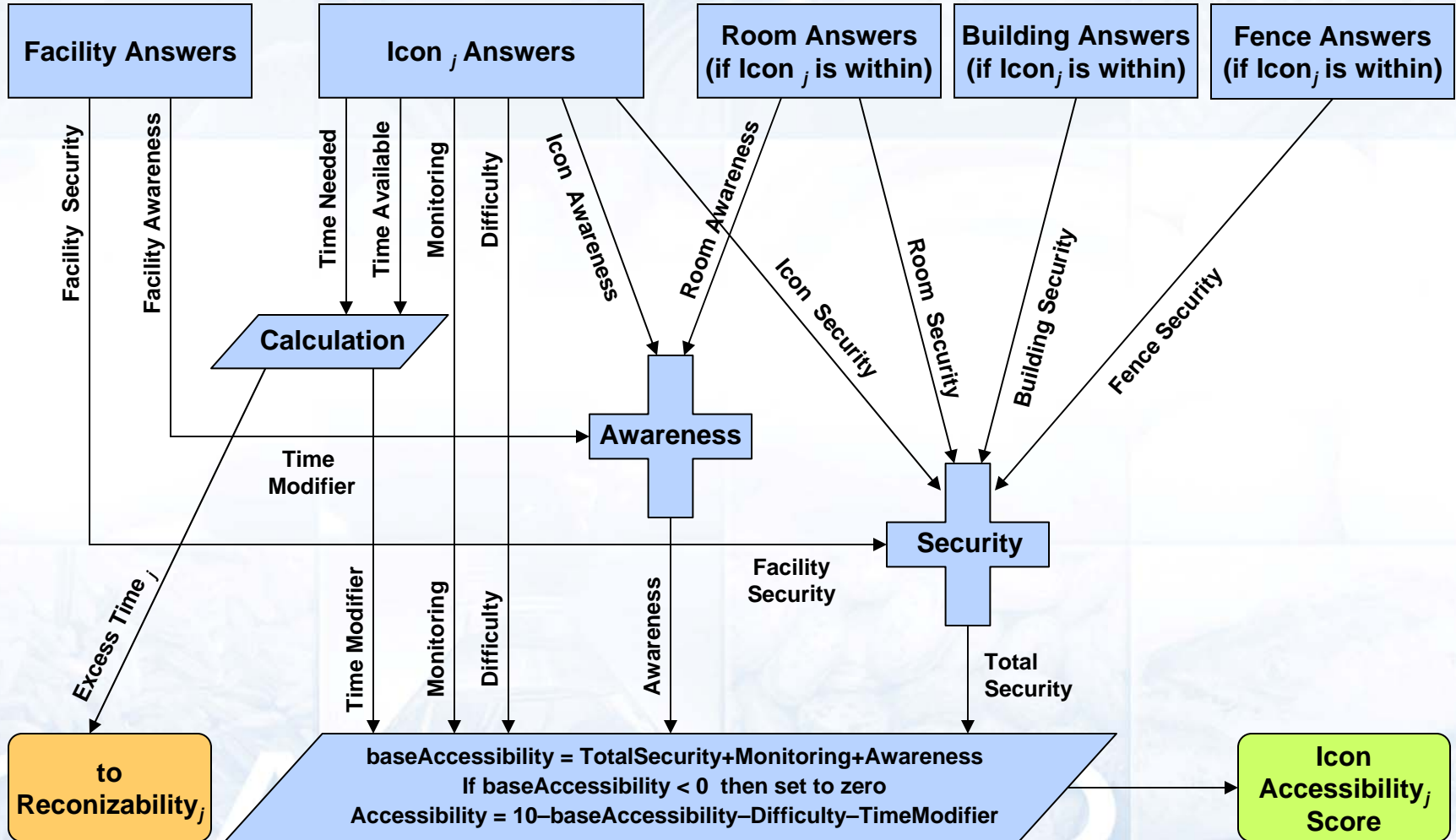
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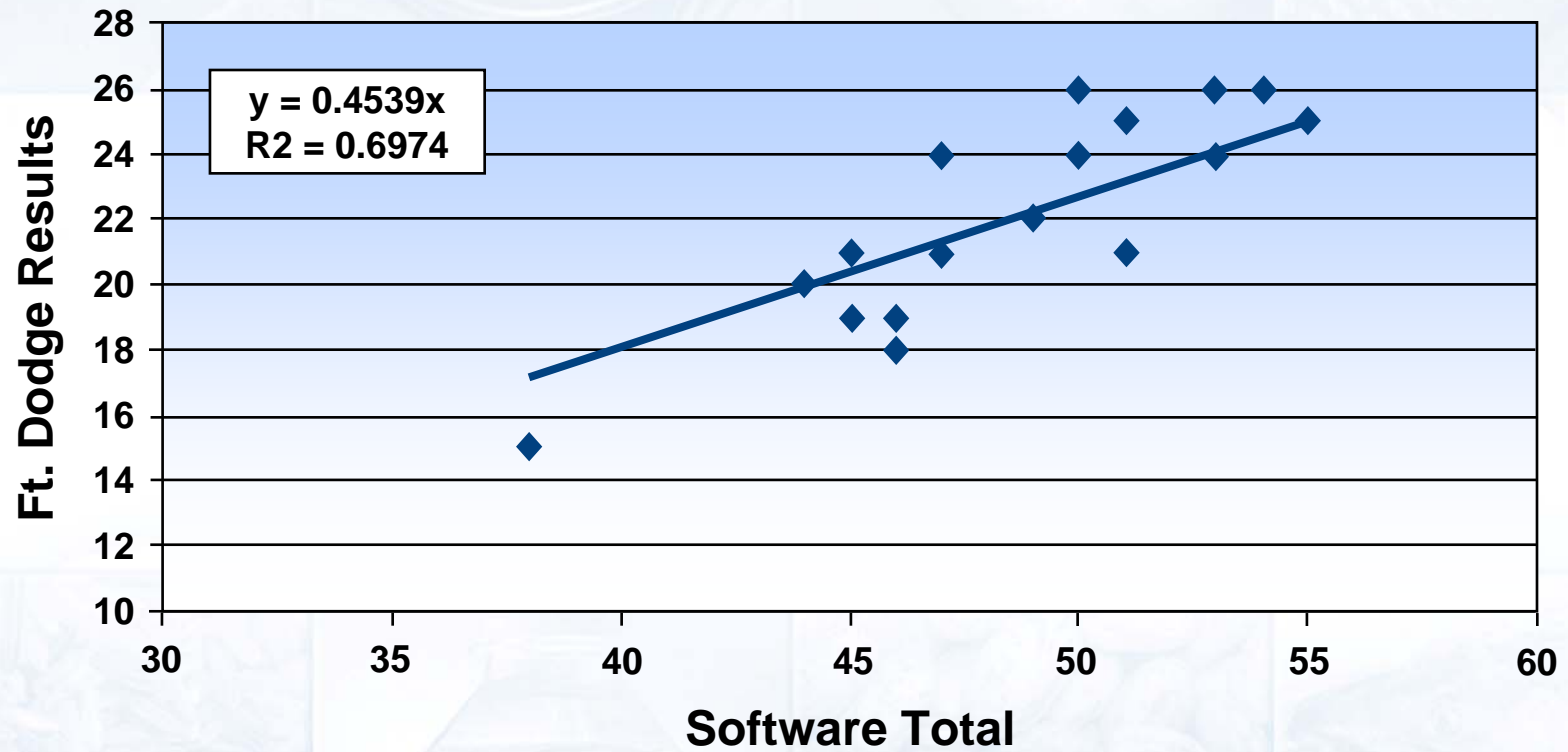
Algorithm Structure

(Accessibility only as example)



Feed Mill Comparison

(Software vs. Live Session)



Issues and Needs

- Testing and calibration must continue
- Food processing jargon and better equipment understanding
- User uncertainty and chief concerns
- Conservative assumptions must be confirmed
- User session improvements necessary for continued use

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Conclusions

- Value to food industry in time/labor/product savings
- Consumer value in safer food supply
- Improved homeland security

Next Steps

- V2.0 will include retail and pre-harvest modules
- Calibration and validation will be ongoing
- Updates will be well communicated and distributed

WHAT CAN **YOU** DO
TO PROTECT YOUR FOOD BUSINESS
FROM INTENTIONAL CONTAMINATION



**PREPARE
WITH THE
FREE**

NEW

WWW.CFSAN.FDA.GOV/FOODDEFENSE



**CARVER
+
SHOCK
SOFTWARE**

