

Food Defense Software Design & Case Study

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CARVER+Shock

METHODOLOGY

- Considers factors that affect the desirability of a target:
- Criticality** – Public health and economic impacts
  - Accessibility** – Physical access to the target
  - Recognizability** – Ease of identifying a target
  - Vulnerability** – Ease of accomplishing the attack
  - Effect** – Amount of direct loss from an attack
  - Recuperability** – Ability of the system to recover
  - Shock** – Psychological effects of an attack

- Criticality:**A target is critical when introduction of threat agents into food/system at this location would have significant health or economic impact.

One must ask: Does it achieve the goals of the terrorist profile?

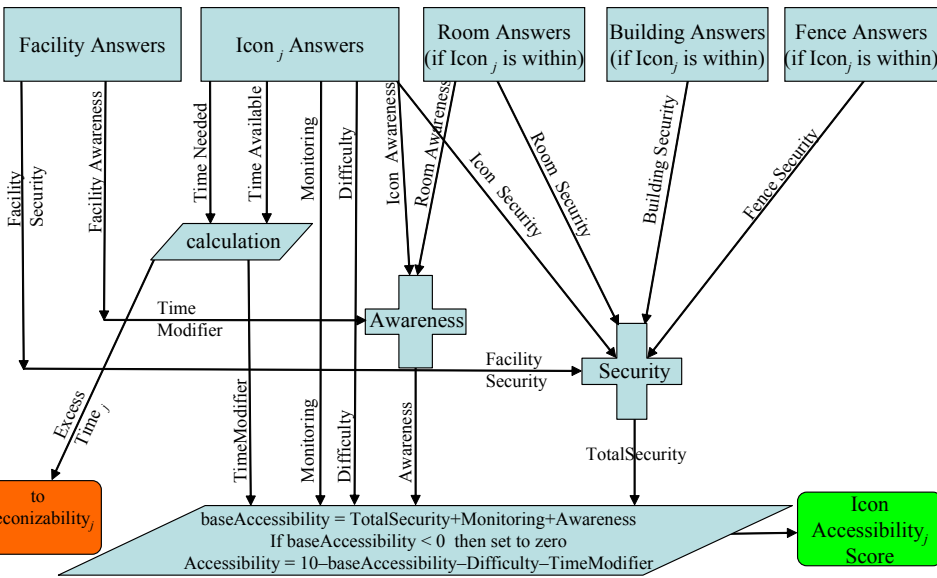
CRITICALITY SCALE

CRITERIA	SCALE
Loss of <b>over 10,000</b> lives OR loss of <b>more than \$100 billion</b>	9 – 10
Loss of <b>1,000 – 10,000</b> lives OR loss of <b>\$10 billion - \$100 billion</b>	7 – 8
Loss of <b>100 – 1,000</b> lives OR loss of <b>\$1 - \$10 billion</b>	5 – 6
Loss of <b>less than 100</b> lives OR loss of <b>less than \$1 billion</b>	3 – 4
<b>No loss of life</b> OR loss of <b>less than \$100 million</b>	1 – 2

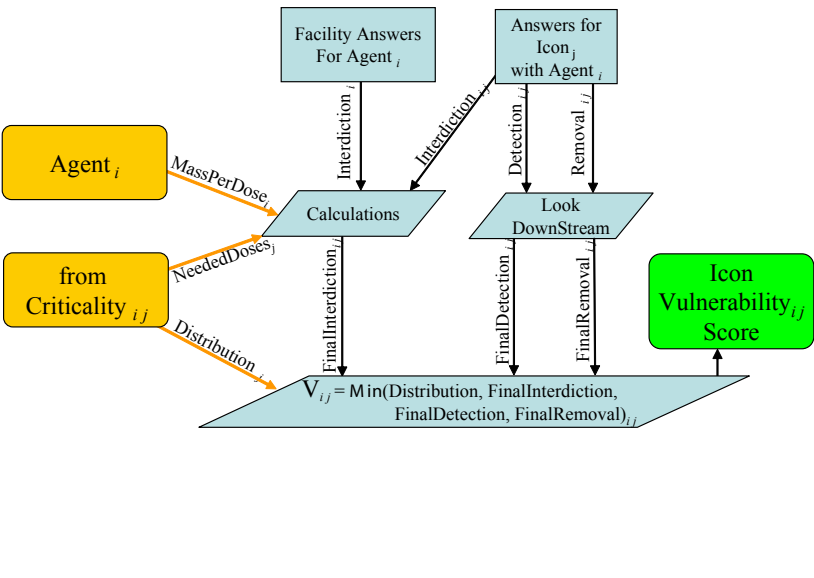
ACCESSIBILITY SCALE

CRITERIA	SCALE
<b>Easily Accessible</b> (e.g., target is outside building and no perimeter fence). Limited physical or human barriers or observation. Attacker has relatively unlimited access to the target. Attack can be carried out using medium or large volumes of contaminant without undue concern of detection. Multiple sources of information concerning the facility and the target are easily available.	9 – 10
<b>Accessible</b> (e.g., target is inside building, but in unsecured part of facility). Human observation and physical barriers limited. Attacker has access to the target for an hour or less. Attack can be carried out with moderate to large volumes of contaminant, but requires the use of stealth. Only limited specific information is available on the facility and the target	7 – 8
<b>Partially Accessible</b> (e.g. inside building, but in a relatively unsecured, but busy, part of facility). Under constant possible human observation. Some physical barriers may be present. Contaminant must be disguised, and time limitations are significant. Only general, non-specific information is available on the facility and the target. .	5 – 6
<b>Hardly Accessible</b> (e.g., inside building in a secured part of facility). Human observation and physical barriers with an established means of detection. Access generally restricted to operators or authorized persons. Contaminant must be disguised and time limitations are extreme. Limited general information available on the facility and the target	3 – 4
<b>Not Accessible</b> Physical barriers, alarms, and human observation. Defined means of intervention in place. Attacker can access target for less than 5 minutes with all equipment carried in pockets. No useful publicly available information concerning the target.	1 – 2

ACCESSIBILITY SCORING

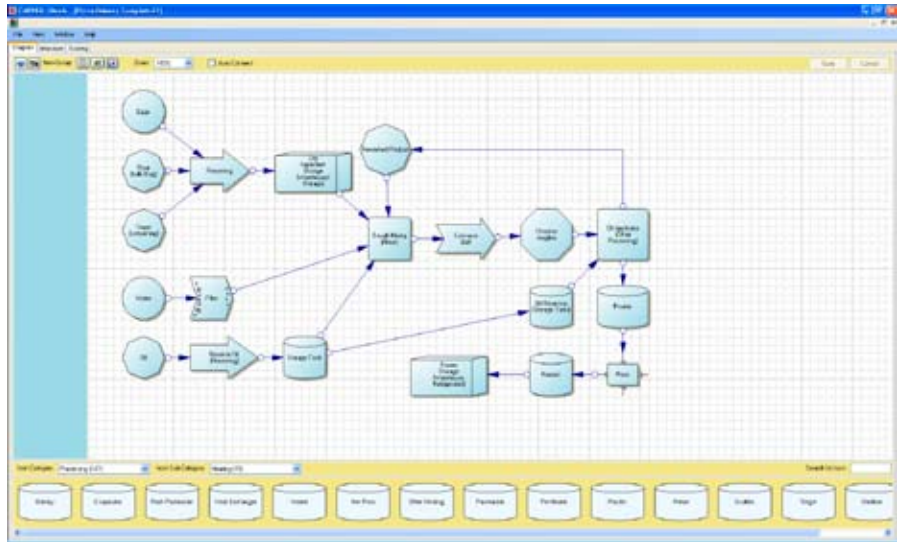


VULNERABILITY SCORING

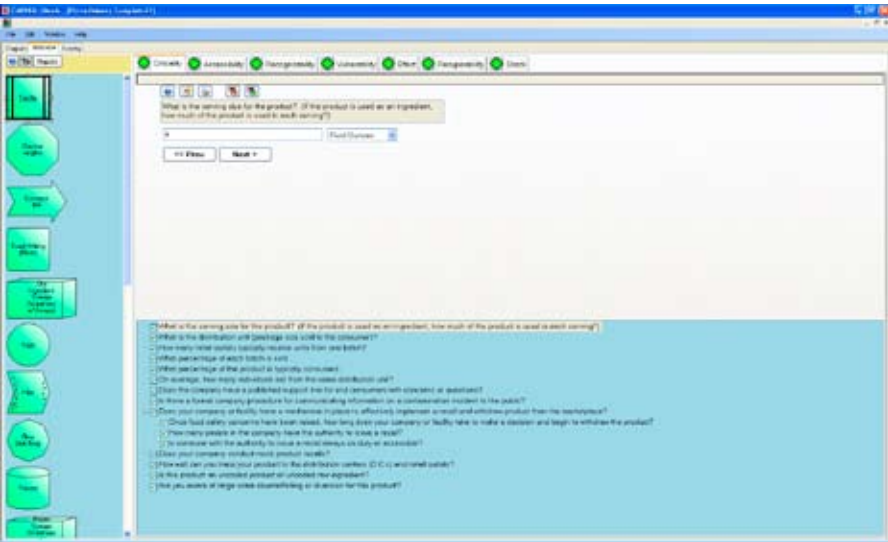


USER SESSION

STEP 1: DIAGRAM

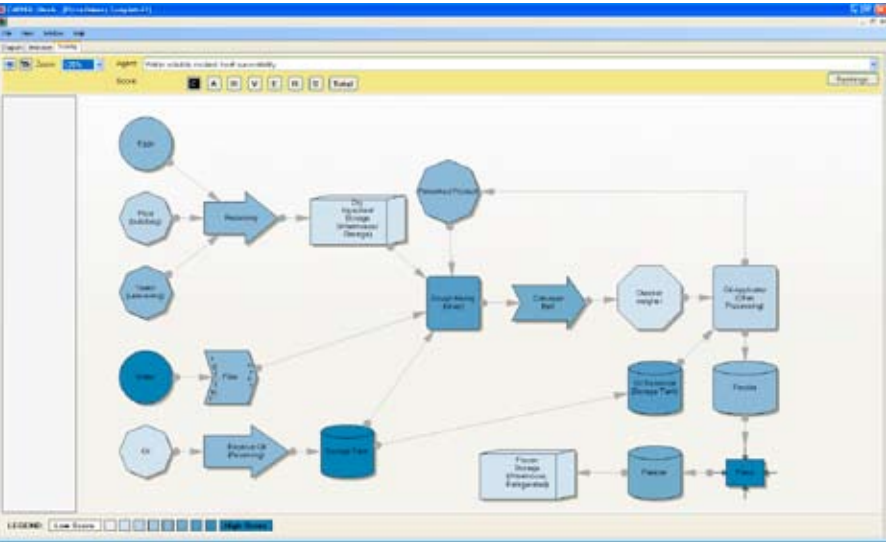


STEP 2: INTERVIEW



STEP 3: SCORING

CRITERIA	SCALE
Loss of <b>over 10,000</b> lives OR loss of <b>more than \$100 billion</b>	9 – 10
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STEP 4: MITIGATION RECOMMENDATIONS

CRITERIA	SCALE
Loss of <b>over 10,000</b> lives OR loss of <b>more than \$100 billion</b>	9 – 10
Loss of <b>1,000 – 10,000</b> lives OR loss of <b>\$10 billion - \$100 billion</b>	7 – 8
Loss of <b>100 – 1,000</b> lives OR loss of <b>\$1 - \$10 billion</b>	5 – 6
Loss of <b>less than 100</b> lives OR loss of <b>less than \$1 billion</b>	3 – 4
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AGENTS CONSIDERED

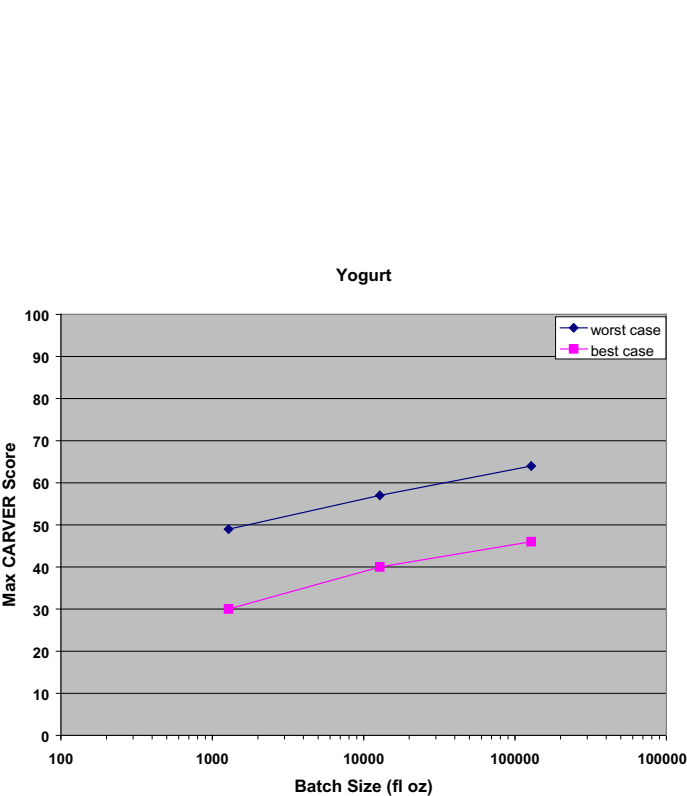
	Max Temperature Degree C	Solubility	Relative Toxicity
Agent 1	80	water	high
Agent 2	100	water & oil	medium
Agent 3	100	oil	high
Agent 4	all temps	water	low
Agent 5	all temps	water	very high

CALIBRATION

OPERATION SUMMARY OF THE BEST CASE & WORST CASE SECURITY PRACTICE SCENARIOS

Operation Attribute	Security Practice	best case	worst case
Perimeter fence		Yes	No
Security personnel utilized		Yes	No
Plans (defense, continuity of operation, product recall, health dept)		Yes	No
Training/drills (security, defense, recall)		Yes	No
Product Traceability		good	poor
Customer support line		Yes	No
Background & drug use checks		Yes	No
Uniforms required		Yes	No
Internet information published		No	Yes
Visitors allowed		No	Yes
Shipping schedule enforced		Yes	No
GPS tracking of shipments		Yes	No
Tamper resistant seals used		Yes	No
Driver ID required		Yes	No
Acceptance testing performed		Yes	No

CALIBRATION DETAILS



	Agent 1	Agent 2	Agent 4
Local Best	C A R V E R S Tot	C A R V E R S Tot	C A R V E R S Tot
Milk	5 4 2 1 2 5 5 24	5 4 2 1 2 6 5 25	5 4 2 1 2 4 5 23
Cooler/Chiller	5 1 2 1 2 5 5 22	5 1 2 8 2 6 5 30	5 1 2 4 2 4 5 24
Pasteurizer	5 1 2 1 2 4 5 20	5 1 2 8 2 6 5 28	5 1 2 4 2 4 5 24
Culture	6 5 4 1 2 4 6 28	6 5 4 1 2 5 6 29	6 5 4 1 2 4 6 28
Culturing Tank	5 1 2 8 2 4 5 28	5 1 2 8 2 5 5 28	5 1 2 6 2 4 5 25
Fruit	5 5 1 1 2 4 5 23	5 5 1 1 2 5 5 24	5 5 1 1 2 4 5 23
Bottler	5 1 2 3 2 4 5 22	5 1 2 3 2 5 5 24	5 1 2 1 2 4 5 20
Ref./Fzn Storage	5 2 1 3 2 5 5 24	5 2 1 3 2 6 5 25	5 2 1 1 2 4 5 21
Truck	5 1 1 1 2 5 5 20	5 1 1 1 2 6 5 21	5 1 1 1 2 4 5 19
Max Score	6 5 4 8 2 5 6 28	6 5 4 8 2 6 6 30	6 5 4 6 2 4 6 28
Regional Best	C A R V E R S Tot	C A R V E R S Tot	C A R V E R S Tot
Milk	7 2 2 1 3 10 7 32	7 2 2 1 3 10 7 32	7 2 2 1 3 10 7 32
Filter	7 1 2 1 3 10 7 32	7 1 2 1 3 10 7 40	7 1 2 4 3 10 7 35
Cooler/Chiller	7 1 2 1 3 10 7 32	7 1 2 1 3 10 7 40	7 1 2 4 3 10 7 35
Pasteurizer	7 1 2 1 3 10 7 32	7 1 2 1 3 10 7 40	7 1 2 4 3 10 7 35
Culture	7 1 2 1 3 10 7 40	7 1 2 1 3 10 7 40	7 1 2 4 3 10 7 35
Culturing Tank	7 1 2 1 3 10 7 30	7 1 1 1 3 10 7 30	7 1 1 1 3 10 7 30
Fruit	7 1 2 3 3 10 7 34	7 1 2 3 3 10 7 34	7 1 2 3 3 10 7 34
Bottler	7 1 2 3 3 10 7 34	7 1 2 3 3 10 7 34	7 1 2 3 3 10 7 32
Ref./Fzn Storage	7 1 2 1 3 10 7 32	7 1 2 1 3 10 7 32	7 1 2 1 3 10 7 32
Truck	7 1 2 1 3 10 7 40	7 1 2 1 3 10 7 40	7 1 2 4 3 10 7 35
Max Score	7 1 2 1 3 10 7 40	7 1 2 1 3 10 7 40	7 1 2 4 3 10 7 35
National Best	C A R V E R S Tot	C A R V E R S Tot	C A R V E R S Tot
Milk	9 2 2 1 4 10 10 38	9 2 2 1 4 10 10 38	9 2 2 1 4 10 10 38
Filter	9 1 2 1 4 10 10 38	9 1 2 1 4 10 10 46	9 1 2 1 4 10 10 38
Cooler/Chiller	9 1 2 1 4 10 10 38	9 1 2 1 4 10 10 46	9 1 2 1 4 10 10 38
Pasteurizer	9 1 2 1 4 10 10 38	9 1 2 1 4 10 10 46	9 1 2 1 4 10 10 38
Culture	9 1 2 1 4 10 10 38	9 1 2 1 4 10 10 38	9 1 2 1 4 10 10 38
Culturing Tank	9 1 2 1 4 10 10 46	9 1 2 1 4 10 10 46	9 1 2 1 4 10 10 38
Fruit	9 1 1 1 4 10 10 36	9 1 1 1 4 10 10 36	9 1 1 1 4 10 10 36
Bottler	9 1 2 3 4 10 10 40	9 1 2 3 4 10 10 40	9 1 2 1 4 10 10 38
Ref./Fzn Storage	9 1 2 3 4 10 10 40	9 1 2 3 4 10 10 40	9 1 2 1 4 10 10 38
Truck	9 1 2 1 4 10 10 38	9 1 2 1 4 10 10 38	9 1 2 1 4 10 10 38
Max Score	9 1 2 1 4 10 10 46	9 1 2 1 4 10 10 46	9 1 2 1 4 10 10 38

PRODUCTION ATTRIBUTES OF THE THREE PRODUCTION SCALES CONSIDERED

Production Attribute	local	regional	national
# cities supplied	1	4	15
# outlets/batch	2	10	50
Market share	<1%	1 - 9%	10 - 25%
Name recognition	no	no	yes
% production loss	>75%	>75%	15-24%
Batch size:			
apples (lbs)	500	5,000	50,000
yogurt (fl. oz.)	1,280	12,800	128,000

DETAILS AND STATUS

ACCESSIBILITY QUESTIONS AND ANSWERS FOR THE FRYER

- Does your facility use part-time or seasonal/temporary workers? Yes
- Which of the following obstacles prevent someone from contaminating the product through this NODE during operations? (check all that apply) Access points are behind a safety barrier (guard rail, wall)
- How many employees at this facility? >1,000
- What is the average annual employee turnover? 30-100%
- How many security personnel are present during the first shift? 1-10
- How many security personnel are present during the second shift? 1-10
- How many security personnel are present during off hours? 1-10
- Are cleaning staff company employees or contractors? Both employees and contractors
- Temporary workers are used for: (check all that apply) Fill in for workers sick or on vacation; Regular, part-time workers; Seasonal peaks
- Are employees allowed to take items not associated with their job into the process areas? No
- Are contractors accompanied by an employee while performing repairs? Yes
- How visible is someone at this NODE? Completely visible to anyone in the general area (30-100 feet)
- What is the average term of employment? 1-5 years
- Are uniforms mandatory for all employees? Yes
- Do uniforms identify work area? (e.g., labeled, color-coded.) Yes
- Do employees receive training in plant food defense policies? Yes
- Do employees receive initial training in plant security policies? Yes
- Are employees trained to notice unusual events and report them to management? Yes
- Customers: (check all that apply); Must sign in; Must be bagged
- Visitors: (check all that apply); Must sign in; Must be bagged
- Vendors: (check all that apply); Must sign in; Must be bagged; Must pass through a security check
- Are public tours conducted on the factory floor? Yes
- How often? Semi-annually
- How many employees work the first shift? 500-1,000
- How many employees work the second shift? 500-1,000
- How many employees work the cleaning shifts? <10
- Does the fence have regularly spaced signs warning against trespass? Yes
- Is the fence more than 6ft high with a well-lit clear zone of at least 10ft on each side? Yes
- How do you detect or prevent people crossing the fence? (check all that apply); Fence is topped with barbed or accordion wire; Fence is monitored by detection-activated surveillance
- Do you control all access points through fixed guards, limited-rate gates (e.g. revolving gates), or detection-activated surveillance? Yes
- Do you check the identity and clearance of everyone before permitting them through the fence access points? (This can include using badges, fobs, examination of ID and biometrics, but not keys or personal recognition.) Yes
- Are vehicles allowed to enter the fenced area? No
- How do you control access to the building? (check all that apply) Windows are alarmed at all times, or building has no windows.; Doors are locked with a badge-swipe, PIN entry, or biometric lock.
- What kinds of security do you have inside the building during working hours? (check all that apply) Contraband detection; Guards at points of entry; Receptionist at points of entry
- What kinds of security do you have inside the building during off hours? (check all that apply); Alarmed motion detectors; Guards on random patrol of interior; Guards at points of entry
- Who can enter this building during working hours? A few members of the workforce and visitors required by law.
- Which of the following obstacles prevent someone from contaminating the product through this NODE during operations? (check all that apply) Equipment is alarmed during operation
- During operations, how long might an individual be unobserved at this NODE? <1 min
- During operations, how long would it take to insert a product contaminant at this NODE without leaving evidence that would cause immediate suspicion? <30 sec
- Which of the following precautions does the company take whenever this NODE is off-line? (check all that apply) Surfaces that could come into contact with food or processing chemicals are inspected before resuming operations.
- How many? 2
- Which of the following obstacles prevent someone from contaminating the product through this NODE during operations? (check all that apply) Vicinity of insertion points is hazardous during operations

STATUS

- Release 1.0 - June 5
- Version 2.0: Retail and pre-harvest (08)
- Intended users: food business staff
- Benefits: Identify R&D needs
- Food safety to be considered (Dual use)
- Use: currently free and open internet
- Writing chapter for Wiley security volume



Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000