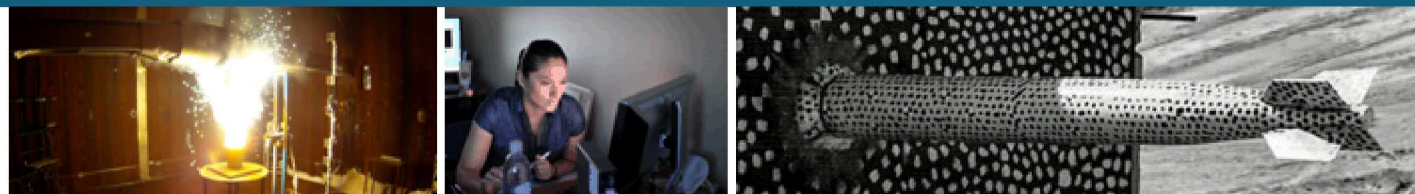


Protection Concepts for Irradiators in a Laboratory Environment



Radiological Malevolent Use Risks and Source Security Approaches Seminar
Vienna, Austria
October 24 -25, 2018

PRESENTED BY
Luke Gilbert

SAND2018-XXXX PE



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MOTIVATION

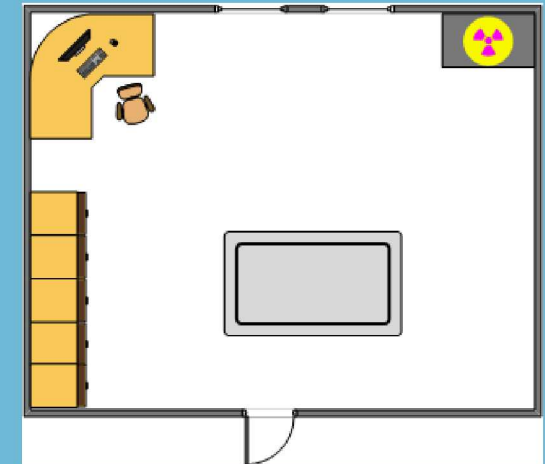
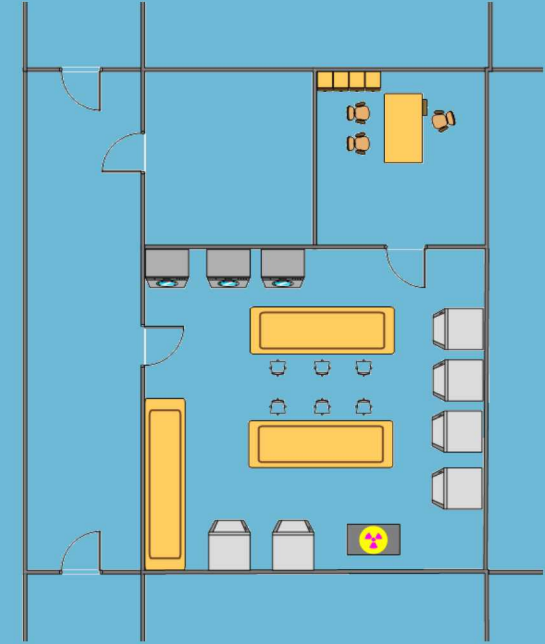
Show examples of “Best Practices” in action, and how to create effective compromises between security and operations

OUTLINE

- Design criteria
 - Continuous and balanced protection
 - Sensored Cage
 - Speed bump
 - Defense in depth
 - Motion detectors
 - In Device Delay (IDD) kits
 - Operational Impact
- Example Facility layouts

WHAT DOES AN OPERATIONAL ENVIRONMENT LOOK LIKE?

- Open to the public
- More concerned with patient care/optics than security
- May not have large security budgets



HOW DO WE IMPLEMENT BEST PRACTICES IN AN OPERATIONS ENVIRONMENT?

We look at three design criteria:

1. Continuous and Balanced Protection

- Provide adequate protection against all potential adversaries along each credible adversary path to the target

2. Defense in Depth

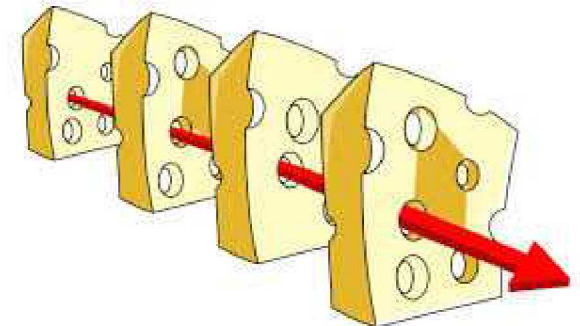
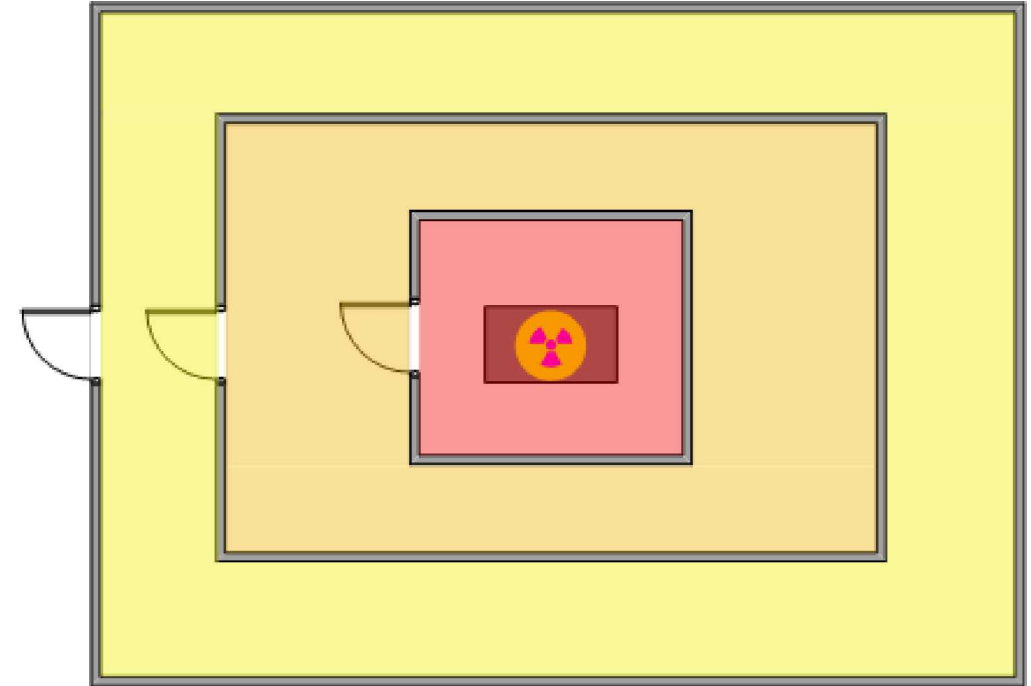
- Use multiple diverse protective measures along each credible adversary path

3. Operational Impact

- We are a volunteer program, not a regulatory body. If the impact of our security upgrades is too large they will not be used.

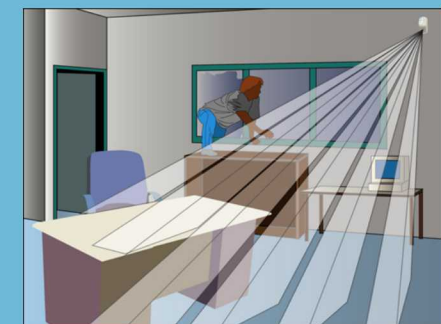
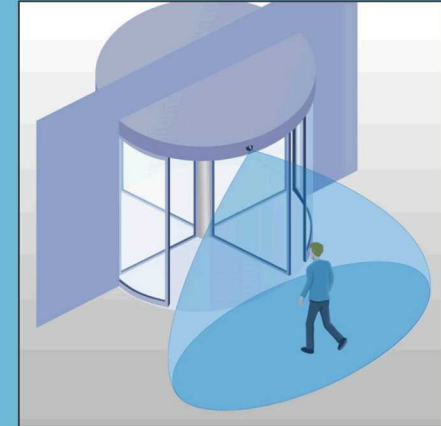
CONTINUOUS AND BALANCED PROTECTION

- No one pathway towards the target should be faster or easier than any other.
- Include as many layers of defense as possible
- Focus Detection elements on the outer layers
- Focus Delay elements on the inner layers
 - Delay without detection does not count

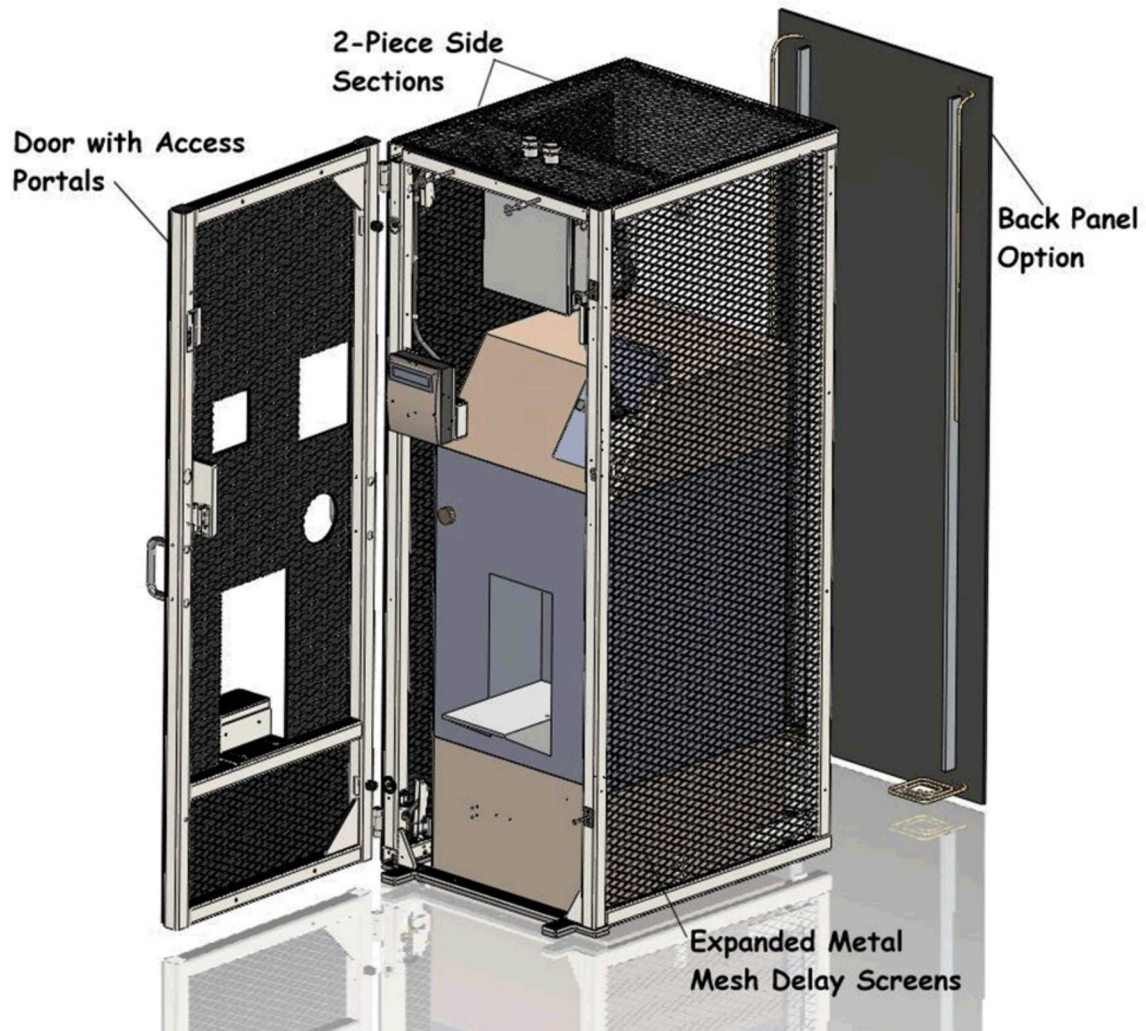


7 DEFENSE IN DEPTH

- Combine technologies to increase probability of detection
- Combine Materials to increase delay
 - More expensive or specialized tools are required
 - More tasks are involved in breaching a target.
- Sensor Example
 - Dual Tech (Microwave and Passive Infrared) Motion detector



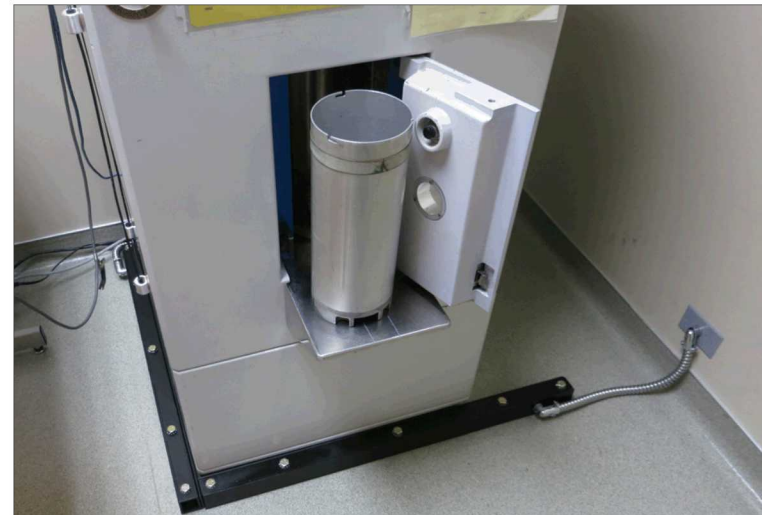
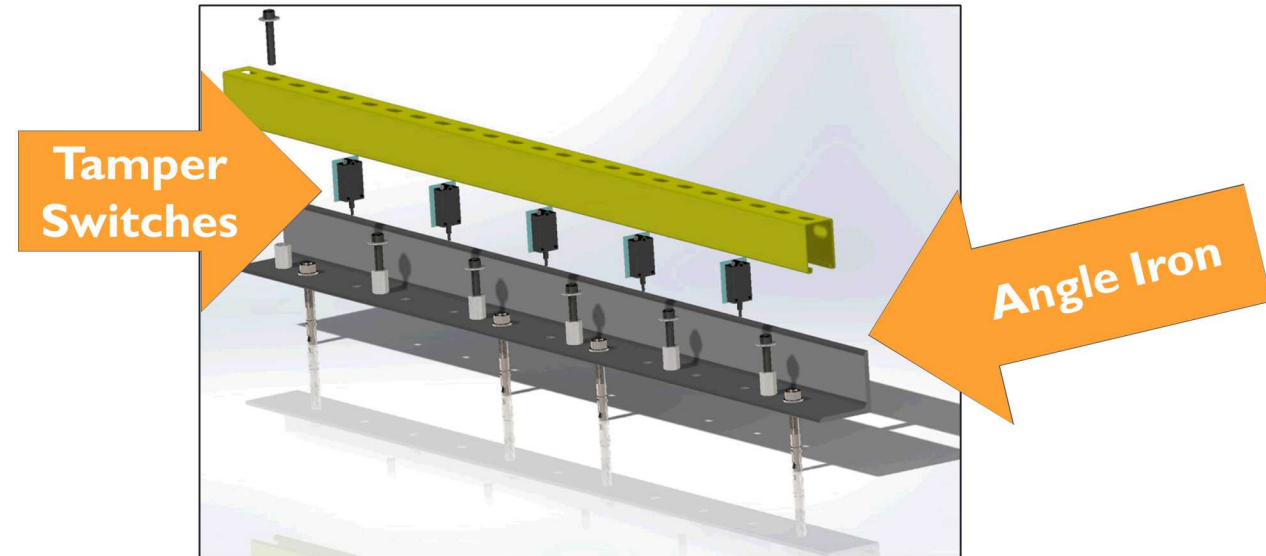
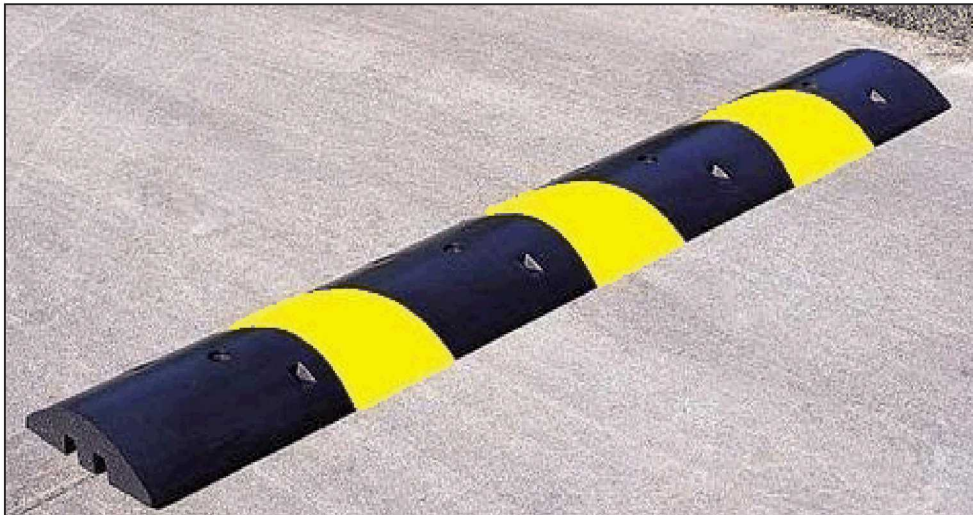
SENSORED CAGE PROVIDES PROTECTION FROM MULTIPLE ATTACK PATHWAYS



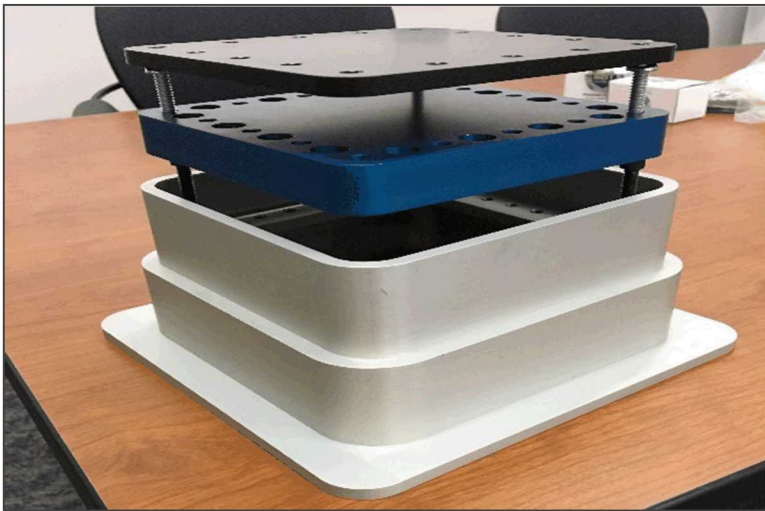
- Prevents removal of the machine with the source in it.
- Prevents breaching from all sides
- Detection before delay
 - Fiber optic panels mounted to frame in front of the expanded metal mesh
 - Cage is anchored from the inside
- Openings allow for normal operation
- Cage is only opened for maintenance.

“SPEED BUMP” HELPS ACHIEVE CONTINUOUS AND BALANCED PROTECTION

- Prevents removal of the machine with the source in it
- Detection before delay
 - In order to remove the angle iron an adversary must remove the cover (yellow)
 - This activates the tamper indicators.
- Does not interfere with standard operations



IDD KITS ALSO PROVIDE DEFENSE IN DEPTH



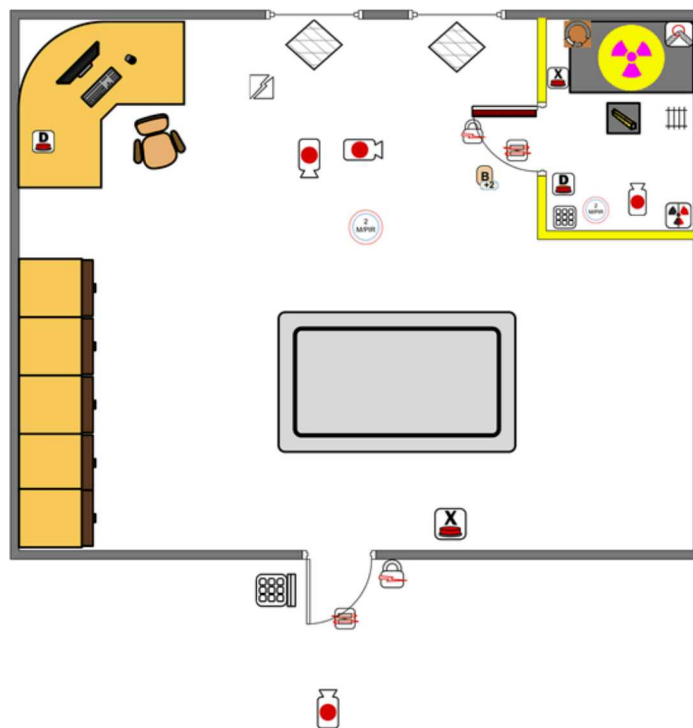
- IDD= In Device Delay
- Global program that works with over 10 manufacturers to harden devices in over 50 countries
- Various Materials are used (Blue, Black, Silver)
 - One may be difficult to cut through using traditional methods
 - Another may be difficult to cut through with thermal tools
- Fasteners
 - Various means of obscuring fasteners
 - Adversary doesn't know which fasteners they will need.
- Plates lay flush, and cover up other fasteners
 - Prevents prying, and ensures that first plate must be removed to access second

OPERATIONAL IMPACT

- The best security system is the one which is used
- We work with the sites to create systems with minimal impact to operations
- Extending security layers to unexpected areas
- Providing pass throughs instead of doorways
- Providing panic buttons for labs which operate 24/7

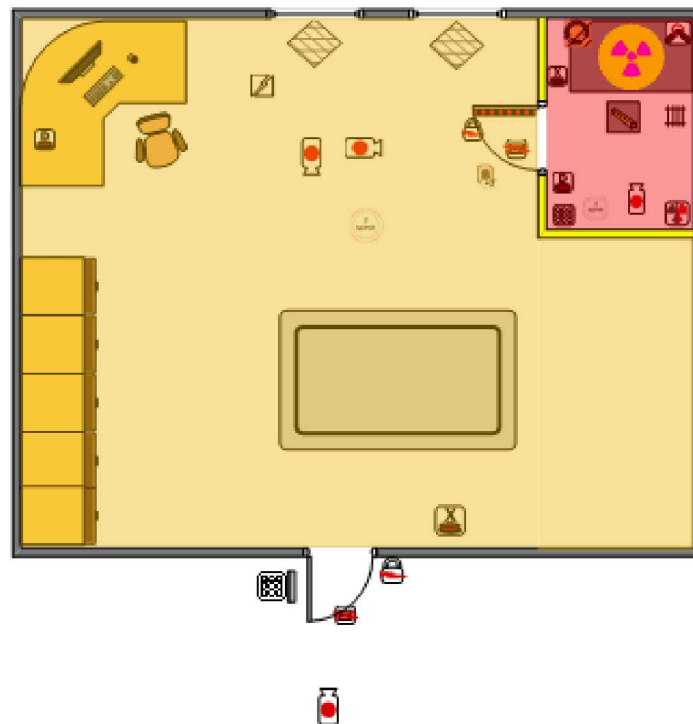


CASE STUDY: RESEARCH LABORATORY



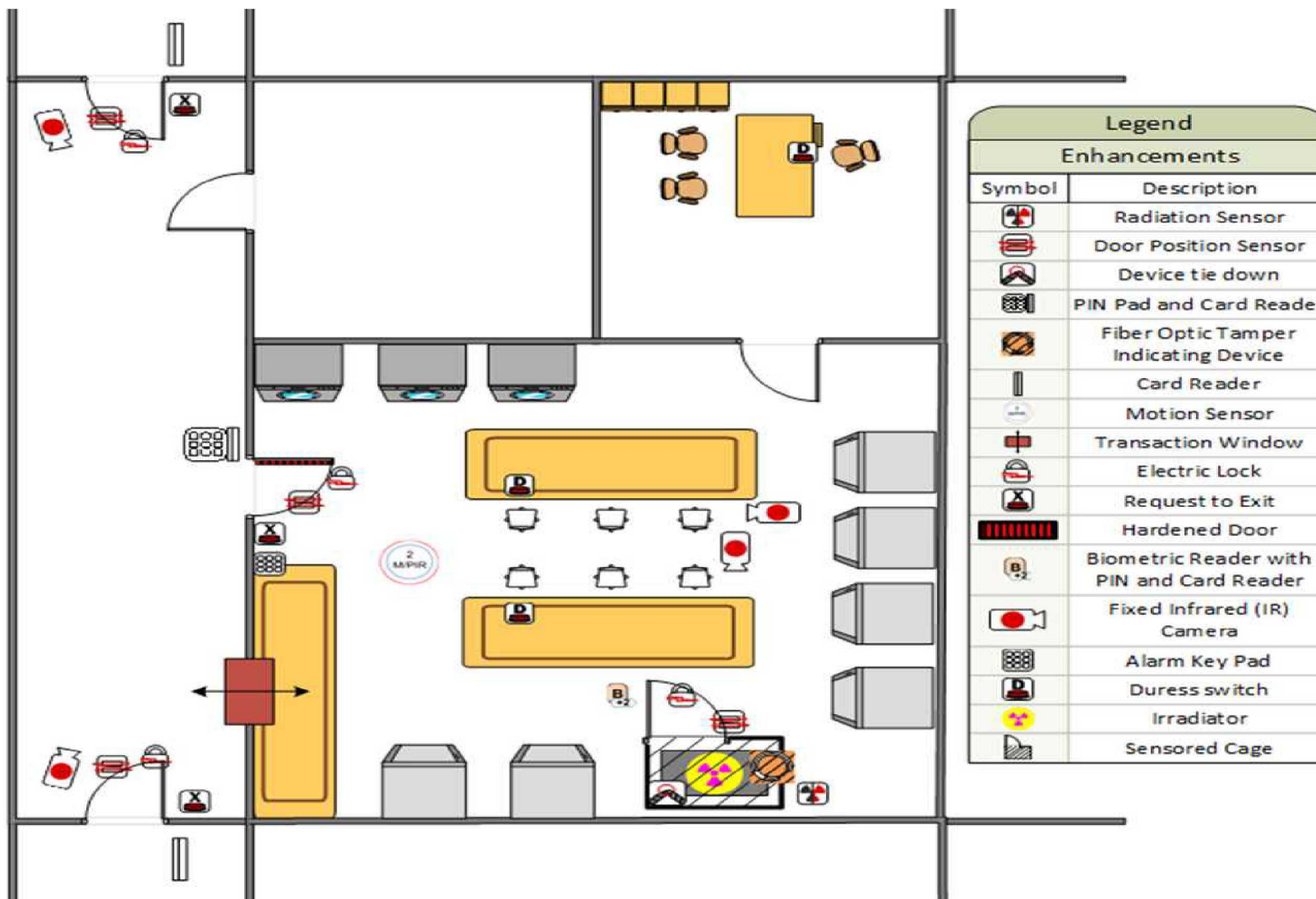
Legend	
Enhancements	
Symbol	Description
	Radiation Sensor
	Door Position Sensor
	Device tie down
	PIN Keypad and Proximity Card Reader
	Fiber Optic Tamper Indicating Device
	Window Bars
	Motion Sensor
	Electric Lock
	Security Grating
	Request to Exit
	Hardened Door
	Biometric Device with PIN and Card reader
	Fixed Infrared (IR) Camera
	Alarm Pad
	Duress switch
	Irradiator
	Speed Bump
	Glass Break Sensor

RESEARCH LABORATORY, LAYERS

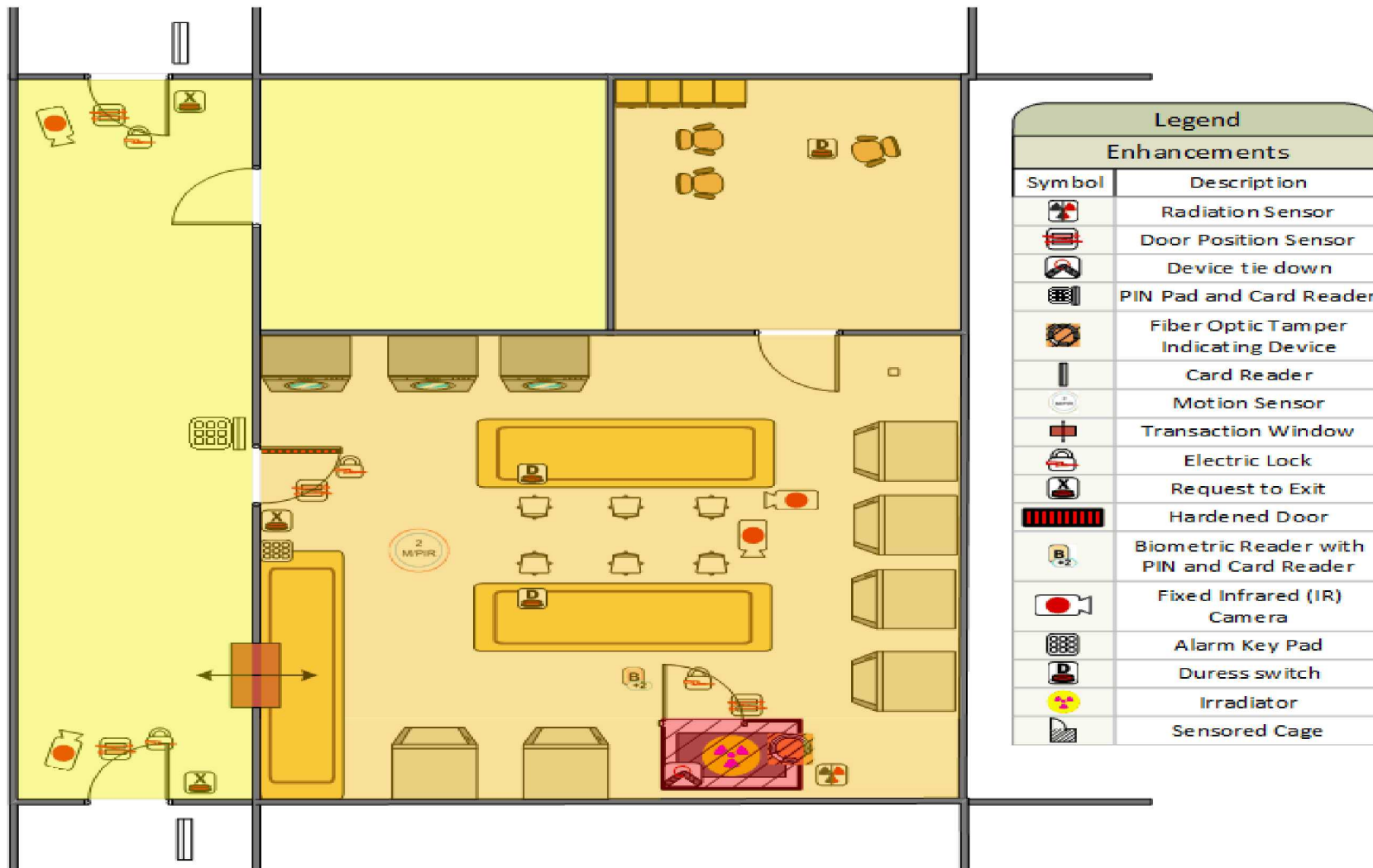


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	Duress switch
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	Speed Bump
	Glass Break Sensor

CASE STUDY: BLOOD BANK



BLOOD BANK, LAYERS



CONCLUSIONS

- Design criteria
 - Continuous and Balanced protection
 - Sensored Cages
 - Speed Bumps
 - Defense in depth
 - Motion detectors
 - Balanced Magnetic Switches (Door Contacts
 - IDD Kits
 - Operational impact
 - Hardened Passthroughs
 - Sensored Cages
 - Unobvious security layers.
 - Delay before Detection does not count!