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Information Barrier Functional Requirements

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INTRODUCTION: For the purpose of this paper, we have used the term “functional requirement” to indicate a required task rather than the recommended method for accomplishing this task. The creation of effective information barrier technology will proceed as a series of steps:

- 1) IB Conceptual Description¹
- 2) IB Functional Requirements (this document - ongoing)
- 3) IB hardware and software specification
- 4) IB hardware and software construction
- 5) IB implementation

This functional requirements document is not intended to supplant or supercede the conceptual description; rather, these functional requirements are intended to be used along with the earlier description to help generate hardware and software requirements.

ASSUMPTIONS: These assumptions are based on a “straw man” scenario for pit inspection. This set of assumptions are based on conversation with James Tape.²

- 1) Time Frame
 - a) Pits are received at the storage facility continuously
 - b) Inspectors are not present at the storage site continuously
 - c) Pits will be accepted into the program when inspectors are not physically present
- 2) Measurements
 - a) Some unclassified identifiers (such as container ID) will be measured
 - b) Some classified identifiers (such as radiation signatures) will be measured
 - c) No classified information will be revealed to inspecting party
 - d) Verification system operation may be checked (e.g. by inserting blind standards into the measurement area) by either party at any time
 - e) Any previously monitored pit can be remonitored with an inspector present
- 3) Accounting
 - a) All declared items must be accounted for
- 4) Data
 - a) Classified data will not be transmitted
 - b) Some classified data may be archived
 - c) Red light/green light output will be archived along with container identification
 - d) Any archived classified data must be in a form which is unalterable by the inspected party
 - e) Any archived classified data must be in a form which is unreadable by the inspecting party
 - f) Archived red light/green light data must be in a form which is unalterable by either party but readable by both parties

- 5) Equipment
 - a) All inspection equipment will be under dual control
 - b) System can be sanitized
 - c) Commercial hardware is employed to the maximum extent possible
 - d) Core software is unclassified

FUNCTIONAL REQUIREMENTS: Each requirement is numbered to identify the assumptions from which the requirement is derived. Assumption 2 mandates that an IB be in place, but this assumption does not make any specific requirements of the IB. Assumption 3 does not impact the IB directly. Thus, assumptions 1, 4, and 5 directly impact the functional requirements of the IB.

I have divided the IB functional requirements into the following areas:

- Physical protection
- Hardware hardening
- Assurance of capabilities and limitations
- Administrative controls
- Validation and verification of the systems and data
- Measurement error detection and resolution
- System error detection and resolution
- Equipment sourcing and maintenance
- Data paths (intended and unintended)

Physical Protection: (assumptions 1, 2, and 4)

- Access control
- Hardware
- Software
- Classified data archives
- Unclassified data archives

Hardware Emissions Control: (assumptions 1 and 4)

- Emission through the air (e.g. rf radiation)
- Transmission through conductors (e.g. power supply wiring)

Capability Assurance: (assumptions 1, 4, and 5)

- Commercial software
- Task-specific software
- Functional specifications of software elements
- Entire analysis system

Administrative Controls: (assumptions 1, 2, and 5)

- Procedural rules for participant behavior
- Procedural rules for unmonitored inspection
- Procedural rules for maintenance
- Continuity of knowledge
- Agreed on levels of participation in all activities
- Keys, passwords, etc
- Operational Security

Validation and Verification: (assumptions 4 and 5)

- Hardware and software inspection and verification
- Analysis system tests
- Authentication of archived data

Error Detection & Resolution: (assumptions 1 and 4)

- System errors
 - Misidentification of device under test
 - Detection
 - Rectification without revealing classified information
- Measurement errors
 - Identification of error
 - Remeasurement protocol
- Effect of error
 - False negatives
 - False positives

Equipment sourcing and maintenance: (assumption 5)

- Use commercial hardware if possible
- Allow for manufacturer maintenance of commercial hardware
- Use commercial software if possible
- Keep specialized software as simple as possible
- Allow for sanitation of most (all?) of the system

Data Paths: (assumptions 1 and 4)

- IB is combination of hardware and software barriers
- Defense in depth
- Hidden data paths
- Maintenance mode
- Interaction between elements
- Consider all barrier crossings

References:

¹ R. Whiteson and D.W. MacArthur, "Information Barriers In the Trilateral Initiative," Los Alamos National Laboratory Publication LA-UR-98-2137, May 1998.

²J. Tape, Private communication.