Homeland Security Information System

Design Brief

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1. Design Goals

The Homeland Security Information System (HLSIS) is a historic undertaking in terms of its scope and longevity. We, as the designers, intend to create an information system that can deliver critical information about homeland security with the following characteristics:

- Comprehensive – covers all aspect of the HLSIS in a systemic holistic view
- Accurate – provides the information which is accurate (validated)
- Reliable – provides the effective & efficient system which can be relied on
- Durable – information may change its meaning but which last for ever
- Cost-effective – create a system which is practically feasible and maintainable

In the short-term, this project will deliver information related with important aspects of nuclear waste transportation to all the people (refer to exhibit 2), both upstream and downstream, who are affected by this substance.

1.1 HLSIS Design implementation Goals

The initial implementation goal of the HLSIS is to assign it *Three* degrees of freedom and make it a *heuristic system*. The three degrees of freedom are procedures, targets, and tactics. Please refer to exhibit 1.
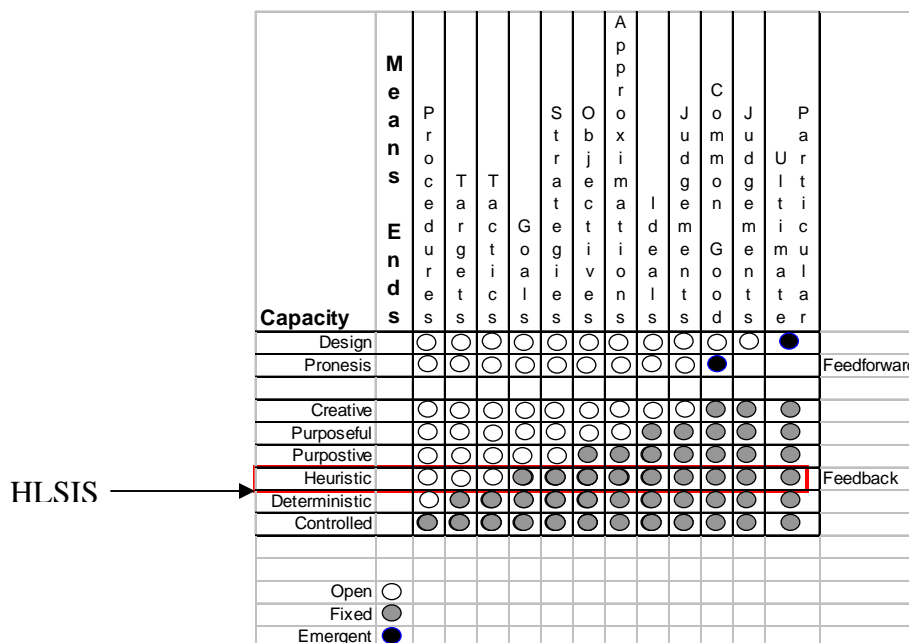
Capacity	Means Ends	Procedures	Targets	Tactics	Goals	Strategies	Objectives	Approximations	Ideals	Judgements	Common Good	Judgements	Particular Ultimate	
Design		○	○	○	○	○	○	○	○	○	○	○	●	
Pronesis		○	○	○	○	○	○	○	○	○	●			Feedforward
Creative		○	○	○	○	○	○	○	○	○	◐	◐	◐	
Purposeful		○	○	○	○	○	○	◐	◐	◐	◐	◐		
Purpostive		○	○	○	○	○	◐	◐	◐	◐	◐	◐		
Heuristic		○	○	○	◐	◐	◐	◐	◐	◐	◐	◐	◐	Feedback
Deterministic		○	○	◐	◐	◐	◐	◐	◐	◐	◐	◐		
Controlled		◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	
Open	○													
Fixed	◐													
Emergent	●													

HLSIS → (Heuristic row)

Exhibit 1

HLSIS Degrees of Freedom

☞ **Freedom from procedures:** This information system would be using tools like information mining and information analysis, but it doesn't know what algorithms would be used, so there are no fixed procedures, and the procedures will be decided based on targets and tactics which are the function of stakeholders' decisions and the threat situations.

☞ **Freedom from targets:** Information or knowledge targets would be decided based on the needs of stakeholders and threat situations.

☞ **Freedom from tactics:** Tactics are dependent on targets, and so the HLSIS system will be using a different set of tactics based on the threat scenarios.

2   HLSIS Dynamics

The first part of the design is to understand the socio-technical dynamics of the systems. Based on the design intention and desired design goals (desiredata), the design team analyzed and developed the roles which will be affected by the implementation of the system.

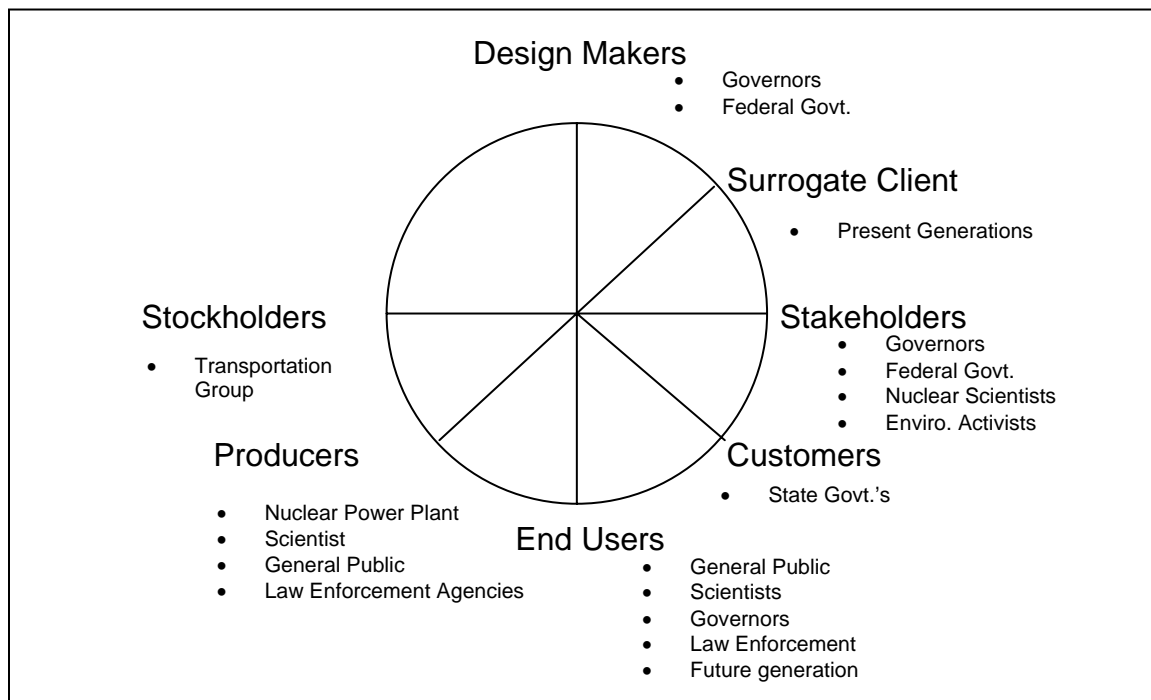Please refer to exhibit 2 for the breakout of different roles.

Design Makers
- Governors
- Federal Govt.

Surrogate Client
- Present Generations

Stakeholders
- Governors
- Federal Govt.
- Nuclear Scientists
- Enviro. Activists

Stockholders
- Transportation Group

Customers
- State Govt.'s

Producers
- Nuclear Power Plant
- Scientist
- General Public
- Law Enforcement Agencies

End Users
- General Public
- Scientists
- Governors
- Law Enforcement
- Future generation

Exhibit 2

3   System Boundary

Based on the design decisions and design goals of homeland security task force and Governors association, a schematic of the system boundary for HLSIS is depicted (refer exhibit 2). Through this systems boundary design team will try to ascertain the various communication links between the different components of the system as depicted in the diagram.

This schematic is based on the preliminary research of the design team based on publicly available information and the designs team's perception of the communication between these components. Further design phases will validate these assumptions by analyzing each component and their communication links. If required, the design team will suggest and incorporate new communication links and new system components for the effective and efficient information flow. A short description of various components of the system is given below.
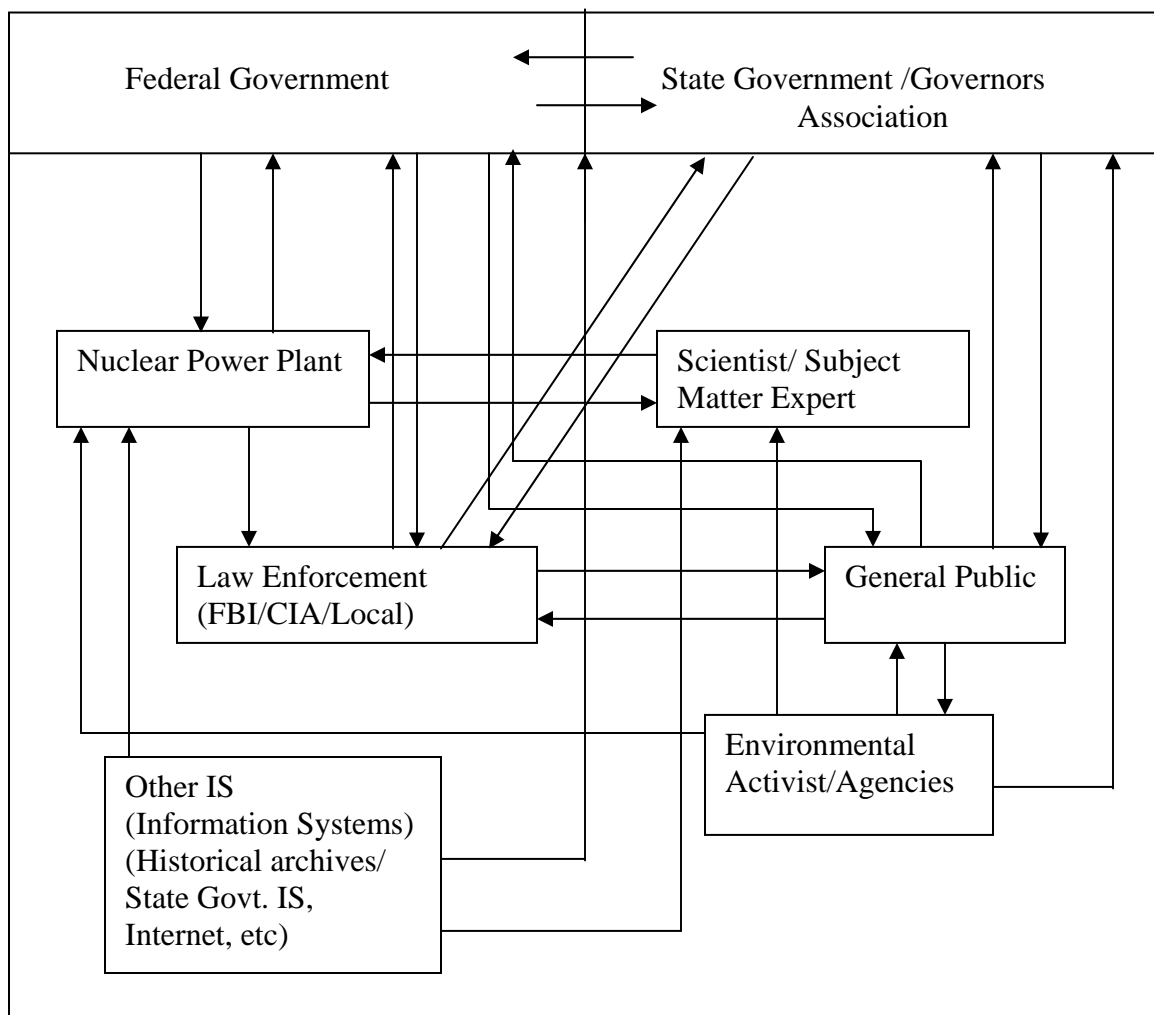

Exhibit 3

Federal Govt.: It includes all agencies under the umbrella of the federal government which deals with homeland security, agencies dealing with nuclear waste issues, etc. More information needs to be collected for the working of various bodies within the federal govt. and their mode of communication. Also need to analyze any existing information system.

State Government: It includes the association of governors, various state bodies dealing with law, public safety, security agencies, etc. More information needs to be collected for the working of various bodies within state govt. and their mode of communication. Also need to analyze any existing information system.

Nuclear Power plant: This encapsulates all Nuclear power plants within United States. The main components for analysis includes – kinds of nuclear material produced, refined, nuclear waste, methods of disposal of nuclear waste, communication between various divisions of Nuclear power plant, methods of communication used, communication between Nuclear power plant and external parties, like Federal Govt., Environmental activist, State govt., etc. and modes of communication.

Scientist/Subject Matter Expert: This includes a body of nuclear scientist, Security Analyst, and other Subject matter experts. First of all, background research needs to be performed to find out if a body like this exists; if so, who constitutes it?   What decisions do they take?   How do they communicate and what medium of communication do they use? If there is no existing body like this, a new body needs to be created in consultation with various stakeholders. The goal of this committee will be to evaluate the existing protocols related to disposing of the nuclear waste, transportation methodology used, and threat possessed by such transportation. Furthermore, a clear process needs to be devised with alternate plans for communicating its findings to the related components of this information management system.

Law Enforcement: This constitutes the FBI, CIA, Local state police and, special task groups, if any. Research and analysis is required in the way inter and intra-departmental communication takes place for these organizations. It includes the kind of departmental/agency information system used and communication between these information system. Further analysis is required in the way these agencies ascertain the threat and communicate to the other components of the information system.

General Public: This constitutes all people living within USA. While doing the further analysis emphasis will be given to the group of people, for example, threat posed for group of people or cities which fall in route to the nuclear waste transport. Various communication channel within and between various components needs to be analyzed with an aim to produce the most effective & efficient mode of communication based on the threat perception and disaster.

Environmental Activist/Agencies: Includes bodies like the EPA and other non-profit environmental group which monitors the effect of industrial pollution in general and nuclear pollution in particular in the environment. Also, communication between this and various other components of the systems will be analyzed.

Other Information systems: These are the most abstract components at this time of the design. There is a general perception within the design team that there will be various information systems which can benefit from our HLSIS but to what extent and in what way needs to be worked out. This will require analysis of information systems, like, historical archives, external information systems used by various state and federal agencies, Internet as the information system, etc. Research should also focus on the way this information is channeled out of the systems and who are various recipients.

4 Intended Characteristics of HLSIS

HLSIS system will be designed based on certain intended characteristics. They are as follows:

Emergence	This system is emerging due to a creation of things and things being brought together due to circumstances, but the intended purpose is to create an Information system which fulfills the needs of the Homeland security in general and nuclear waste transportation in particular.
Relationship	Communication between different components defines the relationship (Exhibit 3) for HLSIS. The design team will evaluate these relationships for *what-it-is* and try to implement *what-is-desired*. Most of the relationships are relationships of equality, nested within the various departments of state and federal government. Many of the relationships are due to positive and negative feedback received in the dynamic information system
Organization	Homeland Security within Governors Association
Consilience	The common principle on which HISIS will work is sharing of information and knowledge among different components (departments and disciplines) of this IS.
Substance	Main substances of the HLSIS are: • Objective information – information coming in • Subjective knowledge – information converted to knowledge after processing
Form	This IS can take multiple forms depending upon the context. The various forms identified by the design team are: • IS for all stakeholders

	• Tool for threat analysis concerning Homeland security (using information mining and information analysis techniques) • Research tool for other IS or future stakeholders • A threat to itself – if not used or secured properly it can be used by the terrorist organization or rogue nations, either by accessing the information from this IS or by feeding the wrong information in this IS
Purpose	Better informed and safer world. Motto of this project is *SSS* – Safe, Secure, and Sound Information system.

Distinction	Different parts of the system will be distinctly identified by the role played in processing of information. Following distinct parts have been identified by the design team based on the initial design analysis:
	  1) Different kinds of Information based on the source
	  2) Flow of information – different flow of information will lead to different result sets (interpretation by node A for information "I" from node B may be different from node C as all components are operating at the different context level)
	  3) Attachment of metadata – information will be distinguished by attaching the well defined sets of metadata
	  4) Categorization of the information based on performance tuning factors (performance tuning factors will be based on the stakeholders' needs, e.g. DEFCON model can be used to produce one set of results while the others model will/may require a different set of results)
	  5) Semantic Web

Contrivance	1) Website for information status associated with threat or security needs 2) Database to follow up with security issues

Communication (channel)	Communication IN and OUT of the system will be done in various forms like
	  • Email
	  • Phone & Fax
	  • Conferences
	  • Secure Communication
	  • Web Based
	  • Radio/TV Broadcast

5   Categorizing Systems

For the better understanding of the HLSIS, the design team categorized the systems into different functional units.

5.1 Types of Variables:

System design needs to take into account the variables which may impact the effectiveness of the systems. Two main variables for this system are:

- **Information** – Information will be changing (or transforming) its form and meaning all the time depending upon the context and time, so understanding this transformation in information when it's passing from one component to the other, and when it gets aggregated will be the critical factor for the success of this design. This is further analyzed in next section (5.2).

- **Stakeholders** – Forms of stakeholders may be changing in future as well as the system's priorities and goals. Therefore, the design should be multilayered, where each layer is an independent **entity by itself** and when the combination of them produces the distinct results based on the characteristics of the combined layers.

5.2 Kinds of components:

Roles:
Based on the members' role, the context of information/knowledge will change, and therefore, the design should take into consideration all different aspects of roles and generate the information/knowledge accordingly.

Communication channel:
Various modes of communication, like, phone, fax, web sites, mail, email, radio/TV broadcast, display boards, etc, will be used as the part of this information systems. This in turn will require design team to work with different format types to generate the most effective output message.

Relationship of Elements:
A preliminary relationship between different components of HLSIS is depicted in Exhibit-3. An extensive analysis of various relationships is required to find out any communication or structural holes between communicating components. Techniques from SNA (Social Network Analysis) would be useful to define the reachable of communicating nodes (component), boundary spanners, gatekeepers, brokers and various clusters. These properties can be effectively used for better information processing between components.

Information:

As mentioned above, information is a variable and will be changing its form and energy (impact of information on knowledge or output) depending upon the context and the time. Therefore, it becomes necessary to analyze different components of **"Information"** as an **"entity"** as it passes through different components of this information system.
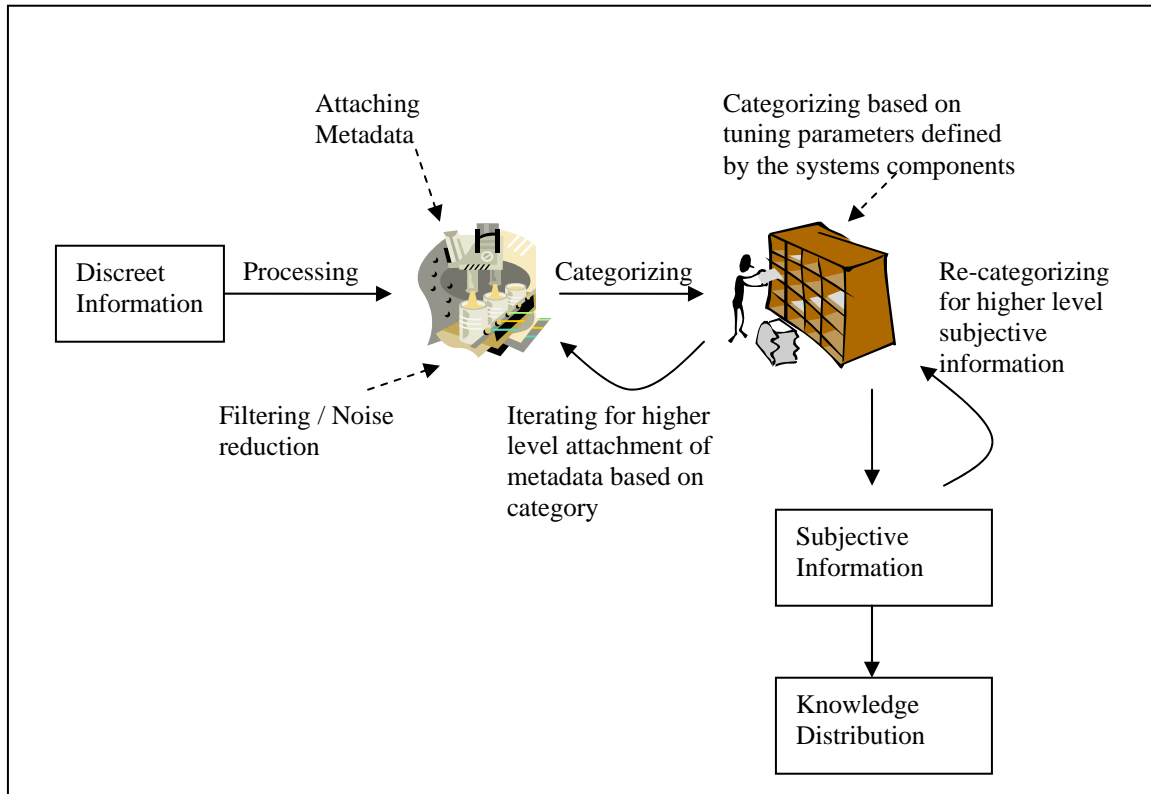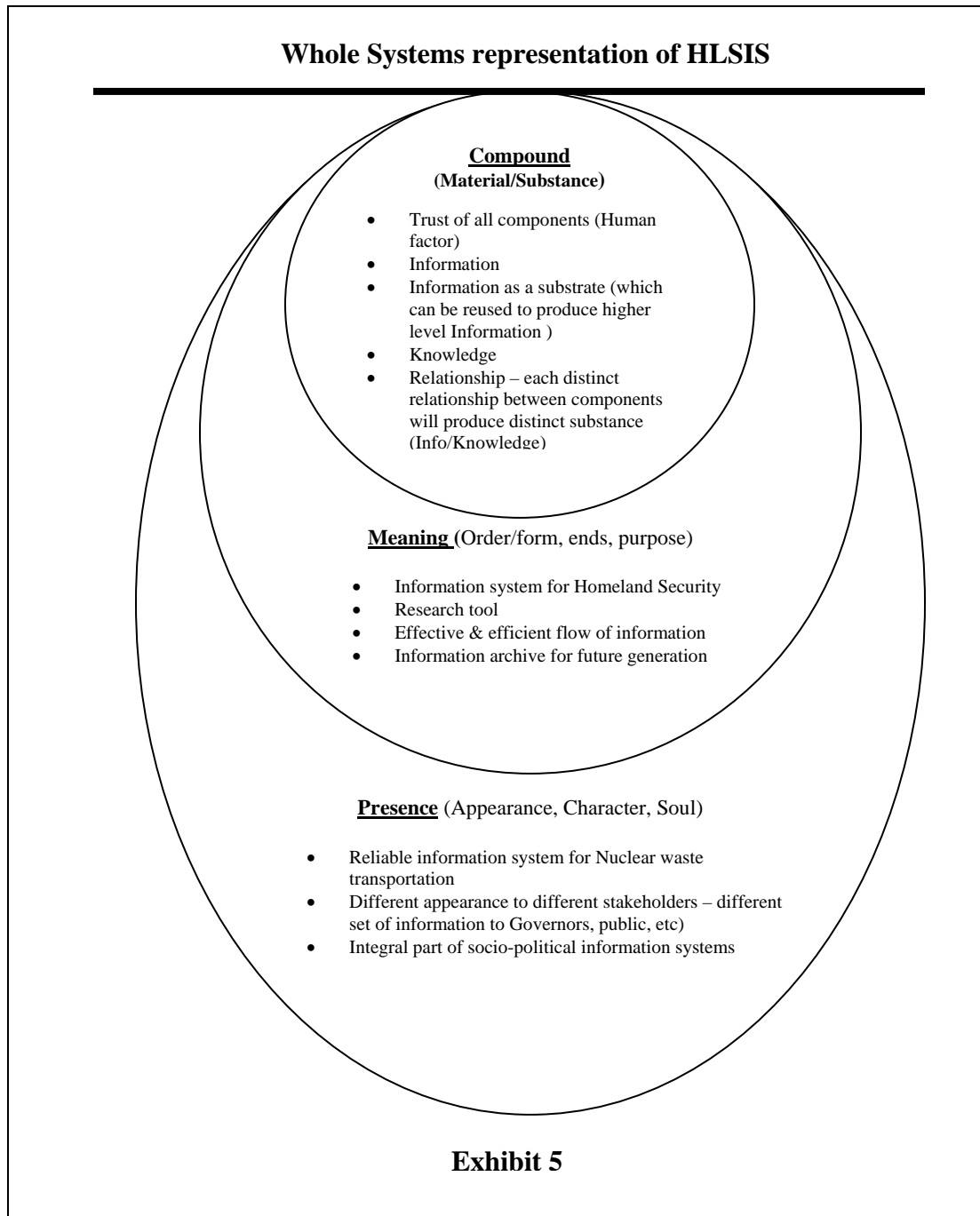

Exhibit 4

6   Homeland Security Information System as a Whole

Any system as a **Whole** has a distinct set of *characteristics, soul and appearance* based on the *meaning* of the systems to the different components. Different roles of the systems have the different perception of the systems based on their ends, purpose, or the order/form needs, or desire, (few philosophers refer it as *desiderata*) and this leads to the *different meaning* of the systems for the different people. Compound is the core of the systems which gives various meanings and appearance to the system, and forms its soul.

Whole Systems representation of HLSIS

Compound
(Material/Substance)

- Trust of all components (Human factor)
- Information
- Information as a substrate (which can be reused to produce higher level Information)
- Knowledge
- Relationship – each distinct relationship between components will produce distinct substance (Info/Knowledge)

Meaning (Order/form, ends, purpose)

- Information system for Homeland Security
- Research tool
- Effective & efficient flow of information
- Information archive for future generation

Presence (Appearance, Character, Soul)

- Reliable information system for Nuclear waste transportation
- Different appearance to different stakeholders – different set of information to Governors, public, etc)
- Integral part of socio-political information systems

Exhibit 5

Above figure is a simple representation of the HLSIS as a whole. All the substances which form the compound for the systems and are the building blocks of the HLSIS systems are listed under *Compound block*. Meanings of this system to various roles are cited under *Meanings block*. And the presence or the soul of the system is mentioned under the *Presence block*.

7   Limits of the System

- *A system is as good as its working components* – Kinds of Information produced by the various components will define the reliability of this information system. If the components are producing the false information or if they are hiding the right information then this will limit the effectiveness of this system. To circumvent this, a process needs to be designed which promotes honest and reliable information sharing without any prejudice.

- *A system is bounded by the design decisions* – The design decisions we make for this information systems will be its limiting factor too. For example, this information system won't be useful for welfare of states.

8   Analysis of the current IS used by Homeland Security

Present system existing is grossly incapable of addressing the threats and needs of the 21st century. Most of the information flow system was created during the 1950's keeping the "Cold War" in perspective.

The flow of information from different stakeholders and components is not being assembled and processed in a consistent fashion, leading to a crack that leads to some disaster or issue. There should be set guidelines for assembling the information and data, processed in a consistent fashion and channeled to proper authorities for actions.

In this age of rapid development of information technology, most of the communication from state governments and federal governments happens using the slow modes of communications like memos and letters.

From our preliminary investigation, we have discovered that there is no uniformity in the flow of information between states. Every state has its own way to deal with the information and distribute the information to its citizens.

9   Impact on Information Ecosystem

On designing this Information system, we will have to consider the impact on the present information ecosystem from all perspectives. Some of the considerations going into the design process are the following:

- **Political**: This system will be designed for use by the governors, federal regulators, cabinet secretaries, and many local elected officials. There will need to be interactions between the people belonging to different political parties with different political agendas, addressing different population bases (conservative/liberal).

- **Professional Service**: The system will be addressing a wide range of professionals from doctors, lawyers, and businessmen with varying self and professional interests. There will be conflicts on the information interpretations, distribution, and also analysis. This should be handled by the system to resolve the conflicts.

- **Environment**: An efficient information system will have input and output for the people it will be affecting. Many of the actions suggested by the system will have some environmental effects that will bring in the environmental activists and lobbyists. This system should be able to process that information also. Some of the rules proposed and restrictions will affect the lifestyles.