



An Intelligent Sensor Network Architecture for Robust and Dynamic Systems-of-Systems Testing

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What is this Research all about?

- To develop an architecture for an
 - Autonomous Sensor Network
 - which is **self-aware** and **adaptable to changes**
 - within itself
 - its tasking and
 - its environment



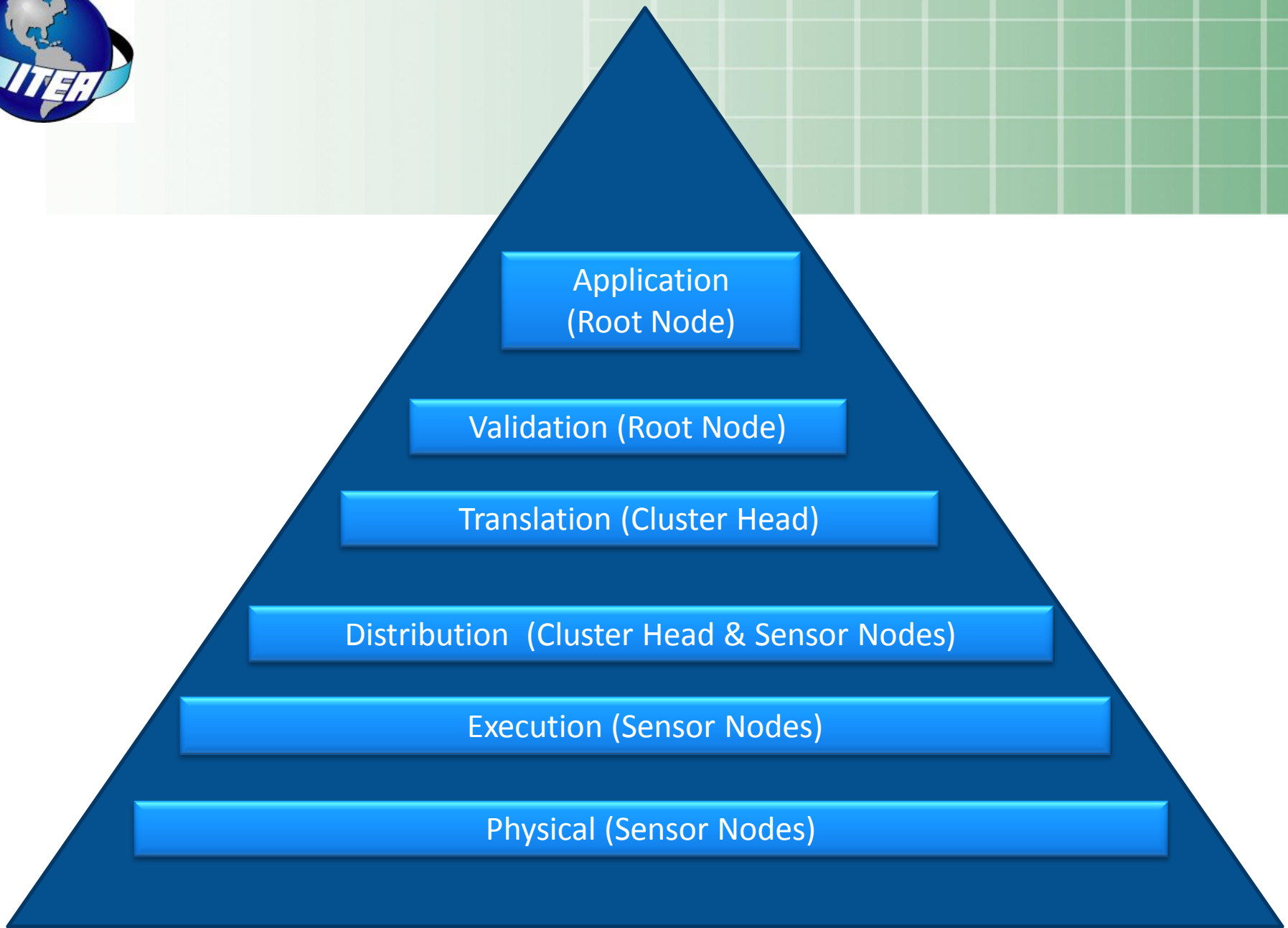
Three Integral Aspects of Autonomous Systems

- **Information Processing**
- **Control Distribution and Implementation**
- **Working (Behavior) of System, Sub-Systems and Components**



Control Technical Reference Model

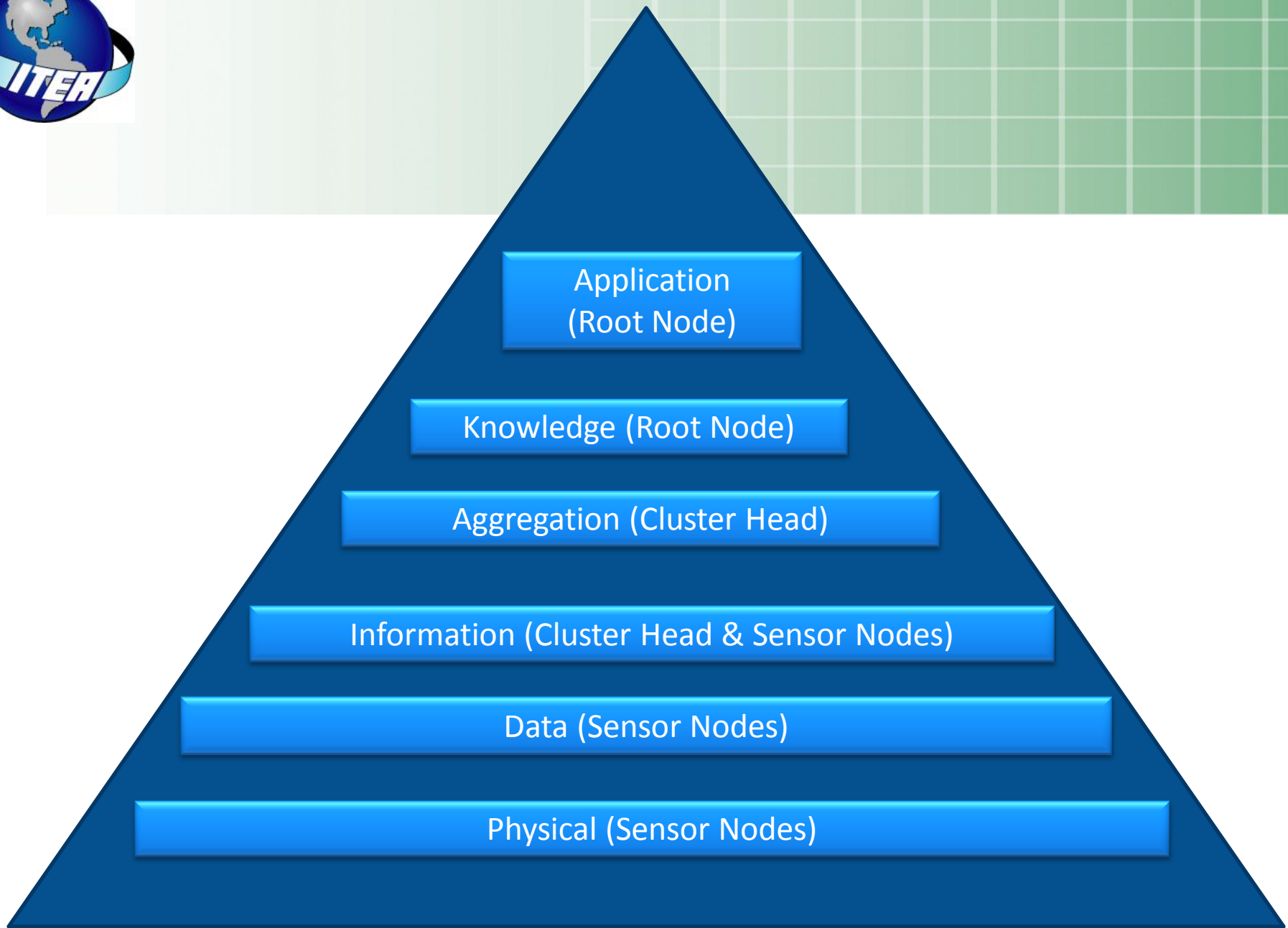
- **Defines a layered architecture**
 - high-level goal definition to task execution.
- **Manages how and where the data is collected.**





Information-Centric Technical Reference Model

- **Defines a layered architecture**
 - data collection
 - information aggregation
 - presentation
- **Not how and where the data is collected.**

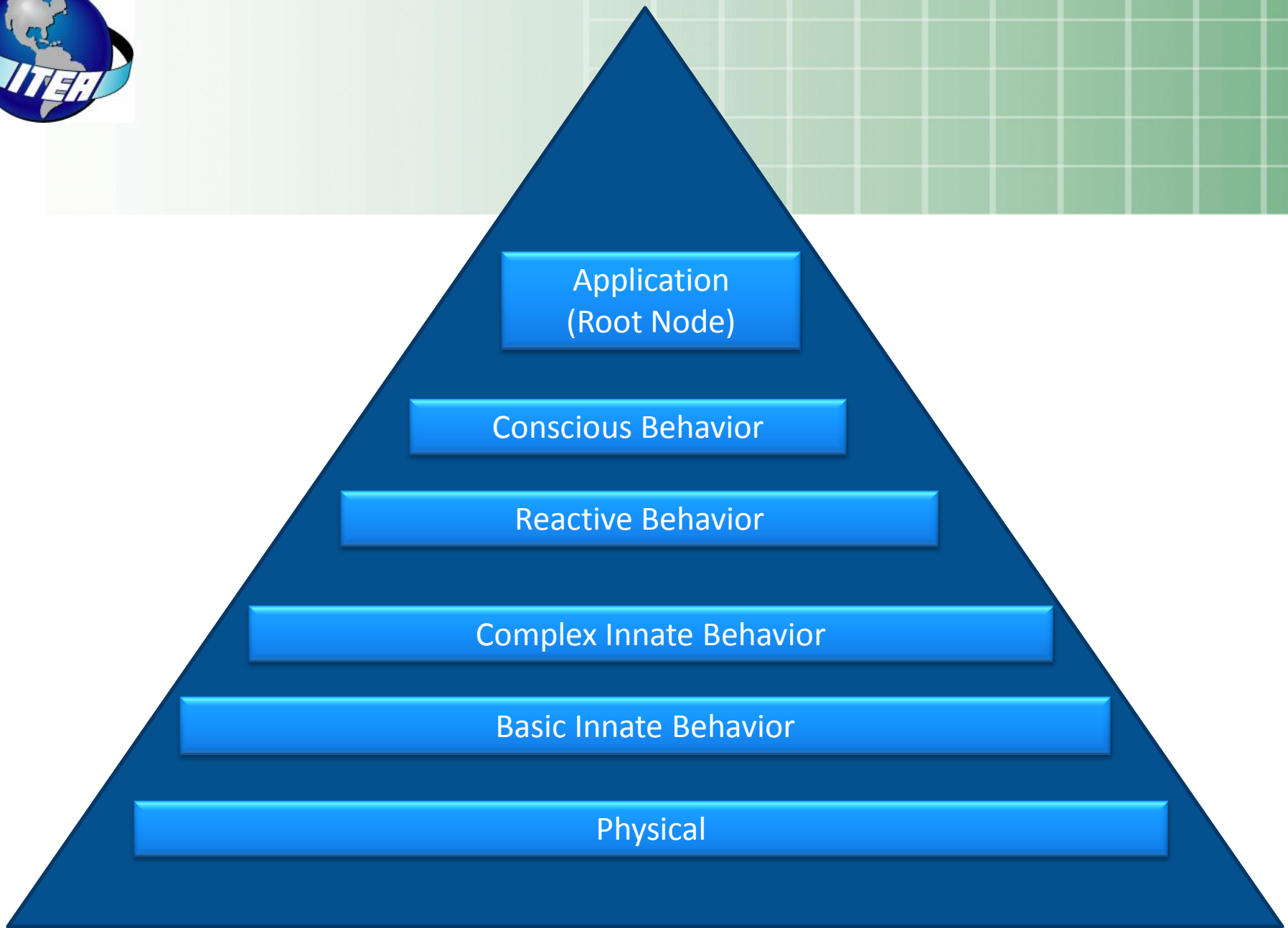




The Link between the Information Processing and Control Mechanisms

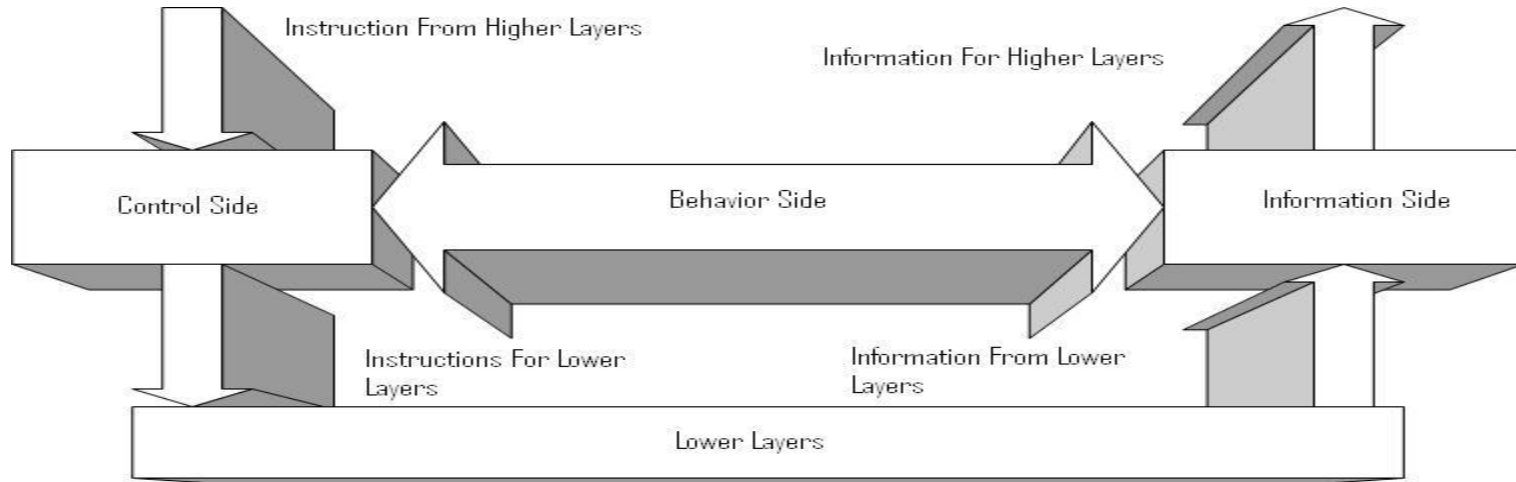
Behavior is:

- A mapping of sensory **inputs** to a pattern of motor/component **actions** which then are used to achieve a **task**.
- The **action or reaction** of something under specified **circumstances**.
- A **series of events** resulting from the execution of the operating rules of that system, as defined **within rule-clusters**.





Modified Closed Loop Control System



- The control side provides instruction to modules, at the subject and lower layers, to execute a task.
- The information-centric side extracts information about the system through the subject and lower layers.
- The behavior side at each level acts as a feedback path between the other two faces.



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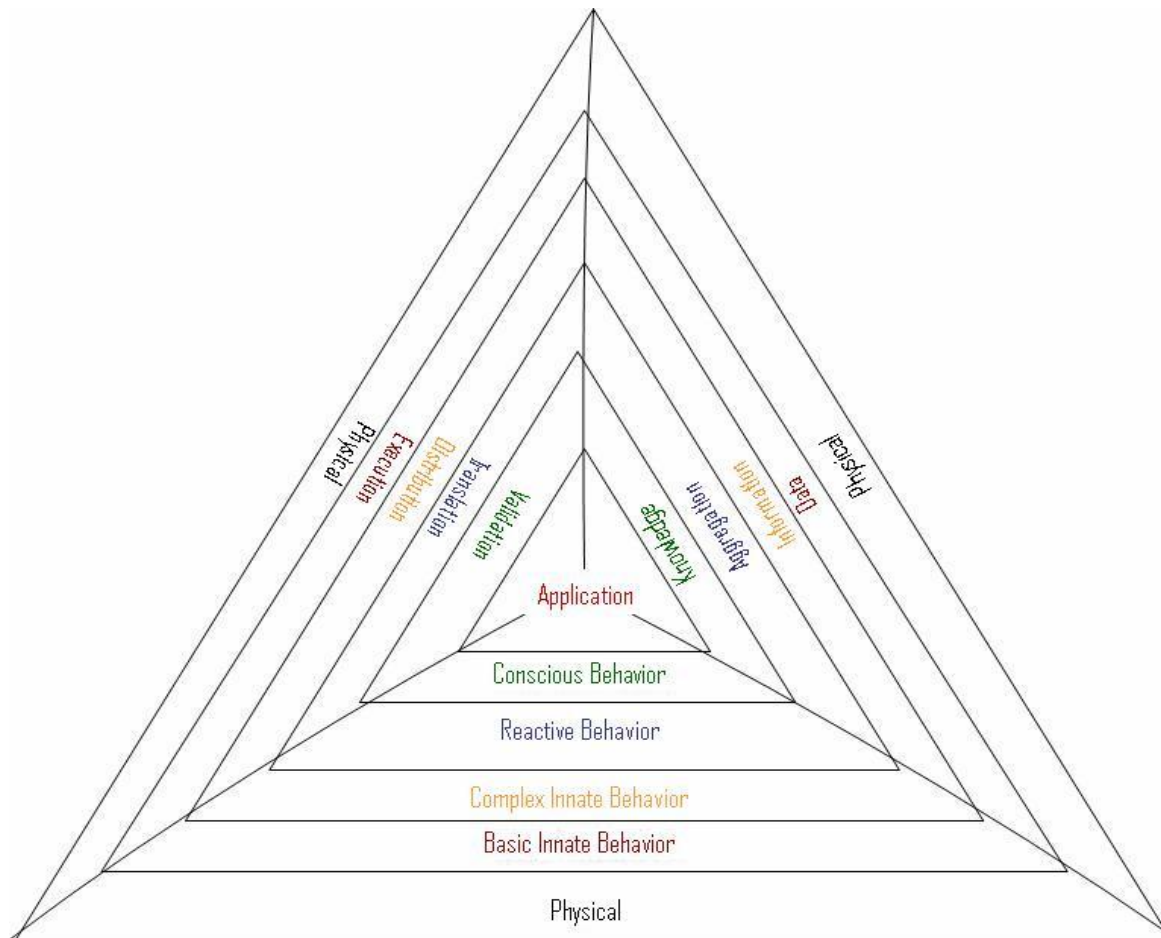
Integrated Technical Reference Model

Has three Faces, each defining an important aspect of the system:

- **Information-Centric Face**
- **Control-Centric Face**
- **Behavioral-Centric Face**



Integrating the Three Views





Sample Architecture Developed Based on the I-TRM

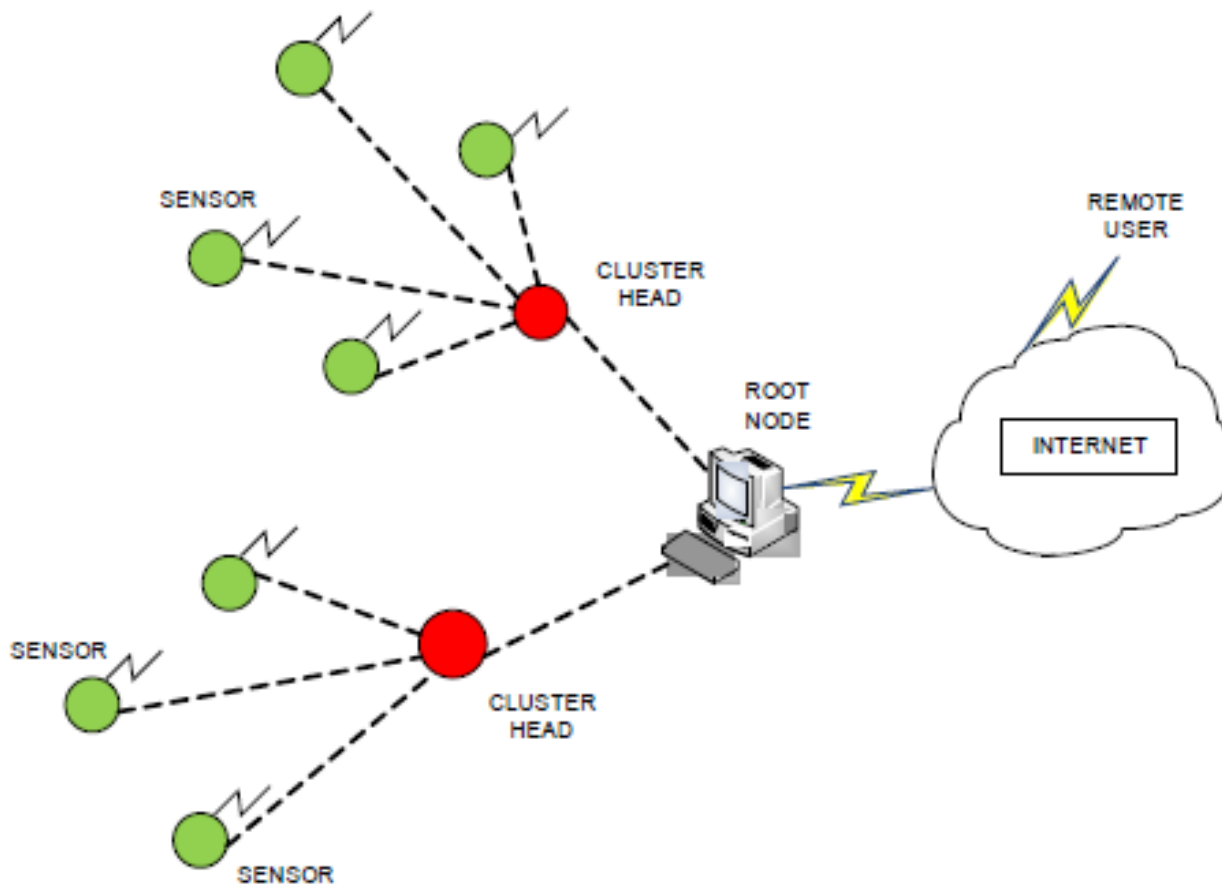
The I-TRM is being used to develop an architecture for a Sensor Network.

This system has three functional groups:

- **One or more Base-Station Units**
- **Multiple Cluster Heads and**
- **Multiple Sensor Nodes**



TYPICAL HIERARCHY OF A WSN



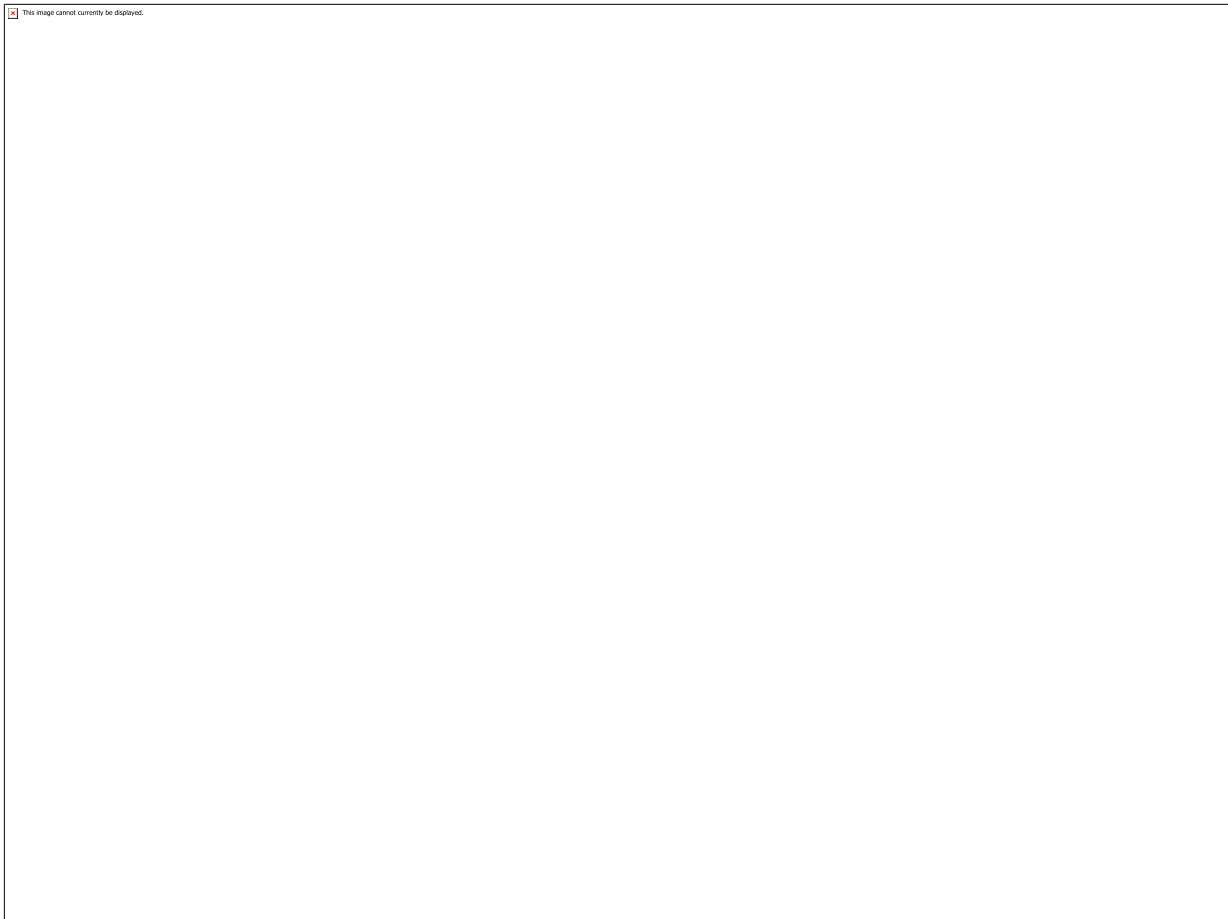


Comparison of I-TRM and Moteworks Architecture

- **WSN organized as Sensor Nodes, Cluster Heads and Root Node.**
- **I-TRM organized into three faces and six layers.**
- **Moteworks architecture divided into Mote Tier, Server Tier and Client Tier**



Comparison of I-TRM and Moteworks Architecture



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Thank You