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# The Trouble With C2 Architectures

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PRESENTED TO:

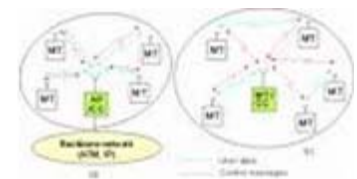
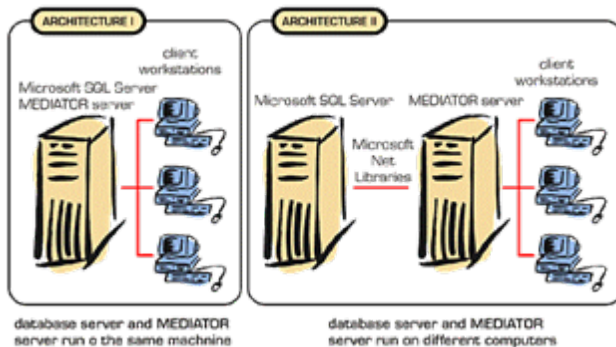
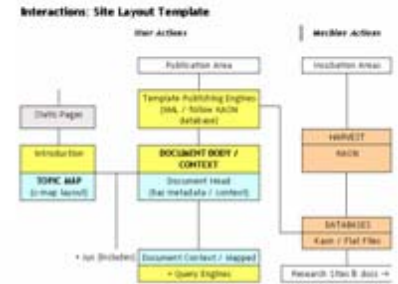
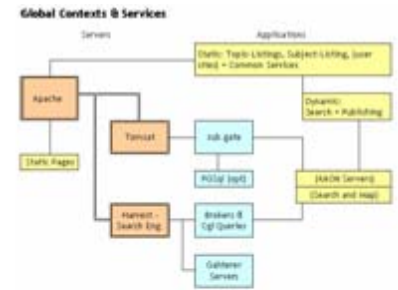
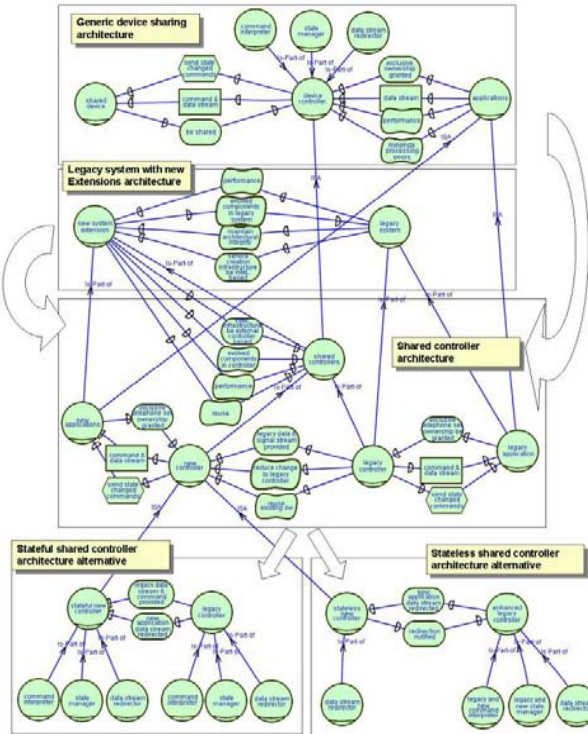
2007 International Command and Control Research and Technology Symposium

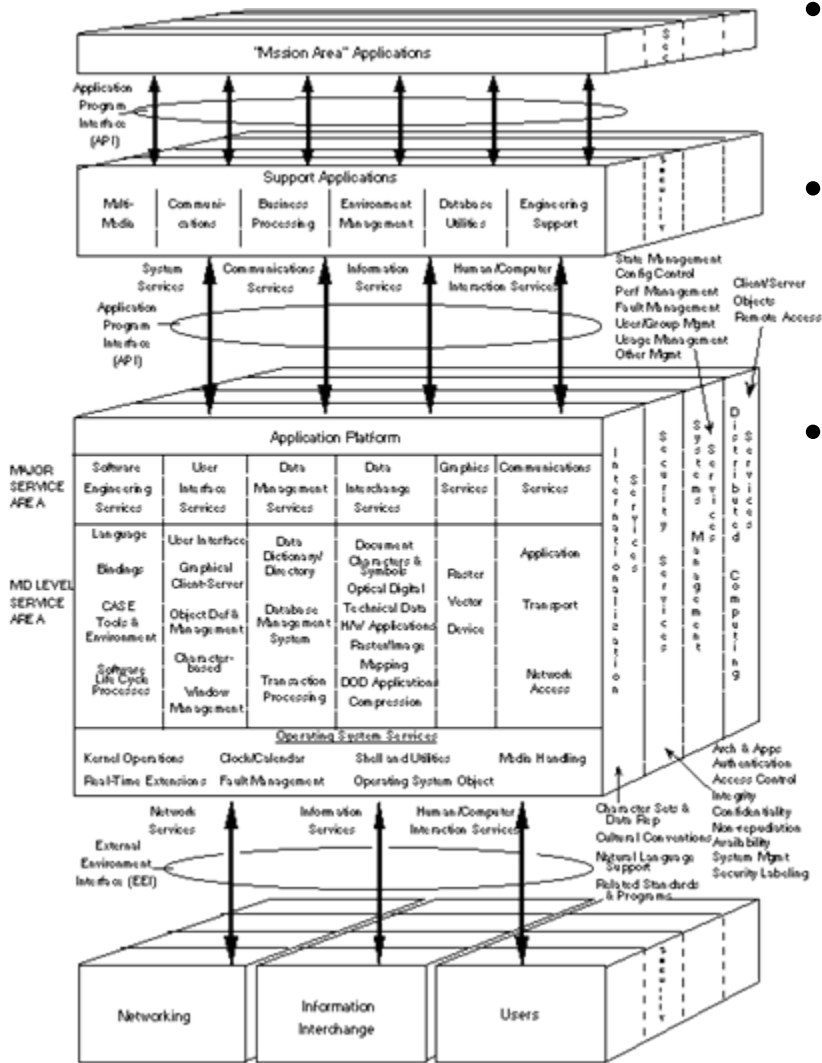
U.S. Naval War College, Newport, RI

19 - 21 June 2007

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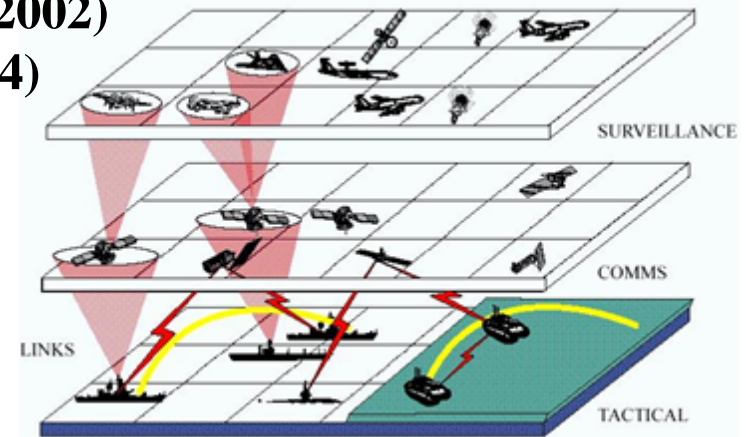
- **Background / Introduction**
- **So What's The Problem?**
- **Previous efforts**
  - WSA&E
  - ForceNet
  - CCEA/NCC
- **WDWGFH?**
  - RECOMMENDATIONS
  - A PLAN
  - A PROCESS





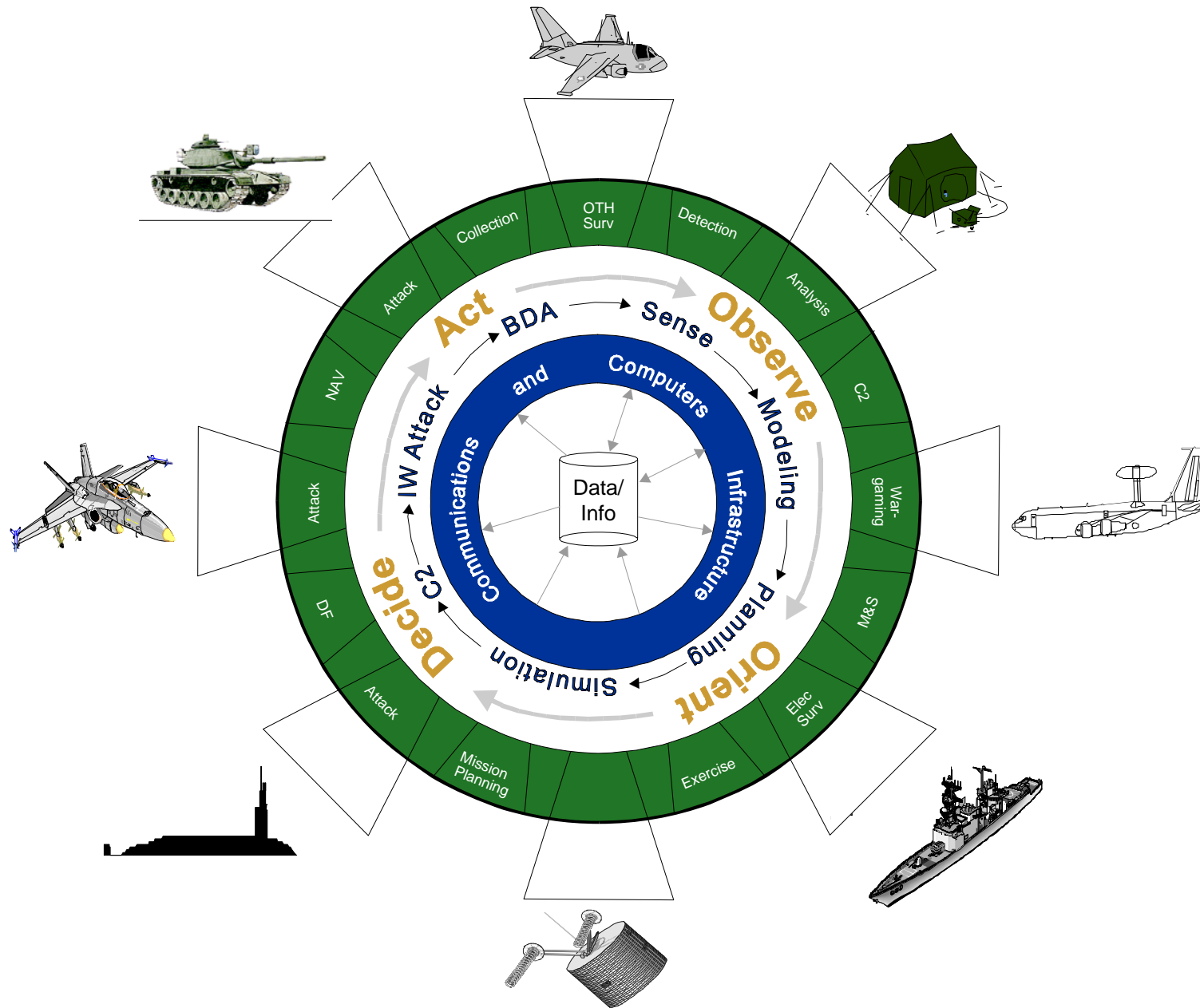
TAFIM Technical Reference Model

- DSB Reports (Early 1990s)
- OASD(C3I) Studies (Late 1990s)
- Architectures Frameworks
  - Zachman (1987)
  - TAFIM (1994)
  - C4ISR (1997)
  - OMB FEA (2002)
  - DoDAF (2004)
  - ....



Navy Copernicus

# INFORMATION SHARING REQUIREMENTS



DoD has been working with architectures for more than 20 years. Yet, few if any architecture projects have survived long enough to have significant impact or acquisition / portfolio management.

- Considering all that has been done over the past 20+ years ...
  - Why is the process of identifying and developing architectures for the Department of Defense so difficult, costly and time consuming?
  - Why is DoD still struggling to:
    - ◆ define what exactly constitutes an architecture,
    - ◆ identify what type of architectures do and/or should exist,
    - ◆ categorize architecture concepts, and
    - ◆ develop a long range plan for architecture development and maintenance?
  - Most of today's presentation reflects our CCRTS paper presented here at the Naval War College in 1999 – "Architecture: The Road to Interoperability": So, is anybody really listening?

# RECENT EXAMPLES



**Grenada**



**Operation Iraqi Freedom**



**9/11**



**Operation Allied Force, Kosovo**

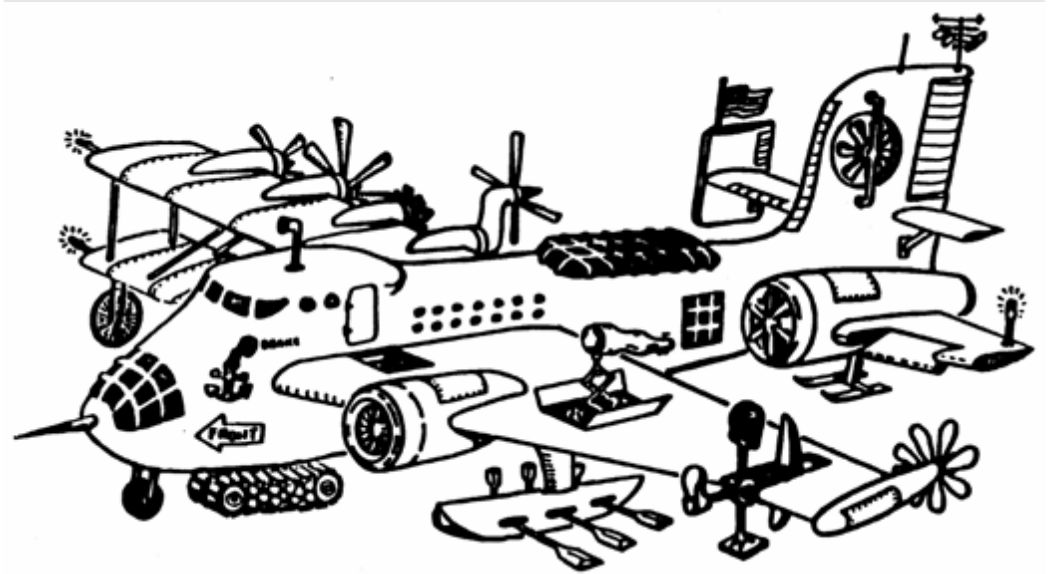


**Hurricane Katrina**

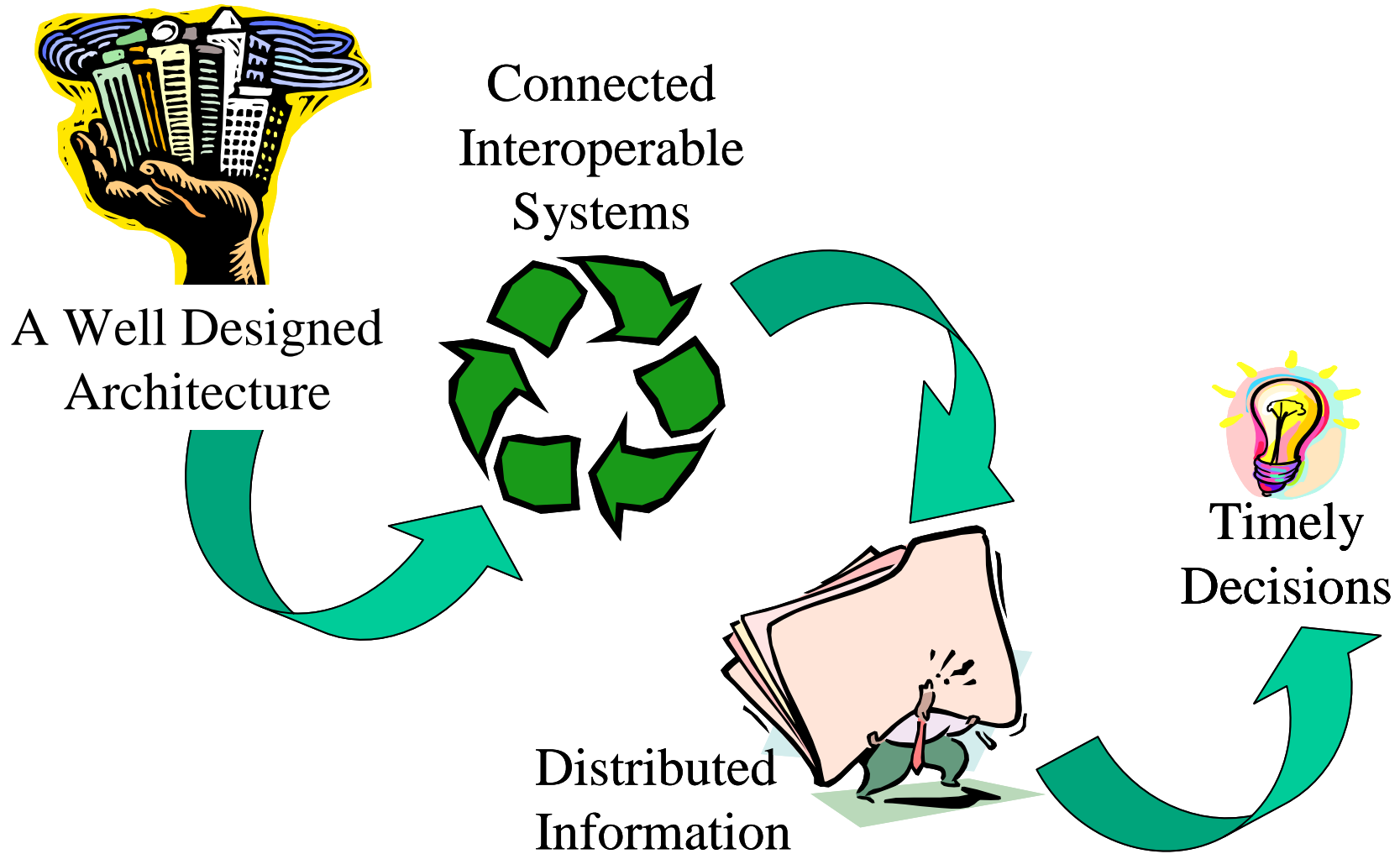
# THE REASON FOR ARCHITECTURES



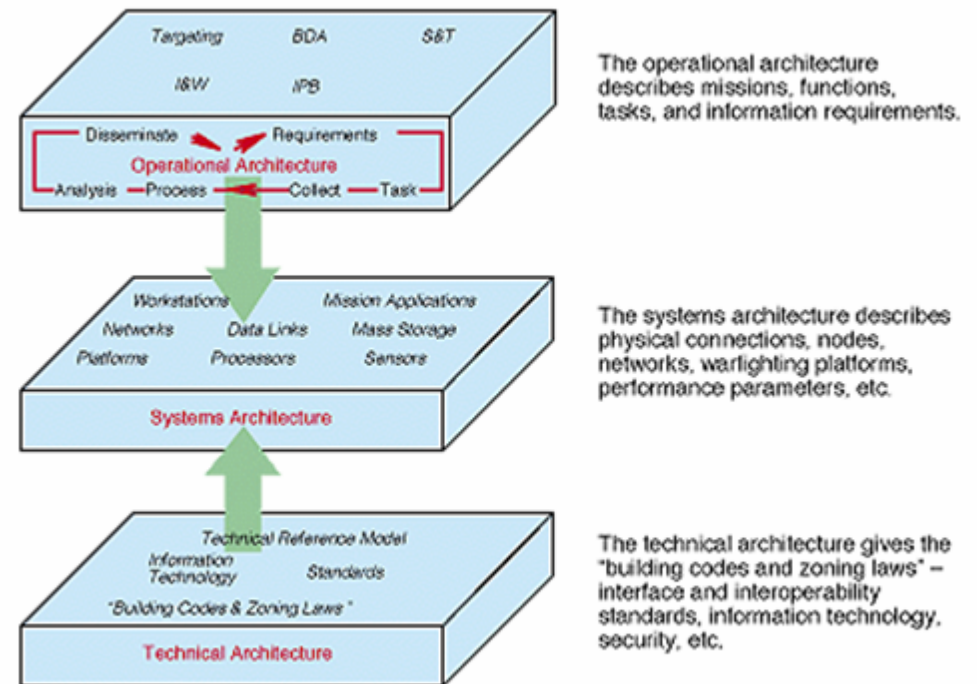
M-18 – “The Pelosi”.



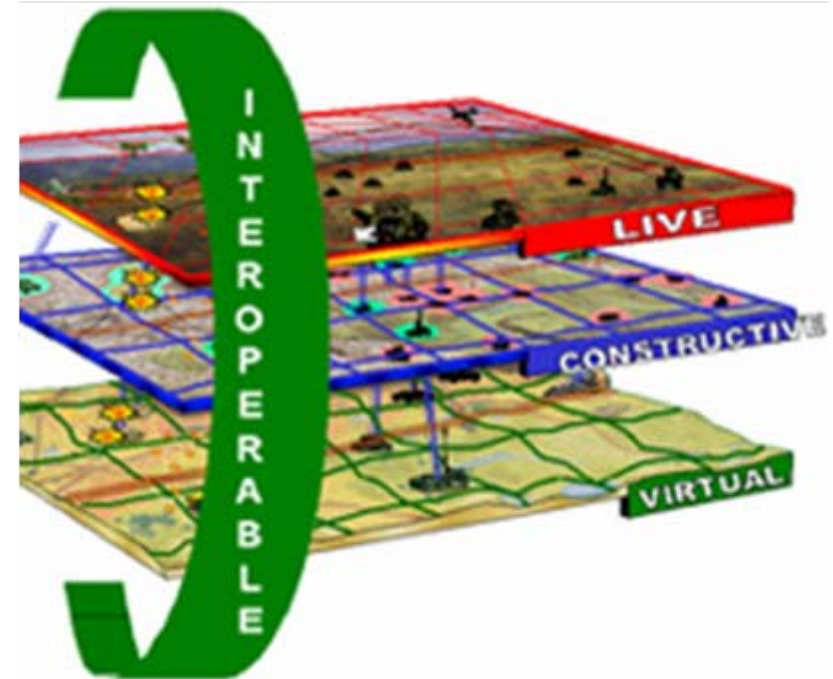




- **Webster:** “... the art and science of designing and erecting ... a style and method of design and construction ... design or system perceived by humans...”
- **CSC:** “A framework or structure that portrays relationships among all the elements of the subject force, system, or activity.”
- **DoD 8020:** “An organized framework consisting of principles, rules, conventions, and standards that serve to guide development and construction activities such that all components of the intended structure will work together to satisfy the ultimate objective of the structure.”



- **From the DoD Dictionary of Military Terms:**  
**1. The ability to operate in synergy in the execution of assigned tasks. 2. The condition achieved among communications-electronics systems or items of communications-electronics equipment when information or services can be exchanged directly and satisfactorily between them and/or their users.**
- **“The ability of systems, units, or forces to provide services to and accept services from other systems, units, or forces, and to use the services so exchanged to enable them to operate effectively together.” [JITC, 1998]**



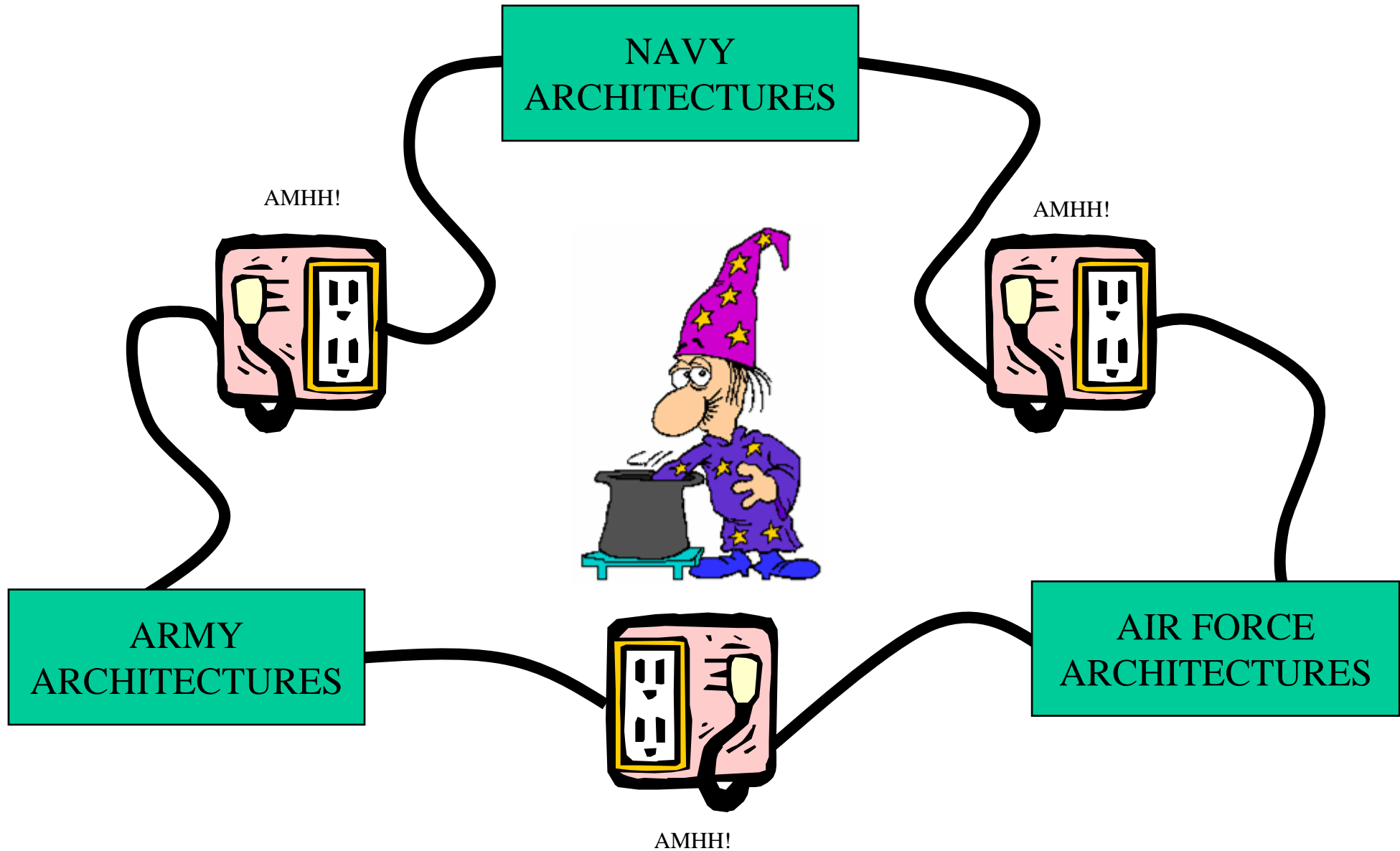
## More confusing terminology:

- **Requirement** – something needed; that which is required; a thing demanded or obligatory; a need or necessity. In architecture terms: functionality that is required in order to do whatever it is we want / need to do. A requirement represents a needed functionality whether it currently exists or not. [Webster, 1984]
- **Capability** – potential for use; the quality of being capable; capacity; ability; qualities, abilities, features, etc., that can be used or developed; potential. An existing functionality. A capability represents a functionality that currently exists whether it is needed or not. [Webster, 1984]

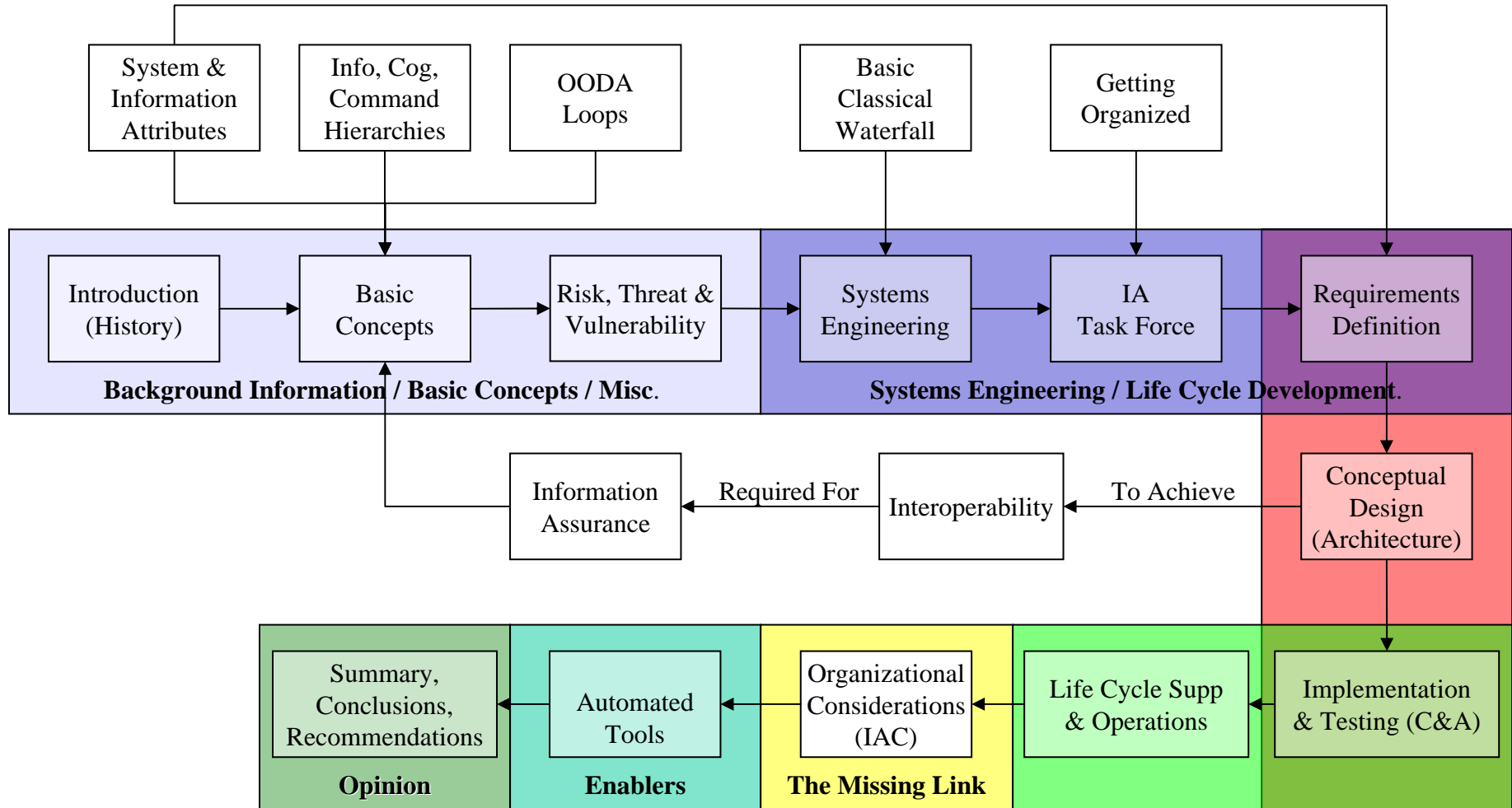
*Imprecise communications just exacerbates the problem.*

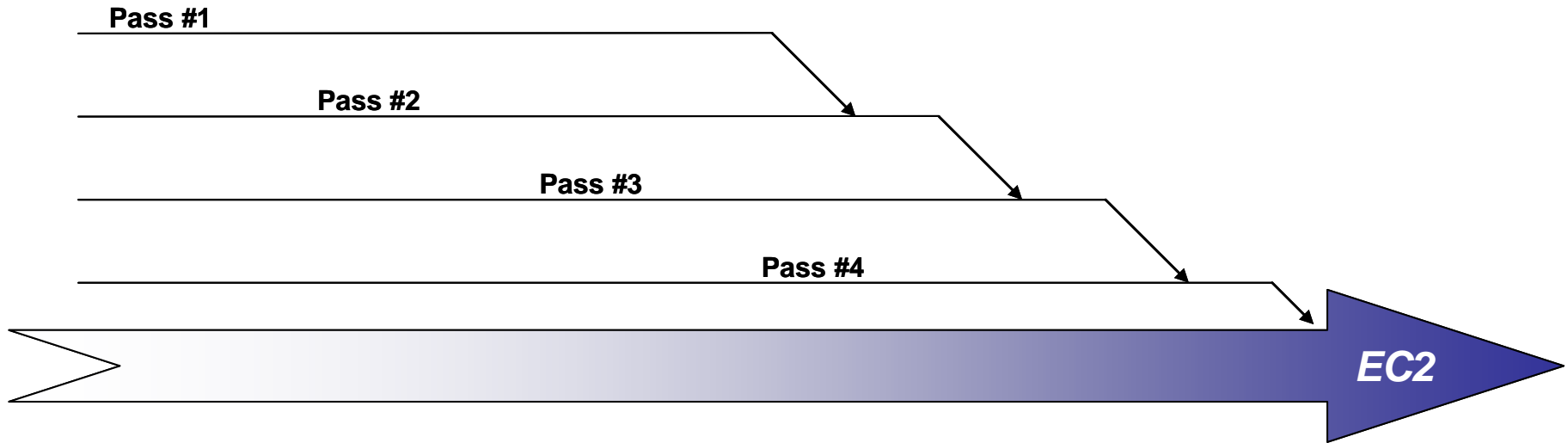
- **WSA&E** – Joint SPAWAR/CNO effort. Took too long with minimal results.
- **ForceNet** - SSC-C revived and automated a WSA&E-like process.
- **UCS** – ASD(NII) focused on C2 policy and, to some extent, portfolio management vs actual architecture.
- **OMB FEA** – Mandated compliance by all D&A but, very little progress so far.
- **CCEA/NCC** – Initiated to respond to deficiencies noted in 9/11 and other events. The initial CCEA document contained very little core architecture data and was a far cry from complete. NCC just getting started.
- **DNI CIO** – Enterprise Architecture for the Intelligence Community.
- **Others:**
  - **DII COE; C4ISR Architecture Framework; Joint Warfighter Architecture; Copernicus; DoN ITI; INCA; Horizon, etc.**

# WDWGFH?



# INFORMATION OPERATIONS LIFE CYCLE





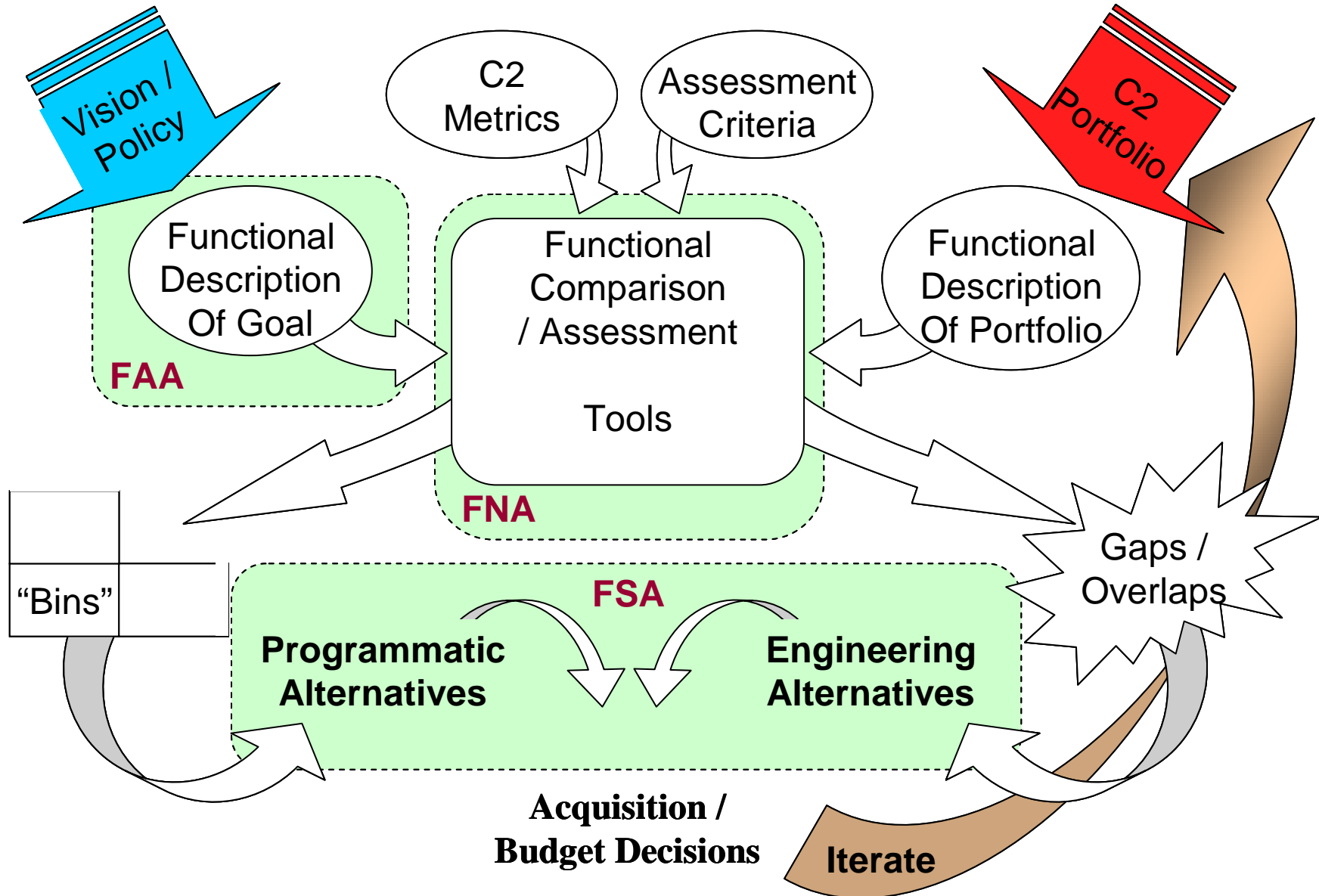
With each pass through the Assessment Process we:

- Identify deltas between the existing state and the goal state;
- Identify alternatives to close the gap;
- Procure / implement alternatives that get us closer to the desired end state; and,
- Update the existing state and re-iterate.

Do this and we continually get closer and closer to the goal end state:



# PORTFOLIO MANAGEMENT PROCESS



- **Architecture development is NOT a short term effort.**
- **Currently, program managers are required to produce architectural artifacts (DoDAF, FEA, etc.) in order to show that they have considered architectural issues.**
- **Most “architectures” take the form of MS Word files, PowerPoint presentations and Visio drawings that are bound into a hardcopy volume and placed upon a shelf.**
- **To date, no architecture assessment process has managed to stay alive through more than one or two iterations.**
- **It is obvious that the concepts, processes and methodologies associated with a well defined, repeatable, enterprise-wide, systems engineering process have merit and would significantly increase the effectiveness and efficiency of C2.**
- **The concept of a single unifying construct and a repeatable, defensible process for portfolio management must receive support at the highest levels of DoD.**

- First, as twice reiterated by the DSB, some high-level guidance and control must be established for the entire enterprise.
- Next, we must settle upon a common lexicon.
- Third, a standardized, a well-defined, repeatable architectural development process would significantly simplify the evolution of architectures.
- Fourth, we must define and adopt architecture development, definition, maintenance and interface standards as necessary.
- Fifth, any architecture effort must produce meaningful interim results if it is to survive.
- Finally, the most important single concept is automation.

**None of this is new!**

*“A good plan executed violently today is better than a perfect plan executed tomorrow.”*



General George S. Patton, Jr.