

**Ground Systems Architecture Workshop  
1998**

**An NRO Vision for Ground Systems  
Architecture**

**Brigadier General Howard J. Mitchell**

**Director**

**Communications Systems Acquisition and Operations**

# Agenda

- **What We all Want**
- **Lessons From the Past**
- **Lessons From Today**
- **A Vision to Consider**

## **What We all Want**

- **Empowerment to Excel**
- **Freedom to do our Mission**
- **Wisdom to Learn from Past Mistakes**
- **Solutions for the Future**

# Lessons from the Past

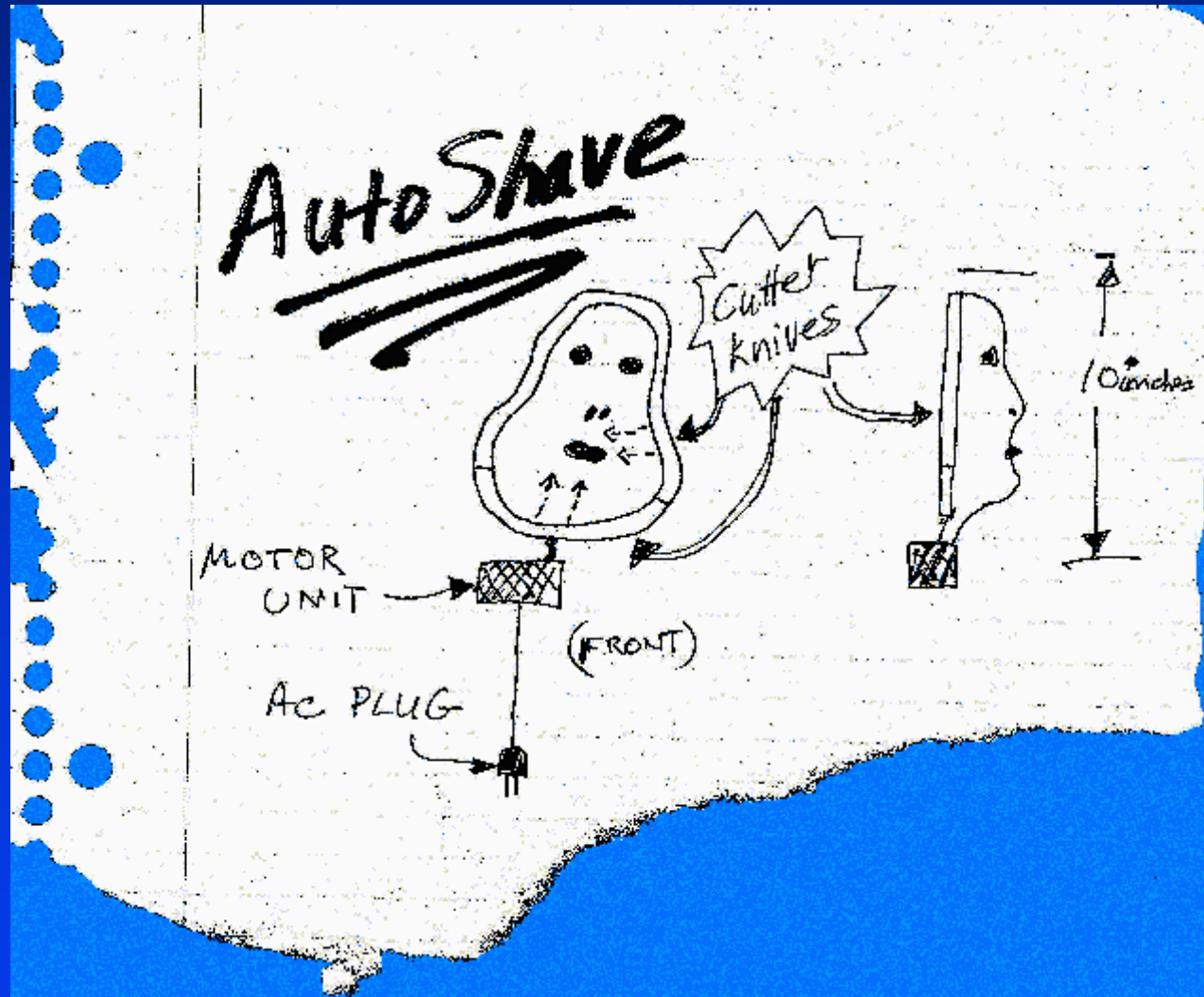
Etruscans: ~1000BC - 505BC



Stovepipes don't work!

# Lessons from the Past

A Common, Rigid Solution Doesn't Work Either



# Lessons from Today

**Experience:** Large core implementation is bad because when it breaks, the system breaks, and regression testing becomes expensive.

General DeKok,  
GSAW 1997

**Lesson 1:** True because the system implemented was not structured to support change.

**Lesson 2:** We need to design large systems in a new way. We need to support change and new technology.

## Lessons from Today

**Experience:** COTS integration is non-trivial.

**Lesson 3:** Architectural mismatches between COTS products can be a problem for reuse and interoperability.

**Lesson 4:** Standards are important, but are not enough for interoperability.

**Lesson 5:** Need to leverage commercial success with component-based systems using a common underlying architecture.

## Lessons from Today

**Experience:** Reuse does not have the promised payoff.

**Lesson 6:** Reuse is the means, not the end.

**Lesson 7:** Successful reuse requires a strategy.

**Lesson 8:** Reuse needs to be applied to leverage big-ticket assets.

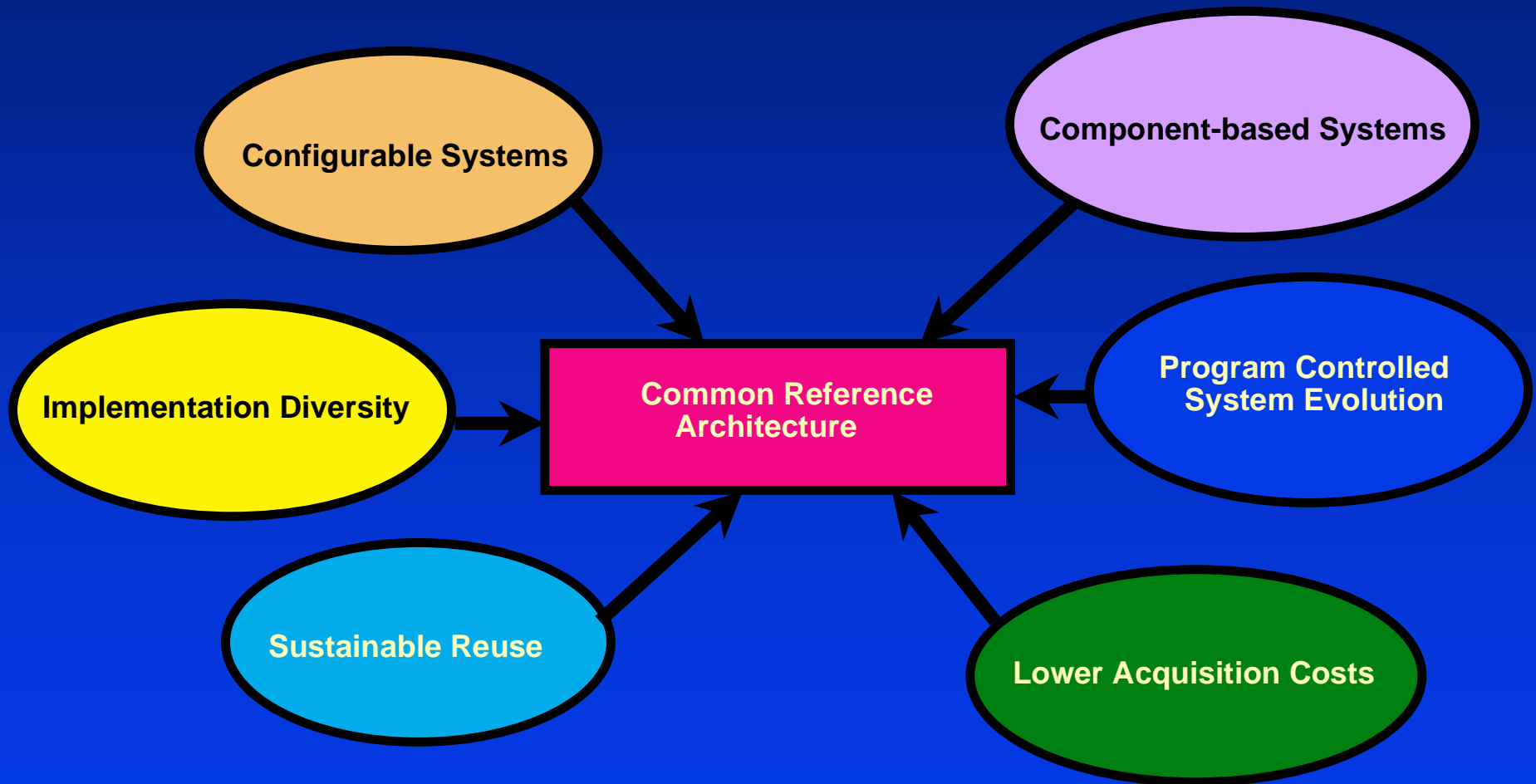
## Lessons from Today

**Experience:** Systems have become increasingly complex.  
They are consequently harder, slower, and more expensive to deploy.

**Lesson 9:** The organizational and acquisition processes we employ are not geared to meet that complexity and to reduce cycle time and cost.

**Lesson 10:** We build what we are organized to build.

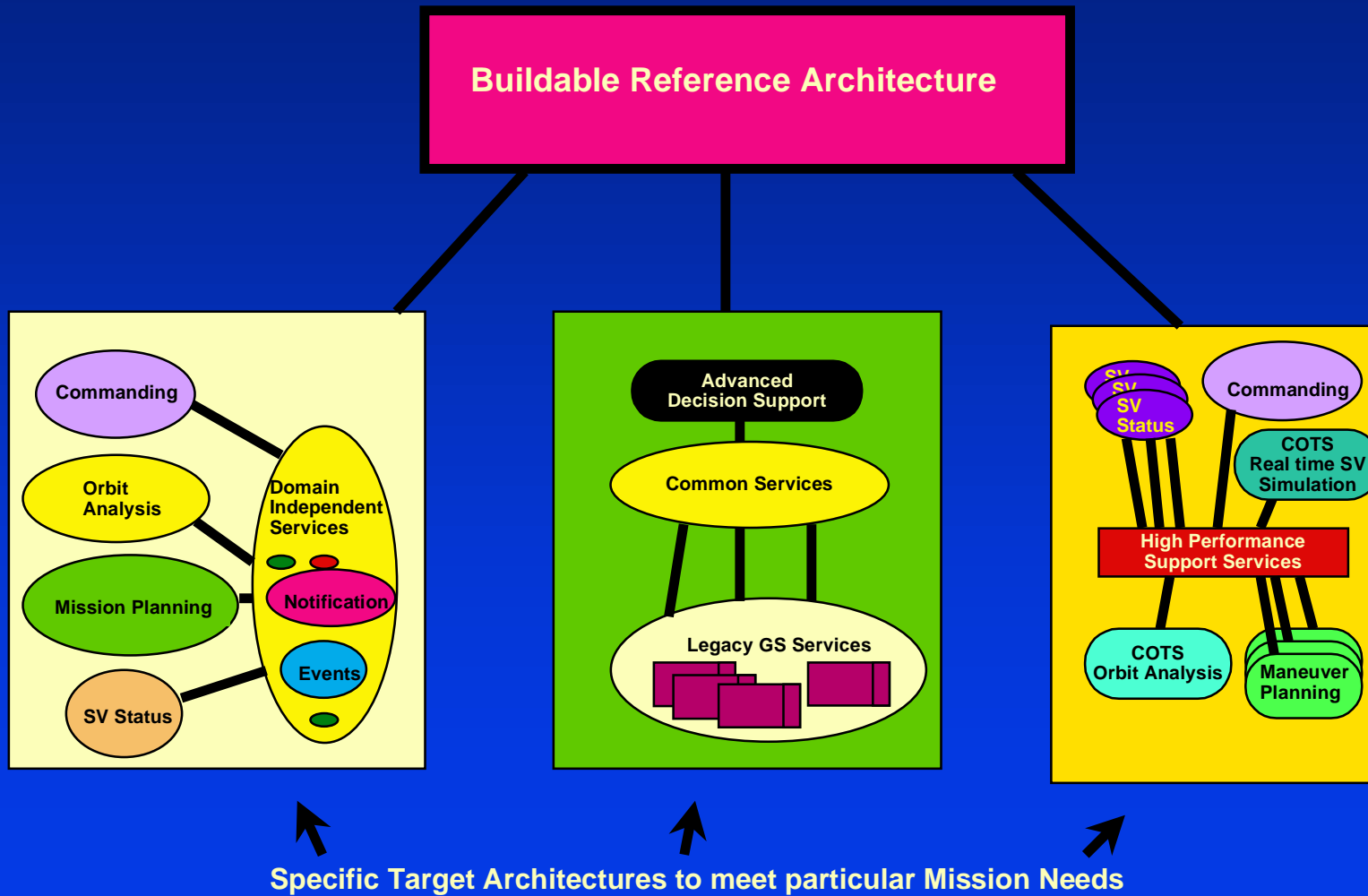
## What does this all mean?



A common reference architecture is **not** AutoShave!

# A Vision to Consider

## A Compromise Solution



## Challenges We Face

- **The Right Domains**
- **Legacy Architectures**
- **Stakeholders**
- **Architectural Evolution**
- **Ownership of Domain and Product Line Architectures**

## **We Have Partners to mount the challenges**



- **FFRDCs (e.g., SEI, Aerospace, Mitre)**
- **Universities (e.g., USC, CMU)**
- **Commercial Developers (e.g., Raytheon, Lockheed Martin, HP)**

## Summary

- We need an approach that falls evenly between the Etruscan and Autoshave extremes
- We live in a constrained world with many relationships
- We need to build systems that support change and complexity
- We must cooperate to achieve interoperability and exploit COTS
- An underlying architecture is key

**Use of a common reference architecture that will support ground system product lines is a promising vision for the NRO**

**Thank you!**