Homeland Security

United States Coast Guard

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- Presenter
- David M. Hammond, RLA, APA
- Office of Civil Engineering
- U. S. Coast Guard

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# The Strategic Process Behind BIM Enabled Decision Processes

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- David M. Hammond, RLA, APA
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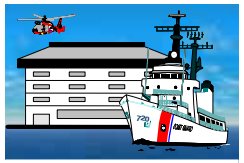
# Linking Facilities to Missions

## Missions to Public Outcomes

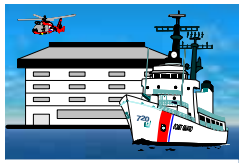


# Overview

## Standards based Building Information Modeling

Experiences of a Government Owner-Operator with new business practices and technologies:

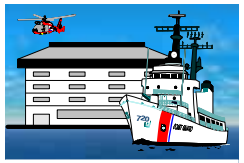
- What we intended to achieve
- What we did differently to achieve it
- How we will measured success



# What we intended to achieve

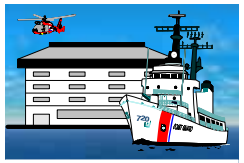
## Organizational Transformation

- Move from a locally focused sub-optimized facility engineering perspective…
- To an enterprise-wide asset and portfolio management organization focused on managing $7.5B PRV for CG-wide Strategic Outcomes.
- Link Facilities to Mission Outcomes.
- Achieve 17%  to 25% recurring savings in how we deliver services.
- Achieve CFO Act Audit Certification (Sarbanes/Oxley).



# What we did differently

- **Reengineered Processes**
- **Identified Enabling IT**
- **Instituted Organizational Change**

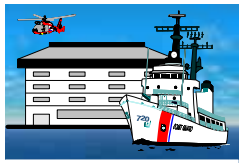


# Be an Info-Centric Organization

## Framework for Integrated Decision-Making

### Essence of this *IT-Enabled* Enterprise Framework:

- Moving away from building-centric and project focus
- Moving to a portfolio-based, business process linked to strategic outcomes
- Integration of individual asset portfolios; i.e., Buildings, Cutters, Aircraft, Logistics, IT and HR
- Continuous horizontal flow across the organization
- Break down of the traditional structure of professional and trade disciplines and traditional stove piped software development
- IAI-IFCs and IFGs important because they enable the horizontal process flow through an open architecture and international standards



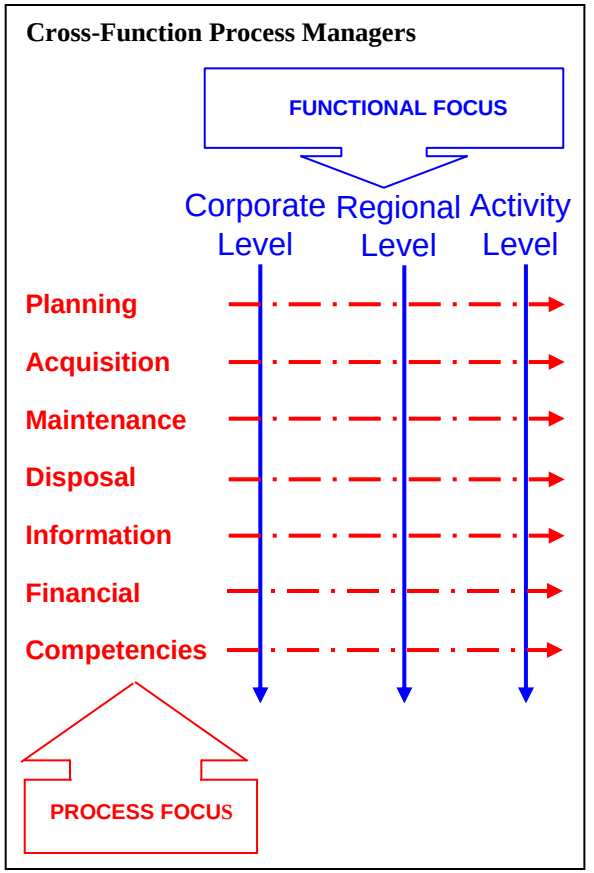
# Process Focus

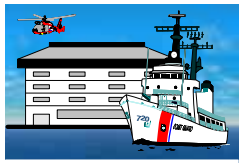
## Horizontal Cross-Functional Alignment

### Cross-Functional Mgmt Recognizes that:

- *Process*, or *how we get things done* must be treated as a strategic corporate priority.
- Competition is won by treating all parts of the organization as a single unified whole.
- Critical cross-functional shore infrastructure processes managed by process managers.

Dimancesu





# Process Reengineering

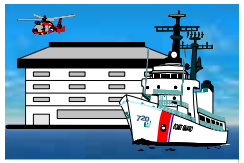
## Vertical Value Chain Alignment

**Process Alignment**

- Link and align daily tactical activities to agency-wide strategic outcomes.

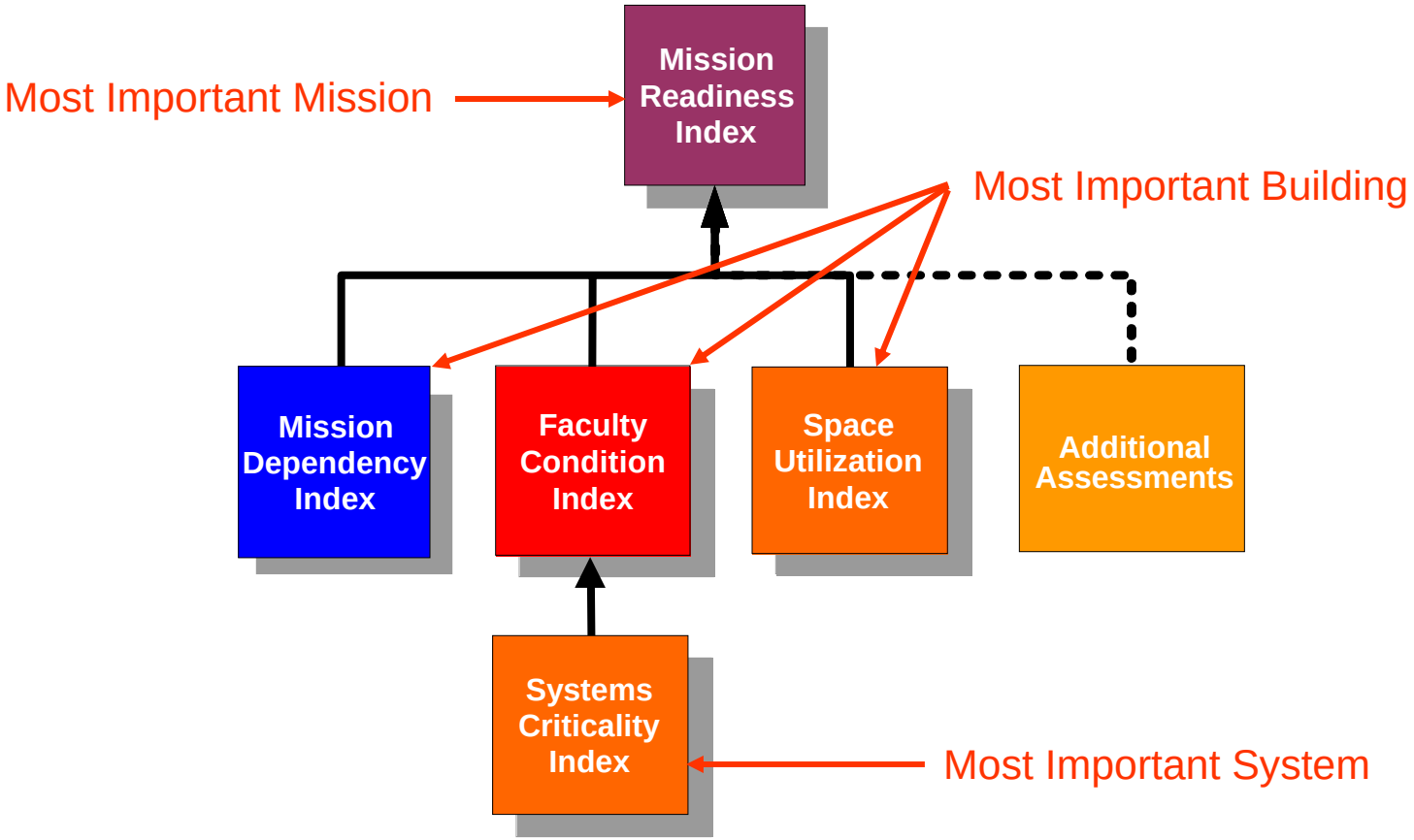
**Value Chain**

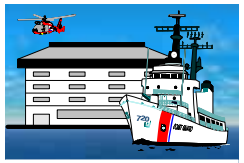
- Link facility capabilities to operational requirements: our customers;
- Link operational capabilities to mission requirements
- Link mission capabilities to public demand for goods/services: our customer's customer.



# Operational Metrics + Data =Decision Support

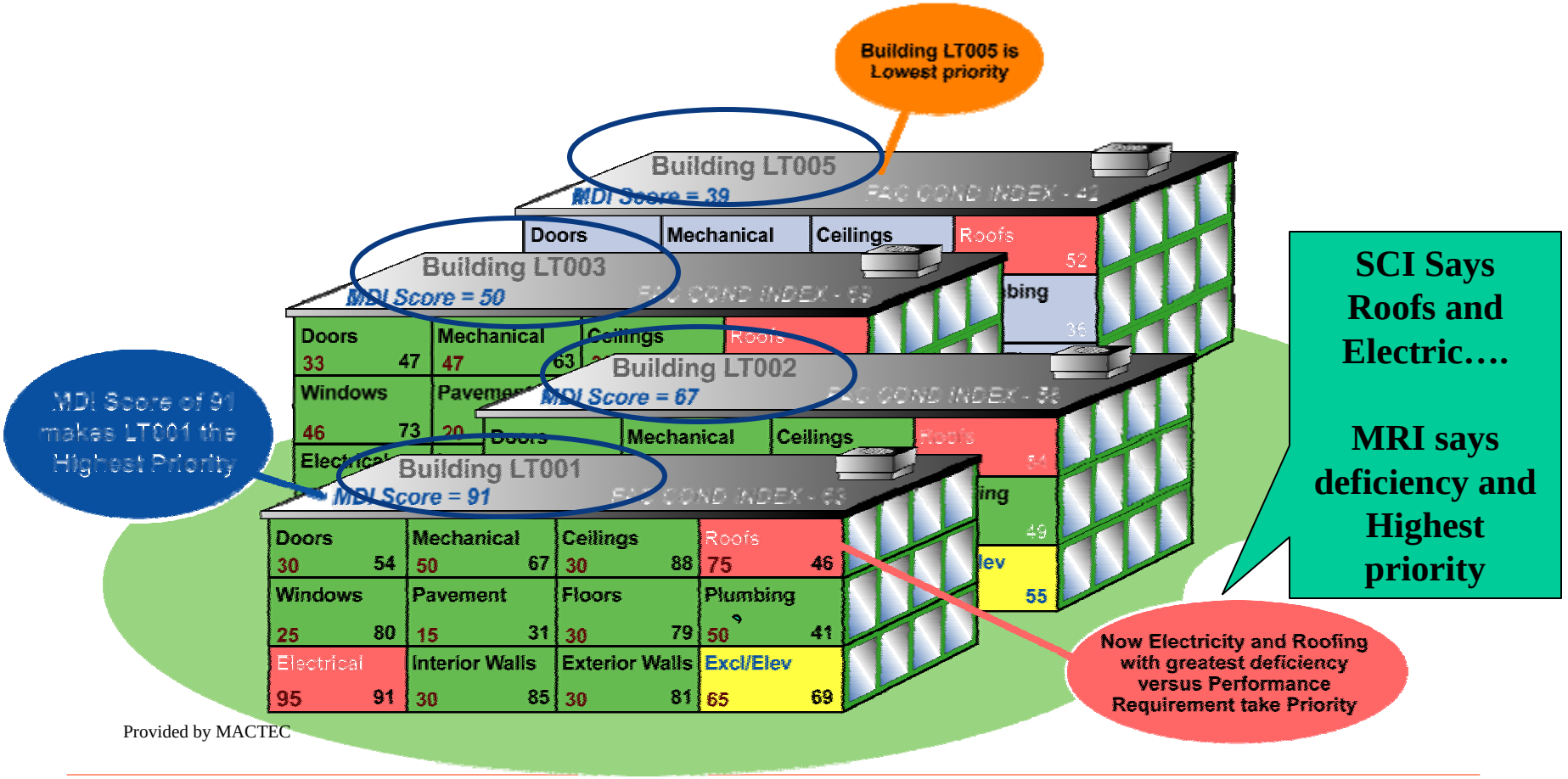
## Asset and Portfolio Performance





# Mission Driven Decisions

## Linking Facilities to Missions




Provided by MACTEC

# Animated Business Case/5D

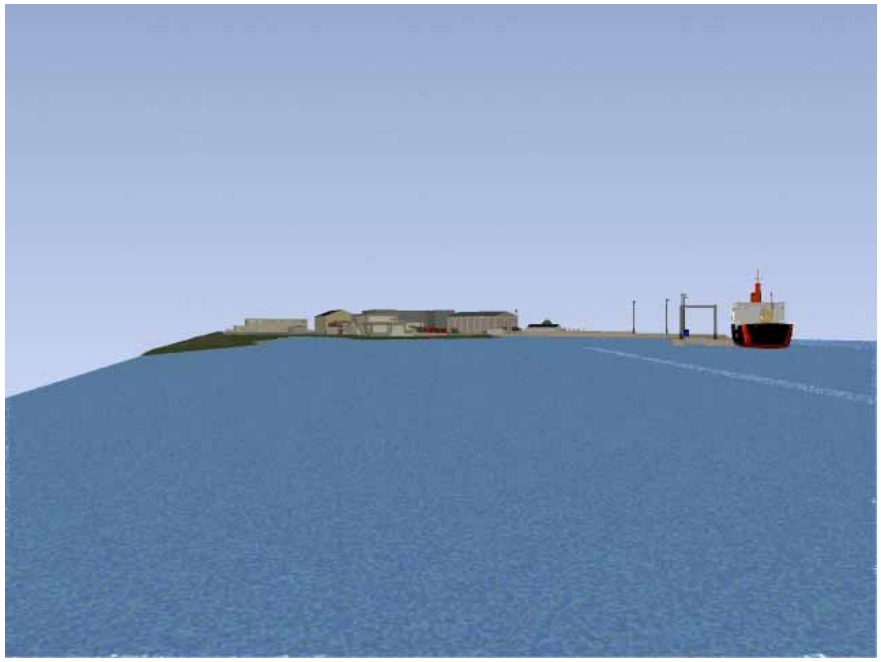
Facilities Maintenance Dollars, Time, and Building Systems. Animations shows how systems can fail over time with current spending methods.

Provided by AEC Infosystems,Inc

# Decision Strategies

## Capital Assets are Part of the Common Operational Picture

Managing Operational Requirements, Infrastructure Capability, and Organizational Needs.



Provided by AEC Infosystems,Inc

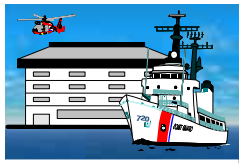
# Capital Asset Management Portal

## Access to Aggregated Database and Graphics

CAMP combines and displays portal tools and data views supporting Portfolio Management and Integrated Decision-Making and Value Chain.

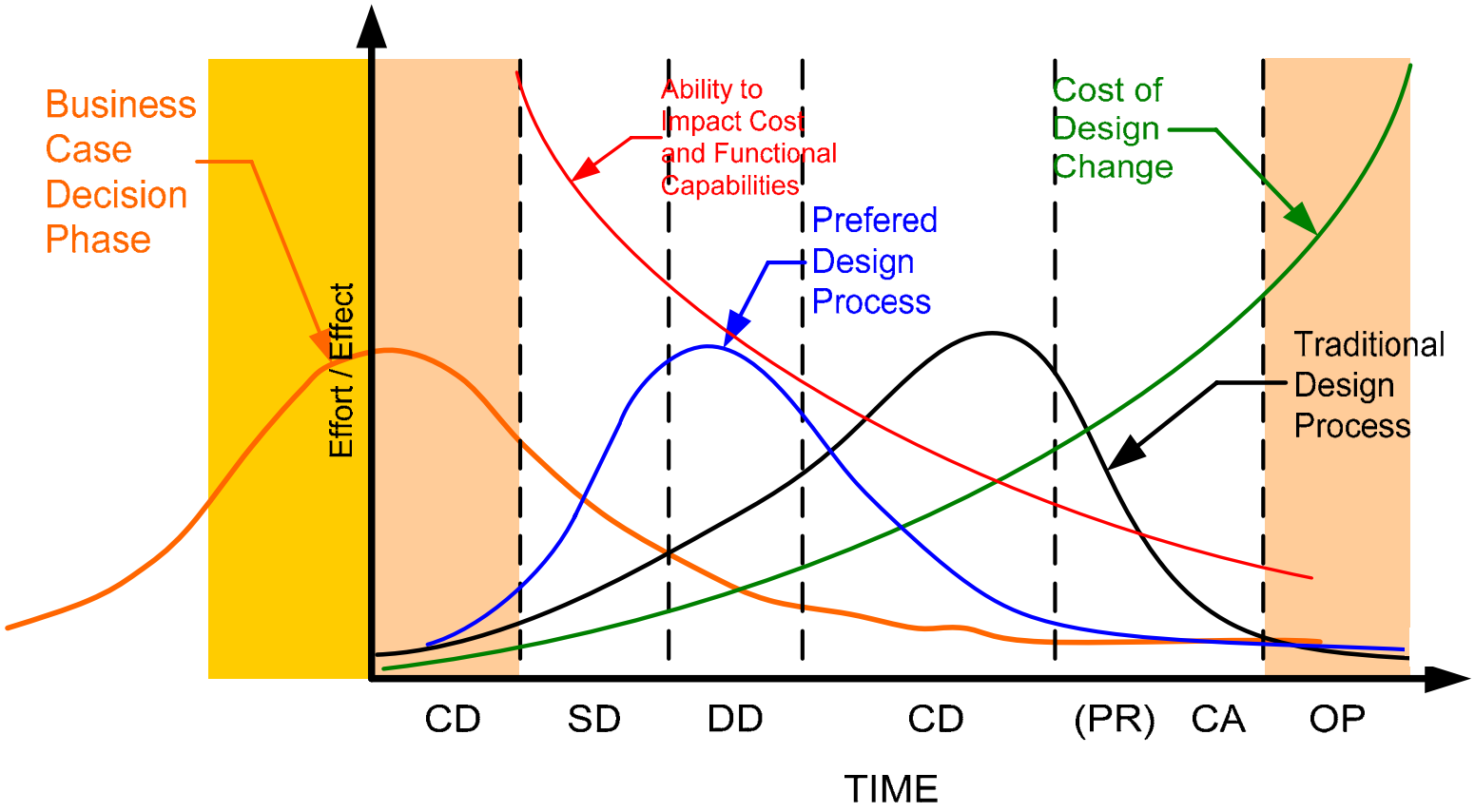
- Portfolio Management Links Supply and Demand Side of Scenario Based Mission Planning:

- Real Time Mission Readiness
- Scenario Based Business Case Development
- Automated Planning Documentation and Web-enabled Approval Process
- Value Chain as Web-enabled Workflow



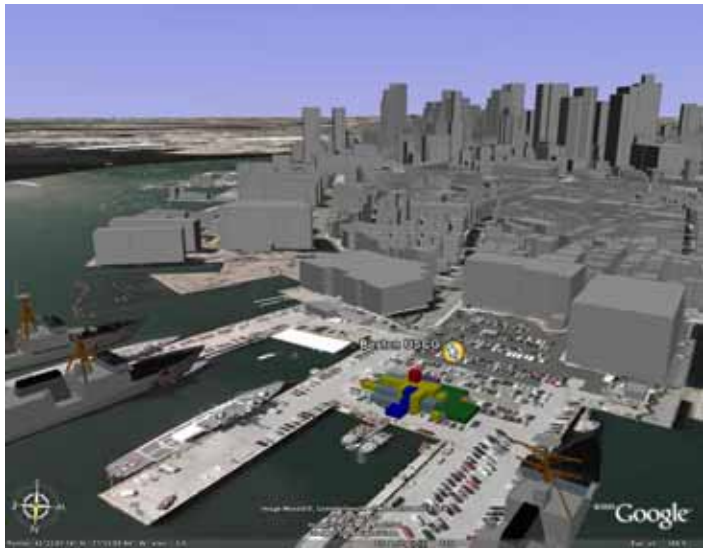
# Left Shift in Decision Support

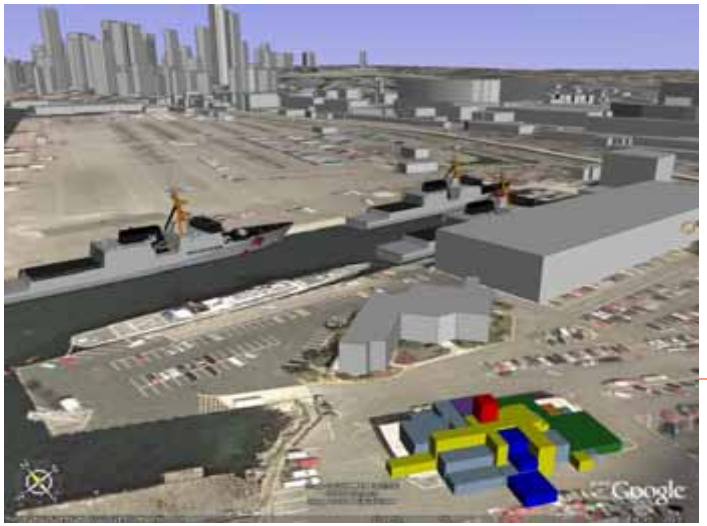
## Simultaneous Life Cycle-Spanning Business Case

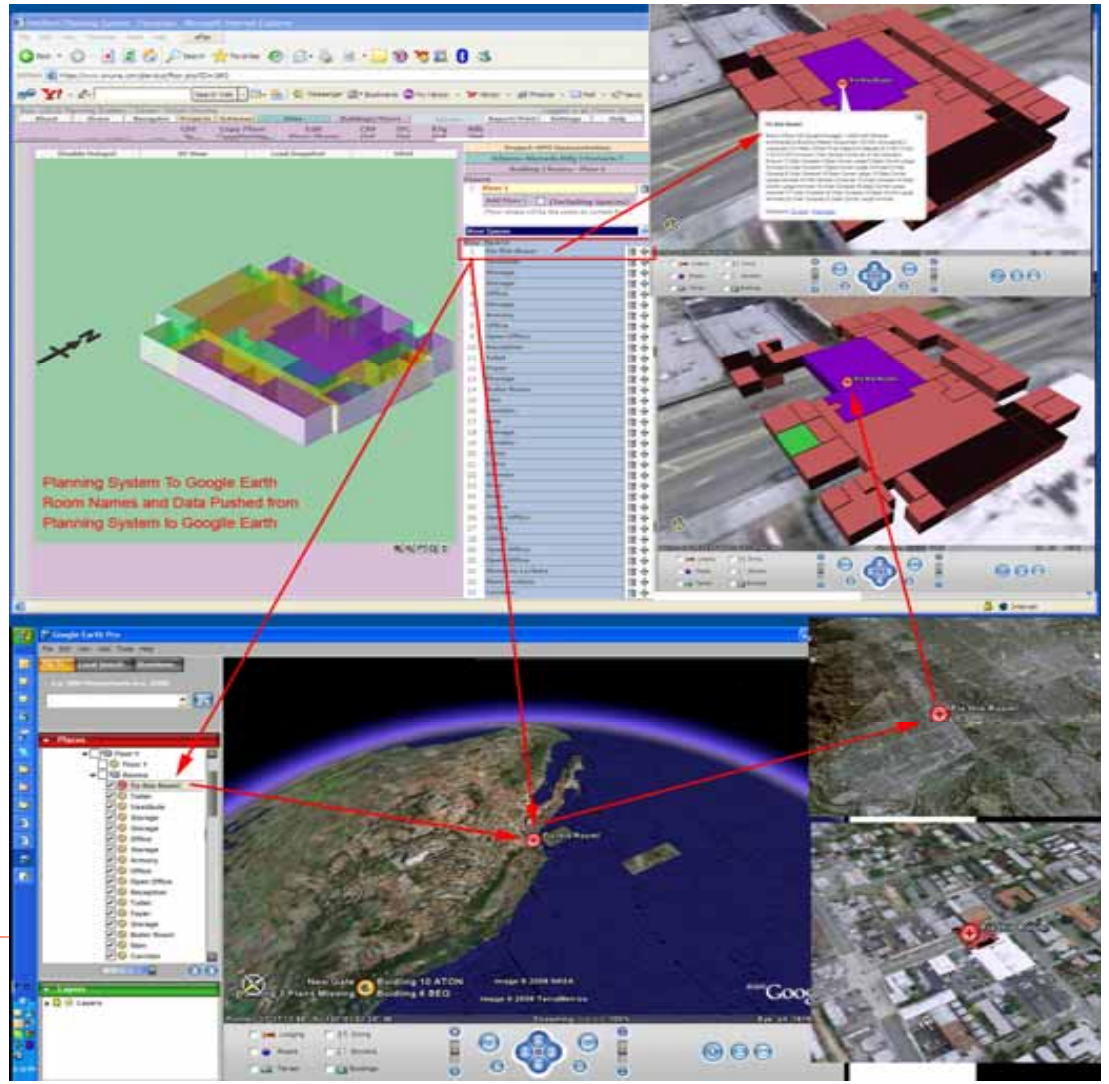


# Combined BIM and GIS Workflows

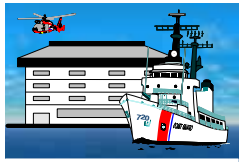
## Multiple Data Sources Accessed through CAMP

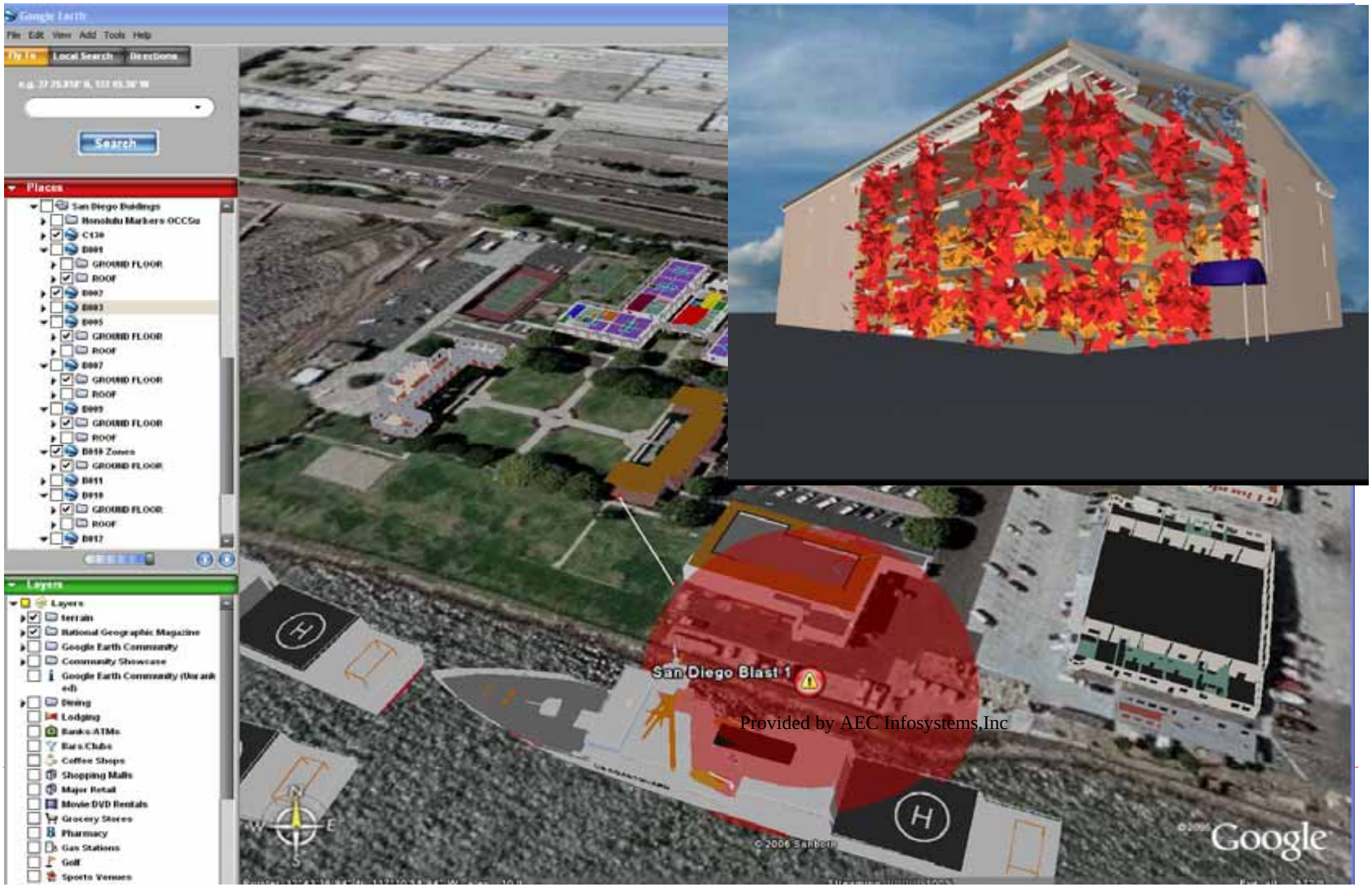


# Security




Search
Places
Layers
San Diego Blast 1
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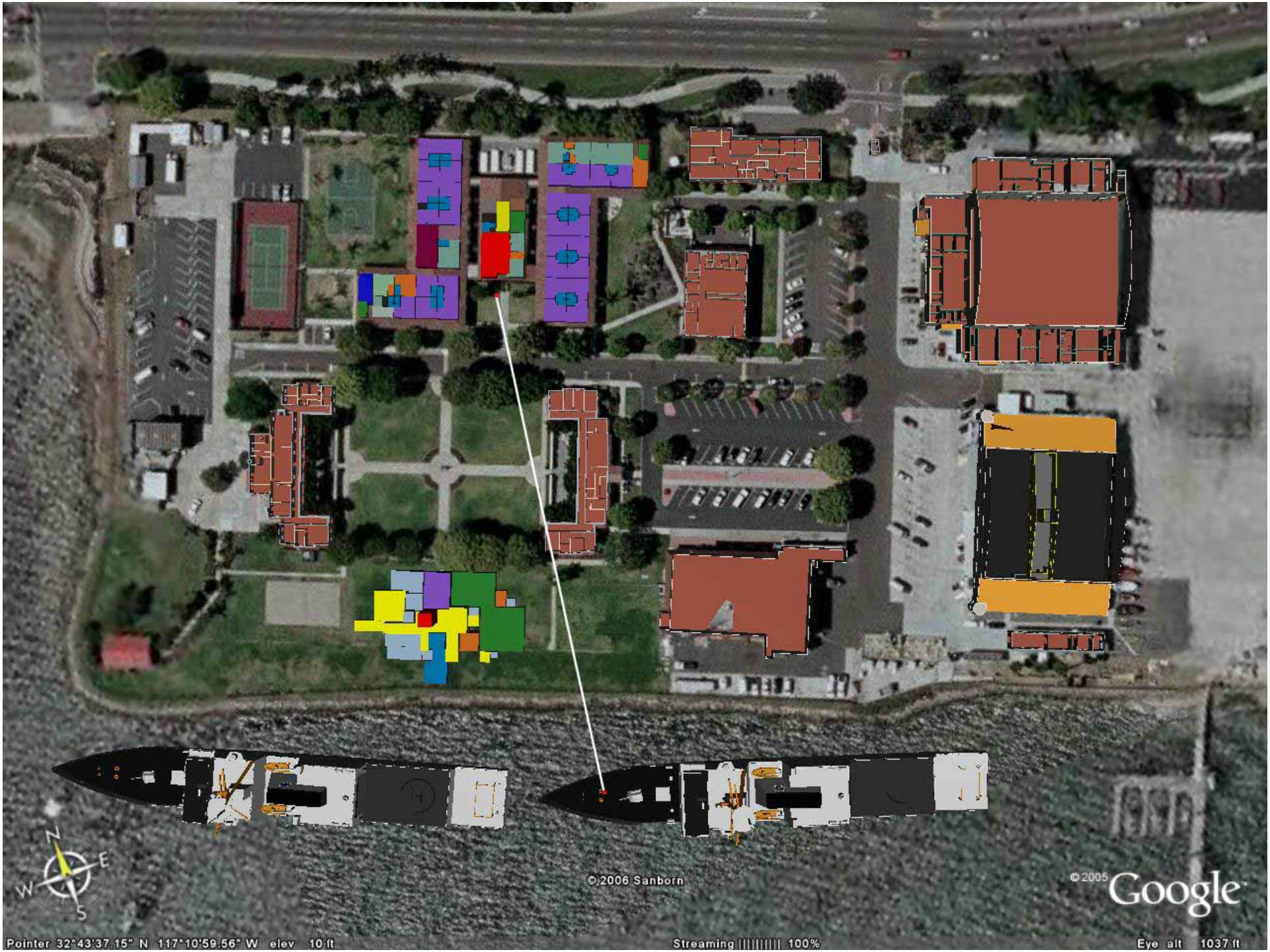
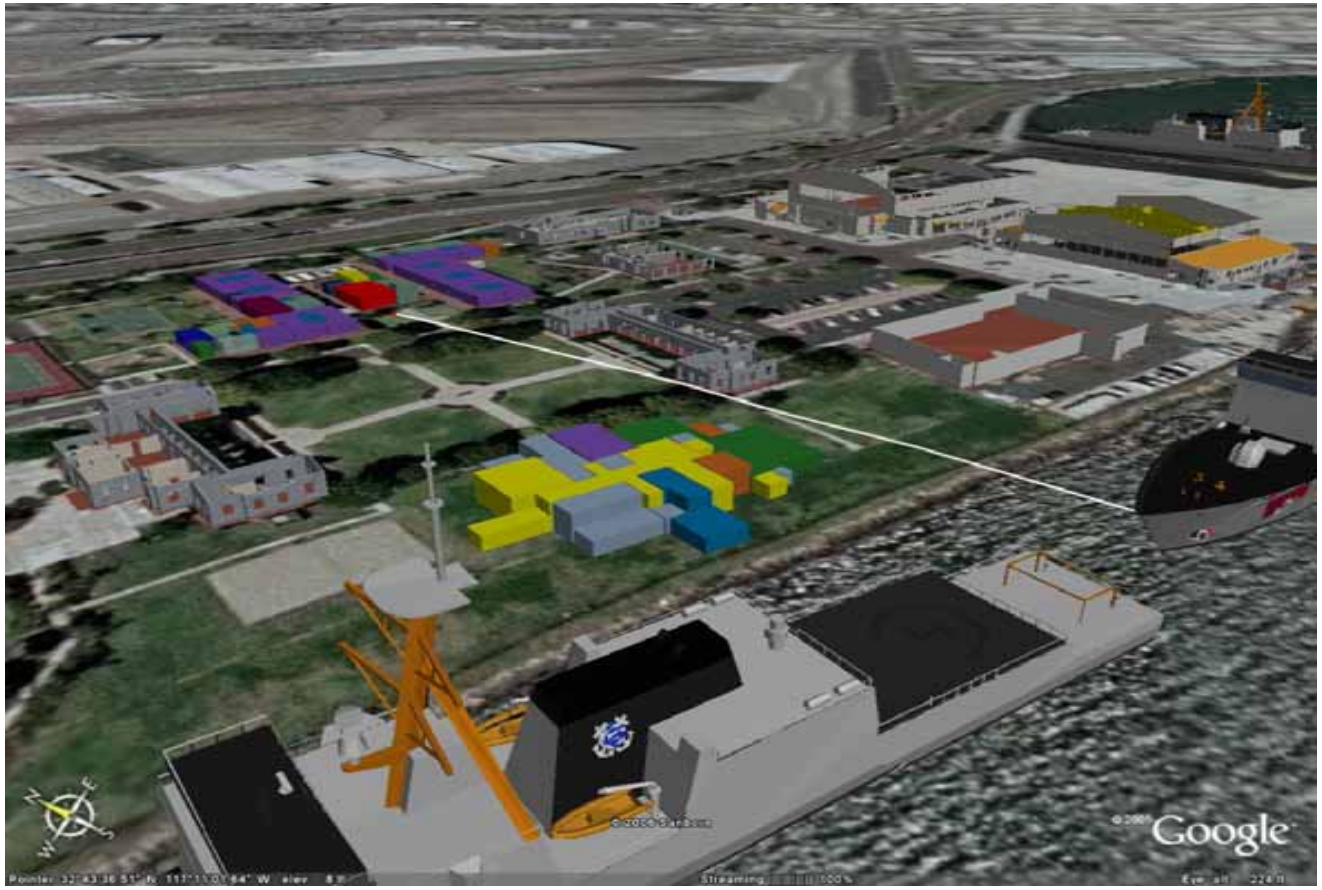
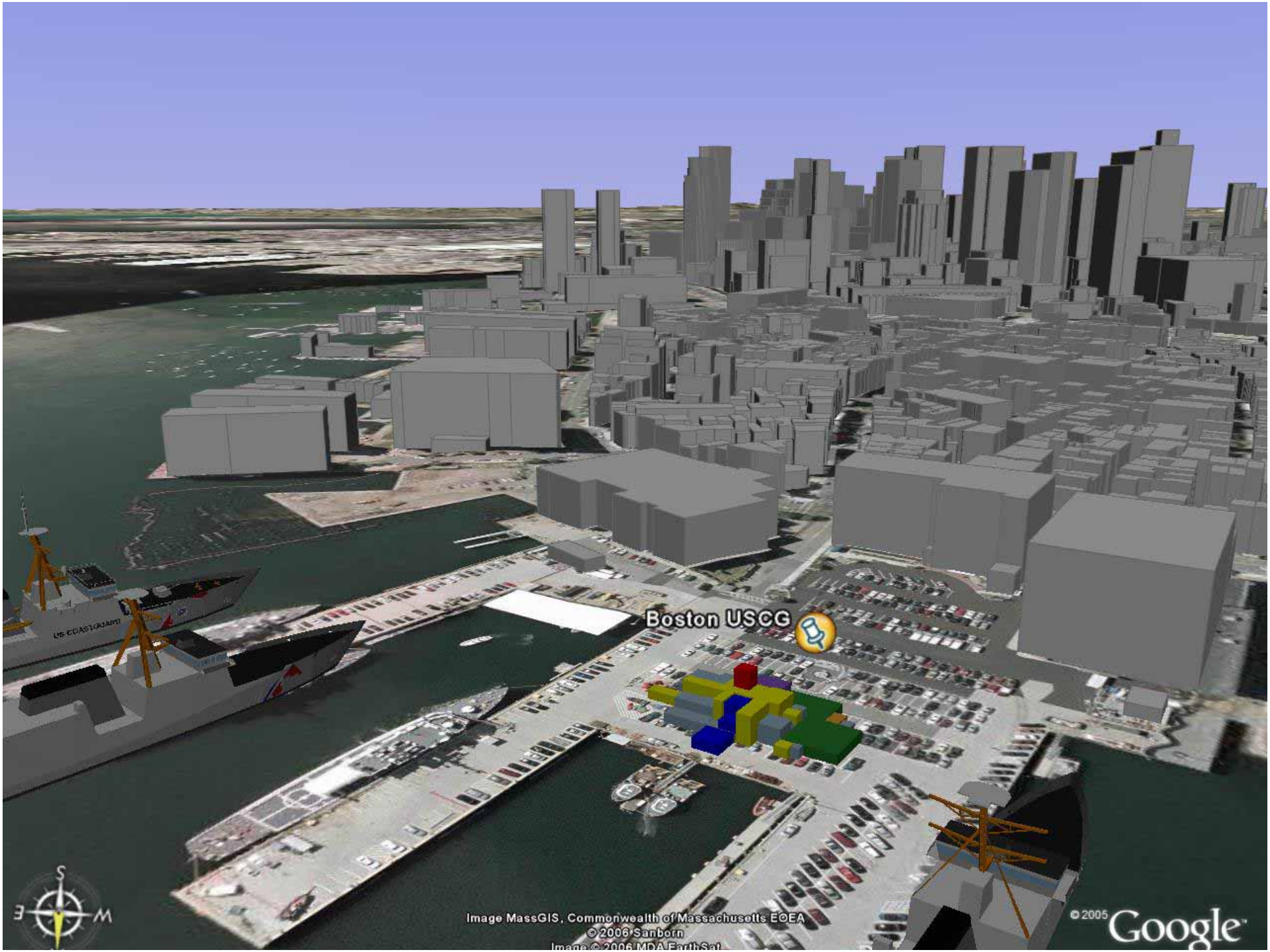
Google


© 2006 Sanborn
© 2005 Google
Pointer 32°43'37.15" N 117°10'59.56" W elev 10 ft
Streaming 100%
Eye alt 1037 ft

# BIM Based Scenario Planning




Boston USCG
Image MassGIS, Commonwealth of Massachusetts EOEA
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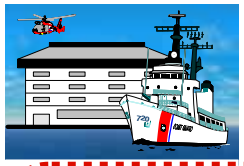
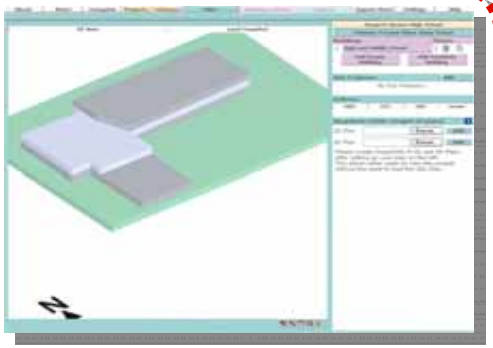
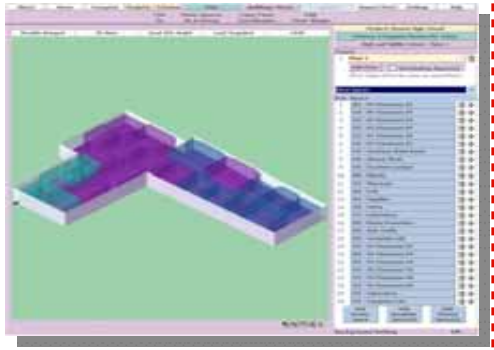


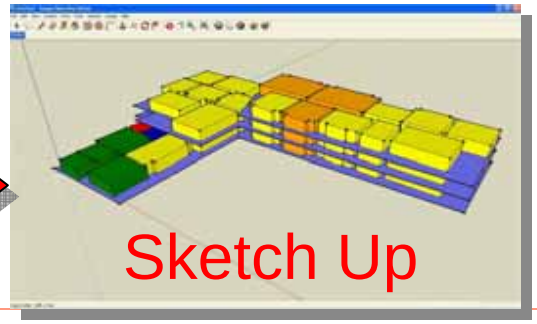
# Combined BIM and GIS Workflows

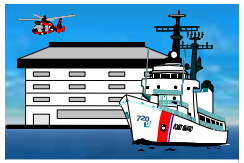
## Multiple Data Sources Accessed through CAMP

Onuma Planning System



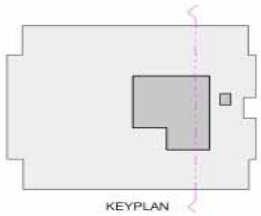


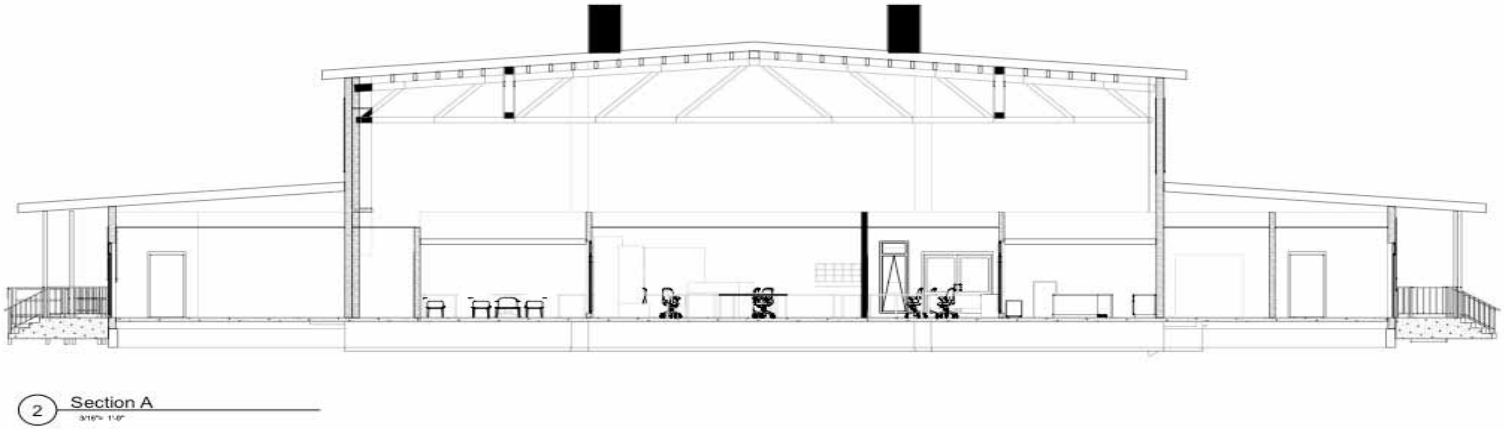




# Rapid Design Tools Fit Into BIM

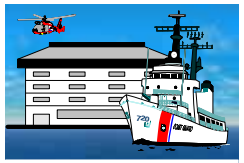
## Rapid Project Execution of Chosen Business Case



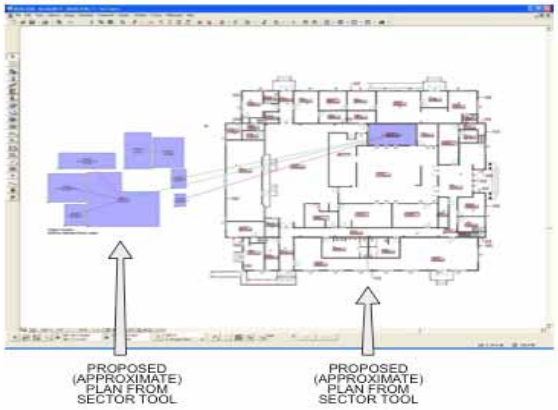

SECTIONAL VIEWS - BUILDING 3

Provided by Onuma,Inc. AEC Infosystems,Inc

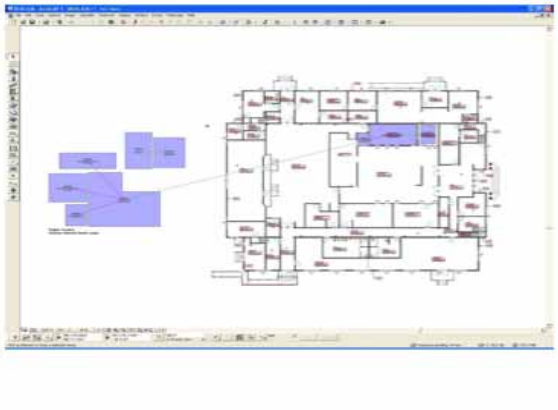


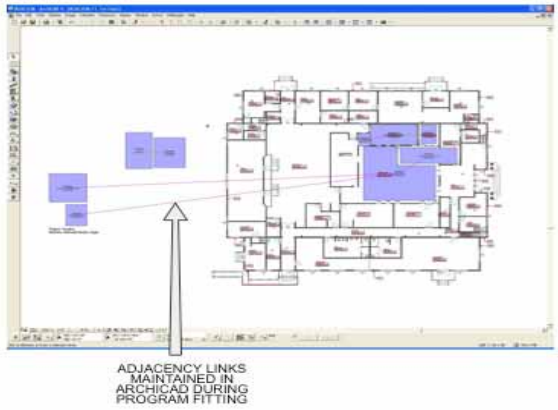
# Rapid Planning Tools Fit Into BIM

## Integrated Planning & Business Case Decisions

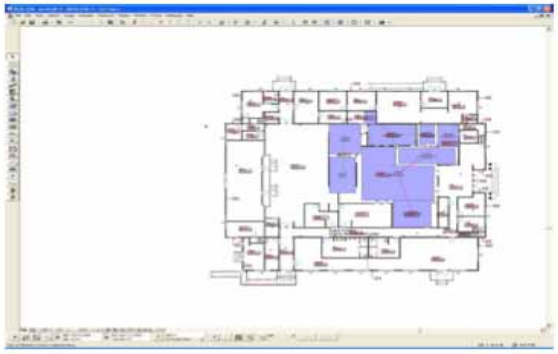



PROGRAM ELEMENTS (ROOMS) IMPORTED TO EXISTING FLOOR PLAN FROM SECTOR PLANNER

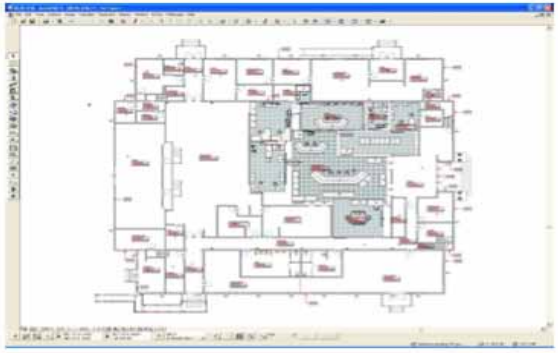





PROGRAM ELEMENTS MOVED INTO FLOOR PLAN OF EXISTING FACILITY/BUILDING

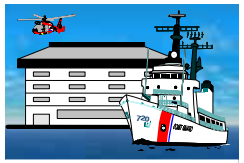


APPROXIMATE FIT OF 'IDEAL' PROGRAM INTO EXISTING BUILDING.



SHOWING DETAIL OF PROGRAM ELEMENTS PLACED INTO FLOOR PLAN

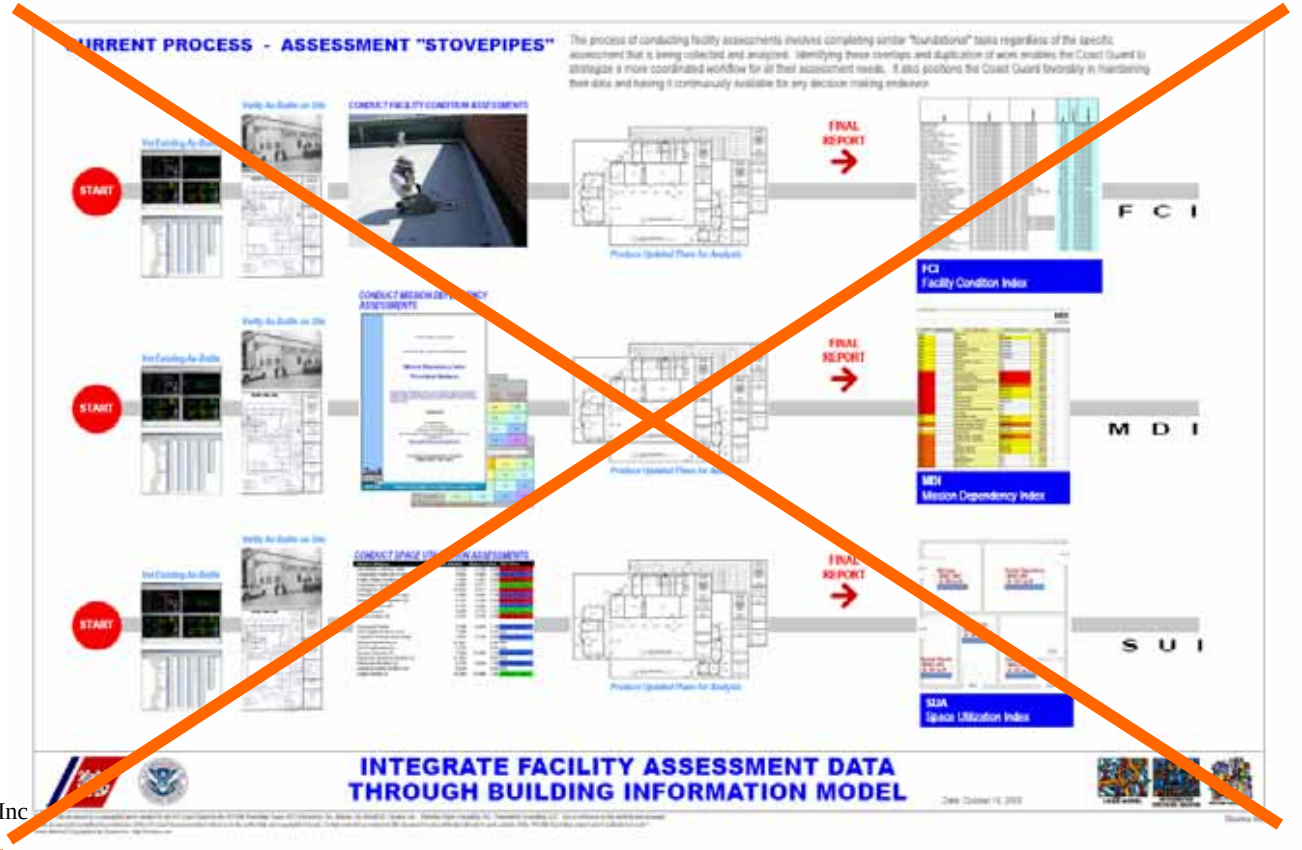
FINAL ADJUSTMENTS MADE ACCORDING TO PROGRAM ELEMENTS, FURNITURE, EQUIPMENT & FLOOR SPACE.



# Inefficient Workflows

## "Stove-Piped" Data Collection Diagram

Efficient Integration of Numerous Data Points is Required

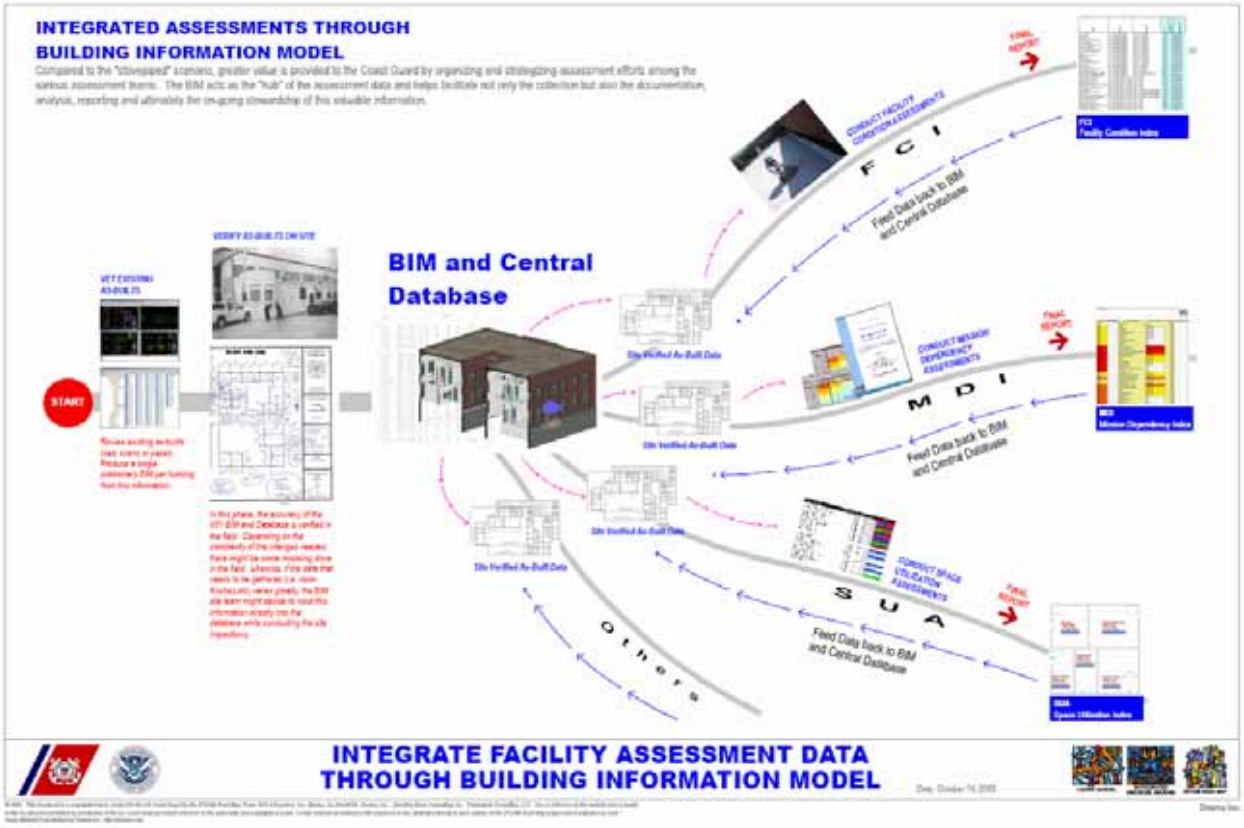



Provided by Onuma,Inc. AEC Infosystems,Inc

# Efficient Workflows

## Integrated and Interoperable Data Collection

### Leveraging BIMs to Integrate Disparate Data Points

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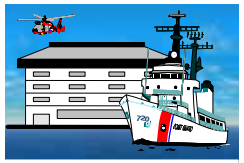


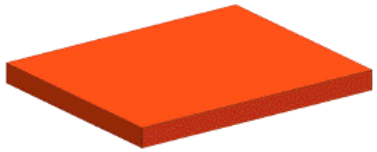
# BIM Levels of Information

## Stepped Strategy of Data Collection and Modeling

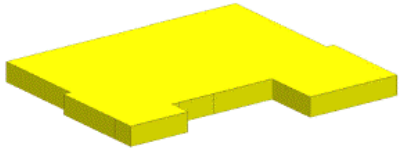
Minimal level of data modeling necessary to integrate BIMs with other data?

Surprising little is needed to get the highest value from the BIMs.

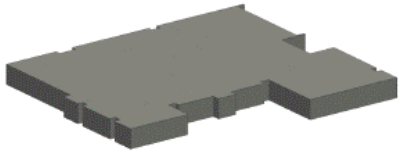
Value comes over time in a logical stepped sequence of data collection.



*Simple Mass Defining Total Square Footage 16,900 SF*

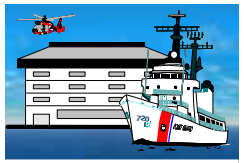


*Mass With Rough Outline Defining Total Square Footage 16,900 SF*



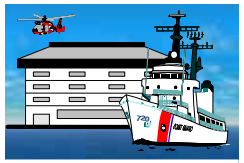
*Mass Accurate Outline Defining Total Square Footage 16,900 SF*

*All of the levels can reference data that exists in other levels of detail.*



# How we will measure success

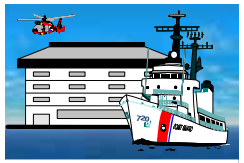
- Organizational Performance
- HPO Contract Performance
- Asset and Portfolio Performance
- Continuous Performance over Time



# Quality Control Plan (QCP)

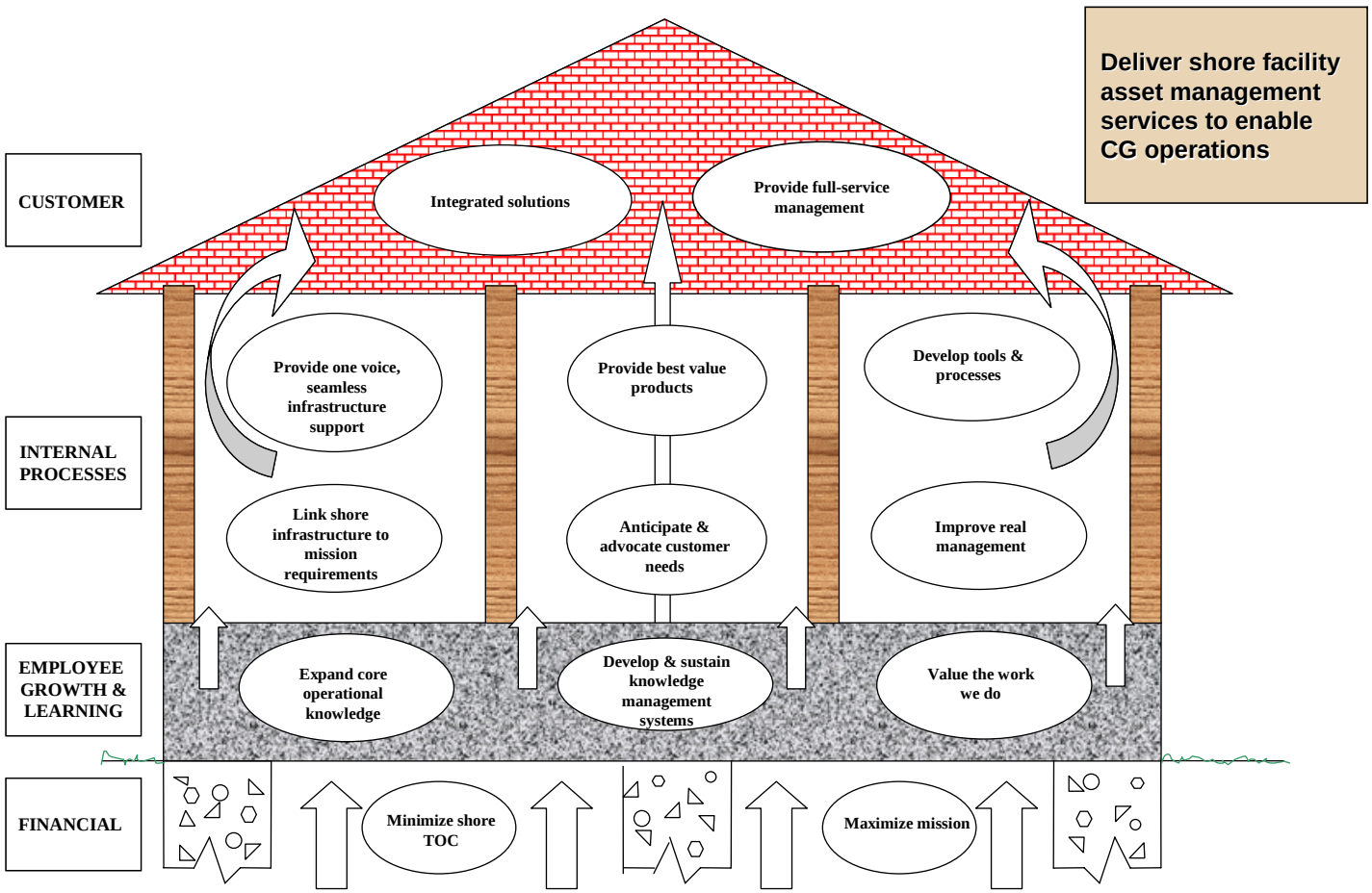
## Quality control processes

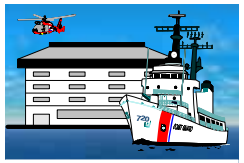
- Balanced Score Card (BSC)
- Operational Metrics
- Performance Requirement Summary (PRS)
- Continuous Performance over Time



# Balanced Score Card

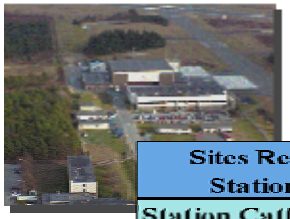
## Organizational Performance





# Mission Dependency (MDI)

## Linking Facilities to Missions



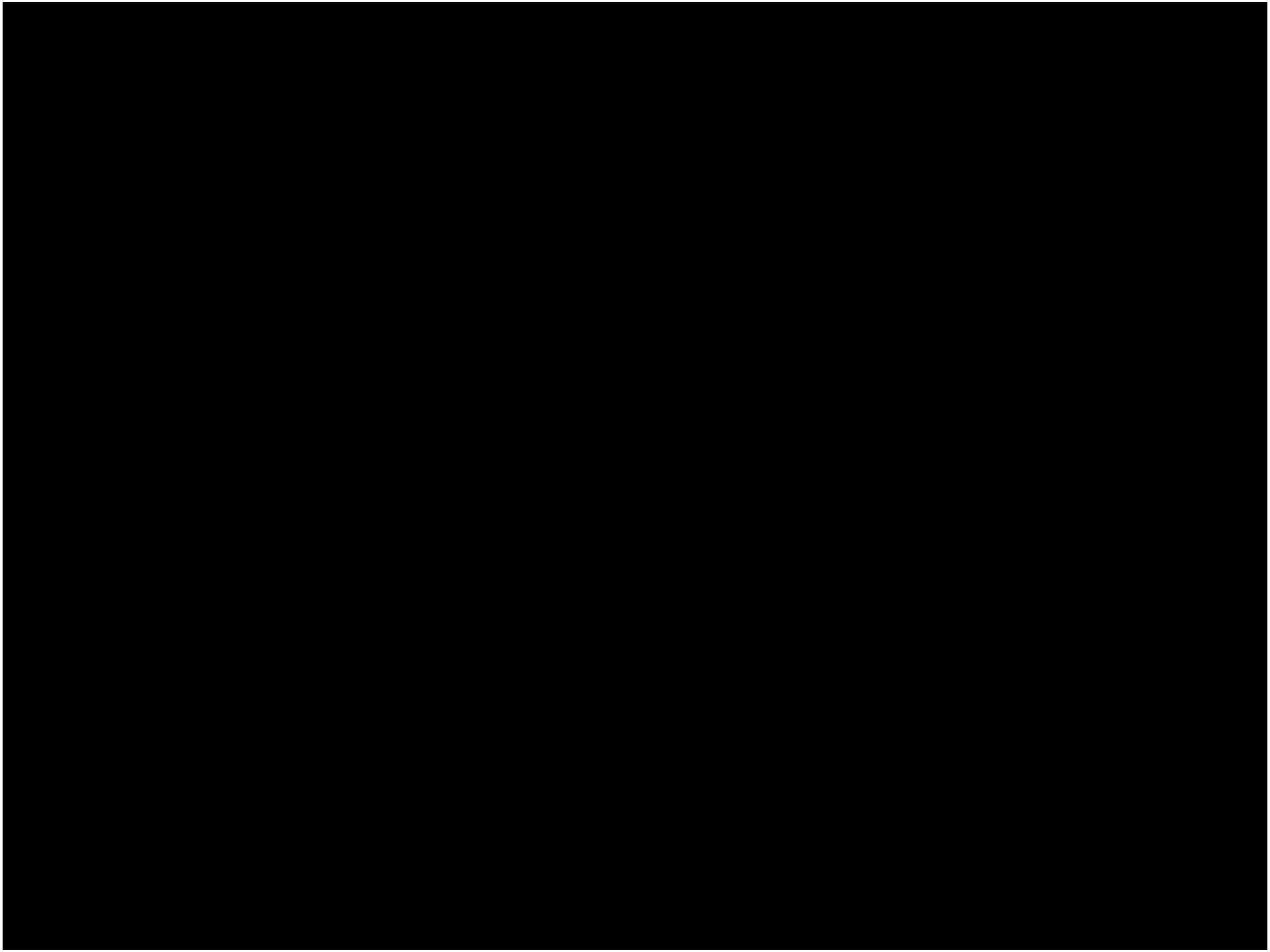
| Facility Name | Q1/Q2 MDw | MDb ave | n |
|---|---|---|---|
| Operations Hanger | 5.00 | 3.87 | 5 |

| Sites Requiring Air Station Support | Q3/Q4 MDb |
|---|---|
| Station Catham | 4.33 |
| Station P-town | 4.33 |
| Station Woods Hole | 3.67 |
| ATN Woods Hole | 1.00 |
| Group Woods Hole | 6.00 |
| *MDb total* | 19.33 |
| *MDb ave* | 3.87 |
| (Number of Missions) n | 5 |

This critical Facility Assessment links facilities to mission from an Operational Risk Management perspective.

Created by Naval Facilities Engineering Service Center, Port Hueneme CA and co-developed with the USCG

| MISSION INTRA-DEPENDENCY SCORE | | | | | |
|---|---|---|---|---|---|
| $MD_W$ | | Q1: Interruptability | | | |
| | | Immediate (24/7) | Hours (min/hrs) | Days (<7days) | Weeks (>7days) |
| Q2: Relocatability | Impossible | 4.0 | 3.6 | 3.2 | 2.8 |
| | Extremely Difficult | 3.4 | 3.0 | 2.6 | 2.2 |
| | Difficult | 2.8 | 2.4 | 2.0 | 1.6 |
| | Possible | 2.2 | 1.8 | 1.4 | 1.0 |
| $MD_W$ = Mission Dependency Within a Command Entity | | | | | |

# Linking Facilities to Missions

## Missions to Public Outcomes