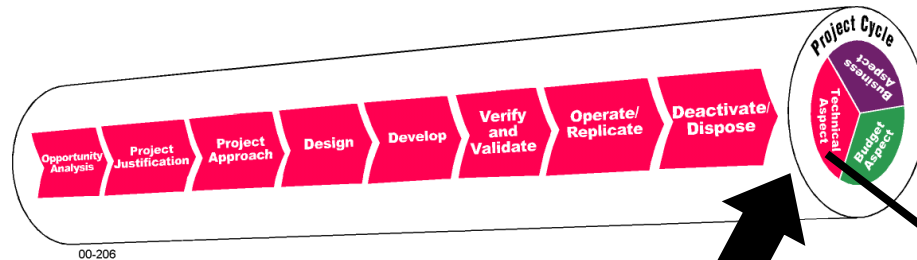


Session 4 - The Fourth Essential

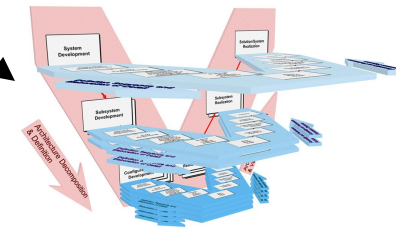
Project Cycle – The Sequential Essential

The sequential management approach to achieving the project's objectives



Three aspects:

- **Business**
- **Budget**
- **Technical**



The grandparent of all tactical planning

Ref: VPM pp 28 - 31, 84 - 127

Project Cycle - First Principles

Upon mastering this session you will be able to explain to others:

- **A Project Cycle is the road map for actions to produce its products and/or services**
- **Use and acceptance of a Project Cycle by creates a common set of expectations among stakeholders**
- **Disciplined tailoring of the Project Cycle may be necessary to meet the requirements of specific projects.**

The Essential Components of a Project Cycle

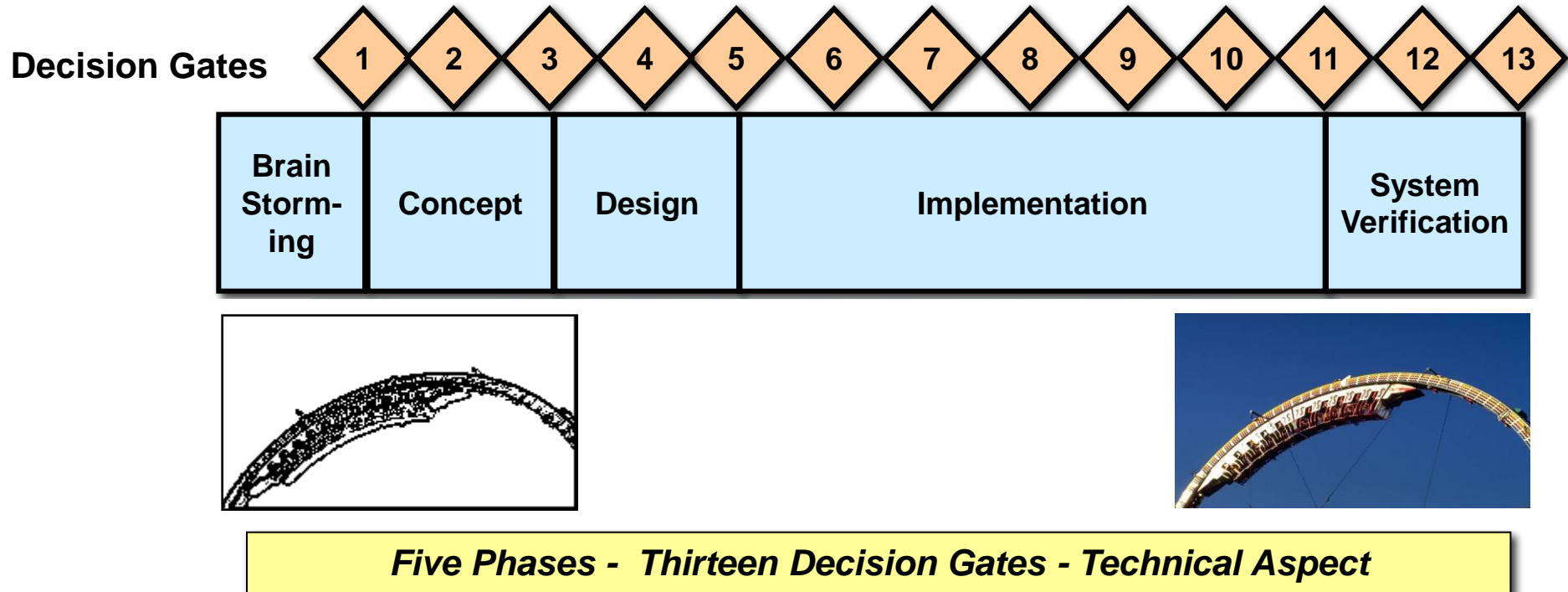
- Phases
- Activities
- Products / Deliverables
- Decision Gates

Ref: VPM p 29, 85

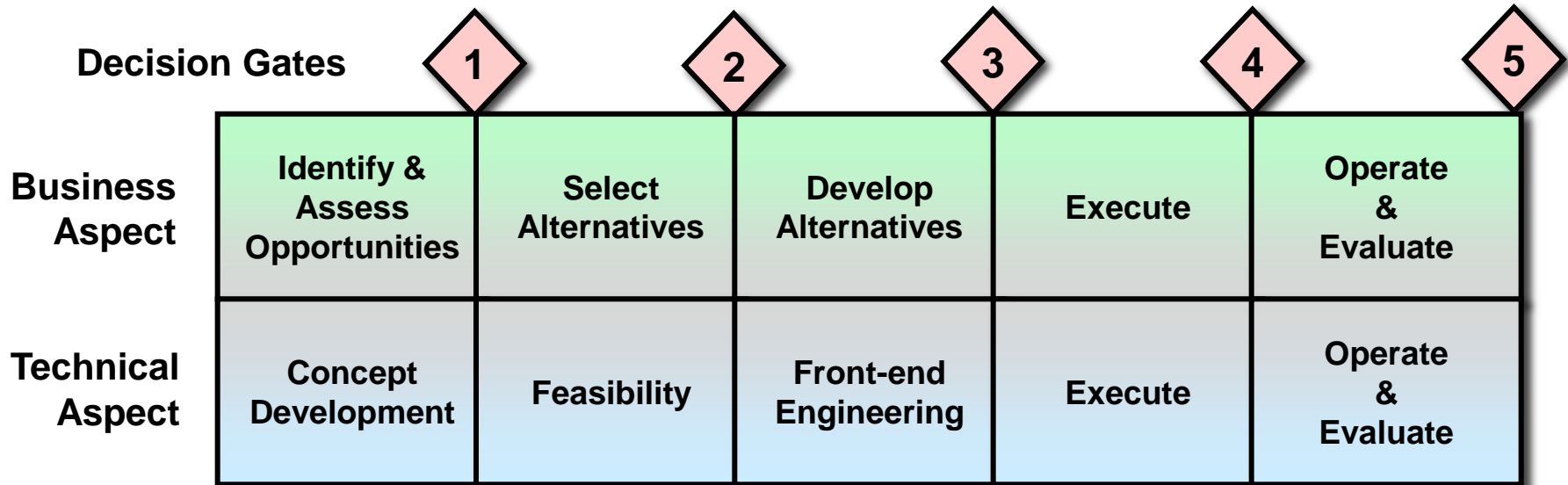
Examples of Project Cycles



Amusement Park Developer Project Cycle

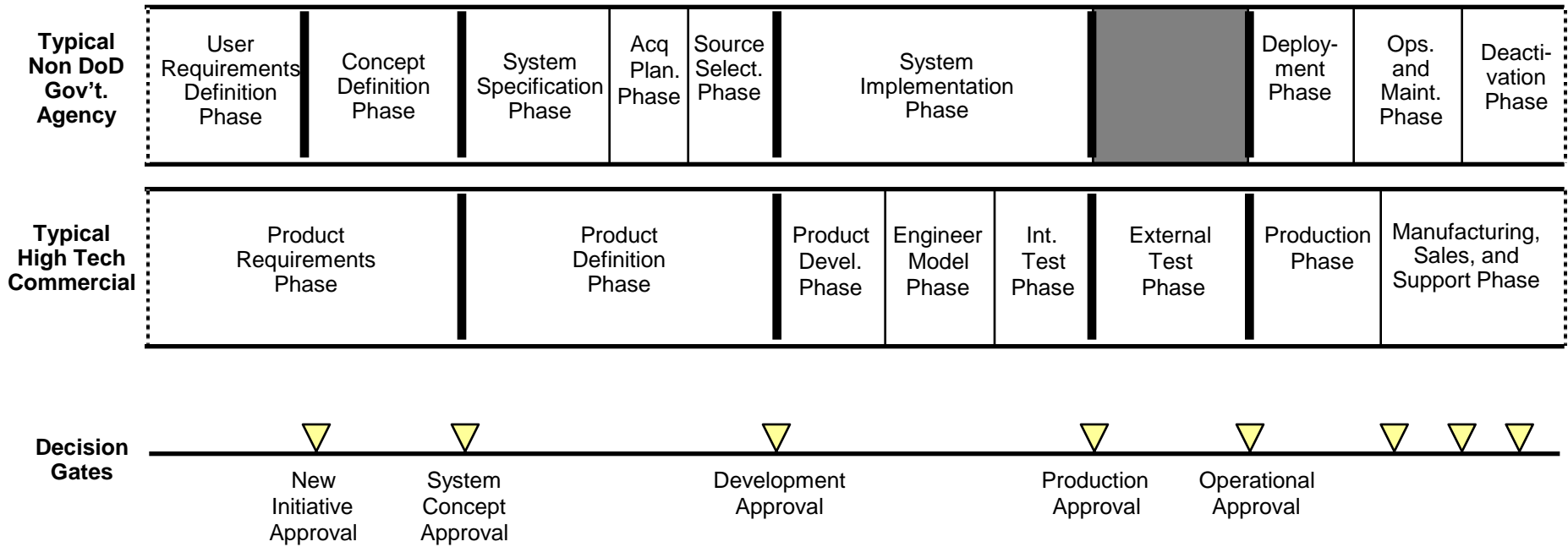


Chevron Project Cycle



Five Phases – Five Decision Gates - Business and Technical Aspects

Commercial and Government Project Cycles



Ref: VPM p 87

Project Cycle Decision Gates (Milestones)

- **Definition:**

- A progress measurement and decision event in the Project Cycle that is of sufficient importance to be identified, defined, and included in the Project Schedule.
(Usually a baseline approval event.)

- **Decision options:**

- Acceptable
 - Proceed with project
- Acceptable with reservations
 - Proceed and respond to identified issues and action items
- Unacceptable
 - Do not proceed
 - Repeat the review
- Unsalvageable
 - Terminate the project

Ref: VPM p 97

Ref: SEHv3.1 p 3.4

Examples of the Consequences of Missing Decision Gates



Minimizing Building Costs Is Usually Good...

But Skipping Process Does Not Equal “Better, Faster, Cheaper”

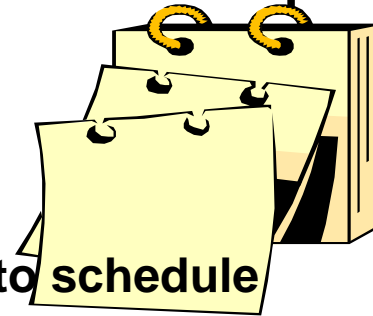
■ Building permits are expensive

- About \$2,500 is charged for school taxes, etc.
- Permits require drawings
- Drawings must be done by an architect
- A structural engineer must sign for earthquake loads, snow load (700 kg/m²), etc.



Permits take time -

- Drawing approval takes weeks
- Site inspection takes more time to schedule
- But ...



The inspector does check property lines and “set-backs”

**Doing it yourself, without drawings or permits,
sometimes saves money ...**

A New 12-m by 15-m Barn Is Built on a 2-Hectare Lot.



How Do You Move A 12-m by 15-m Slab-floor Barn?



The Result of a Missed Decision Gate



**Meanwhile,
Across the Street,
Construction Starts on a New
Custom-Designed Home**

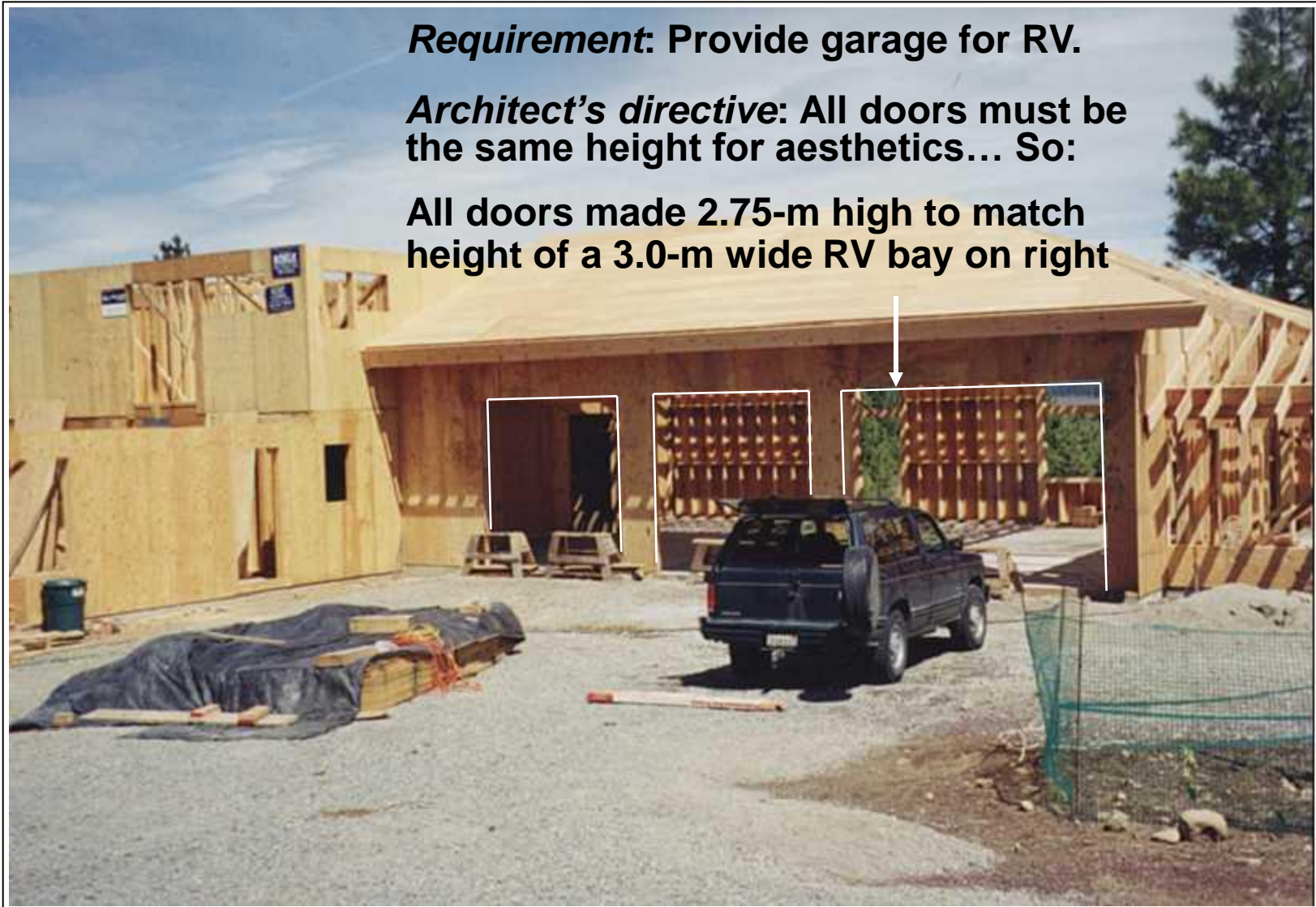
**Where they prove once again...
drawings or permits are not enough ...**

A Custom-Designed Three-Car Garage

Requirement: Provide garage for RV.

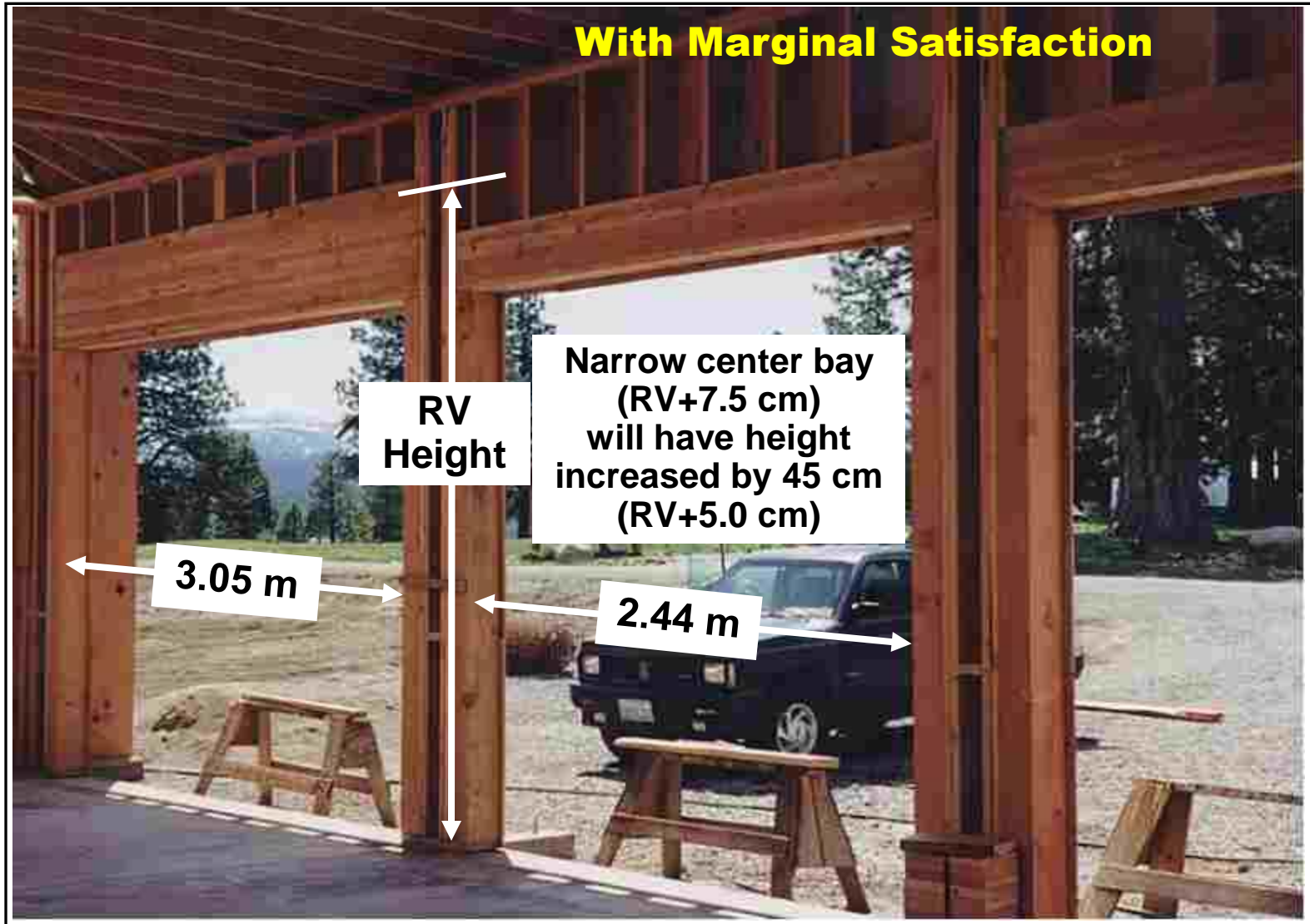
Architect's directive: All doors must be the same height for aesthetics... So:

All doors made 2.75-m high to match height of a 3.0-m wide RV bay on right



Result of Incomplete Decision Gate Will Be Corrected

With Marginal Satisfaction



The Finished Home

With three garage doors of unequal size



**The recreation vehicle
outside its snug quarters**



The “Build-To Drawing Approval” Decision Gate Was Held – *So What Happened?*

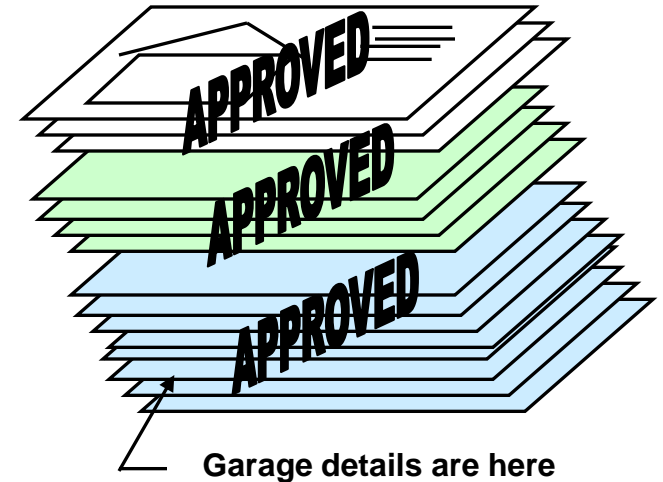
- The Architect presented the 60 detailed construction drawings to the Contractor and the Home Owner for approval.

The review team checked the first 10 drawings in detail.

They scanned drawings 11 to 22 and found no errors.

They flipped through the remaining drawings, but “they didn’t see the need to check all the details.”

They then signed EACH of the 60 drawings as “APPROVED,” as requested by the Architect.



This Decision Gate Review was incomplete... and led to failure
PRIOR to the Decision Gate all details must be verified.
Evidence of requirements satisfaction must be presented
at the DG, consistent with the project risk philosophy.

The Owner paid for all rework...



Scaling Up...

The new \$140 million post office in a major city opens ... Almost.

“The new post office has been highly praised for its creative architecture, but



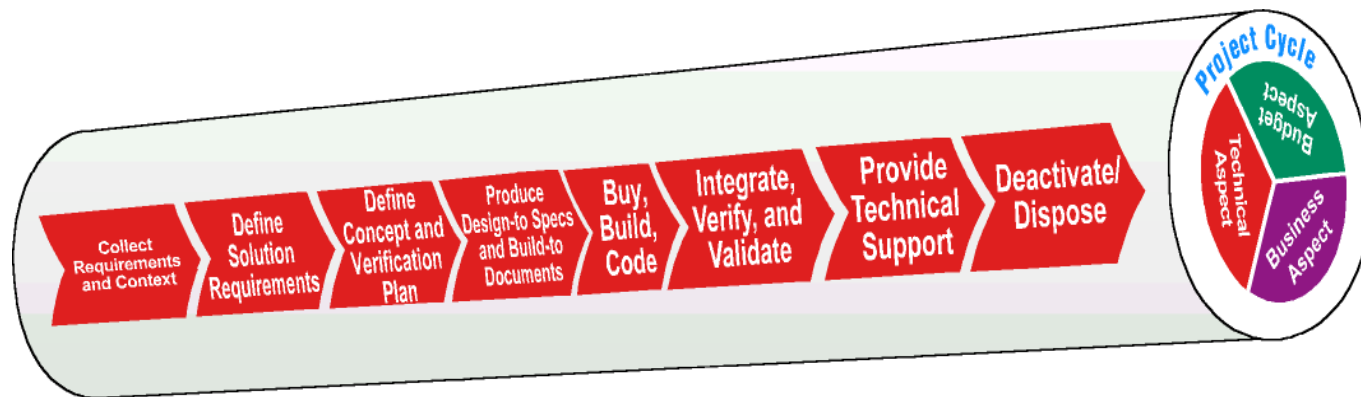
- It is two years late,
- It is 60% over budget,
- And ... U.S. Post Office trucks ARE TOO HIGH TO FIT THROUGH THE ENTRYWAY!”

Another victim of poor SYSTEMS ENGINEERING...

July 1992

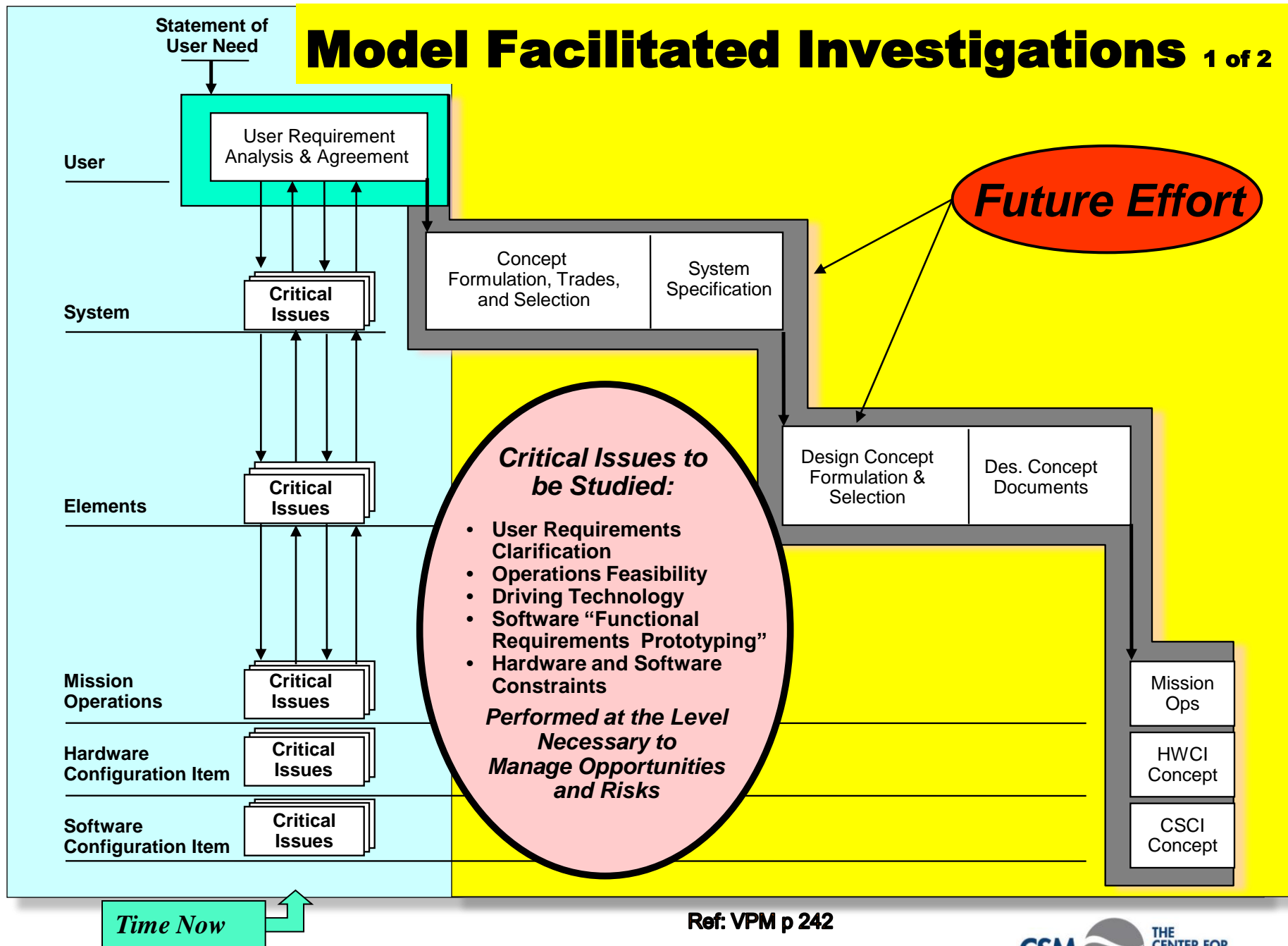


The Project Cycle Model



Ref: VPM pp 24

Model Facilitated Investigations 1 of 2



Ref: VPM p 242

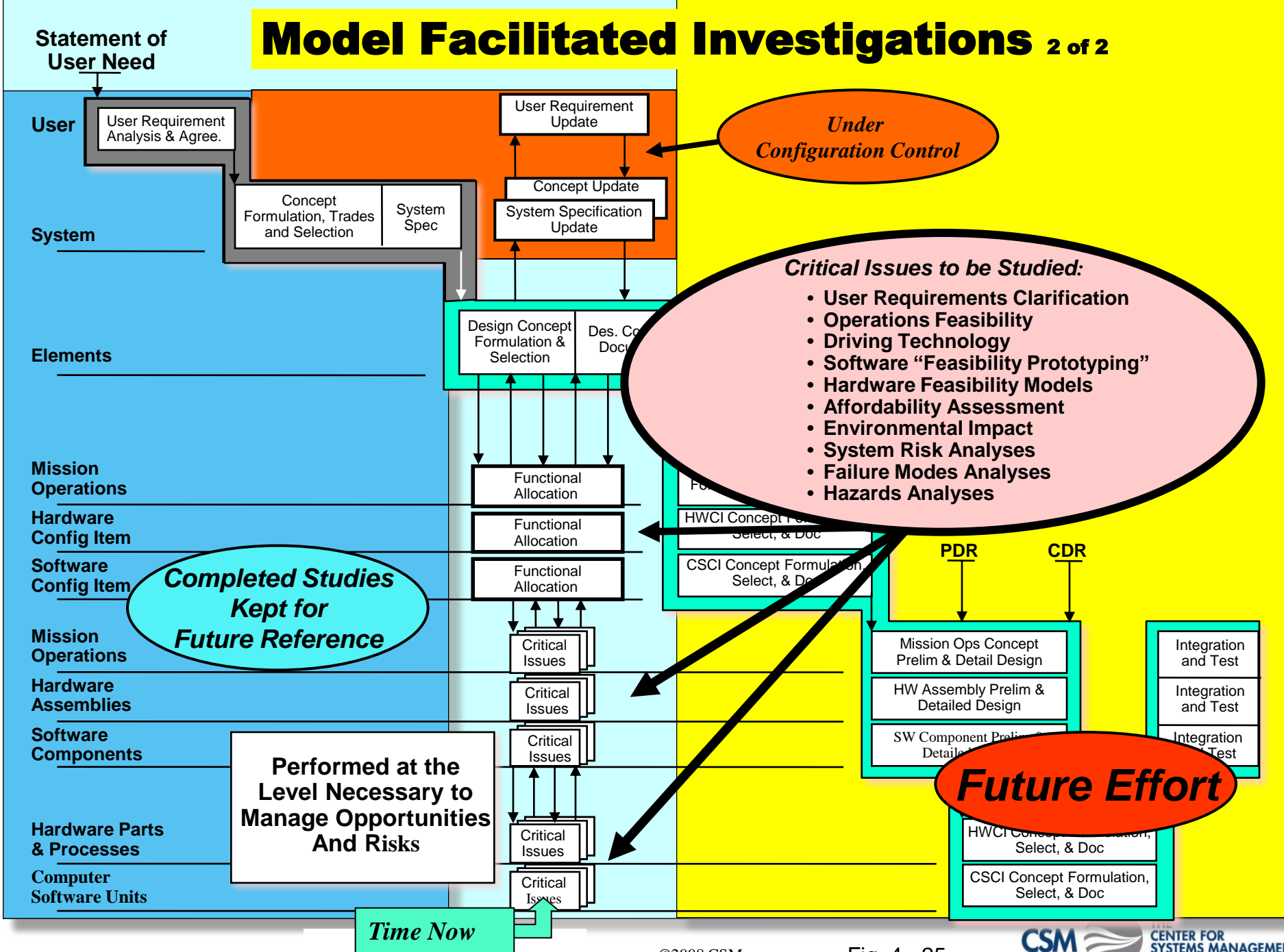
Fig. 4 - 23

“Mars Mission Has Some Seeing Red”

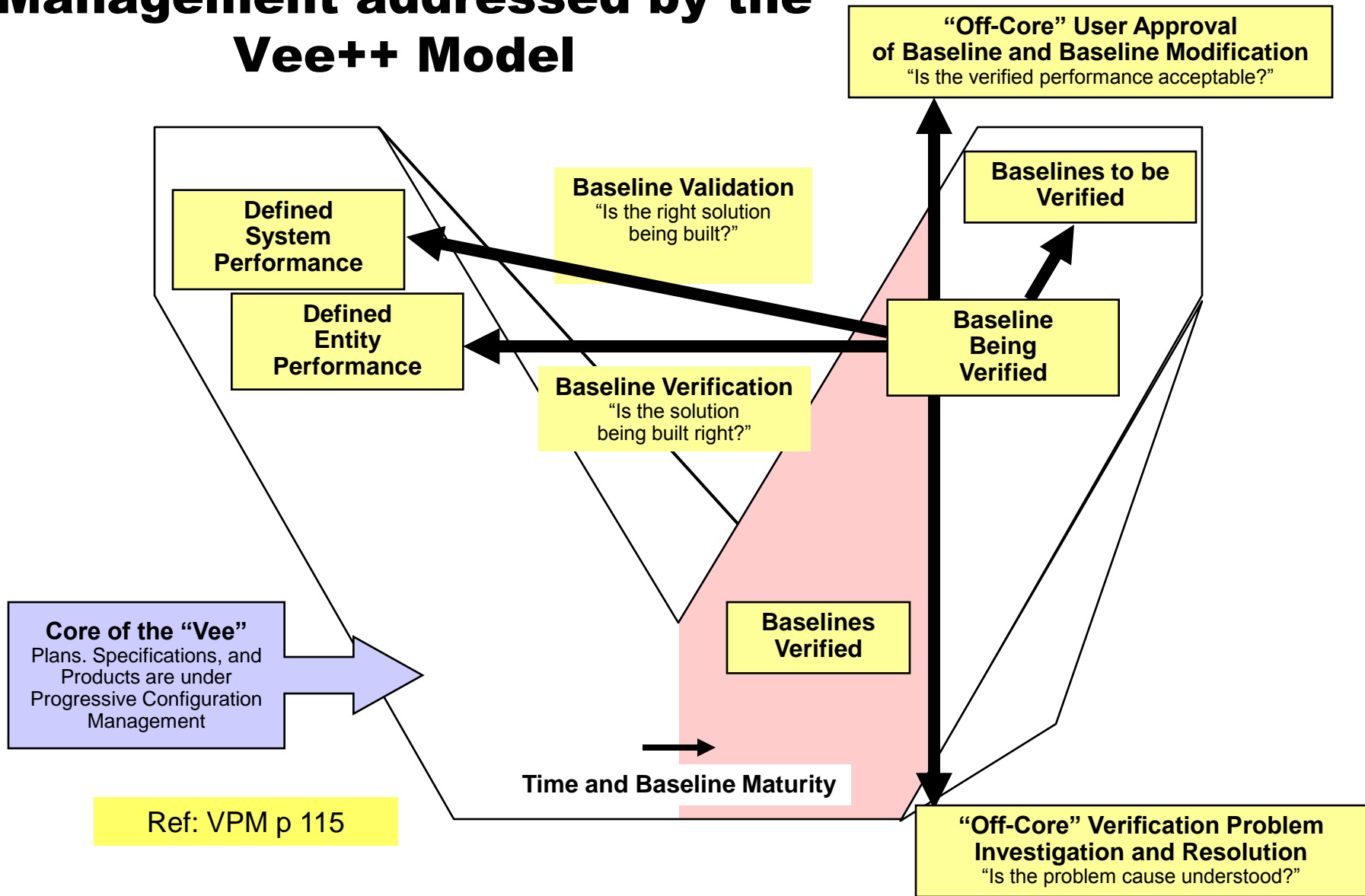
Washington Post, February 2009

- **The next NASA mission to Mars was to be the Mars Science Laboratory. At 1,875 pounds (845 Kg) it is twice as heavy as the largest previous Mars rover.**
- **Technical “glitches” in final checkout caused a delay and the team missed the launch window which caused a two year program delay.**
- **The program office said that as a result the program cost has increased by almost 30% (to \$2.2 billion).**
- **However program critics say the cost has really increased by 400% since the project was first dreamed up. They now want to kill the project, arguing that the new rover is too ambitious.**

Model Facilitated Investigations 2 of 2



Integration and Verification Management addressed by the Vee++ Model

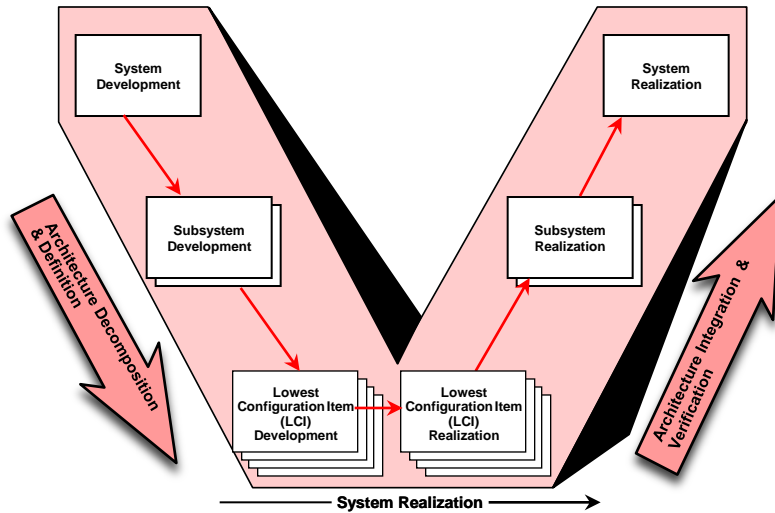




Who did the physical interface analysis?

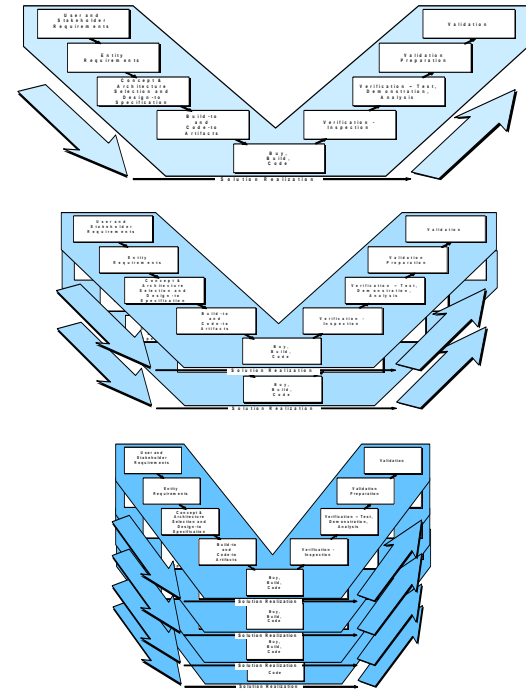
Dual Vee Model

Architecture Vee for architecture management



Depicts architecture baseline evolution. Vertical dimension is architecture decomposition. Horizontal dimension is system realization. Third dimension normal to the image is quantity of entities and their interfaces.

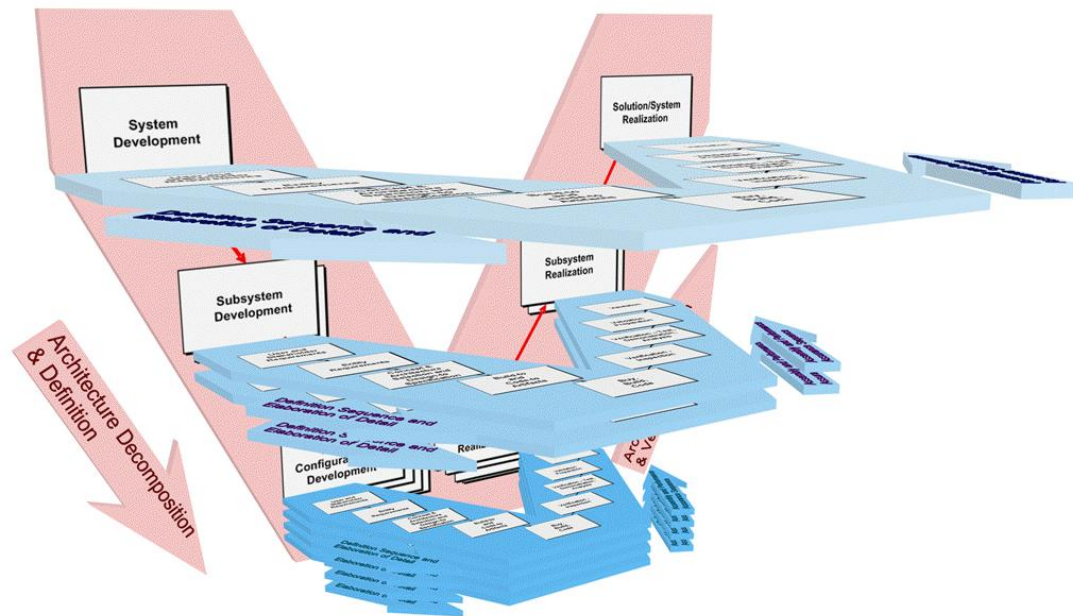
Entity Vee for entity management



An entity is any item of the architecture. The Vee depicts entity baseline elaboration. Vertical dimension is entity detail. Horizontal dimension is entity realization.

Concurrent Architecture and Entity Development

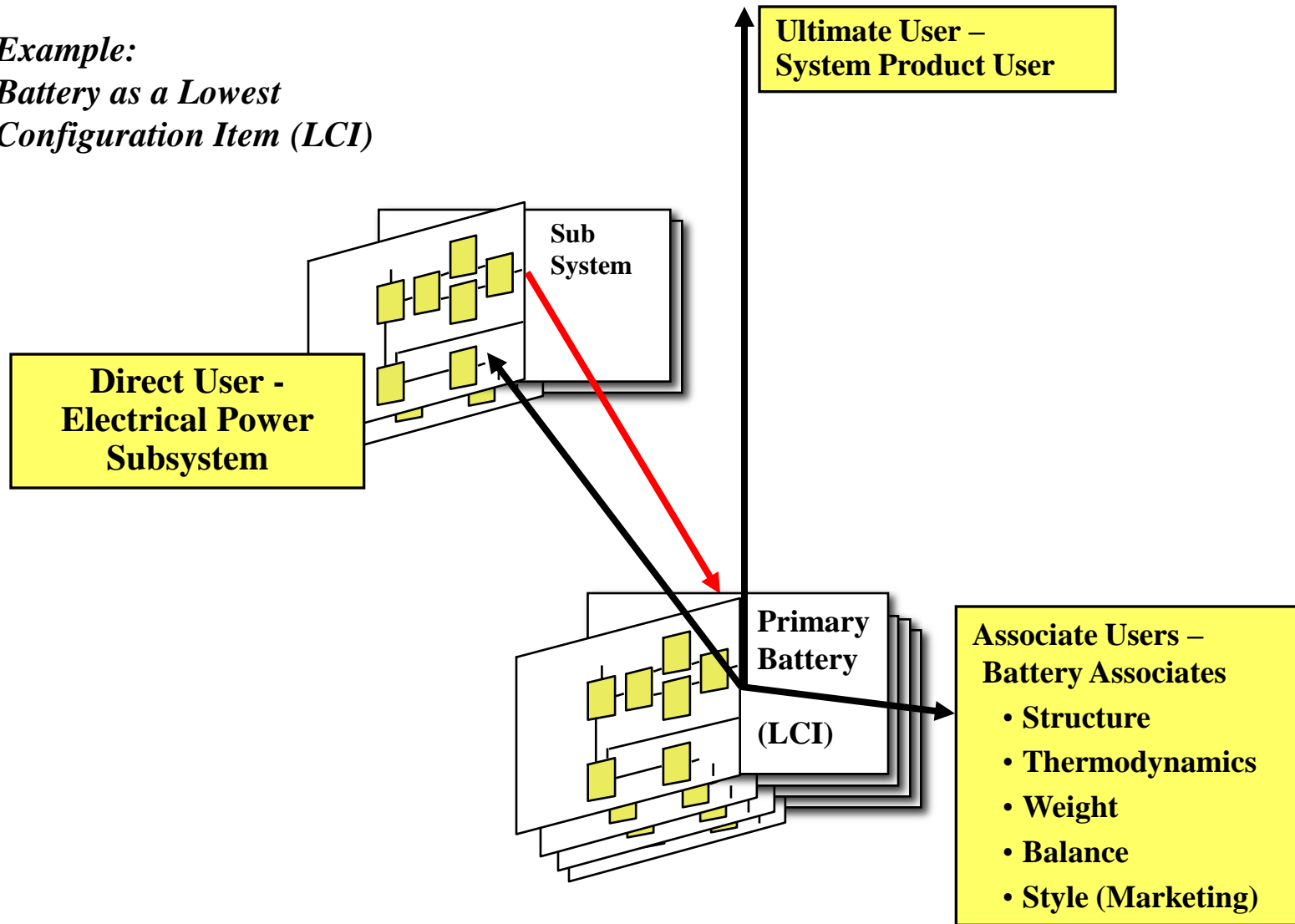
- Depicts concurrent architecture and entity development:
 - There is one architecture Vee
 - There is one entity Vee for each entity within the architecture
 - The architecture Vee depicts architecture baseline evolution
 - The entity Vees depict baseline evolution for each entity



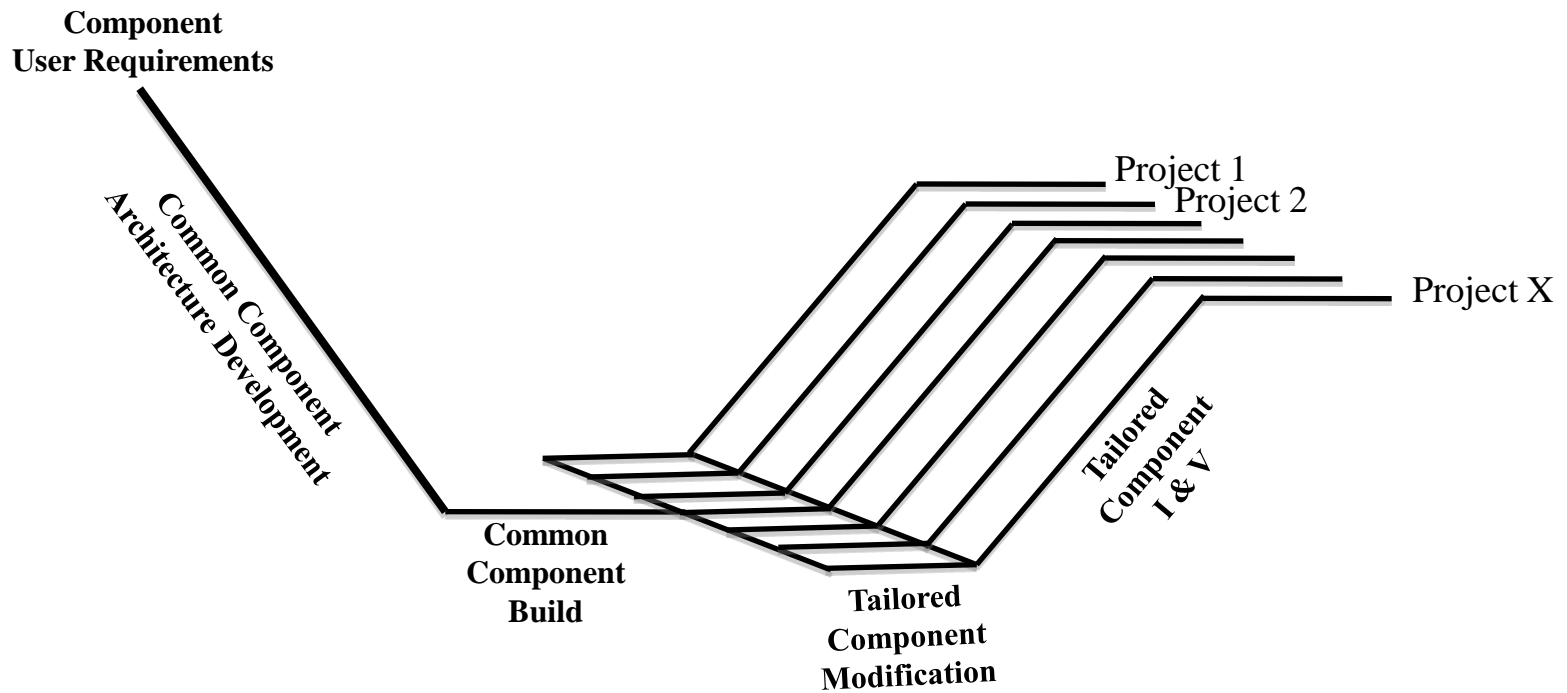
Ref: VPM p 350

Three Categories Of Users Must Be Satisfied At Every Level – Example

*Example:
Battery as a Lowest
Configuration Item (LCI)*



Component Level Development



System Architecture Development Output



System/Segment CONOPS

System/Segment
Specification

1. Scope

Port Data

Before you are done...

Review the selected architecture

- Determine which system/segment specification requirements drive cost, schedule, and technical risk.
- Ask...
 - “Is this requirement worth the impact?”
 - “Can the customer/user relax the constraints without impacting usability?”

Session Summary

- **Key Management actions:**
 - Assign responsibility for identification of all stakeholders.
 - Create forums to ensure stakeholders are heard.
 - Assign responsibility for documentation of requirements and management of requirements traceability.
 - Assign responsibility for management of decomposition and definition.
 - Assign responsibility for management of verification and integration.
 - Instill proper communication discipline in the management of customer and contractor contacts.
 - Take an active role in the management of TBDs and TBRs.

End of Session

