

N93-26897

MODELING AND ANALYSIS TOOLS

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Modeling and Analysis Tools

The Objective

Help SEI Become Reality By Providing
Environment Interactions Information
To SEI Planners, Designers, & Engineers

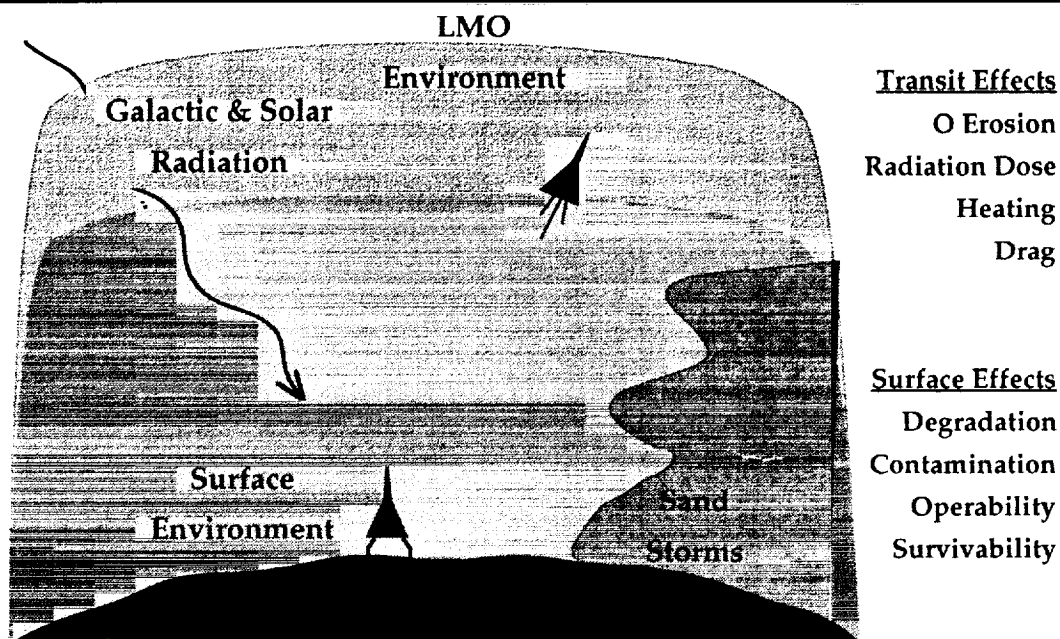
The Reason

- SEI designers need information for preliminary designs
- SEI designers need the latest knowledge as early as possible
- The legacy of SEI should be retained knowledge, not lost expertise

The Method

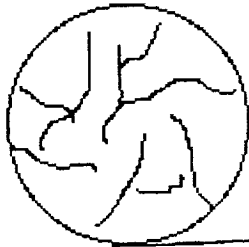
- Coordinate model development & identify gaps in the data
- Integrate models and data into a software package for SEI
- Develop the tool now in time to impact SEI conceptual designs

Mars Environments Will Affect Systems In Many Ways



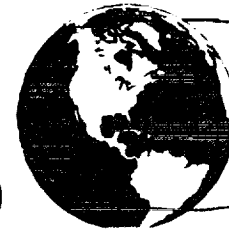
Models and Modeling Tools Must Be Designed With the Entire SEI Mission in Mind

Models will be developed by scattered researchers from many disciplines



LMO & Mars Surface Environments

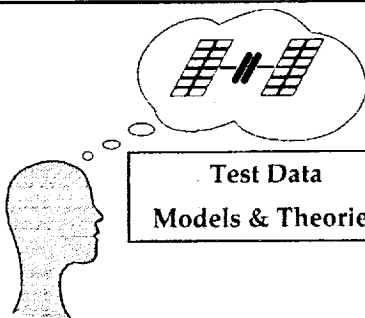
Interplanetary Environments
Mission Staging



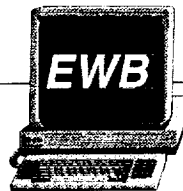
LEO & GEO Environments

30 year program requires modeling codes be complimentary by adhering to standards

Space Station Designers Did Not Have Integrated Environment Interaction Tools



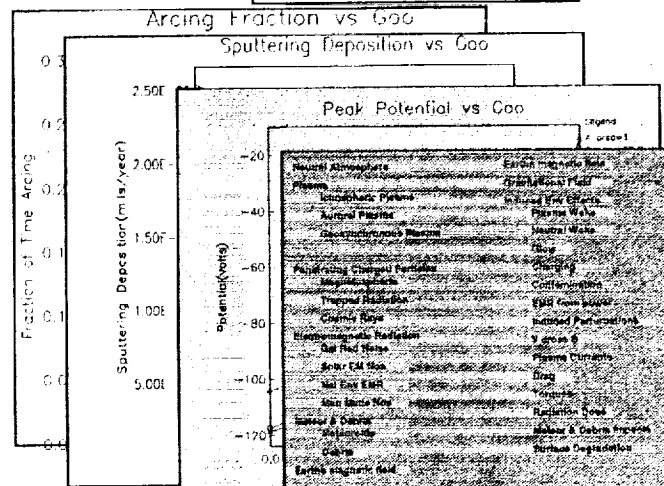
Test Data Models & Theories



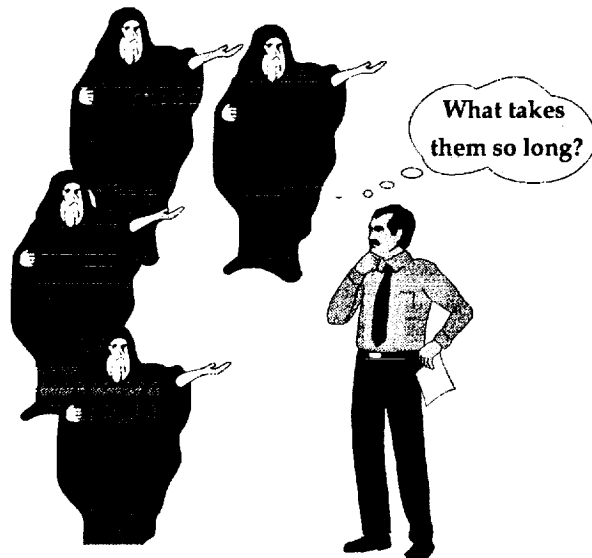
Implications For Space



- EWB is being developed by NASA/LeRC & S-Cubed to fill this need.
- Had EWB been available early in the program, the array grounding issue & others would have been avoided!



Environment Interactions Information Must Be Provided To SEI Planners, Designers, And Analysts In A Timely Fashion

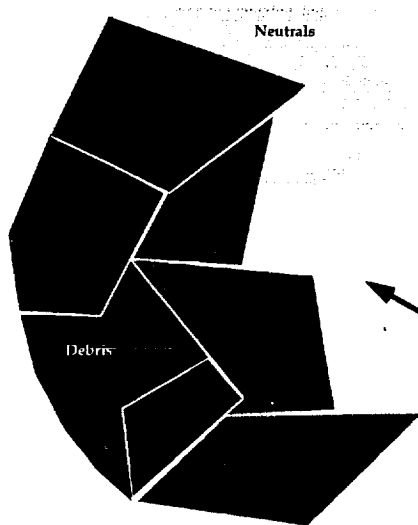


Presently, integral knowledge is scattered among a few Gurus and is inaccessible, incomplete, and unreliable.



This knowledge and expertise can be transferred to mission planners through models, databases, and tools.

Tools Are Needed To Aid In The Development And Validation Of Models



Each model is one piece of the puzzle

- Environments & systems interact
- Validation of physics models requires relevant input to produce relevant output
- Output from models must be available as input to other models
- Embedding of new models in existing knowledge is necessary for development and validation

SEI Workbench Builds On Proven Technology

Flexible Display Module

same commands for all functions

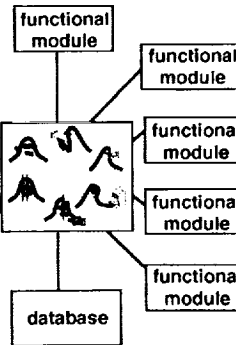
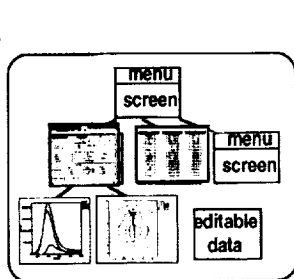
- data entry screens
- tables
- line graphs
- contour plots

Non-Procedural Process Controller

does only the calculations necessary for the desired result

Workstation Independent

- UNIX
- Fortran & C
- Sun 3, 4 Sparc
- Compaq
- Celerity
- IBM 6000
- Decstation



Software "Expansion Slots"

plug in new or additional environment & system models

Designed For Change

- editable screens
- text based data item dictionary
- coding standards
- all source government owned

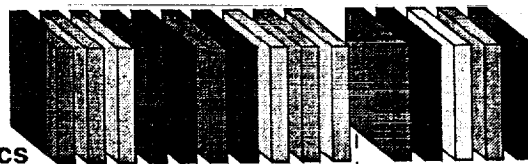
Object Oriented

message passing between modules

An SEI Workbench Based On The EWB Will Satisfy Both The Needs Of Researchers And SEI Mission Planners

Library of models & databases

Environments
Interactions
Systems
Orbital mechanics



Proven Technology

- EPSAT
NASA/LeRC SDIO Space Systems
- EWB
NASA/LeRC SSF
- SSAM
Space Nuclear Power
- LIWB
- LDEF
- SEISAT
SEI IR&D Prototype

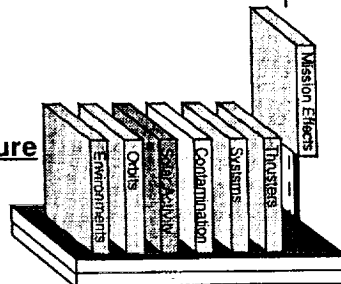
MIRIAD

Integrating Architecture

Expandable

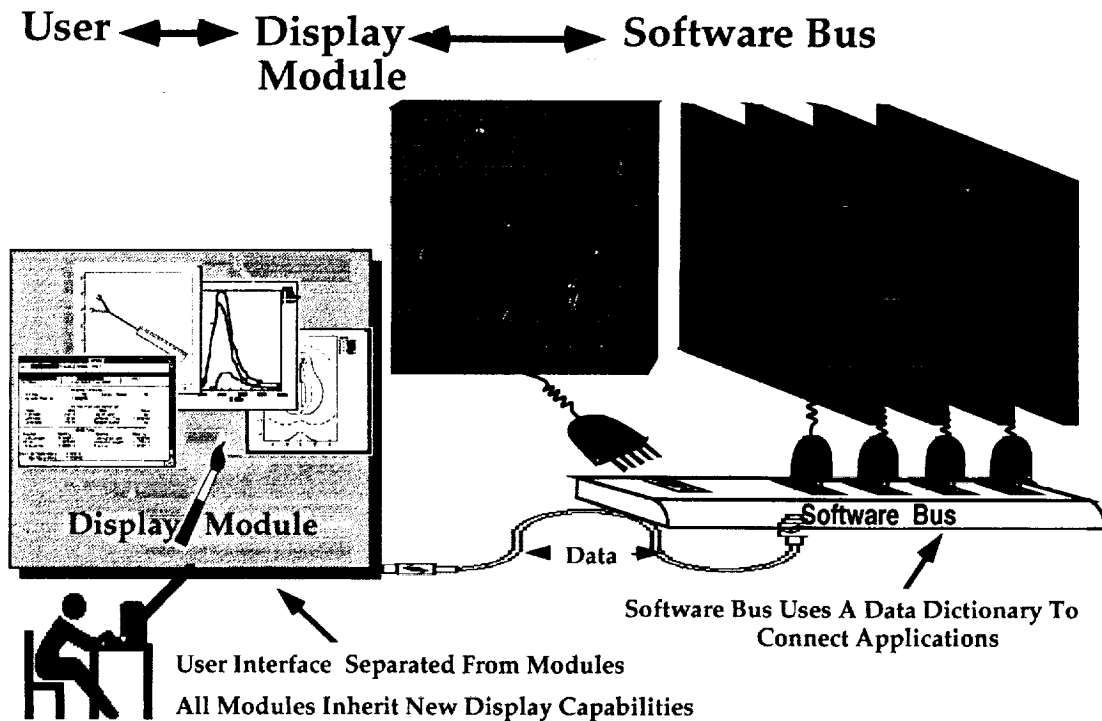
Tailorable to specific needs

Transfers knowledge & technology to the users

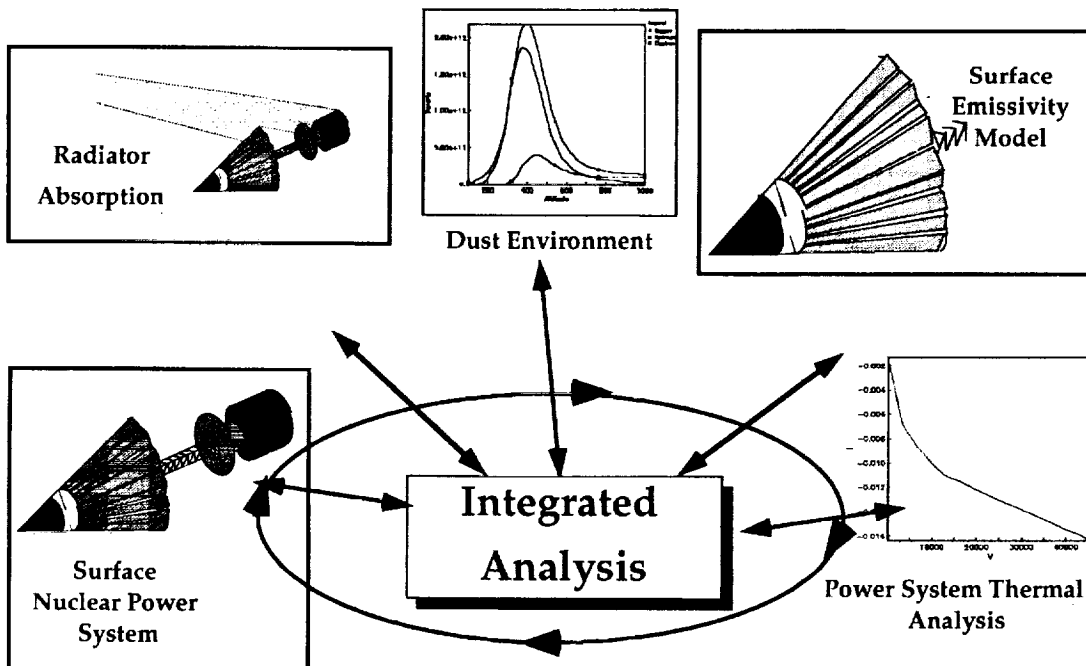


Mirriad Architecture

The Core Of An Integrated SEI Workbench



SEI Mission Planning Needs Integrated Assessment Tools



Summary Modeling And Analysis Tools

- **SEI mission will be the most intricate & longest running project ever attempted**
 - Over 30 years**
 - Moon, Mars, & interplanetary environments**

- **SEI designers must have mission design tools in time**
 - To impact the conceptual design**
 - To identify gaps in the knowledge**
 - To aid in the design of precursor missions**
 - To provide a vehicle to retain acquired knowledge**

- **The SEI workbench must be an integral part of the SEI**
 - Provides the vehicle for knowledge and technology transfer**
 - Is the nucleus for permanent retention of knowledge**