



**HOMER**  
Energy

# **Designing Least Cost Mini Grids with HOMER Pro**

5<sup>th</sup> Mini Grids Action Learning Event  
Reaching Universal Energy Access in Ghana

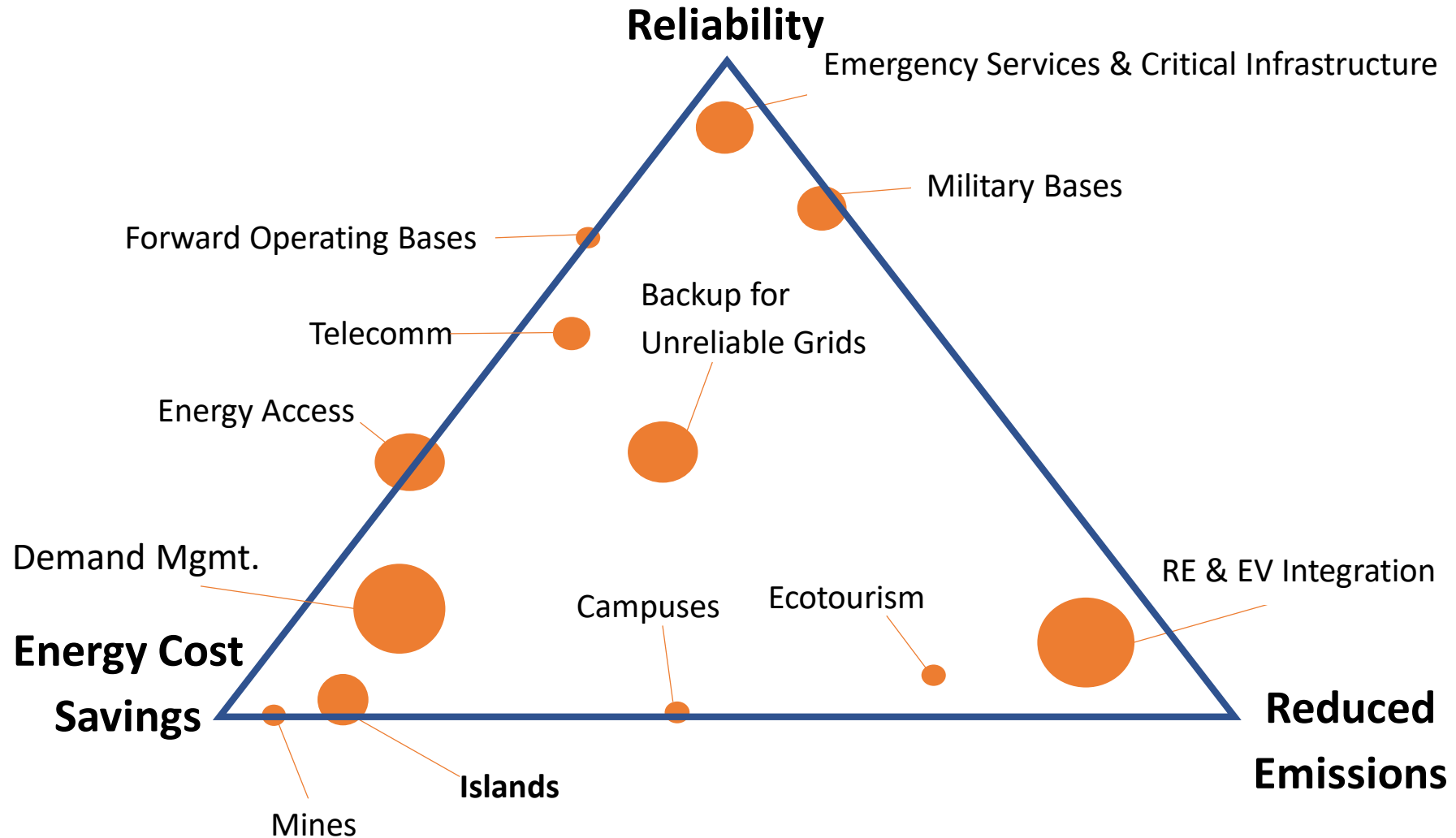
Peter Lilienthal, Ph.D.  
CEO, HOMER Energy  
June 24, 2019

# The Future of Power is Distributed



- Technology improvements
  - Solar, storage, communications, controls
  - Erase advantage of centralized plants
- Even more true for developing countries

# Mini Grid Value Propositions



# Mini Grid Markets

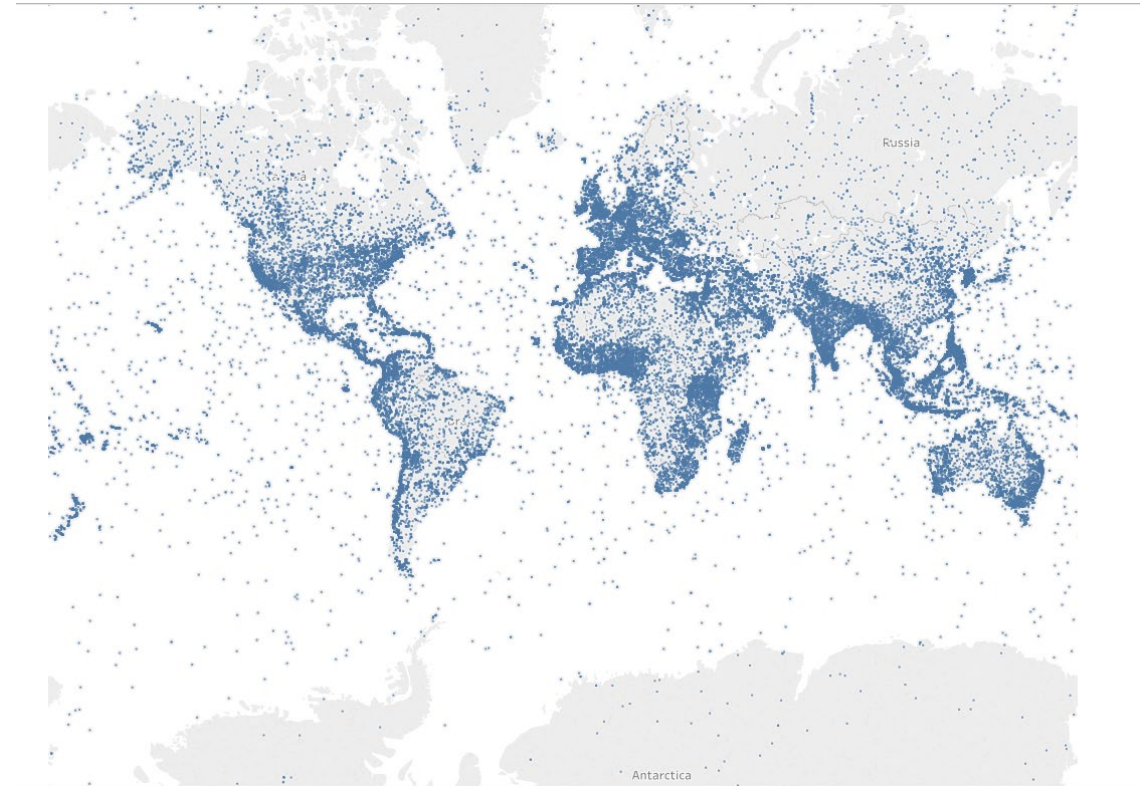
- Grid-Connected
  - Reliability & resilience
  - Utility cost management
    - Demand charge, TOU, and sellback restrictions
- Off-Grid
  - Energy Access
    - No existing infrastructure
  - Island & isolated utilities
    - Existing diesel-based power system



# HOMER Energy

## Designing Hybrid Systems for over 25 years

- 1992 – 2008 at NREL
- 2009: HOMER Energy created with exclusive license
- >250,000 people have used HOMER
- >100,000 opted-in to our hybrid system design network
- **Global Data**
  - 3 million HOMER files
  - 70,000 projects modeled since 2014



# Who uses HOMER

## Developers



## Component Suppliers



## Education



## Engineering Firms



## Government & Financial Institutions



## Utilities



# HOMER Solutions Framework

## Market Access

- Conferences and Webinars
- Microgrid News
- Industry Partner Program
- Network Component Library

## Software Solutions

- HOMER Pro
- HOMER Grid
- HOMER QuickStart
- HOMER QuickGrid
- HOMER SaaS API
- HOMER Controller API

## Services

- Consulting
- Training
- Support

# HOMER Energy's Industry Partners



LEONICS®



SPARKMETER⚡

MICROGRID  
Systems Laboratory  
*Accelerating Our Energy Future*





# Too Many Choices

Solar

Fuel Cells

Wind



Hydro

Micro-turbines

Geothermal

Micro-grids

Biomass

Demand Response

New Storage Techs.

Load Management

Electric Vehicles

Smart grids

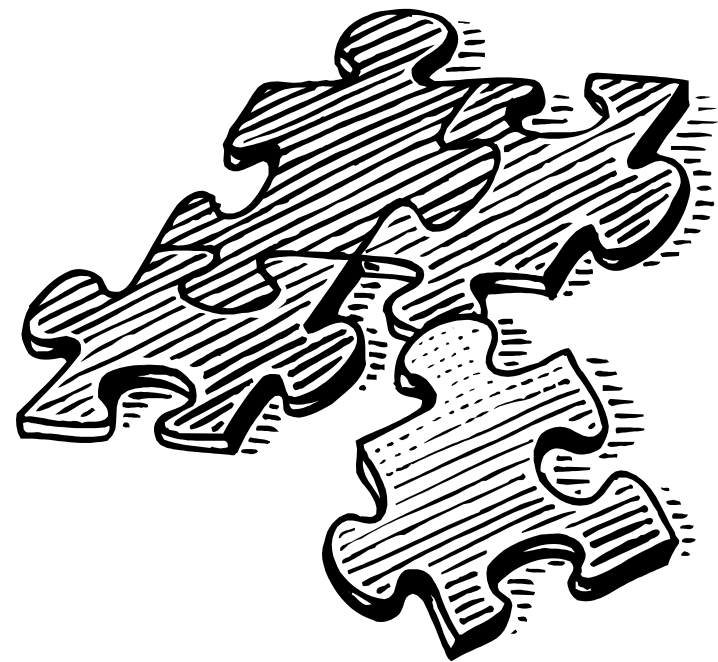


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# What is best?

It depends on:

- Resources
- Loads
- Equipment prices
- Equipment performance



**A confused mind says “No!”  
HOMER fits the pieces together**



**HOMER**  
Pro

The **trusted global standard** for economic analyses of hybrid system design

Get **insight** into the design tradeoffs of **cost-effective, reliable mini-grids and hybrid energy systems.**



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# Hybrid System Design in HOMER<sup>®</sup>

## Project Inputs



Economics

Load Profile

Site-Specific  
Renewable Resources

System Components

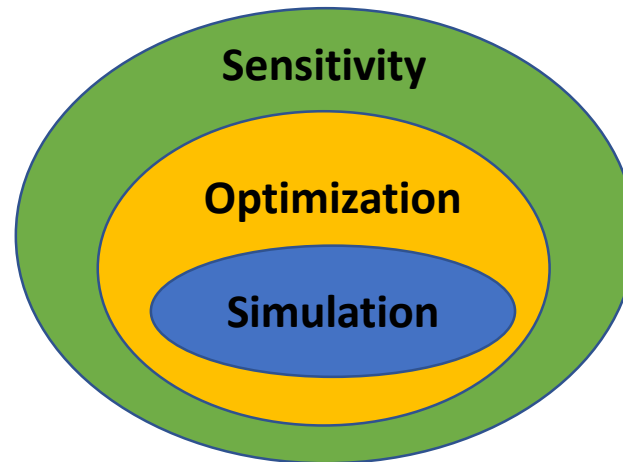
## Analysis



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Grid



## Results



**Economics & Engineering**

System Sizing

Performance Details

Financials

Various Reports

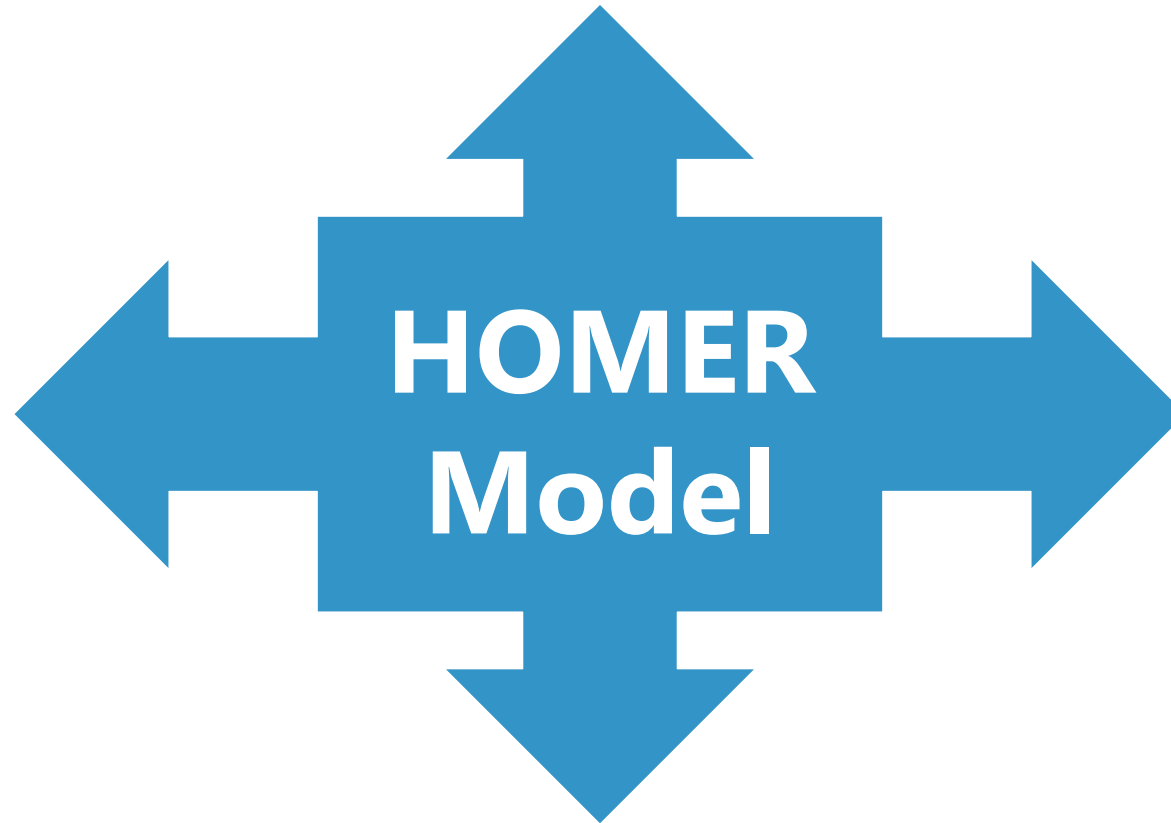


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# HOMER Connects the Mini Grid World

Renewable Advocates

Power  
Engineers

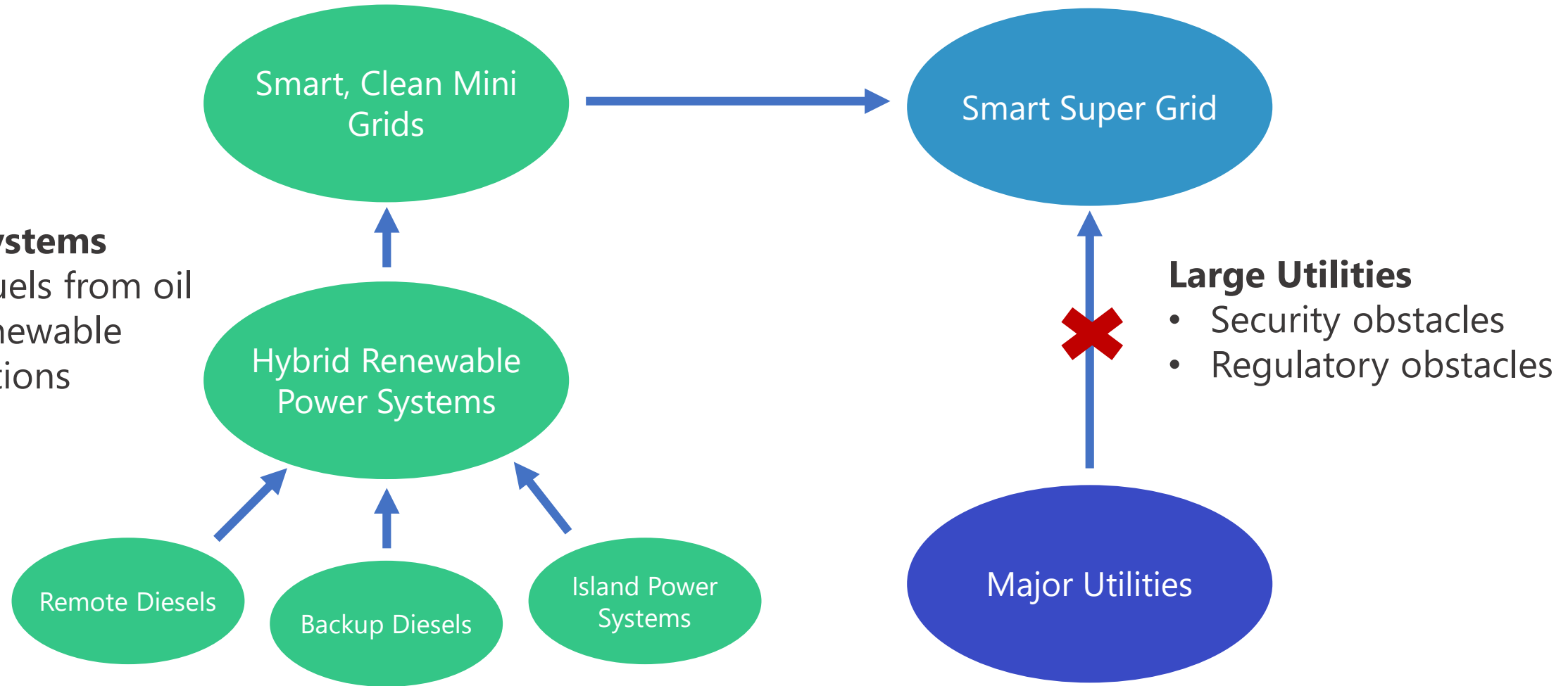


Financiers

Utility Operators

**Software as a communication tool**

# Clean Power Evolution



*We recommend HOMER to everyone. There is nothing else out there that does what it does.*

Anders Pedersen  
World Bank

*We spent a lot of money developing our own model, but threw it away because everyone kept asking for our HOMER results.*

Bruce Levy, CEO  
TDX Power

*The best hourly assessment tool for hybrid renewable electric generation systems in the world – bar none.*

Dr. Jan F. Kreider  
Building Systems Program  
University of Colorado

*We are amazed at both the thoroughness of the software and the design complexity it allows us to relatively quickly evaluate. To our knowledge, there is no other software on the market that matches HOMER for the purpose of designing renewable energy systems.*

Lisa Michael  
Renewable Energy Systems

*HOMER is a beautiful thing... it does most everything you could want it to, and it actually presents results in an intuitive/understandable manner.*

Jonathan Murphy  
Aerospace Systems Design Laboratory,  
Georgia Tech

