Two thrusts:

• Biomedical and imaging (as outlined by Dennis)
• Modeling and simulation of highly nonlinear processes

Expectations:

Given the state budget climate, immediate funding is unlikely - we are “priming the pump” for future funding
The Role of Modeling and Simulation in Hampton Roads

Business impact

• $450M/year business activity, expected to grow to $800M/year in 5 years
• Second leading location for M&S (after Orlando)

Need for M&S:

• Container traffic in Hampton Roads is expected to quadruple by 2030
• Vulnerability of Hampton Roads to hurricane and terrorist threats (M&S of traffic, emergency access, evacuation, supply-chain disruption, …)
• Biomedical applications
• War games, hurricane models, …
Forecasted Growth at The Port of Virginia
(courtesy of Bob Sharak of HRP)

Forecast Capacity
Forecast Demand
(4.2% Average Growth Per Year)

Maersk Terminal
Craney Island Marine Terminal
M/S EMMA MÆRSK  Circa 2007

Godspeed Brigantine, Circa 1607
M&S Expertise at William and Mary

Human side of military simulation
  • (PMESSII, Anthropology)

Traffic and supply chain modeling:
  • Computational operations research program
  • Business school

Hurricane probabilities and storm surge
  • VIMS researchers (H. Wang, J. Shen, …)

Highly nonlinear processes
  • Theoretical analysis of highly non-linear processes
    (E. R. Tracy, J. van Rosendale, N. Zobin)
Theoretical Issues

Need improved methods to predict the likelihood of ‘extreme events’ due to wind-driven waves.

These methods should include:

- Wave-kinetic models that include nonlinear effects (solitonic behavior and instabilities).
- Better treatment of the passage from deep to shallow water.
- Effects of bottom topography and obstacles on surface waves.
- Nonlinear wind-wave forcing.