Developing CPES Configurations (Part 2)

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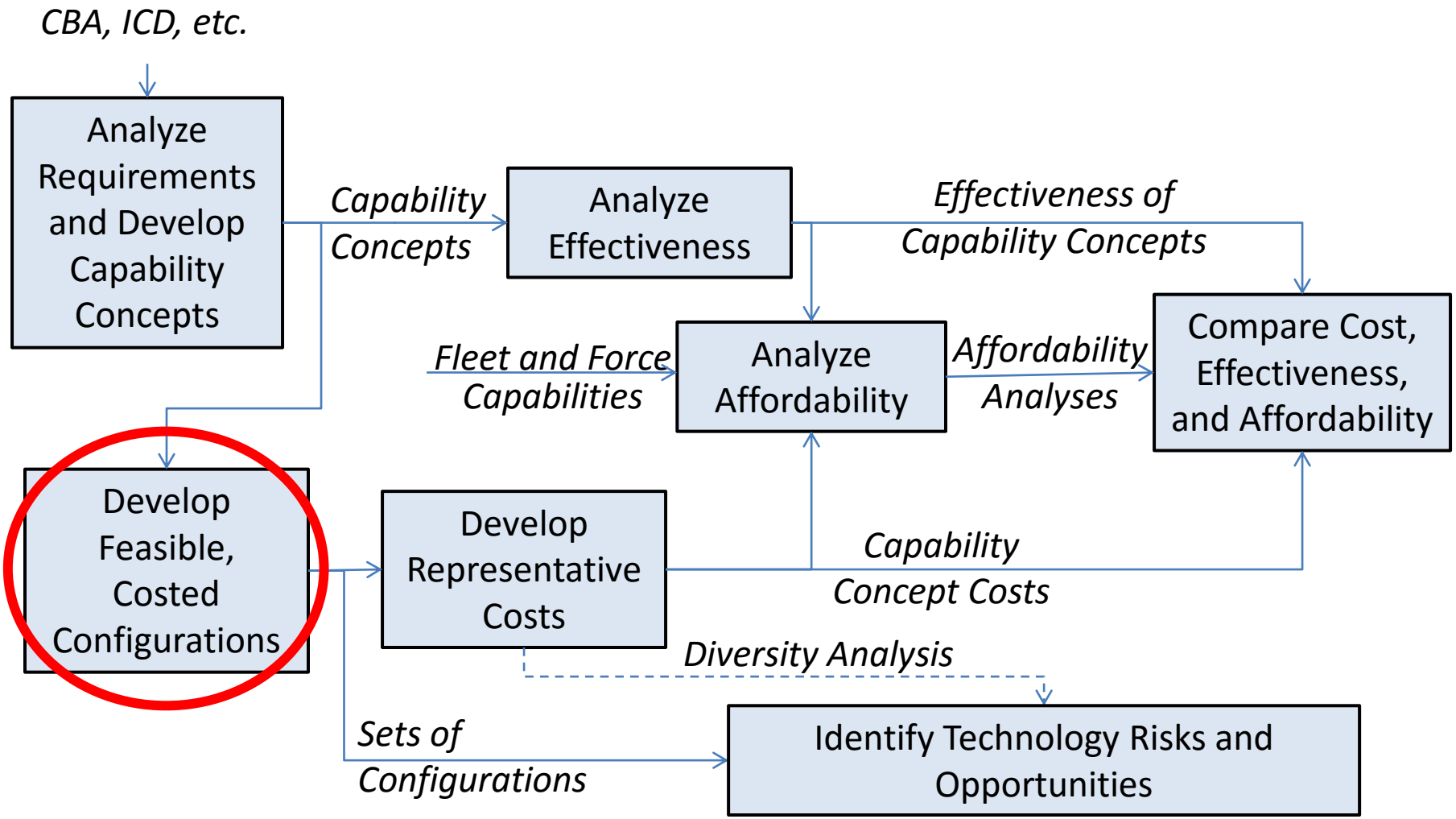
Reference Concept Exploration Process



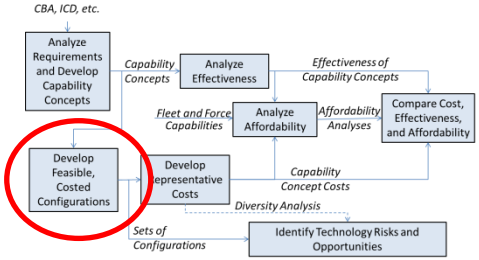
Pre-studies

- Pre-studies can …
  - Narrow the options considered in concept exploration by providing insight on design options that are likely not the solution
  - Produce synthesized data from which we can prepare behavior models and develop synthesis algorithms
- Possible Pre-Studies
  - Hull & Propulsion trade study: understand relative efficiency of different propulsor options (i.e. single vs double screw, contra-rotating, pods, etc.)
  - Number of zones study: Determine impact of number of zones on survivability and cost
  - Studies to develop the sizing algorithms for system architecture patterns
  - Studies to develop cost algorithms that are sensitive to power system alternatives

Are these good Pre-Studies?

What other Pre-Studies should be accomplished?

Develop Feasible, Costed Configurations



Capability Concept

Select Capability Concept Variables

Capability Concept Variables

Select Configuration Variation Variables

Configuration Variation Variables

Synthesize Configuration

Calculate Feasibility Elements

Feasibility Elements

Calculate Configuration Feasibility

Configuration Output Variables

Configuration Feasibility

Estimate Configuration Costs

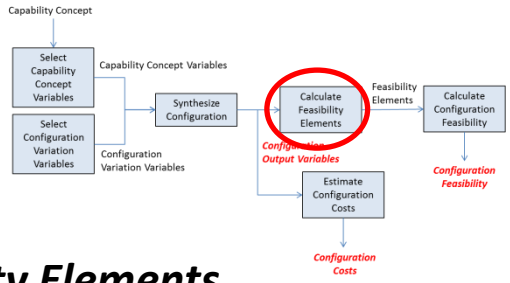
Configuration Costs

Repeat Process until have enough feasible configurations with sufficient diversity (or determine feasible configurations do not exist)

Products of Configuration Synthesis (Collectively form the "Sets of Configurations")

Calculate Feasibility Elements

- Configurations that are synthesized may not be feasible
- Feasibility Elements are the result of "feasibility tests"
  - Must establish criteria for feasibility categories
  - More tests, more likely a feasible configuration is viable
  - Should have tests for areas of greatest risk
- Trade-off between screening variables at the input vs testing for feasibility on the output of synthesis
  - Testing at the output may require synthesizing more configurations to generate sufficient feasible configurations (low yield)
- Feasibility Categories
  - Feasible (confident)
  - High Risk for Feasibility (not confident if feasible or not)
  - Not Feasible (confident)



SSCTF Feasibility Elements

SUW Performance
ASW Performance
AW Performance
Sustained Speed
Endurance Speed
Arrangeable Area
Displacement
Length to Beam Ratio
Stack up Length
Seakeeping

Possible Power System Related Feasibility Elements

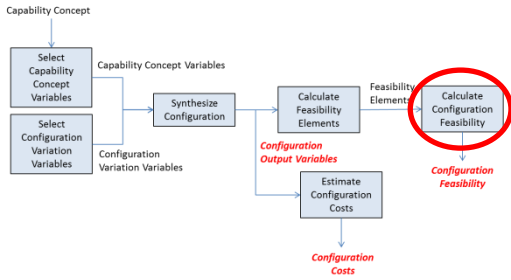
- Power system capacity
  - What percentage of the time can the power system meet the demand (power) without load shedding?
- Power continuity requirements (Quality of Service)
- Electric weapon requirements (Pulse power support)
- Survivability
  - To what degree are vulnerability (zonal survivability) and recoverability (compartment survivability) requirements achieved?

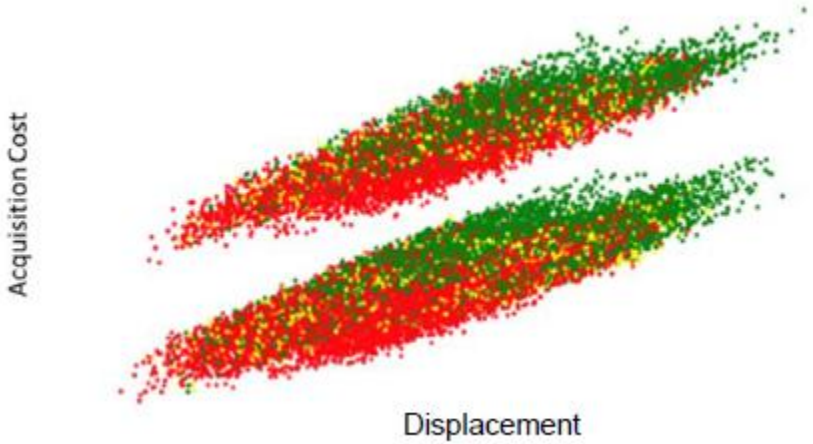
Should algorithms be developed for these Feasibility Elements?

Are there other Feasibility Elements that should be calculated?

Calculate Configuration Feasibility

- Combine values of all the Feasibility Elements into a single value
- Incorporate compound integration risk
- Suggested calculation method
  - Feasible: All Feasibility Elements are Feasible
  - High Risk for Feasibility: All Feasibility elements are Feasible or High Risk for Feasibility, but no more than 5 can be High Risk for Feasibility
  - Not Feasible: At least one feasibility element is Not Feasible, or more than 5 feasibility elements are High Risk for Feasibility

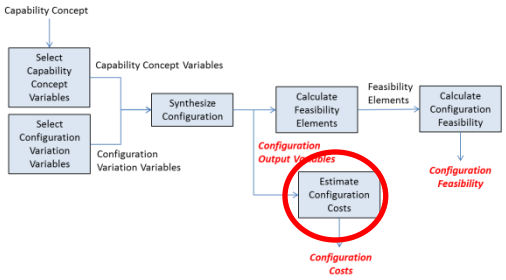




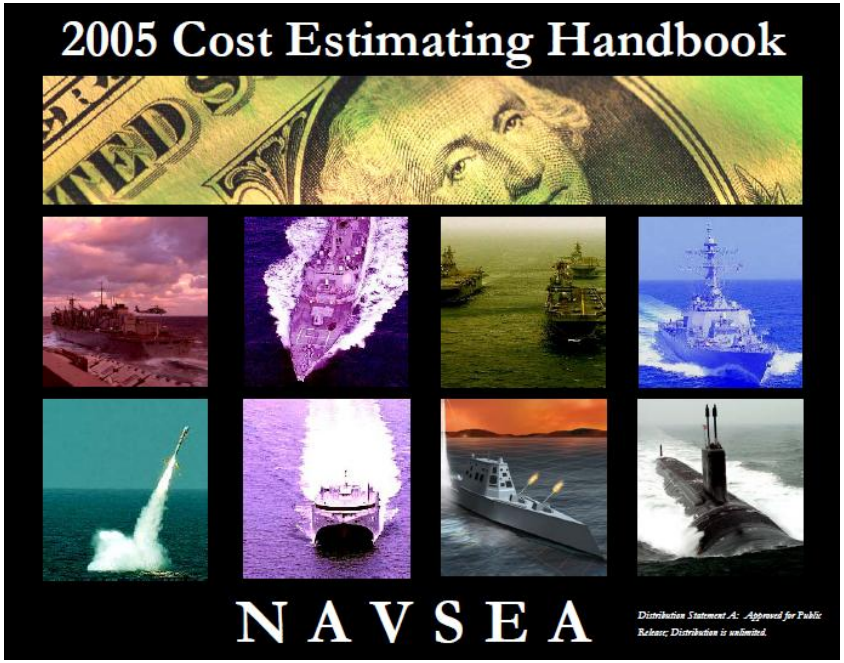
Is this a good method?

Are there good alternatives?

Estimate Configuration Costs

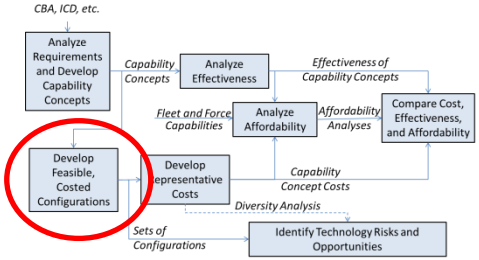


- Acquisition and Lifecycle cost calculated for each configuration
  - Based on Configuration Output Variables and other parameters (ground rules and assumptions)
  - Cost estimating methods developed by SEA 05C
- Costs should be presented in ranges
  - Reflect uncertainty in costing methods



What are the CPES related Cost Estimating Issues?

Develop Feasible, Costed Configurations



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