

Subtask E: Develop Functional Modeling Tool to Facilitate the Net Zero Energy Resilient Community Master Planning Process

a.k.a., “Develop a Tool”

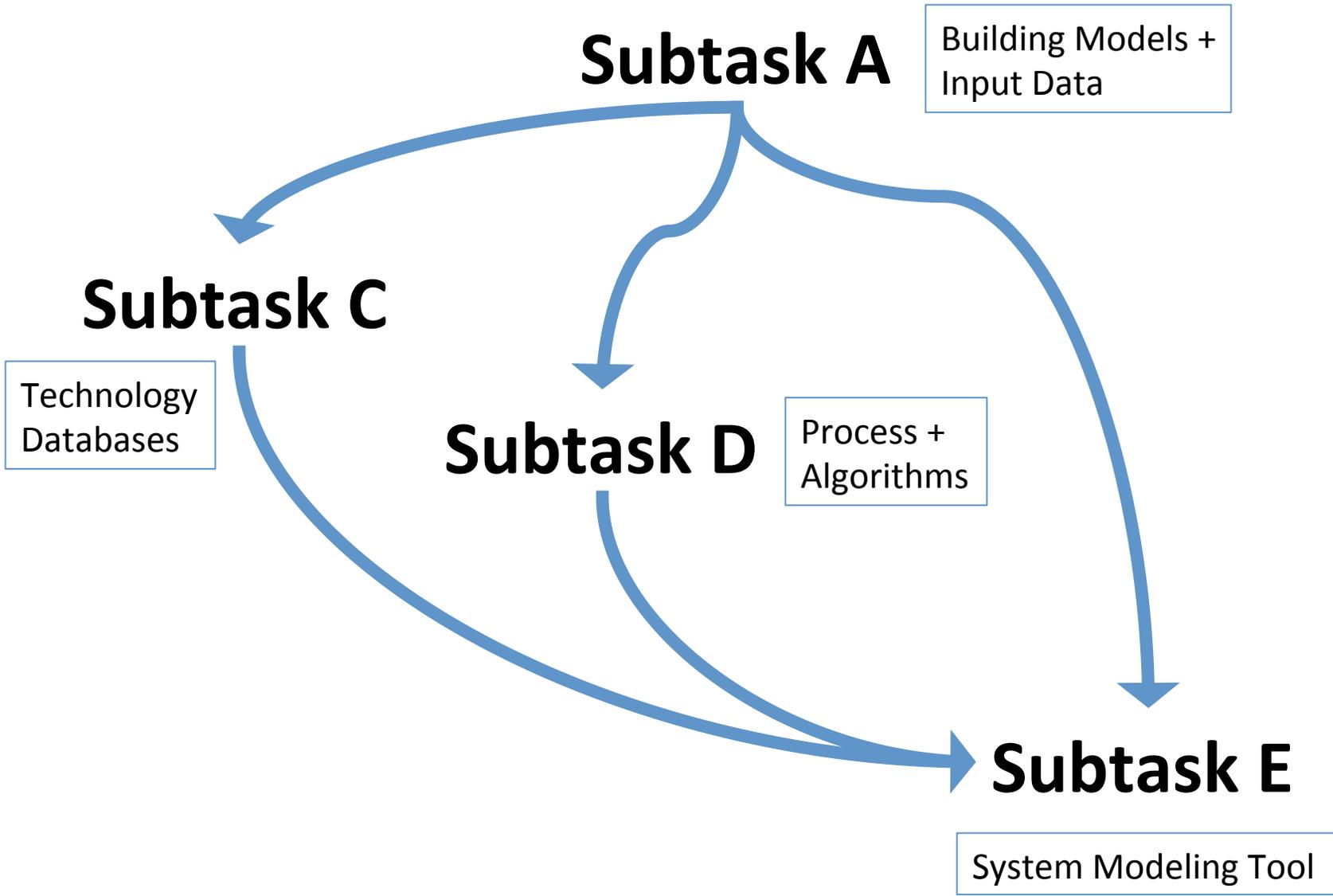
Task Co-Leads

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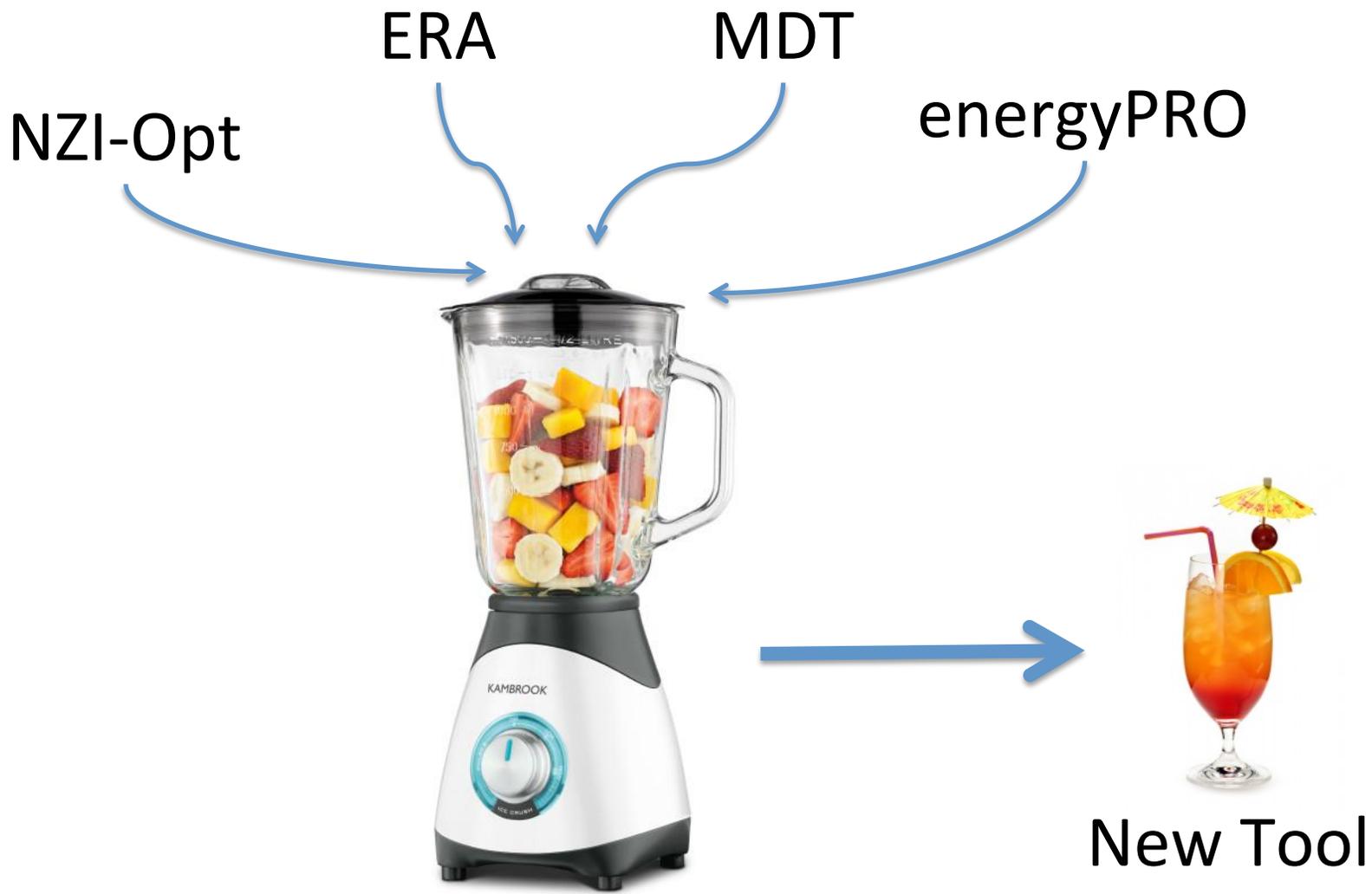


Subtask E Scope

- Review existing modeling tools
- Develop new modeling tool
 - Stand-alone module
 - Supply, distribution, and storage technologies
 - Thermal and electrical systems
 - Performance and cost optimization
 - Resiliency analysis

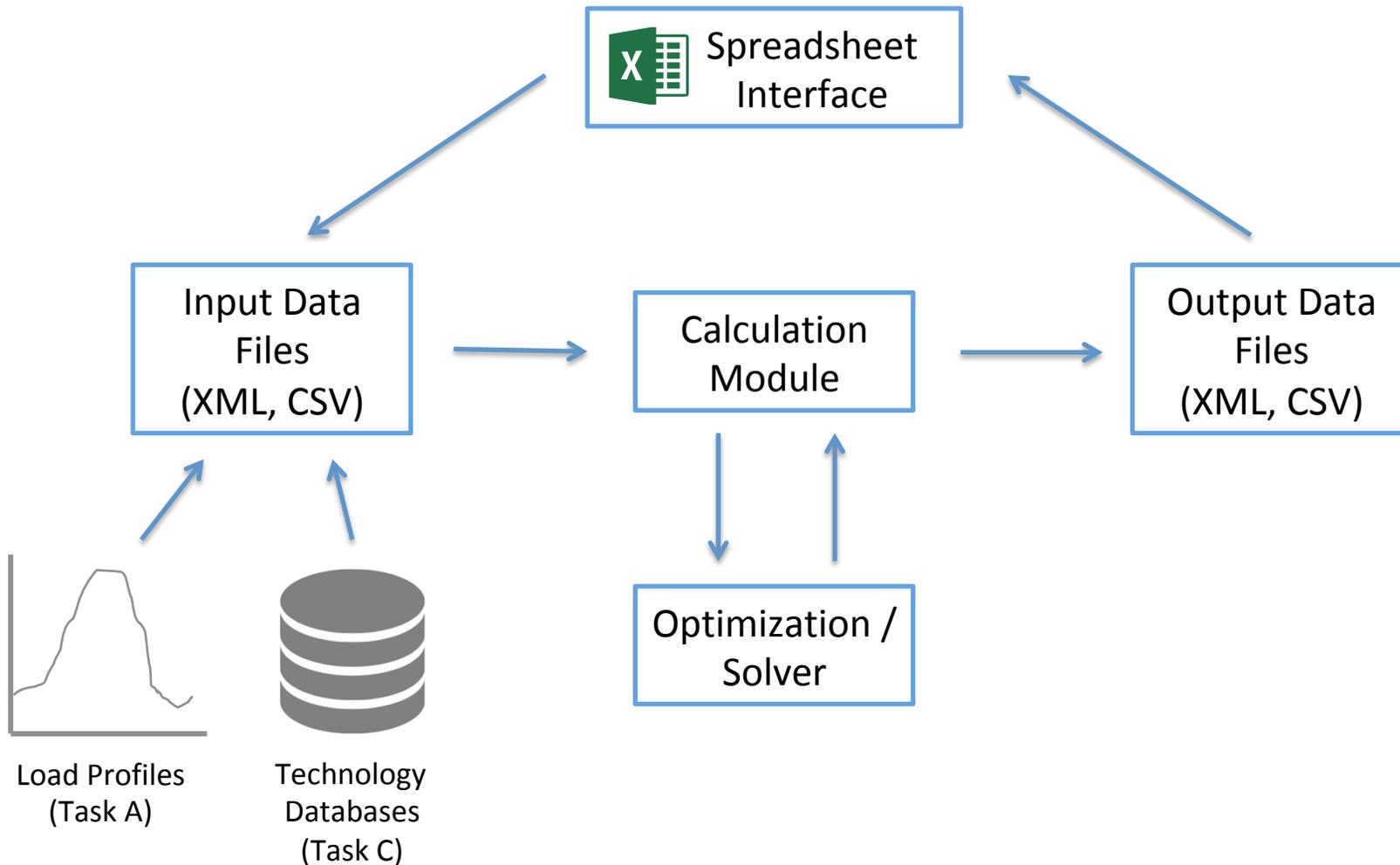
Existing Modeling Tools

- NZI-Opt / System Master Planning Tool (SMPL)
 - US Army Corps of Engineers (USA)
- Energy Resilience Analysis Tool (ERA)
 - MIT Lincoln Laboratory (USA)
- Microgrid Design Toolkit (MDT)
 - Sandia National Laboratory (USA)
- energyPRO
 - EMD International A/S (Denmark)





Architecture



Deliverables

1. Stand-alone calculation module
2. Simple Excel spreadsheet interface

Progress Update

- Initial review of existing tools
- Just received funding in September 2018
- Next Steps:
 - Define software requirements
 - Begin new tool design and development

Software Requirements

- Establish needs of stakeholders
- Define features and functionality



Problem Statement

- What is the problem we are trying to solve?

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Planners for public communities (military installations, universities, etc.) need tools to evaluate holistic solutions for satisfying energy needs and energy security for the buildings in an entire installation, campus, or district. Although several energy master planning tools with various capabilities already exist, the problem is that *there is no singular tool that integrates the comprehensive modeling and cost optimization of energy generation, storage, and distribution technologies (from around the world) for electrical and thermal systems and includes a quantitative assessment of energy resilience.*

Software Requirements

- What requirements must the tool satisfy?

Proposed Requirements

1. Calculates and quantifies energy performance for a given scenario
2. Supports thermal and electrical systems and networks
3. Accounts for thermal/electrical network characteristics (capacity, losses, cost)
4. Calculates and quantifies resilience for a given scenario
5. Supports the comparison of multiple alternative scenarios
6. Accepts building load profiles as input data
7. Accepts scenario definitions as input data
8. Includes a comprehensive data set of typical and cutting-edge energy generation, storage, and distribution technologies/strategies with performance and cost inputs
9. Facilitates extensibility and maintainability of the data set of technologies/strategies
10. Uses text-based input and output formats to facilitate integration with other software tools/workflows
11. Includes command-line interface to facilitate integration with other software tools/workflows
12. Includes simple graphical user interface (e.g., spreadsheet interface) to allow users to operate the tool without the command line
13. Runs on a standard desktop computer with Windows operating system

Questions / Feedback

- Feedback requested on problem statement and proposed requirements, please contact:

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