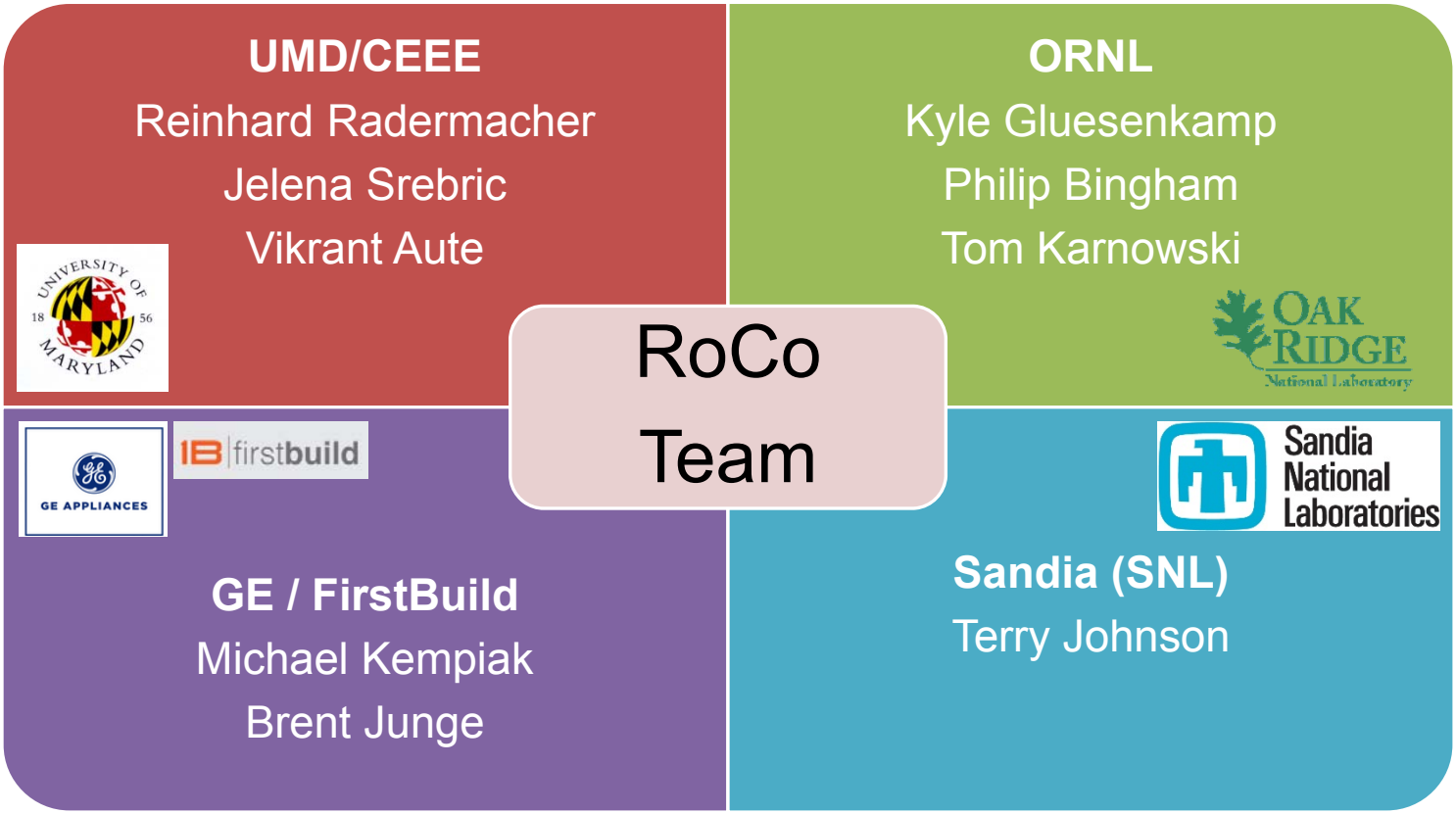
Robotic Personal Conditioning Device

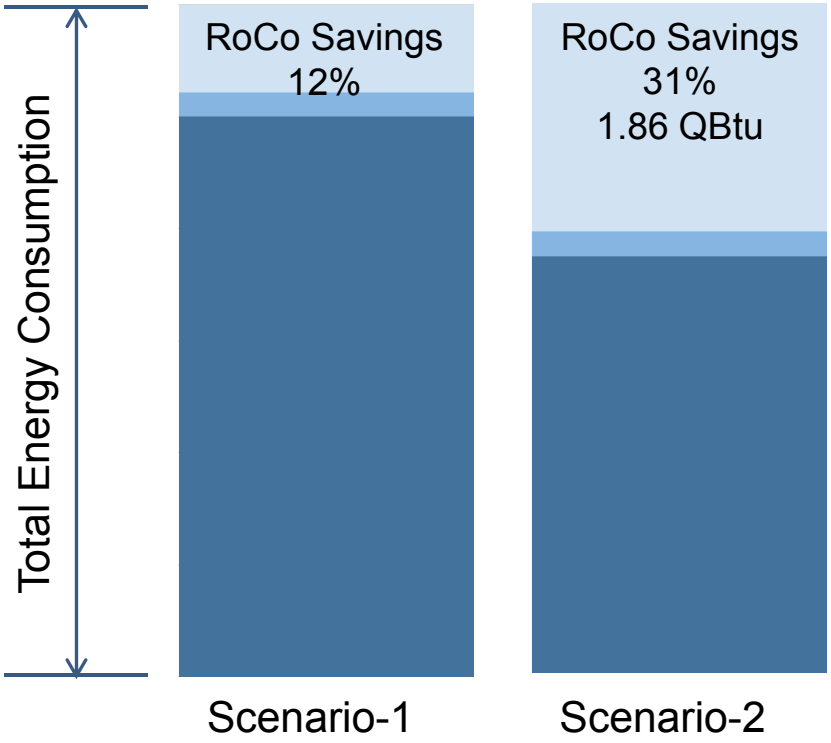
RoCo: The Roving Comforter



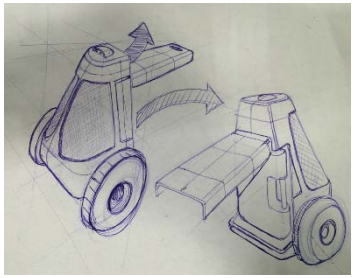
Award Number: DE-AR0000530; Duration: 5/6/2015 to 5/5/2018
Unfunded Industry Collaborators: Embraco, Heat Transfer Technologies LLC.

Technology

- Challenges with existing systems
  - Weight, bulkiness;
  - Limited mobility range
  - Short operating times
  - Limited air flow directionality
  - Limited appeal
- RoCo Technology
  - Personal ‘attendant’ for thermal comfort
  - Cooling and heating through one or more robotically controlled air nozzles
  - Highly portable, can follow a person
  - Integrates thermal storage
  - Multiple implementations and price points



Savings from expanded set points for same comfort



VA10

Slide 2

VA10 RoCo Tech - last bullet changed from many implementation to - multiple implementations and price points

Vikrant Aute, 5/18/2015

Value Proposition

- Ultimate local comfort technology (personal attendant)
- Significant energy savings
- Unmatched flexibility from modules
  - Robotic platform
  - Intelligent nozzles
  - Miniature heat pump and thermal storage
- Expandable platform
- Low cost

Performance Targets & Validation

- Year-1: Design, build and demonstrate one RoCo, v1.0
  - Working prototype, capable of cooling and following a person
  - Evaluate and select 2-3 preferred cooling options for further R&D
  - Develop thermal comfort models
  - T2M: FirstBuild feedback, BOM & cost models
  - Validate COP through laboratory testing
  - Capacity 100W; COP 2.0/-; Cost $240; PCM (0.25 W/mK) ; Wt. 30kg
- Year-2: Build and test 4 RoCos, v2.x
  - Improved robot, nozzles, heat pump
  - Design and build 4 cooling devices
  - Comfort Lab tests, FirstBuild and in-team field experience
  - T2M: FirstBuild feedback, design competition
  - Validate component performance and system COP
  - COP 2.5/2.0; Cost $120; PCM (0.5 W/mK) ; Wt. 30 kg
- Year-3: Build and test 6 RoCos with extensive testing, v3.x
  - Improved component performance
  - Design and build six RoCo units with two cooling options as working prototypes
  - Design guidelines
  - T2M: Field test experience within the team and FirstBuild community
  - Validate component performance, system COP and thermal comfort
  - Cost ~$60; COP 3/2.5; PCM (1.0 W/mK)

How DELTA can help?

- Synergy with other teams
- Field test assistance
- Market Survey
- Academic design competition
- Constructive criticism