

Moving from insights to interventions

Designing experiments to reduce fuel waste and change organizational culture in military environments

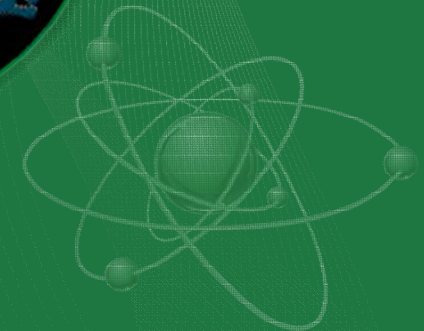
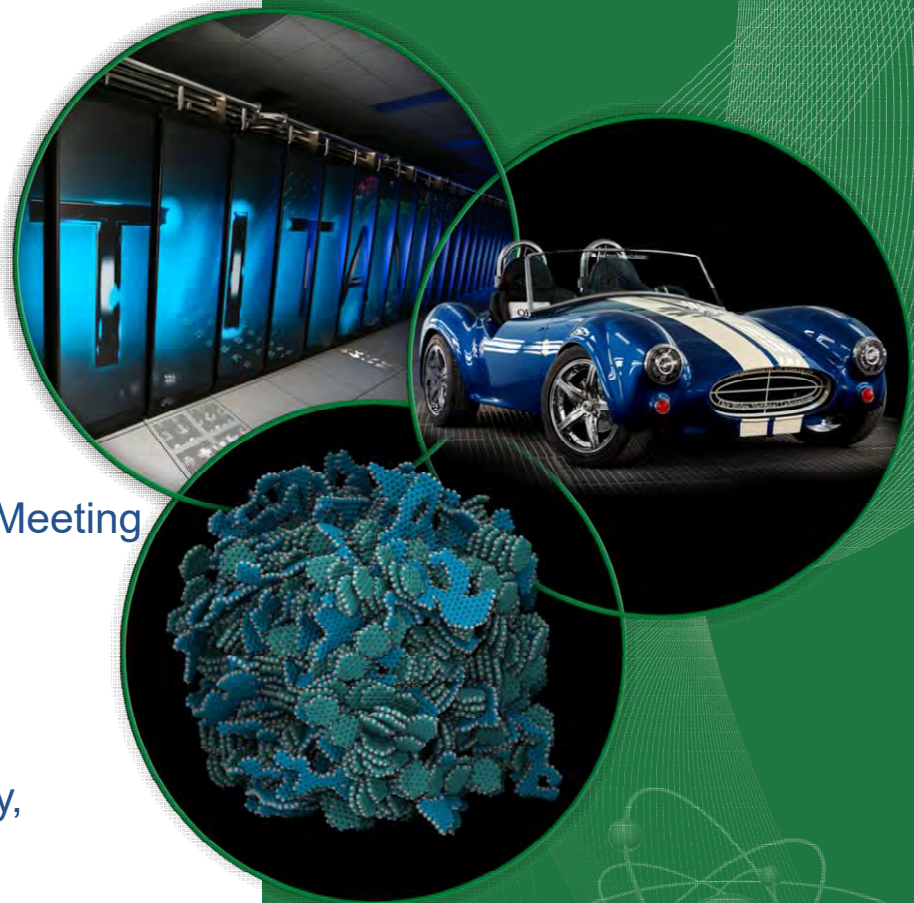
Behavior, Energy, & Climate Change Annual Meeting
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Plus...



ERDC-CERL:

- Tom Decker
- Amanda Ehmann
- Nate Putnam, PhD
- Craig White

EXWC:

- Ken King
- Earl Childs
- Marcus Highfill

MCSC:

- John Peters

JPID Consulting:

- Ibibia Dabipi, PhD
- Valerie Lefler, MPA
- Judy Perkins, PhD, PE
- Kristian Smith
- Jeffrey Stevens, PhD
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NSWCCD:

- Sean Sadlier

ORNL:

- Erin Rose
- John Reed, PhD (Innovologie, LLC)

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BEyOnD seeks to reduce fuel consumption through behavioral changes

BEYOND = BEHAVIORAL ENERGY OPERATIONS DEMONSTRATION

BEyOnD seeks to reduce ground-based USMC fuel consumption in austere environments **by over 10%** by changing human behavior **at little to no cost**; four foci →

- **Phase I:** observation, interviews, & analysis
- **Phase II:** experimentation
- **Phase III:** broader implementation

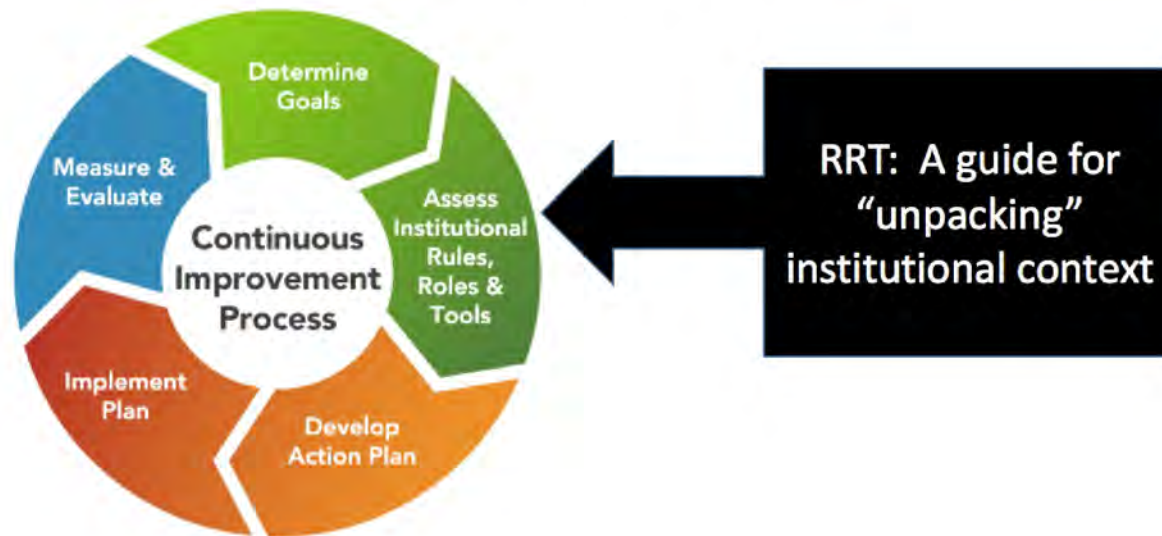


***Situation:* Clear “imperatives” to “save” fuel; but “fuel-wasting” behaviors among warfighters**

- Imperatives for saving fuel
 - Extends operational reach
 - Reduces casualties, death
 - Also saves money, conserves energy
- Saving fuel = reducing fuel wastage
 - Fuel usable for other, higher priority purposes
- Fuel wastage (prior evidence, observations)
 - Vehicles idling for (very) long times; driving behavior
 - Generators used at very low capacities
 - ECUs heating/cooling unnecessarily

Phase I took an *Institutional Change** approach to understand WHY warfighters behave the way they do

FEMP promotes a whole-system approach that includes institutional context



Using an evidence-based, social science continuous improvement approach to help agencies design, implement, and achieve lasting energy and sustainability goals

* US Department of Energy, Federal Energy Management Program, Institutional Change Team
N. Baker, FEMP program manager
A. Wolfe (ORNL), C. Payne and R. Diamond (LBNL), IC Team
<http://energy.gov/eere/femp/institutional-change-sustainability>

Empirical data collection at ITX-3 2016* — 50+ observations and 49 interviews**

- 5 days, in May 2016
 - Varied training settings and activities, fixed & mobile
 - Temperatures (53°–115°F) did not require cooling for large blocks of time
- 15 BEyOnD team members conducted observations
- 6 BEyOnD team members conducted interviews based on observations

*Integrated Training Exercise, USMC, at Twentynine Palms, CA, May 2016

**With Human Subjects Institutional Review Board approval

Phase I produced compelling behavioral insights, from Marines' perspectives

- Varied behaviors in similar circumstances
- Inattention to energy
- Roles matter
- Technologies matter
- Often, fuel *NOT* wasted

Phase I produced compelling behavioral insights, from Marines' perspectives

- Varied behaviors in similar circumstances
 - Informal “rules of thumb,” sources of information →
- Inattention to energy
 - When considered, fuel → typically *not* highest priority
- **Roles** matter
 - Motor transport specialists →
 - Utilities specialists →
- Technologies matter
- Often, fuel *NOT* wasted

Formal & informal **Rules**

- Fill gaps in training
- Shape “normal” (local) priorities & practices
- Define role-specific responsibilities, penalties, restrictions

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- **Technologies matter** →
- Often, fuel *NOT* wasted

Tools: Technologies, systems, & behavior inextricably linked

- ECU controls
- Reliability of gauges
- Equipment readiness and needs

Microgrid deployment a notable case of easy adoption

- Saves energy *plus*
 - Increases reliability
 - Frees time for mission-essential activities

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- Roles matter
- Technologies matter

• **Often, fuel *NOT* wasted**

Vehicle idling

- Tactical readiness (functional, symbolic)
- Equipment readiness
- Preserve batteries
- Powering equipment (vehicles as generators)

Generators and ECUs

- Equipment environmental needs
- Linkage to vehicles/batteries

Results from Phase I intended to identify potential Phase II experimental interventions

Now, what?

Findings/insights do *NOT* automatically translate into [obvious] interventions

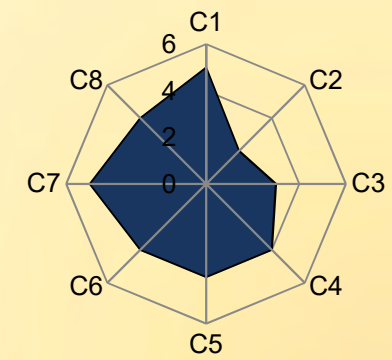
Multiple approaches could be used to select interventions

Weighted decision matrix approach

For each [specified] proposed intervention & target (vehicle idling, ECU, etc.)		Intervention score
Criteria (decision weight)	C1: Meets fuel-saving objective (2)	
	C2: Compatible with existing operations and norms (2)	
	C3: Advantage(s) over existing practice (2)	
	C4: Easily observable impacts (1)	
	C5: Multiple benefits—Mission (1)	
	C6: Multiple benefits—Safety (1)	
	C7: Aligns with Marine specialty (0.5)	
	C8: Shovel-ready & scalable for wide adoption (0.5)	



Spider plot approach



For each [specified] proposed intervention

Logic model approach



Multiple approaches could be used to select interventions



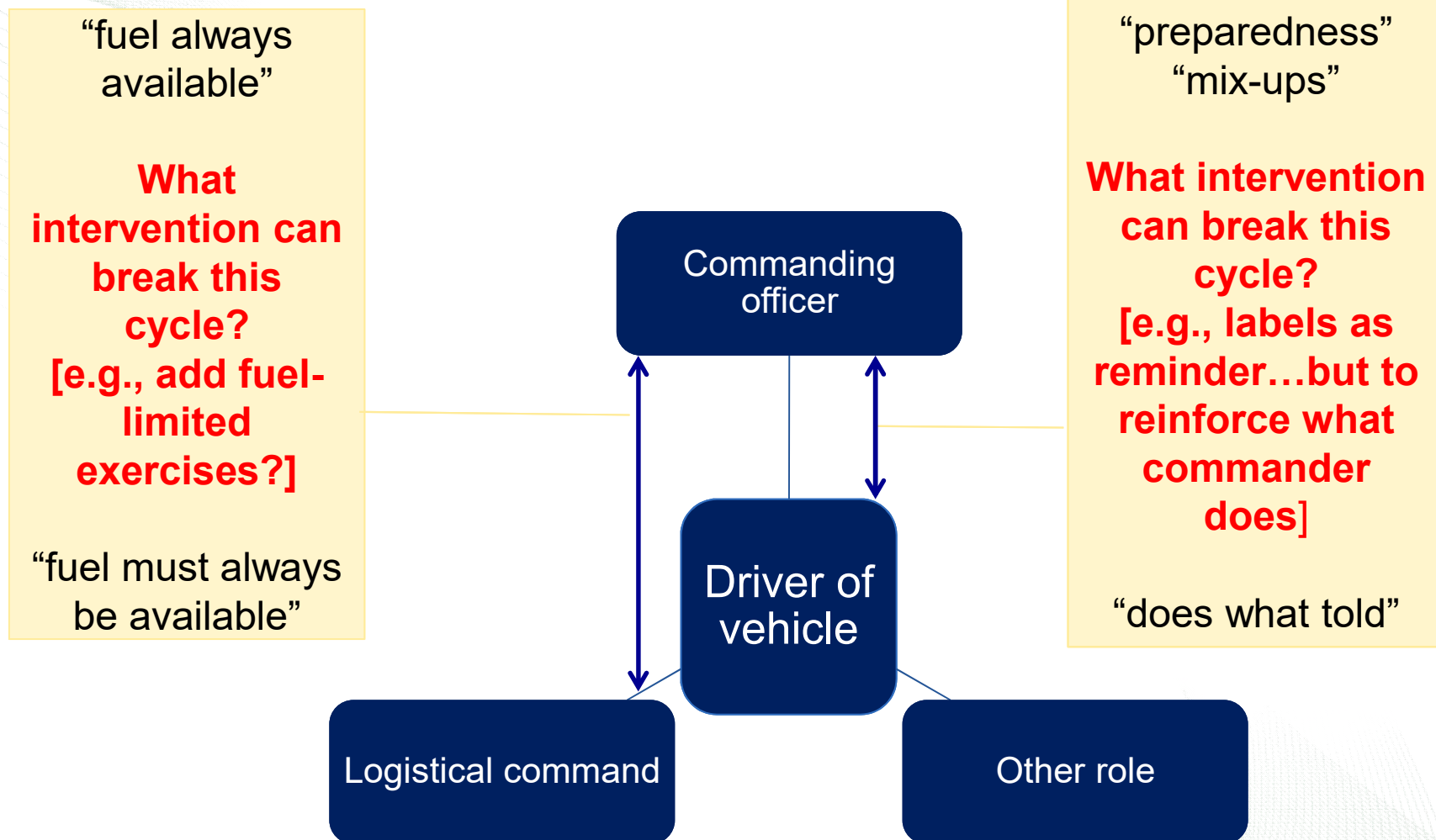
Criteria and weights should derive from and fit within the institutional change continuous improvement process (from goals and assessment of institutional context)

Process raises many questions; answers are not obvious

- **Goal specification**—what constitutes “success”
 - What goals? How to be measured (interim/end)?
 - Behavior change \neq fuel savings (necessarily)
 - Short term ‘success’ \neq persistent ‘success’
 - Short-term demonstration...indicator of persistence? strategic intervention?
- **Criteria for selecting interventions**
 - Derive from goal specification
 - Logic of *how* intervention can achieve goal(s)
 - Understanding about *why* target populations would change behavior
 - How to get people to change [specified] behavior?

Complex systems—*which* points of interventions, amongst *which* groups, to achieve which goals (demonstrably)?

Organizational, institutional approach— map key roles & issues; then think about potential points of intervention



We are deciding how best to proceed

- We've determined some elements
 - Separate sets of interventions
 - For vehicles and for ECUs/generators
 - Quasi-experimental approach
 - With “control” vs “intervention” comparisons
- We've identified ideas for interventions, but have neither completed that process nor selected *which* interventions to pursue in Phase II experimentation

...stay tuned

Thank you.

Questions?