

Modeling Human Terrain



Connections UK

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IW Definitions

DoD Directive 3000.07 (w/ch 1) May 12, 2017

Irregular Warfare. A violent struggle among state and non-state actors for **legitimacy** and **influence** over the **relevant population(s)**.

Stability Operations. An overarching term encompassing various military missions, tasks, and activities conducted outside the United States in coordination with other instruments of national power to maintain or reestablish a safe and secure environment, provide essential governmental services, emergency infrastructure reconstruction, and humanitarian relief.

Counterinsurgency. Comprehensive civilian and military efforts designed to simultaneously defeat and contain insurgency and address its root causes.

Unconventional Warfare. Activities conducted to enable a resistance movement or insurgency to coerce, disrupt, or overthrow a government or occupying power by operating through or with an underground, auxiliary, and guerrilla force in a denied area.

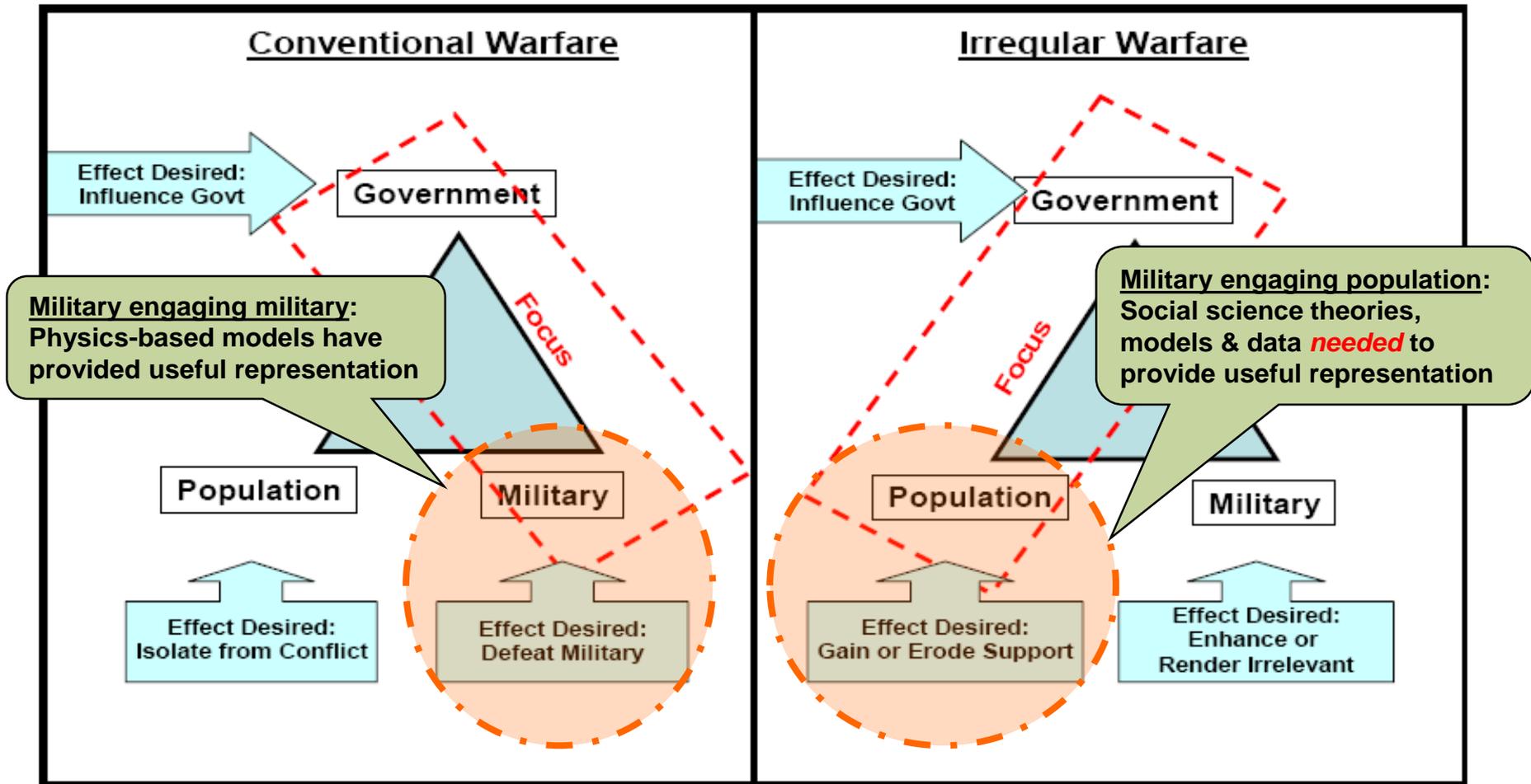
IW can include any relevant DoD activity and operation such as counterterrorism; unconventional warfare; foreign internal defense; counterinsurgency; and stability operations that, in the context of IW, involve establishing or re-establishing order in a fragile state or territory.

The focus of IW is the relevant populations, not the enemy's military capability.



Contrasting Conventional and Irregular Warfare

(U.S. Department of Defense ability to model)

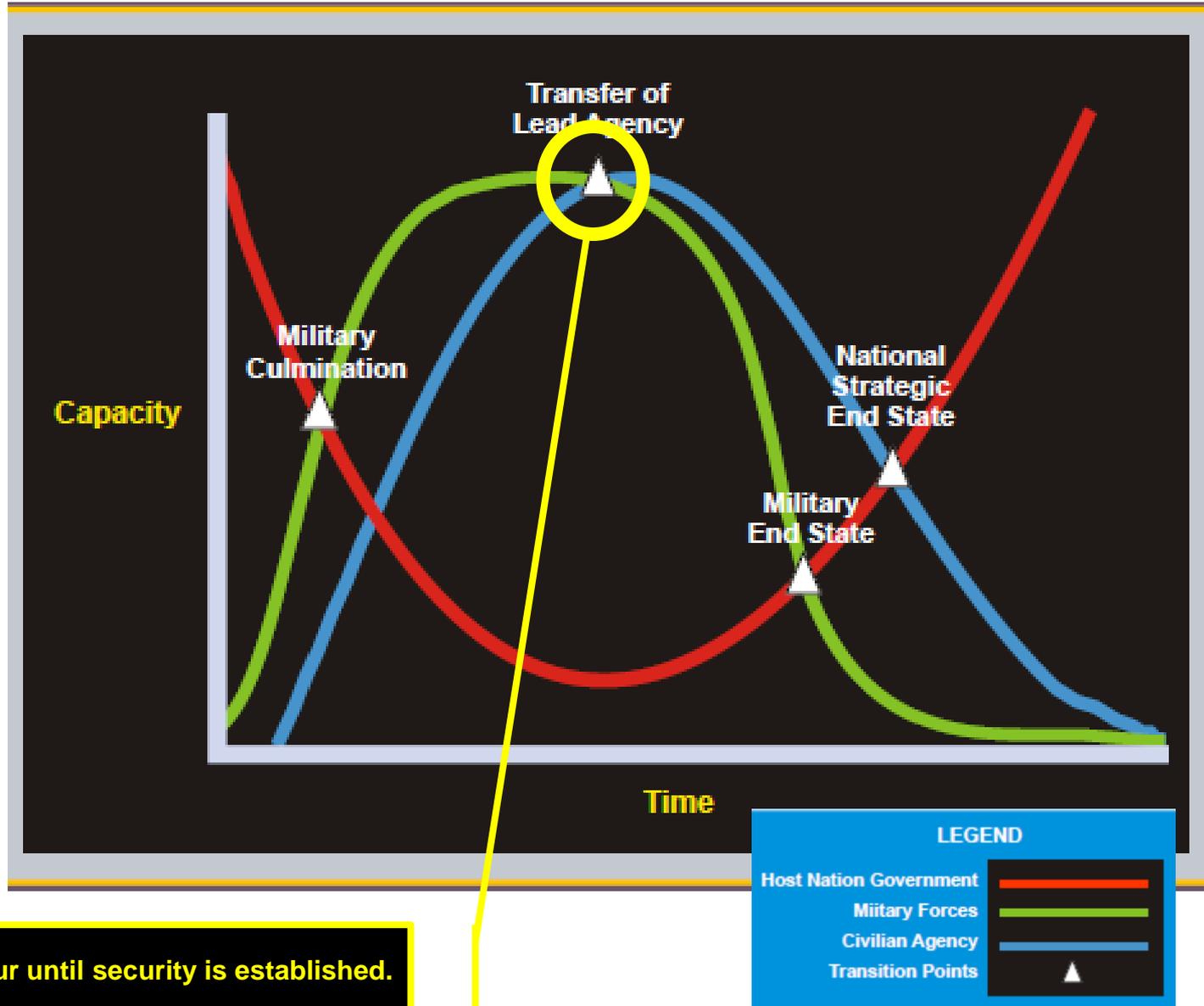




The Big View: U.S. Intervention to Stabilize a Failing Nation

Notional Transitions of Authority

- Military 'First Responders' to instability.
- Government and non-governmental organizations next.
- Rebuilding Host Nation (HN) capacity (for security) key military role.
- Lasting security requires HN re-establish Rule of Law and have security forces and judiciary to enforce.

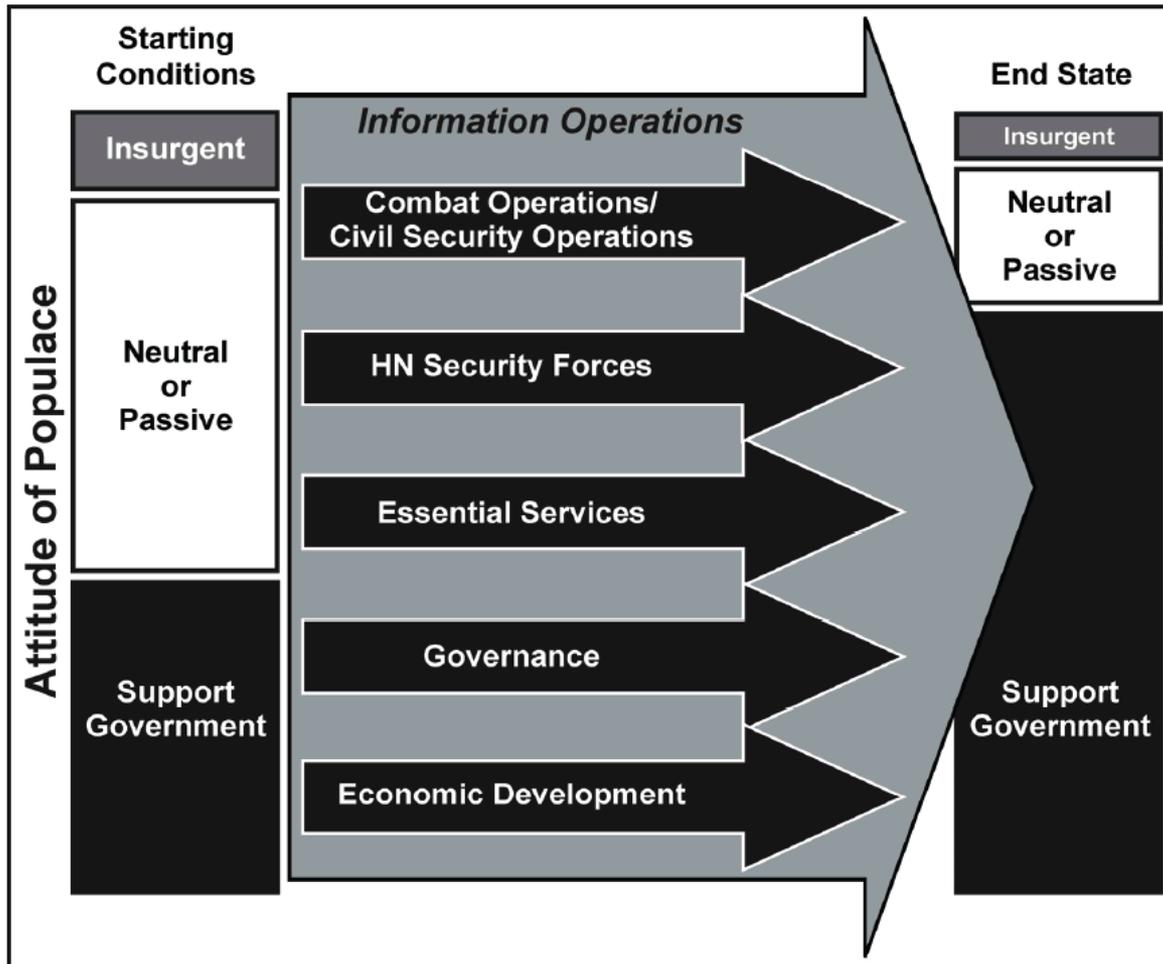


This transition cannot occur until security is established.



FM 3-24/MCWP 3-33.5 (2006)

Example: Logical Lines of Operation for a Counterinsurgency



“Hearts and Minds”

**Attitudes,
Beliefs, and
Behaviors**

Before you determine what it is you want to affect, ask yourself how are you going to measure success? (and don't forget you need a baseline before you can calculate a delta!)

In almost every case, counterinsurgents face a populace containing an active minority supporting the government and an equally small militant faction opposing it. Success requires the government to be accepted as legitimate by most of that uncommitted middle, which also includes passive supporters of both sides.



Key IW Modeling Concepts and Tenets

Military OR
Strategic
Campaign
Mission
Engagement
Engineering

Social Level
International
Nation
Community
Small Group
Individual

	Psychology	Anthropology	Sociology	Economics	Political Sci.

From Yuna Wong and Steve Hunt

- **Data is the key to developing credible and relevant IW Methods, Models, and Tools (MMT).**
- **Social science models and methods should have accepted pedigree**
 - widely accepted theory.
 - respected journals or a theory endorsed by prominent social science expert(s) in appropriate field.
- **IW MMT with social science models must be peer-reviewed by an appropriate panel of social scientists.**
- **Programmatics:**
 - Without exception, models, algorithms and data will be transparent.
 - All MMT developed will be government-owned with unlimited rights to maintain and operate.



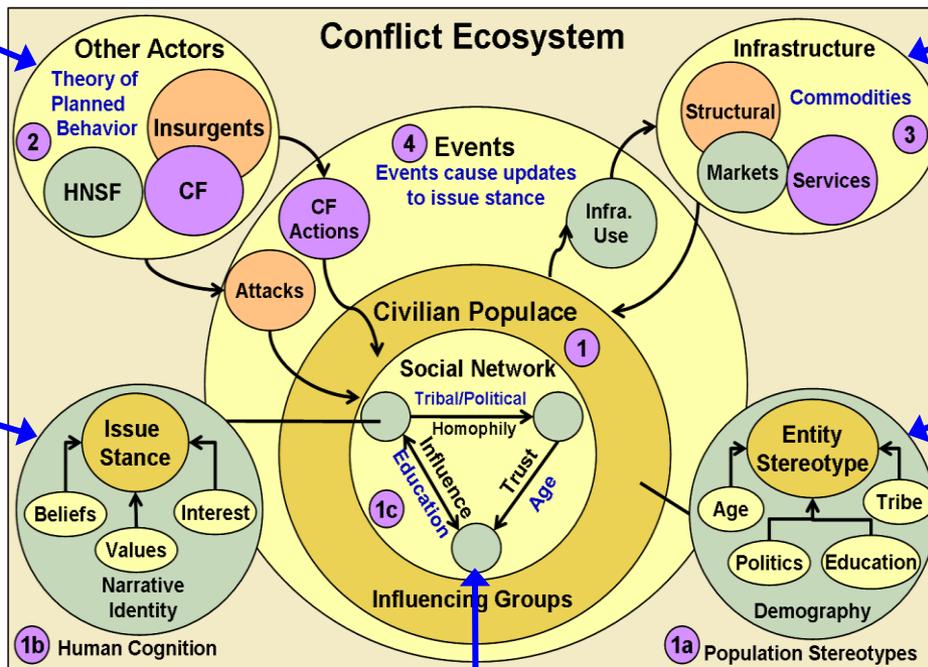
Cultural Geography (CG) Model

U.S. Army TRADOC Analysis Center (TRAC)-Monterey [2006]

The CG model is an agent-based simulation of the operational environment based on doctrine and social theory focusing on the population's evolving stance on issues and related behaviors.

Coalition, host nation security forces, and adversary actions can be provided by human-in-the-loop wargaming or closed form simulation.

Each entity's issue stance is based on its interests, values, and beliefs derived from their narrative identity.



Each Infrastructure object represents a provider of goods and service and is modeled by a multi-server queue.

The population in the area of operations is segmented by socio-demographic, socio-cultural and socio-economic factors and entities are drawn from each population segment.

The social network represents relationships and influence. Entities and organizations propagate Information on events through the social network. Persuasion and influence depends on qualitative social science theories.



PAKAF SMA Cultural Geography Support

PAKAF SMA Purpose: Provide ISAF Commander with a rich contextual understanding of multiple dynamic environments and situations, locations, messages and people in PAKAF area.

- TRAC-MTRY Purpose: To determine the **impact of operations on the populace** over time using the CG agent based model to provide a temporal analysis of the population issue stances and the factors that cause change.
- Modeled the population and operational environment of **six districts in Helmand** for **three issue stances** and associated behaviors.
 - Issue Stances: Security, Infrastructure, and Governance.
 - Geographical focus: Kajaki, Sangin, Lashkar Gah (LG), /Nahri Sarraj (NS), Nawa-i-Barakzayi, and Garmsir.
- Duration: 5 months (Start: Sep 09 - End: Jan 10).





Peace Support Operations Model (PSOM)



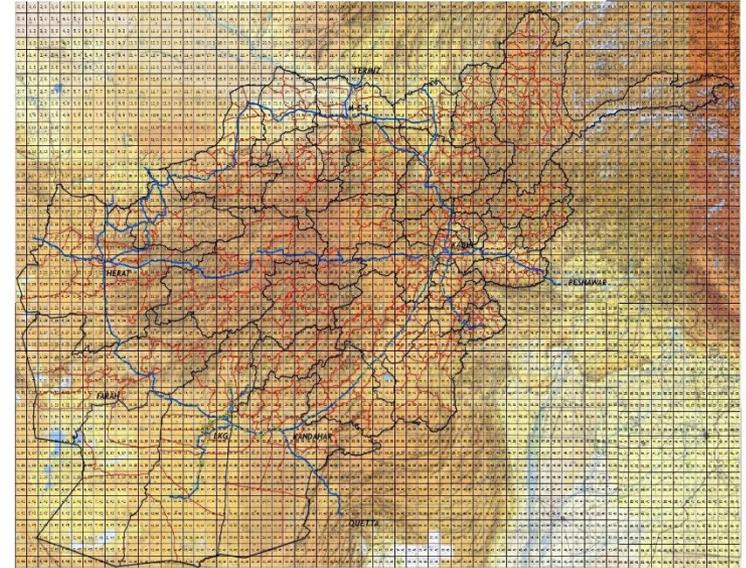
Support for ISAF

- In March 2011, a team of analysts from UK MOD deployed briefly to HQ ISAF Joint Command to help HQ IJC test their Operational Plan, OP OMID 1390, using the Peace Support Operations Model.
- A second exercise was a joint UK / US exercise, and took place in November 2011.



US Partnership for Peace Training and Education Center (USPTC) developed a two-week United Nations Peacekeeping Operations Training Course:

- Week one: introduction to UN PKO.
- Week two: Use PSOM as a simulation-stimulation tool to assess UN PKO proficiency.
- Week 2 courses conducted in both Kyrgyzstan and Kazakhstan in fall of 2011.



The Caucasus and Central Asia





PSOM Output Measures of Interest (Yellowstone, fictitious island nation)

Focus of UN Mission

Second and Third Order Effects

Security

0,10	1,10	2,10	3,10	4,10	5,10	6,10
0.22	0.22	0.22	0.22	0.22	0.22	0.22
0,11	1,11	2,11	3,11	4,11	5,11	6,11
0.22	0.22	0.22	0.22	0.22	0.22	0.22
0,12	1,12	2,12	3,12	4,12	5,12	6,12
0.22	0.22	0.22	0.22	0.22		
0,13	1,13	2,13	3,13	4,13	5,13	6,13
0.22	0.22	0.22	0.22	0.22		
0,14	1,14	2,14	3,14	4,14	5,14	6,14

Humanitarian Aid

0,10	1,10	2,10	3,10	4,10	5,10	6,10
5	5	5		0		
0,11	1,11	2,11	3,11	4,11	5,11	6,11
5	5	5				
0,12	1,12	2,12	3,12	4,12	5,12	6,12
0,13	1,13	2,13	3,13	4,13	5,13	6,13
0,14	1,14	2,14	3,14	4,14	5,14	6,14

Legitimacy

0,10	1,10	2,10	3,10	4,10	5,10	6,10
0	0	0	0	0	0	0
0,11	1,11	2,11	3,11	4,11	5,11	6,11
0	0	0	0	0	0	0
0,12	1,12	2,12	3,12	4,12	5,12	6,12
0	0	0	0	0		
0,13	1,13	2,13	3,13	4,13	5,13	6,13
0	0	0	0	0		
0,14	1,14	2,14	3,14	4,14	5,14	6,14

Crime

0,10	1,10	2,10	3,10	4,10	5,10	6,10
0	0	0	0	0	0	0
0,11	1,11	2,11	3,11	4,11	5,11	6,11
0	0	0	0	0	0	0
0,12	1,12	2,12	3,12	4,12	5,12	6,12
0	0	0	0	0		
0,13	1,13	2,13	3,13	4,13	5,13	6,13
0	0	0	0	0		
0,14	1,14	2,14	3,14	4,14	5,14	6,14

Infrastructure

0,10	1,10	2,10	3,10	4,10	5,10	6,10
3						0.6
0,11	1,11	2,11	3,11	4,11	5,11	6,11
0,12	1,12	2,12	3,12	4,12	5,12	6,12
	0.6		0			
0,13	1,13	2,13	3,13	4,13	5,13	6,13
0,14	1,14	2,14	3,14	4,14	5,14	6,14

Consent of UN Presence

0,10	1,10	2,10	3,10	4,10	5,10	6,10
0	0	0	0	0	0	0
0,11	1,11	2,11	3,11	4,11	5,11	6,11
0	0	0	0	0	0	0
0,12	1,12	2,12	3,12	4,12	5,12	6,12
0	0	0	0	0		
0,13	1,13	2,13	3,13	4,13	5,13	6,13
0	0	0	0	0		
0,14	1,14	2,14	3,14	4,14	5,14	6,14



Initial Consent Matrix*

		Faction				
		Militia A	Militia C	Militia E	Govt	UNSFOR
Ethnic Group	Ethnic A	Supports	Tensions exist	Neutral towards	Supports	Supports
	Ethnic B	Neutral towards	Neutral towards	Neutral towards	Supports	Supports
	Ethnic C	Tensions exist	Supports	Tensions exist	Tensions exist	Supports
	Ethnic D	Neutral towards	Neutral towards	Neutral towards	Supports	Supports
	Ethnic E	Neutral towards	Tensions exist	Supports	Tensions exist	Supports

How is data developed for this? How do these data change over time? What are the threshold values to transition between states? Can you jump from “Supports” to “Tensions Exist” without ever being neutral?

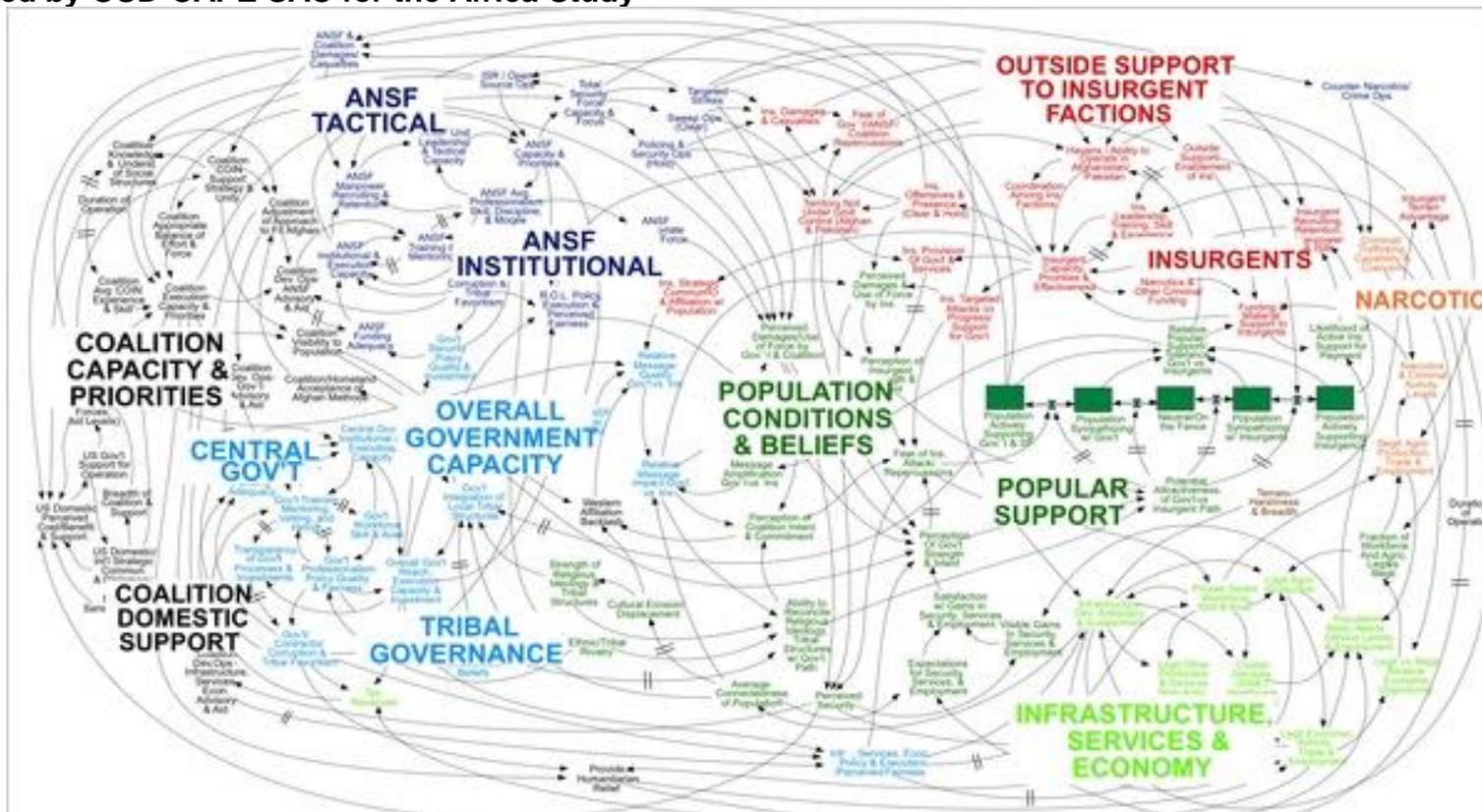
-  Supports
-  Neutral towards
-  Tensions exist

* Example from [dstl], PSOM Yellowstone Scenario, but there are similar matrices in other IW models.



IW System Dynamics Model (IW-SDM)

- The IWSDM Model was developed as an initial pilot simulation – “broad but shallow” – to aid wargaming of a specific scenario.
- Quantitative model development: 10 wks duration, completed in early Dec 07
- Built on FM 3-24 model developed with J8/WAD (PA Consulting)
- Expanded by OSD-CAPE SAC for the Africa Study



Imagine developing the equations and data for each of the stocks and flows...

There is an interesting TED talk:

http://www.ted.com/talks/eric_berlow_how_complexity_leads_to_simplicity.html

UrbanSim (ICT, USC)

THE MILITARY JANUARY/FEBRUARY 2010 ATLANTIC

A new computer game lets army officers practice counterinsurgency off the battlefield.

by *Brian Mockenhaupt*



SimCity Baghdad

An innovative aspect of UrbanSim will be the deep social simulation built into the training applications including models of population and culture groups (tribes, religious groups, criminal gangs, neighborhoods...), key individuals, social networks, and links between the human terrain and the physical terrain.

UrbanSim is a PC-based virtual training application for practicing the art of battle command in complex counterinsurgency and stability operations.

The UrbanSim practice environment allows trainees to take on the role of an Army battalion commander, and to plan and execute operations in the context of a difficult fictional training scenario. Trainees direct the actions of a battalion as they attempt to maintain stability, fight insurgency, reconstruct the civil infrastructure, and prepare for transition.

Used to educate US Army officers selected for battalion command.

Operational Energy Wargame System Wargame





NATO SAS-130

Course of Action Analysis in the 21st Century

- Examining the potential for conducting better COA Analysis could help NATO make better informed resourcing decisions and create better plans.
- Looking for volunteers to take a short survey to help better inform this effort vis-à-vis wargaming tools and methods that you know about that may be of use to this effort.
- See myself or Rob Burks if you would like to contribute, or send us an e-mail:
 - jaappleg@nps.edu
 - reburks@nps.edu



Questions/comments/concerns?