A Conceptual Framework for Testing and Evaluating Technologies for IFFN in Urban Warfare

By

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- Opinions are those of the speaker alone
- Not representing those of EPA
- 4 years from national defense/DOT&E
- Not working for defense industries
- No classified materials used
- Unintentional duplications on others' research including those supported by the DOD
- Intended to be a dialogue
- No constraints

故曰：
知皮（彼）知己，百戰不殆；
不知彼而知己，一勝一負；
不知彼，不知己，每戰必殆。

SUN-TZU
(Art of War)

He who:

Knows the enemy, knows self;
   Will never be at risk;

Does not know the enemy, knows self;
   Will win some and lose some;

Knows neither the enemy nor self;
   Will always be at risk.

In Other Words

The level of Intelligence (understanding) on:

self,

friends or allies,

neutrals,

and foes (enemy)

defines our level of risks and successes in each battle.

SUN-TSU
(Art of War)

- To win a hundred victories in a hundred battles is not the highest excellence;

- The highest is to subdue the enemy without fighting at all.

- The best military policy is to attack strategies,

- The next alliances,

- The next soldiers, and the

- Worst to assault cities.

Outline

- Realities

- FFN

- Technologies

- Risk Assessment/ Risk Management

- T&E – current framework

- T&E – new framework

New Realities

- Military Ops
  - FF
  - Lethal weapons
  - Detecting, Identifying, Targeting, and destroying
  - Well defined and organized
  - Functional specialists
  - Physical Sciences
  - Short term

  Source: DARPA

- Peacekeeping
  - FFN
  - Hearts and minds
  - Securing, Protecting, and Stabilizing
  - Not well defined and less organized
  - Generalists
  - Social Sciences
  - Long term

Urban Warfare

- Transitional – Military Ops to Peace Keeping
- F to N to F
- F to F/N to N to N/F to F
- Minimal friendly and neutral casualties
- Situational awareness and instantaneous response
- Lethal/non-lethal weapons
- Asymmetric

NEUTRALS

- In an ever changing social, economical, cultural, and political environment, they could morph from friends to neutrals to foes and back again.

- Depending on the time and circumstances, or even a direct response to a specific event, they could move from being helpful, to interfering, and to hostile the next.

Technologies

- Weapon types (both friends and foes)
  - Portability
  - Explosives (types: TNT, RDX, composition B,…)
- Operational parameters
  - Containers/shells
  - Delivery mechanisms
  - Environmental constraints

Technologies

- Passive EM (EM Signature, IR, FLIR, MM Wave, Microwave)
- Active EM (Induction, radiography, Gamma ray imaging, Microwave enhanced IR, Radar, Terahertz imaging, X-ray)
- Other sensors (Acoustic, Seismic, Biosensors, Neutron analysis, Trace vapor)
- Unmanned ground vehicles
- Unmanned air vehicles
- Robotics

Technologies

- Target designators (laser)
- Loitering and tethered
- Information technology
- Communication technology
- Navigational technology
- Miniaturization technology (nano)
- IF – GPS with frequency hopping, transponders, IR
- Encoding for screening - random update of ID using commutative algebra for encoding (active sonar)

Technologies

- KE armor-piercing

- Laser beam-rider

- Fuse/warhead for urban warfare

- Recoilless weapon

- Localized ECM

- Off-axis weapon launcher

- Navigational guidance

Risk Assessment

- Vulnerability determination (targets, likely locations, opportunities.)

- Threats/Means (individuals, delivery mechanisms, pre-emplaced)

- Costing the risk (value, uncertainties)

- Level of response

- Loss function (impact, social, economical and political from FNF's perspectives)

Risk Management

- Risk analysis
- Risk communication
- Urgency
- Specifications (details)
- Actions or alternatives

OT&E – current framework

- Traditional framework no longer applies
- Technical, technology, system oriented
- One-sided interaction-predominated Blue
- Threat limited
- Preplanned
- Linked to DT
- Incentives for success
- Decision/Milestones
- Production oriented
- Time consuming

OT&E-new framework

- Holistic, multi-services, blending DT/OT for early introduction to the forces (Vietnam)
- Create Blue, White and Red Adaptive Independent Teams (FNF)
- Test beds, existing or new, with dedicated ranges allowing different rate for introducing to the force
- Develop strategies separately for FNF: F=>NF, FN<=F
- Decentralized
- Self contained – integrated functionally
- Multiple systems and functions, social, cultural, and political (Vietnam-200 years)
- Instrumentations for monitoring situational actions/reactions dynamically

FNF Perspectives
Functional layers

	Friends	Neutrals	Foes
Friends			
Neutrals			
Foes			

Framework - Outcomes

- Develop threat characteristics and data bases
    - Delivery platform mechanisms (pre-emplaced, handheld, backpack, vehicles, trucks, weapons…)
    - Delivery mechanism characteristics (suicide bomber, standoff, speed,…)
    - Signatures (shapes, for pattern recognitions,…)
    - Passive Signatures (EM, IR spectrum, acoustic,…)
    - Active Signatures
    - Explosives/fuses

Framework - Outcomes

- Multi-criteria approach to assess risks and consequences
    - Social
    - Economical
    - Cultural
    - Political

- Progression in measuring results (single system to multiple; structured to flexible, single engagement to multiple ones; from Friends-to-Foes to Friends-to-Foes-to-Neutrals)

OT&E-new framework

- Feedback loop for readjustment of systems, subsystems and interactions
- Measures of failures and reasons for failures are just as important if not more so than successes for FNF
- Measures: prevention, avoidance, screening, and detection
- Measures: reducing vulnerability, collateral damages, fratricides, level or severity of threat
- Outcomes: innovative use of technologies, integration, synergism with the ability to dynamically adjust with new tactics and operational concepts

Thank You