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# Operations Intent and Effects Model and Formalism - A contribution to the ongoing C-BML and MSDL standardization

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# Outline

- Overview
- What is Intent
- An example of Grammar to express Effects, Expressives and Command Intent
- Operations Intent and Effects Model
- MSDL and C-BML

**NBF**  
Nätverksbaserat försvar

Nätverksbaserat försvar ger Försvarsmakten förutsättningar att lösa sina uppgifter med den snabbhet, precision och samordning som den framtida insatsmiljön kräver.

**Precisionsinsatser**  
Samordnade precisionsinsatser av olika slag i hela konfliktskalan.

**Interoperabilitet**  
Förmåga att agera tillsammans med övriga delar av samhället och med internationella partners är en grund i NBF.

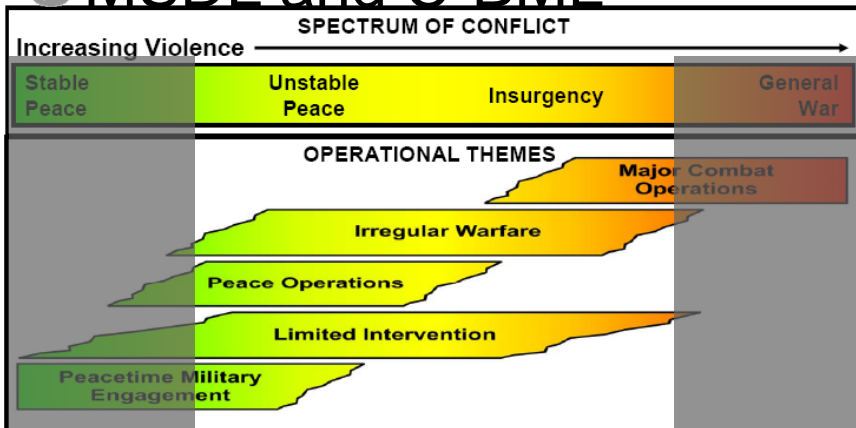
**Överlägsen lägesuppfattning**  
En gemensam lägesinformation som presenteras anpassad till varje användares aktuella uppgifter.

**Ledningsöverläge**  
Ledningsöverläge genom en snabbare, bättre samordnad och mer precis ledning än motpartens.

**Situationsanpassade enheter**  
Förband ur hela Försvarsmakten kan flexibelt sirtas samman för att snabbt anpassa insatsförbandens förmåga till aktuell uppgift.

**Kompetent personal**  
Den viktigaste komponenten i systemet är kompetent personal. Därför är kontinuerlig utveckling, utbildning och övning av förbanden under realistiska förhållanden en viktig del i det nätverksbaserade försvaret.

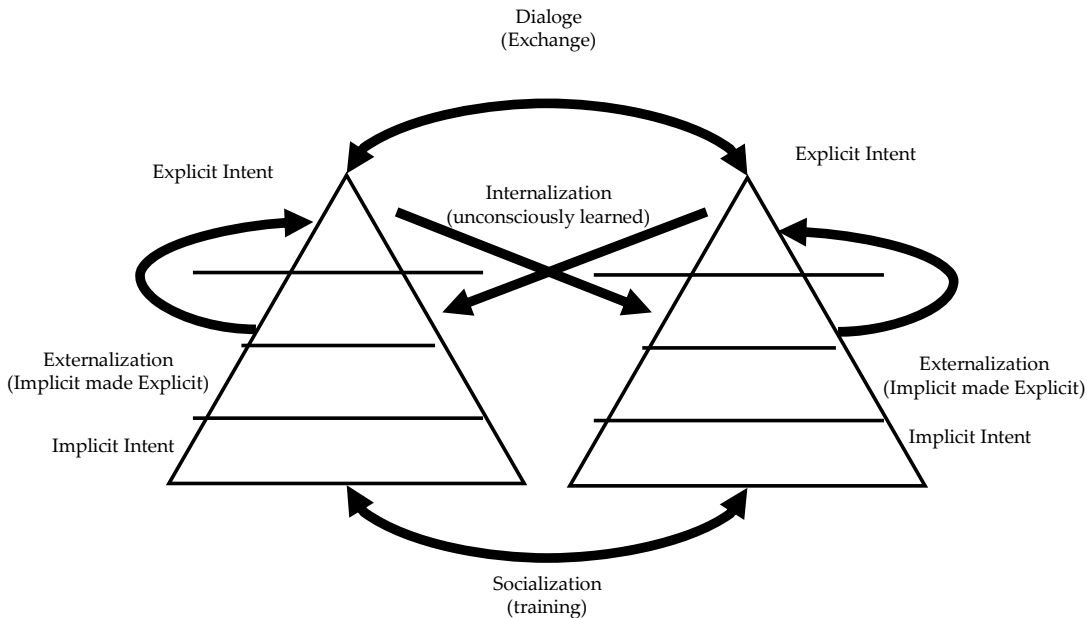
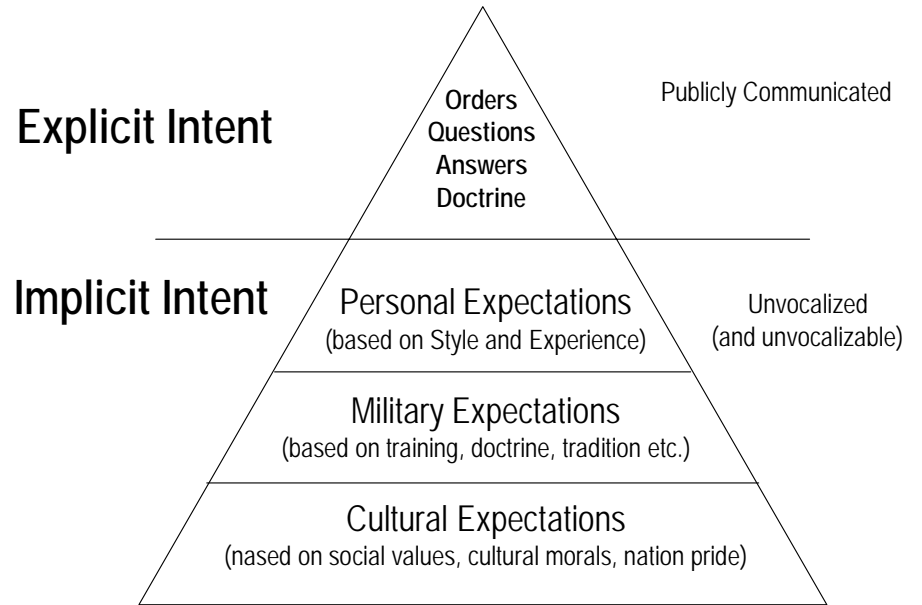
**Kontinuerlig och snabb utveckling**  
Kontinuerlig och snabb utveckling genom bland annat demonstratorer och försöksförband.



# Intent

- ▶ It depends...
  
- ▶ Intent can be a whole OPLAN/OPORD
  
- ▶ Intent can be as within the OPLAN/OPORD
  - Execution has Commander's Intent paragraph
  - End State, Expanded Purpose and Key Tasks
  
- ▶ Intent can also be as defined by Gary Klein 1998 (Sources of Power p225)
  - The purpose of the task (the higher-level goals);
  - The objective of the task (an image of the desired outcome);
  - The sequence of steps in the plan;
  - The rationale for the plan;
  - The key decisions that may have to be made;
  - Antigoals (unwanted outcomes);
  - Constraints and other considerations.

# Intent



# Intent

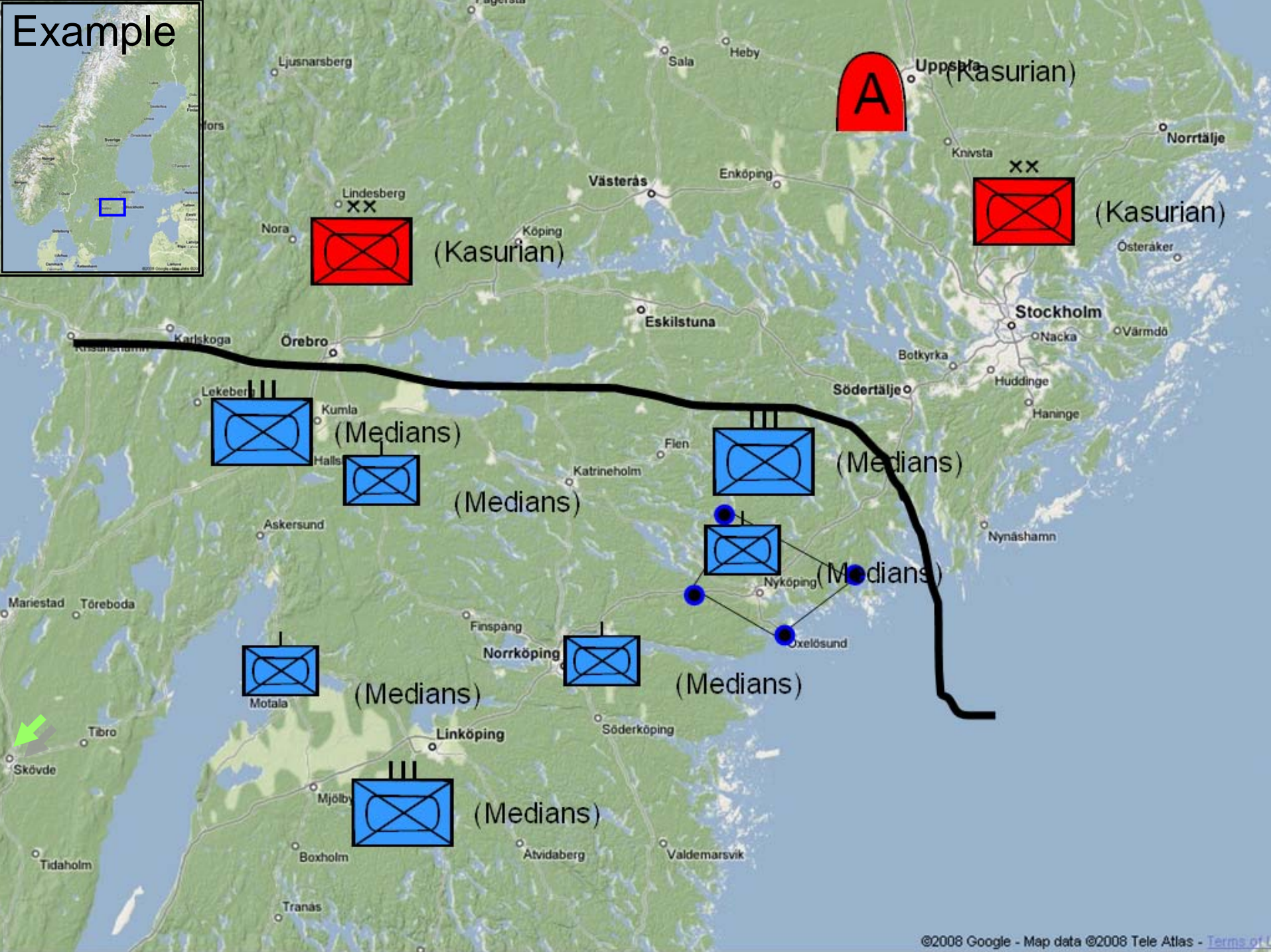
- ▶ Traditionally:
- ▶ **Commander's Intent** is an intent describing military focused operations developed by a small group, e.g. staff, and a commander. Even though there is no limit to use it in other domains, for this work it is limited to the military domain. (FM-5.0)
- ▶ **Shared Intent** is an intent exchanged amongst commanders and staff at multiple levels in an organization or even across organizations.
- ▶ Idealized:
- ▶ **Common Intent** is an intent that is shared and understood by all participants, i.e. there is no discrepancy between the intent of participating humans. Common Intent is an idealized view of intent. (Ross Pigeau)
- ▶ **Common Mission Intent** is a workable version of Common Intent in that it directed for a specific situation, bounded by participating organization, space and time. For the operation at hand the intent is common but other intent and goals of the participating humans may differ. (Per G.)
- ▶ **Command Intent** is an intent developed and exchanged amongst commanders and staff at multiple levels in an organization or even across organizations (Alberts and Hayes)
- ▶ Practically:
- ▶ **Command Intent** is a Common Mission Intent developed in cooperation amongst participating commanders and staffs at more than one level. (Alberts and Hayes)



# The purpose of Command Intent ...

- ▶ Intent can also be viewed as the players in a soccer team that all have individual goals with their lives and families, but on the soccer field they have the common intent to win the game...



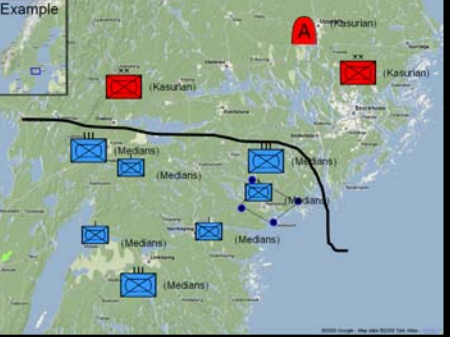




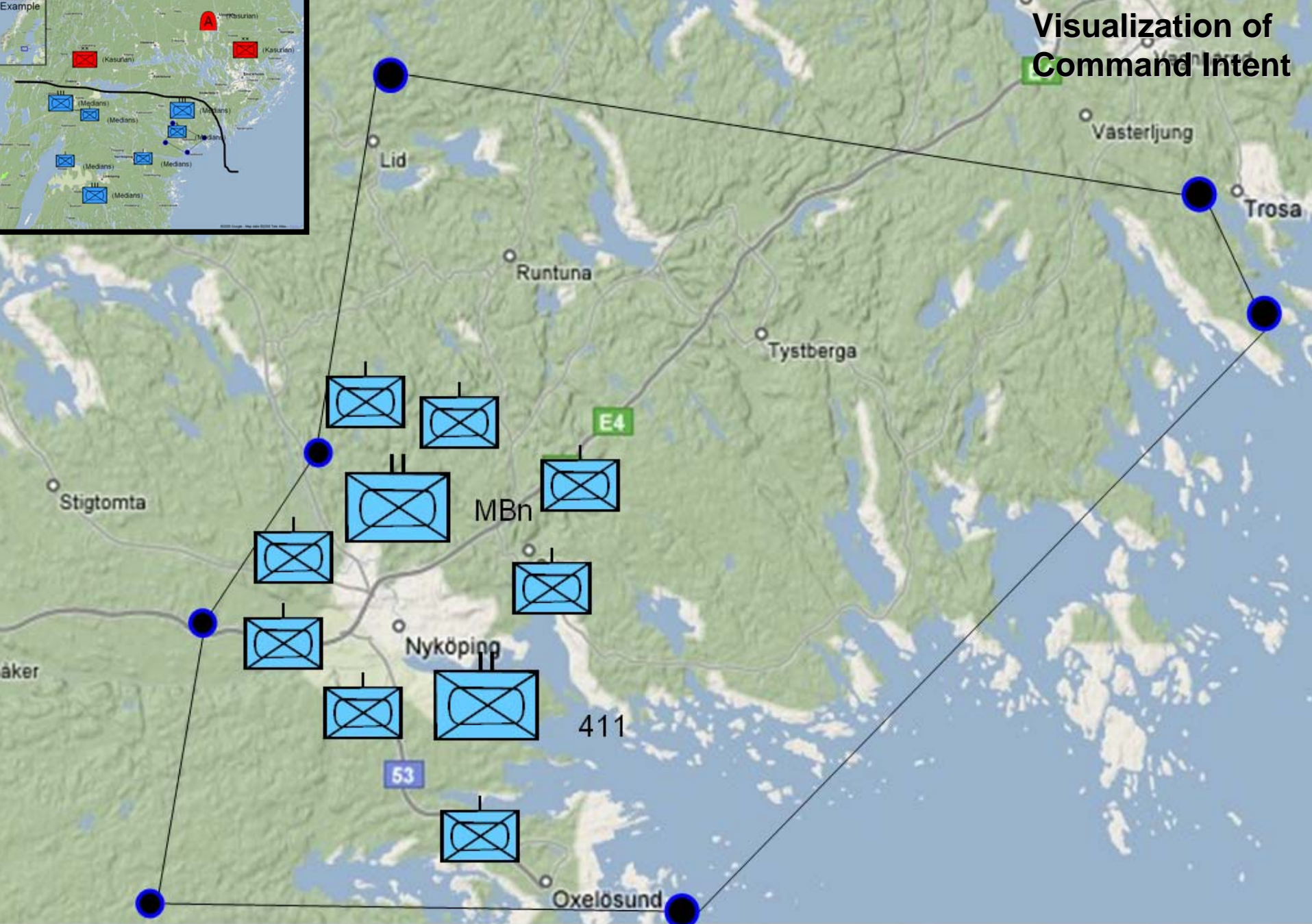
# Command Intent

- ▶ In a five paragraph Operations Order (OPORD) a section is named Commander's Intent
- ▶ Commander's Intent include Expanded Purpose, Key Tasks and desired End-State (US Field Manual 5.0)
- ▶ **End-State**
  - ▶ The harbor in OXELÖSUND (X06 Y74) (SPOD) is operative and our sea assets can use it **without** risking being affected from sea, air or ground.
  - ▶ **SKAVSTA airport (X18 Y63) (APOD) is operative and usable to our air assets. Direct fire, SAM or mortars can not affect the airport.**
  - ▶ Brigade has at least one main supply route open from the SPOD to the APOD.
  - ▶ etc ...

Example



# Visualization of Command Intent



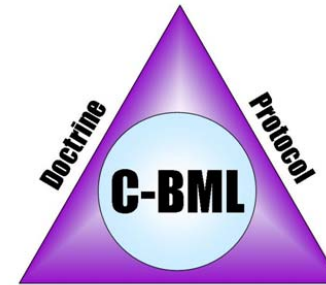
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# BML Representation

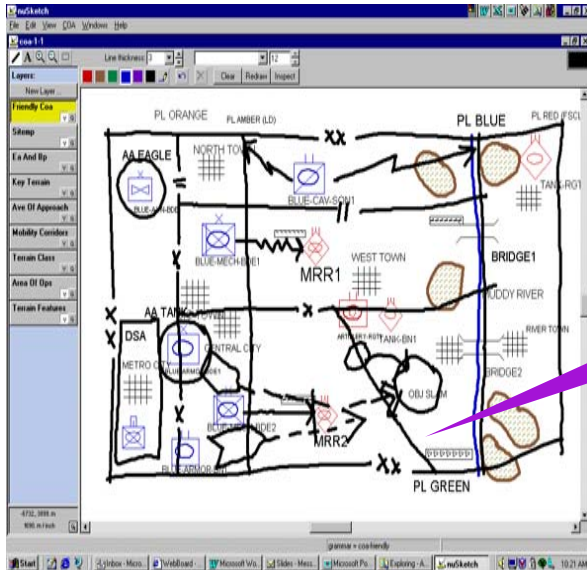
Terms rooted in Military Doctrine,

What does attack mean

XML  
Web Services



Representation  
C2IEDM/ JC3IEDM



C2 Plans & Orders

As Graphics

As Data

Who	What	When	Where	Why
BLUE-MECH-BDE1	Attacks	On order	Zone	Fix (MRR1)
BLUE-MECH-BDE2	Attacks	On order	Zone	Penetrate (MRR2)
BLUE-ARMOR-BDE1	Follows & Assumes (B-M-BDE2)	On order	Zone	Seize (OBJ SLAM)
BLUE-AVN-BDE	Occupy	On order	AA EAGLE	Reserve
BLUE-ARMOR-BN1	Follow and Support (B-A-BDE1)	On order	Zone	Support (B-A-BDE1)
BLUE-CAV-SQN1	Screen	On order	Zone (PL AMBER to PL BLUE)	Protect (Division left flank)
BLUE-MECH-TM1	Tactical Combat Force	On order	DSA	Protect (Division Rear Area)

# Formalizing Intent

CI → (Expanded Purpose) (Key Tasks) [End State]

SKAVSTA airport (X18 Y63) (APOD) is operative and usable to our air assets. Direct fire, SAM or mortars can not affect the airport.

- ▶ [End State] → **Status-Report** own **status-general** APOD Operational SKAVSTA airport (X18 Y63) start at Date-Time-5 Fact label-ES2.1
- ▶ [End State] → **Status-Report** own **status-general** AirAssets Operational SKAVSTA airport (X18 Y63) **start at** Date-Time-5 Fact label-ES2.2
- ▶ [End State] → **No Event-Report** NKN Mortar-Fire label-ES2.2 SKAVSTA airport (X18 Y63) **start at** Date-Time-5 Fact label-ES2.3



# Extension to C2LG – Representation of Effects for Communication

▶ [End State] → **No Event-Report** NKN Mortar-Fire label-ES2.2 SKAVSTA airport (X18 Y63) **start at** Date-Time-5 Fact label-ES2.3

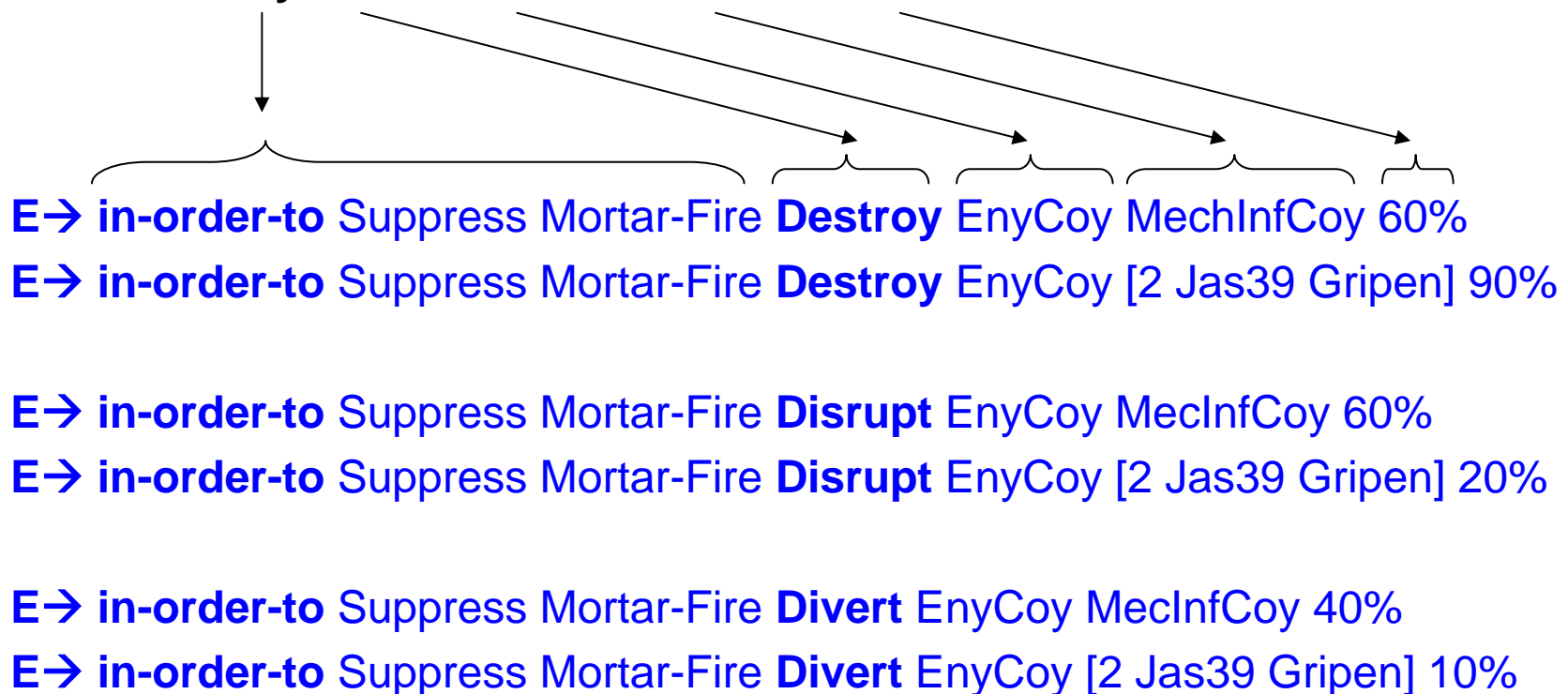
▶ **Effect:** Suppress Mortar-Fire

▶ **Effect → Why Verb Affected Executer Likelihood Label**

- ▶ “**Why**” from military doctrine (or civilian) (e.g. Suppress Mortar, Provide Stability, Support Judicial System, Take that Hill)
- ▶ “**Verb**” is an action that provides the wanted effect (e.g. Destroy, Disrupt)
- ▶ “**Affected**” is the object that the action is targeted to.
- ▶ “**Executer**” is the object that are performing the action (e.g. Specific, arch-type)
- ▶ “**Likelihood**” describe the likelihood such action performed by executer will generate the effect described by WHY.

# Determine Actions from Effects

Effect → Why Verb Affected Executer Likelihood Label



# Expressives

CI → (Expanded Purpose) (Key Tasks) [End State] (Expressives)\*

## Expressives → Style Value

Example: If the commander in the example has the style of using low violence.

### Expressives → [Use of power and force] Low

Disrupt or Divert is defined to be less violent than Destroy according to doctrine

**E → in-order-to Suppress Mortar-Fire Destroy EnyCoy MechInfCoy 60%**

**E → in-order-to Suppress Mortar-Fire Destroy EnyCoy [2 Jas39 Gripen] 90%**

**E → in-order-to Suppress Mortar-Fire Disrupt EnyCoy MechInfCoy 60%**

**E → in-order-to Suppress Mortar-Fire Disrupt EnyCoy [2 Jas39 Gripen] 20%**

**E → in-order-to Suppress Mortar-Fire Divert EnyCoy MechInfCoy 40%**

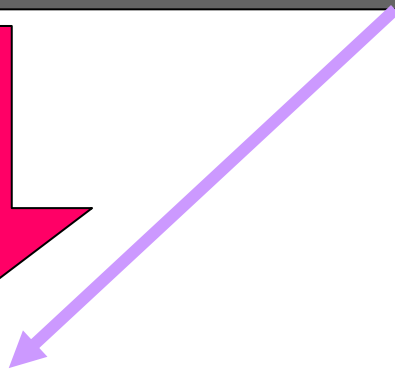
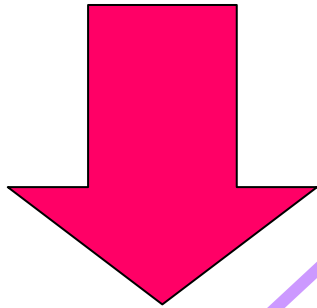
**E → in-order-to Suppress Mortar-Fire Divert EnyCoy [2 Jas39 Gripen] 10%**

# The OIEM Model

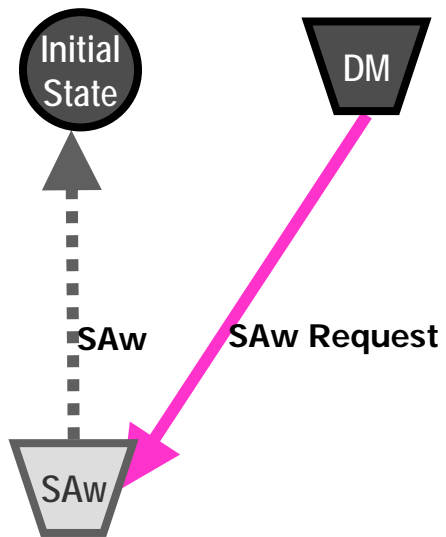
- ▶ Behind the presented formalism is a model
  
- ▶ Operations Intent and Effects Decision Support Model



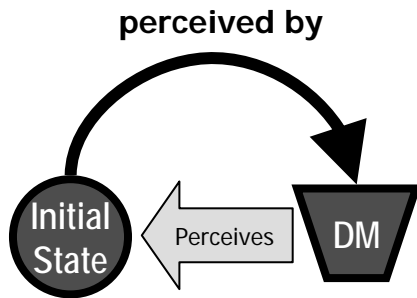
An external order, request or Intent is sent to a system (including humans and/or technology)



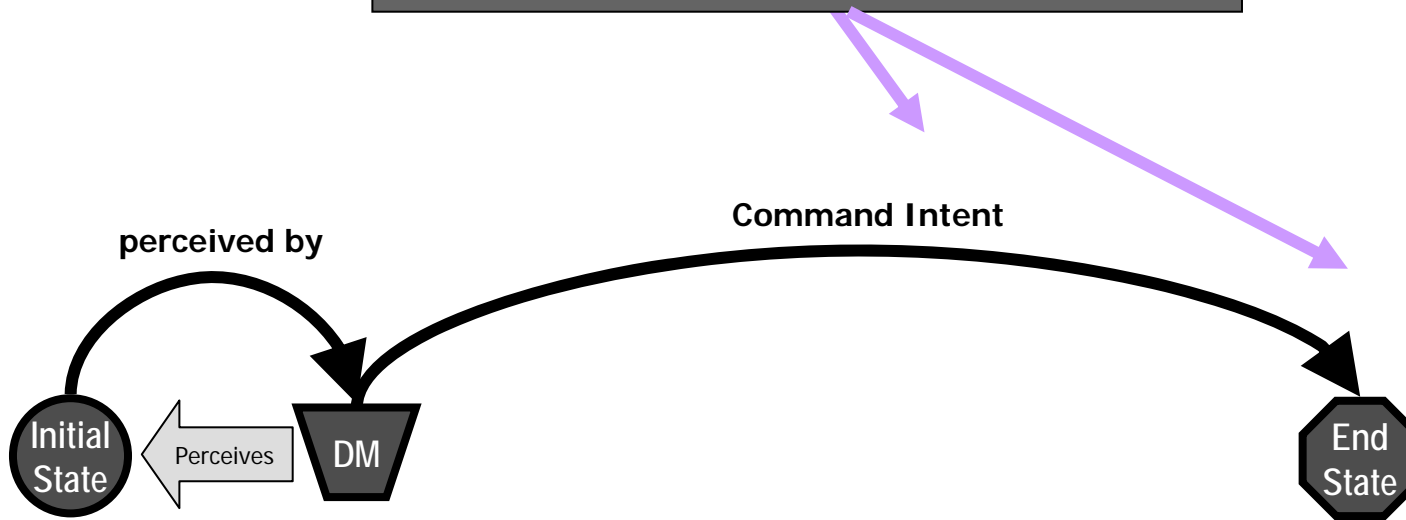
The DM process Require a SAw  
(depending on previous knowledge  
the order, request or Intent etc.)  
The output from the SAw process is  
TA, LA and/or GA and is the Initial  
State for the Decision Maker(s)



The **Initial state** are perceived by the DM process and is the foundation for the process together with previous knowledge, information assumptions etc.



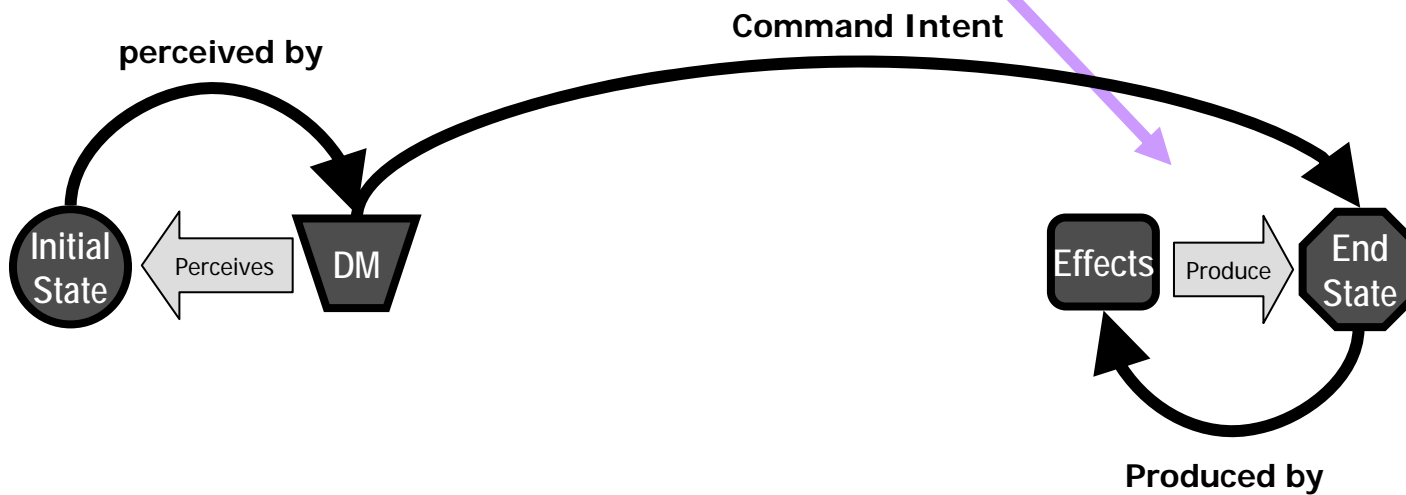
As an output from the DM process an intent is formalised representing a desired End State



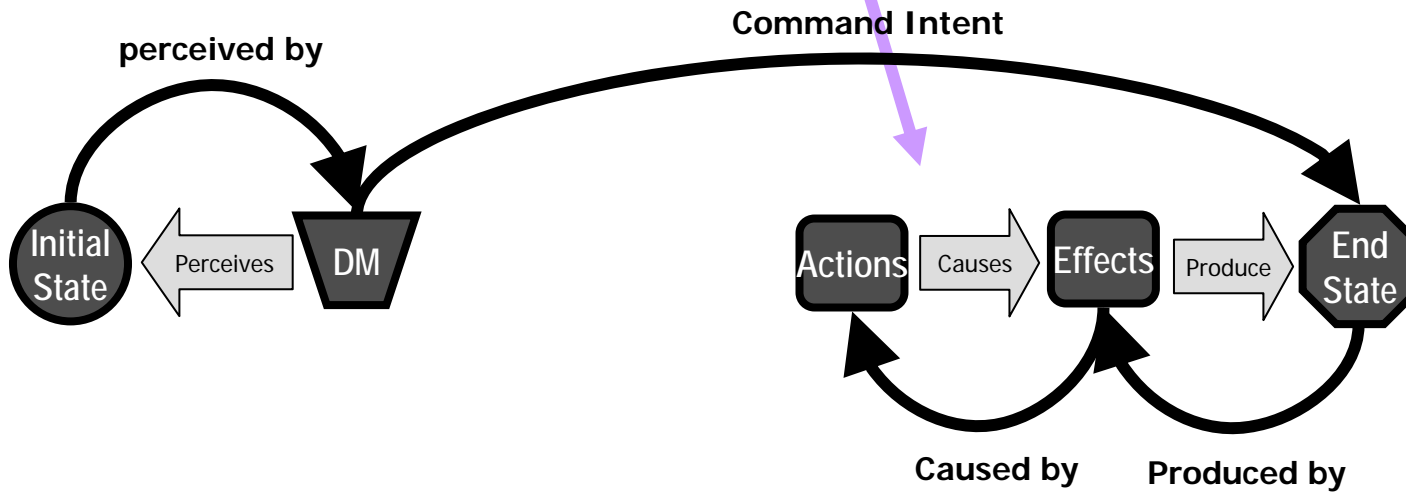
Even though the CI is **explicit** it could be that this CI product is Implicit and made explicit in the order, i.e. a thought of minds. For the purpose of this work the CI and ES however needs to be **explicit** in a collaborating environment.



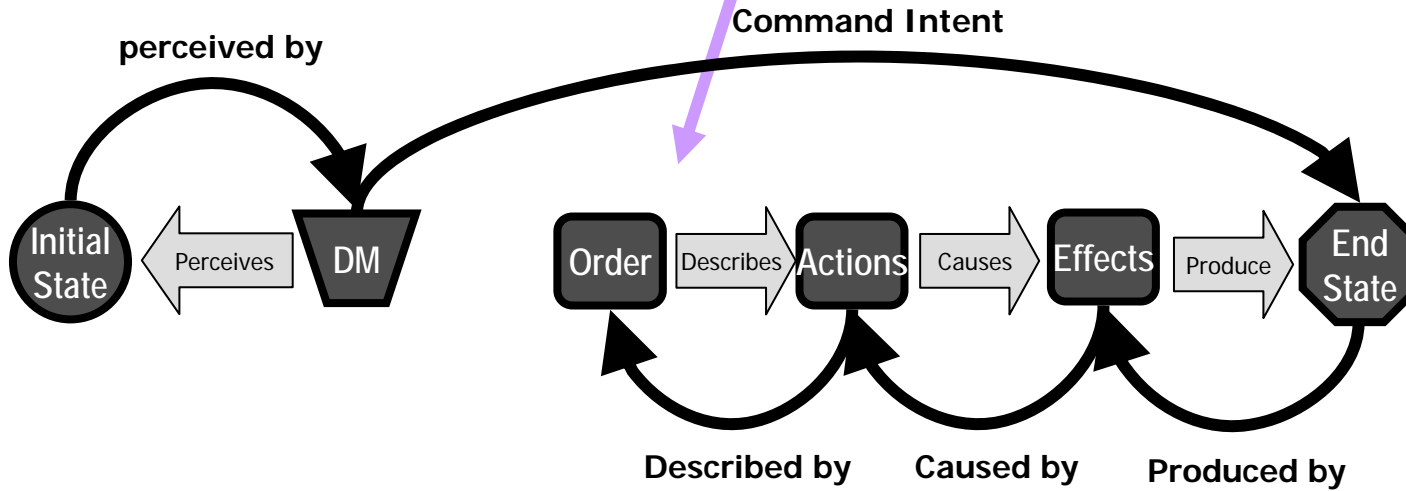
End-State is reached by applying effects, i.e. Effects produce the End-State



Effects are created by Actions

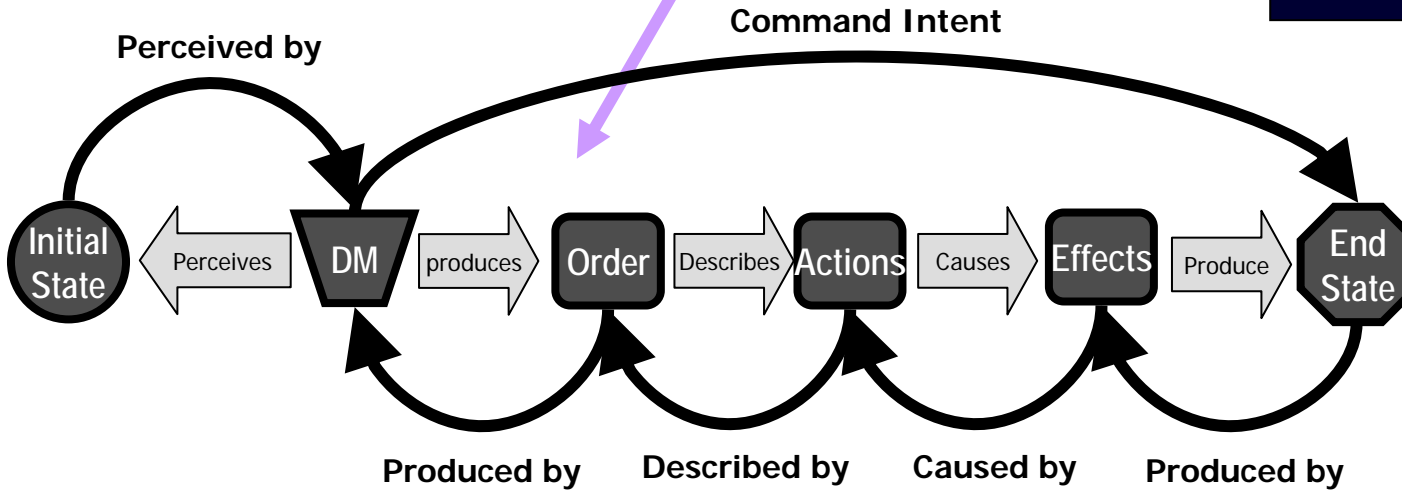


Actions and/or Effects are described  
in an order or a plan

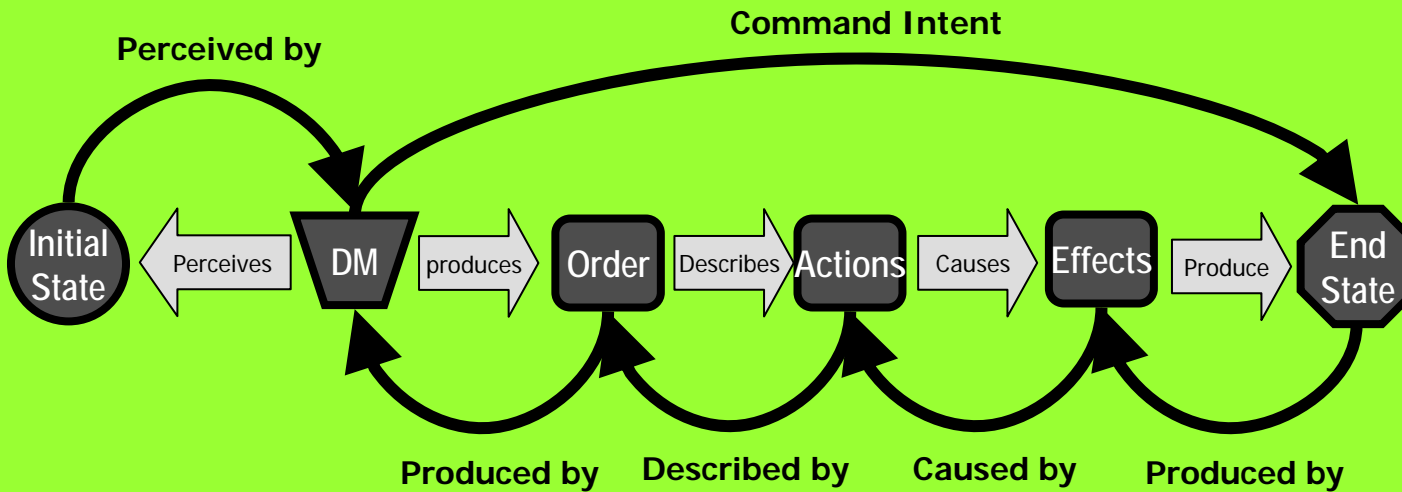


En order är en explicit produkt från beslutsprocessen

Comment: The CI is explicit declared in the Order.  
OPLAN/OPORD etc.

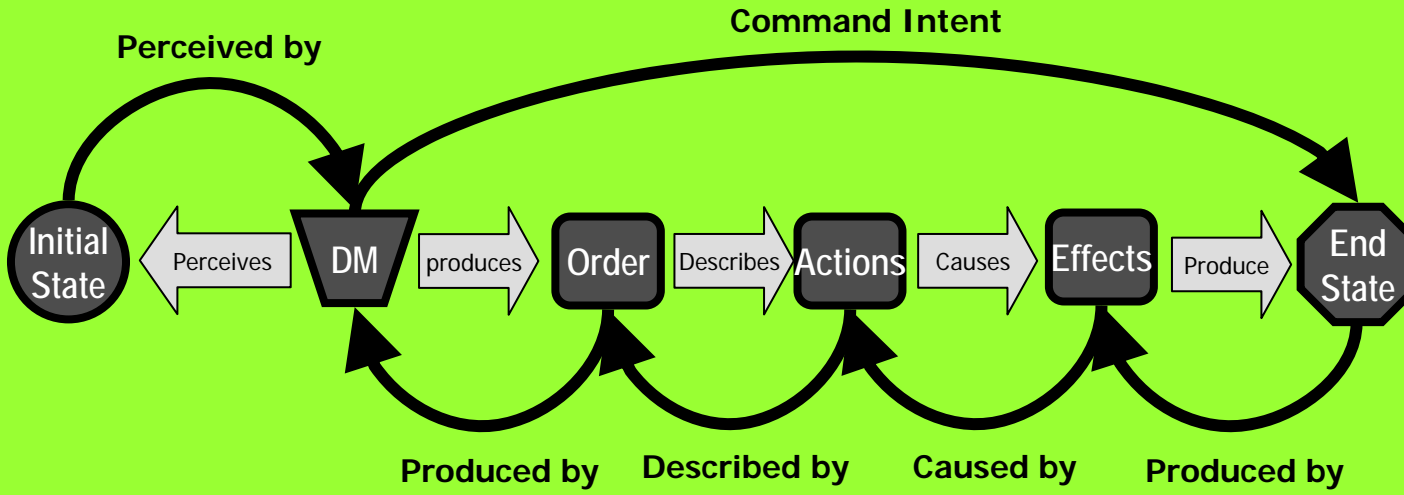


# Operations Intent and Effects Model



Ordern kan vara till den egna kroppen, till andra människor eller till andra system

# Operations Intent and Effects Model



Electro-Chemical / Human / System

**WORLD**



# Address to C-BML, MSDL, SRML

- ▶ For a Simulation Reference Markup Language (SRML) it important to have mechanisms to evaluate if a state has been reach, meaning that there is a need for SRML to handle complex state representations.
- ▶ The MSDL and C-BML Product development groups need to address that for 21st century operations the articulation of Command Intent is essential, it is not enough to just address directed tasking orders or reports.
- ▶ In the C-BML Study Group Report (Blais et al. 2005) it is stated that “*The objective of BML is to define an unambiguous language to describe a commander’s intent to be understood and used by soldiers and systems in training and in real-world operations*”.
- ▶ The MSDL and C-BML then need to put effort in how to express CI and related concepts flourishing in the Network-centric, Network-enabled paradigms so that when developing capabilities for 21st century missions the simulation environments can be of extensive help in operational method development.
- ▶ One way might be using a Command and Control Lexical Grammar

# Keep Your Style of Protocols and Information Models

