THE OPERATIONS INTENT AND EFFECTS MODEL: A COMMAND AND CONTROL METHODOLOGY FOR INCREASED AUTOMATION

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• Command and Control (C2) is viewed as an increasing important part of future military technologies.
• While recent C2 theory has focused on desirable features of complex organizations, such as Agility, and emerging work is looking at social media approaches – the key issues for many nations and programs are how to integrate and benefit from increased automation.
• Rapid advanced in Robotic and Simulation technologies are very apparent and challenge the current C2 methodologies that rely upon intensive human intervention and monitoring.
• Future C2 will need to accommodate “mixed” forces of Humans and Robots.
C2 AGILITY
GOP / MDMP etc.

sensing

object

situation

WARNO

OPORD

Observation
Collaborative Planning Under Time Pressure (PUT)
MATURITY MODEL

after Alberts & Hayes (2007)
Cope with Change

A"er Nato Newtwork Enabled Capabilities, Hayes et.al Focus and Convergence (2008),

Gustavsson, 2010
Future C2 will need to accommodate “mixed” forces of Humans and Robots.
Battle Management Language

Commander’s Intent

BML

C2 Systems

Simulation Systems

Live

Virtual

Virtual

Constructive

Robotic Systems

SAAB
FOKUS PÅ SITUATIONS FÖRSTÅELSE MEN

... INTENT ...

...
Decision Making Process

Knowledge

Information Fusion

DIME
Diplomatic, Information, Military, and Economic

PEMSII
Political, Military, Economic, Social, Infrastructure, and Information

Real World

Observe
Orient
Decide
Act

Effect

WARNO, OPORD, FRAGO

Situation
Mission
Execution
Service Support
Command and Signal

Subordinate Commander

Decide
Orient
Act
Observe
Intent is the state of mind with which an act is done and can describe the formulated or planned intention. (Merriam-Webster, 2009)
DEFINITION OF INTENT

- UK Army Doctrine Publication – Operations (DCDC 2010, para.0622) is the British Army’s capstone doctrine, containing the enduring philosophy and principles for the UK army approach to operations. “Intent is similar to purpose. A clear intent initiates a force’s purposeful activity. It represents what the commander wants to achieve and why; and binds the force together; it is the principal result of decision-making. It is normally expressed using effects, objectives and desired outcomes.”

- Swedish Armed Forces - Integrated Dynamic Command and Control (IDC2) (Josefsson, Marklund, and Hansson 2007) defines intent as “Intent is a concise formulation of the overall goals and purpose. The focus is to describe operations, restrictions and resource allocation.”

- Canadian Forces Joint Publication 5.0 (Chief of the Defence Staff 2008, 5E-2) “Commander’s Intent. This summary should provide the Commander’s overall intent and establish the purpose of the plan. It is an important focusing statement for subordinate commanders. (1) Military Objectives. (2) Desired Military End-State. (3) Transition Conditions”.

- US Field manual 5.0 (U.S. Army 2010, 2-90) constitute the US Army’s view on planning, preparing, executing, and assessing operations. “The commander’s intent is a clear, concise statement of what the force must do and the conditions the force must establish with respect to the enemy, terrain, and civil considerations that represent the desired end state (FM 3-0[1]). The commander’s intent succinctly describes what constitutes success for the operation. It includes the operation’s purpose and the conditions that define the end state. It links the mission, concept of operations, and tasks to subordinate units.”

- NATO allied Joint publication 1 (AJP-01) (NATO 2010, 0538) provide the keystone doctrine for the planning, execution and support of Allied joint operations. “The intent defines the end-state in relation to the factors of mission; adversary, operating environment, terrain, forces, time and preparation for future operations. As such, it addresses what results are expected from the operation, how these results might enable transition to future operations, and how, in broad terms, the Commander expects the force to achieve those results. Its focus is on the force as a whole. Additional information on how the force will achieve the desired results is provided only to clarify the Commander’s intentions. “

- US Joint Publication 3.0 (US Joint Chiefs of Staff 2010, IV-25) provides the doctrinal foundation and fundamental principles that guide the Armed Forces of the United States in the conduct of joint operations across the range of military operations. “Commander’s intent is a clear and concise expression of the purpose of the operation and the military end state.” and continues” It also includes where the commander will accept risk during the operation. The initial intent statement normally contains the purpose and military end state as the initial inputs for the planning process. “

- Other doctrinal work that has been used in this survey are US Field Manual 6.0 (U.S Army 2003, 1-68) describe doctrine on C2 for tactical Army echelons (corps and below), US Field Manual 3.0 (U.S. Army 2008, 5-55) presents overarching doctrinal guidance and direction for conducting operations and is one of the two capstone doctrine hand books for US army, SwAF - Regulations for ground operations (Regler för markoperationer) (SwAF 2009, 143) UK Glossary of Joint and Multinational Terms and Definitions (The DCDC 2006, pp.C-16)

Intent contains:

- Initial State
  - Initial State

- Execution
  - Sequence
  - Key Decisions
  - Constraints

- Outcome
  - Mission / Goal
  - Antigoals
  - End State

DM – Decision Making Process

Klein
Dimensions of Intent

Commander’s Intent

Command Intent

Common Intent

Shared Intent

Increasing Hierarchy

Increasing Control
Explicit Intent
Publicly Communicated

Orders
Questions
Answers
Doctrine

Personal Expectations
(based on Style and Experience)

Military Expectations
(based on training, doctrine, tradition etc.)

Cultural Expectations
(based on social values, cultural morals, national pride)

Implicit Intent
Unvocalized (and unvocalizable)

After Pigeau and McCann (2000, 2006)
INTENT SHARING

Explicit Intent

Internalization (unconsciously learned)

Externalization (Implicit made Explicit)

Explicit Intent

Externalization (Implicit made Explicit)

Implicit Intent

Socialization (Training)
OPERATIONS INTENT AND EFFECTS MODEL

Decision Making
Decisions Making Models

The Dynamic OODA loop (DOODA loop)

John Boyd's OODA Loop

Processes
MDMP
GOP
IDC2
PUT
OPERATIONS INTENT AND EFFECTS MODEL

DM

Initial State

Perceives

Mimion

Perceived by

Orders

Describes

Intent

Develops

Guides

Describes

Actions

Causes

Current State

Move towards

End State

Produced by

Produced by

Described by

Caused by

Perceived by
SITUATION AWARENESS

Fig. 1. JDL data fusion model (1999 revision).
SITUATION AWARENESS

Homogenous – heterogeneous information sources and representations

Transitory Awareness (TA)

Who is there?
What do they want?

What are they doing?
What will they do?

Local Awareness (LA)

Who is there?
What do they want?

What are they doing?
What will they do?

Global Awareness (GA)

What do they want?
What will they do?

What are they doing?

Smaller

time span, command span, area of interest etc.

Larger

SAAB
DM – Decision Making Process

DM

Initial State

Execution

Sequence

Key Decisions

Constraints

Outcome

Mission / Goal

Antigoals

End State

Guides

Actions

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OPERATIONS INTENT AND EFFECTS MODEL

DM

Initial State

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Intent

Guides

Describes

 Causes

Effects

Move towards

End State
Win the War

Destroy will of Enemy
- Acceleration of straggler count
- Drop Intel
- Carpet Bomb

Halt Second Echelon
- Traffic Density
- Units in Bivouac
- Isolate the Battle Field
- Prevent Crossing
- Deny Access

Prevent Crossing
- Destroy Bridge 1
  - Attack with Bn1

Destroy Bridge 2
  - Attack with Bn1

Destroy Fuel Reserve

End-State

Effect

Action

Indicator

Mechanism

Air Assault
Credible TaskForce (TF) Freedom of movement and action of own forces ensured

Force Protection established
External support of ISAF established

Movements of others in area controlled
Local support for ISAF/ITU established
Narcotics eliminated
Physical insurgency capability of OMF eliminated

ANP operational
Temporal basic aid provided
Usable and productive available land established
NDS operational
ANA operational

ISAF - International Security Assistance Force
TFU – Task Force Uruzgan
OMF – Opposing Military Force
ANP – Afghanistan National Police
NDS – National Directorate of Security
ANA – Afghanistan National Army
OPERATIONS INTENT AND EFFECTS MODEL

- **Mission** develops **Intent**, which describes **Actions** that cause **Effects**. The **Current State** moves towards the **End State**.

- **Perceived by** DM, who perceives the **Initial State** and produces **Orders**. DM also perceives **Actions** and produces **Effects**.

- **DM** produces **Orders** that describe **Actions**. **Effects** are caused by **Actions**.

- **Intent** guides the process and is perceived by **DM**.

- **Operational Model** includes **Intent**, **Actions**, and **Effects**.
OPERATIONS INTENT AND EFFECTS MODEL

Initial State ✎ DM ✎ Current State

Perceives

Perceived by

Perceived by

Produced by

Produced by

Described by

Guides

Develops

Describes

Moves towards

End State

Operates ✎ Intends ✎ Effects

Orders

Causes

Produces

Perceived by

Produced by

Described by

Caused by
OPERATIONS INTENT AND EFFECTS MODEL

1. **Initial State**
   - Perceived by DM
   - DM Produces Orders

2. **Orders**
   - Describes Actions
   - Actions Causes Effects

3. **Effects**
   - Produces Current State
   - Move towards End State

4. **End State**
   - Perceived by DM
   - DM Produces Mission

5. **Mission**
   - Developed by Intent
   - Intent Guides Current State

6. **Current State**
   - Perceived by Perceives
   - Described by Produced by

7. **Intent**
   - Guides Effects
   - Describes Initial State

8. **Initial State**
   - Perceived by DM
   - DM Produces Orders

9. **Orders**
   - Describes Actions
   - Actions Causes Effects

10. **Effects**
    - Produces Current State
    - Move towards End State

11. **End State**
    - Perceived by DM
    - DM Produces Mission

12. **Mission**
    - Developed by Intent
    - Intent Guides Current State

13. **Current State**
    - Perceived by Perceives
    - Described by Produced by

14. **Intent**
    - Guides Effects
    - Describes Initial State

15. **Initial State**
    - Perceived by DM
    - DM Produces Orders

16. **Orders**
    - Describes Actions
    - Actions Causes Effects

17. **Effects**
    - Produces Current State
    - Move towards End State

18. **End State**
    - Perceived by DM
    - DM Produces Mission

19. **Mission**
    - Developed by Intent
    - Intent Guides Current State

20. **Current State**
    - Perceived by Perceives
    - Described by Produced by
Five Paragraph Order

- **Situation**
  - Enemy Forces
  - Own Forces
  - Recent Actions
  - Current Situation
  - Expected Actions

- **Mission**
  - Commander’s Intent

- **Execution**
  - Concept of the Operation

- **Service Support**
  - Task to Maneuver Units

- **Command and Signal**

**OPORD**
OPERATIONS INTENT AND EFFECTS MODEL

DM – Decision Making Process
The OIEM model is a general and high-level description of C2 information constituents, their relations and causality in the view of an organizational planning context.
Systems enabled for MSDL / C-BML by SBML/WISE

- MIP
- NFFI
- LINK

National

9LandBMS
SitawareHQ
Rapid3D
Cyber

C2 mapping

C-BML

Sim mapping

Logging
Filtering
Security
SBML

Robotic mapping

- National Protocol
- MSDL / C-BML

- HLA
- DIS
- TENA
- SWORD
- VBS2
- StealBeast
- BattleTEK