



M&S to support wargaming for concept development:

Multi-domain operations in urban environment Use Case

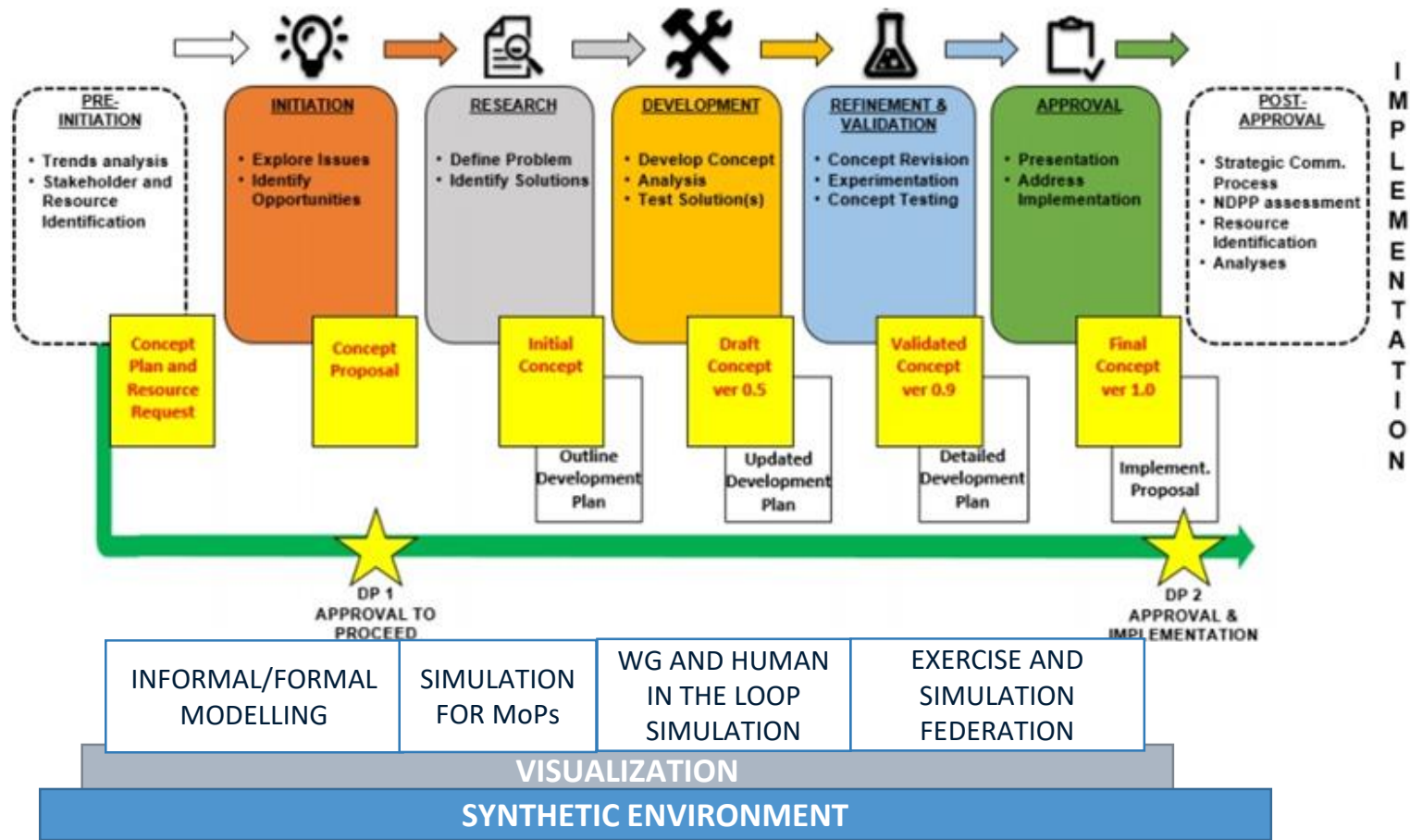
Jan Hodicky, Modelling & Simulation and Learning Technologies Branch, Joint Force Development, HQ SACT

Outline

- **M&S in NATO Concept Development process**
- **Use Case: Multidomain Operations in Urban Environment (MDO in UE) key aspects**
- **M&S objective in the Use Case**
- **WarGame Turn Cycle**
- **M&S support to WG**
- **M&S support to the concept validation**
- **Main takeaways**

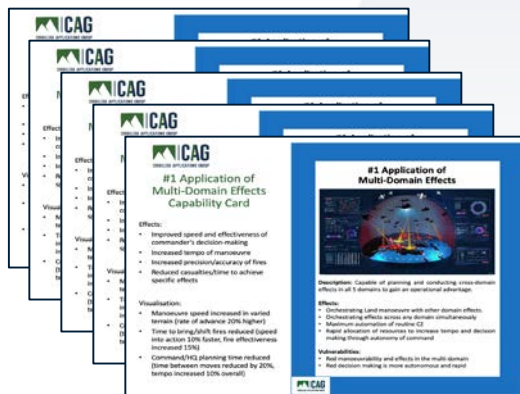
M&S in NATO Concept Development

- NATO M&S Master Plan (Capability Development)
- MC-0583, MC Policy for NATO Concept Development and Experimentation
- NATO Concept Development and Experimentation handbook



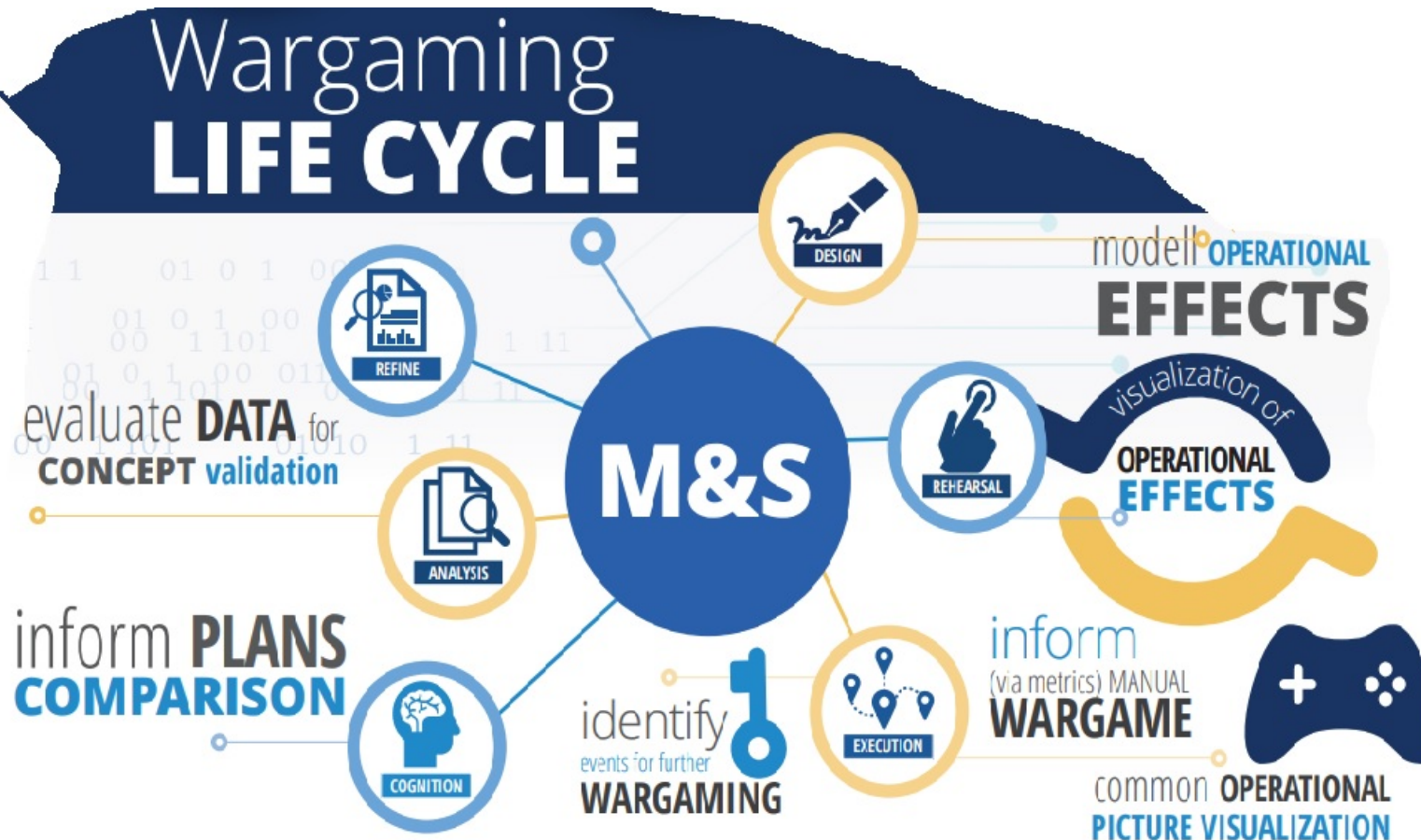
Use Case: MDO in UE

- NATO Military Committee (MC) approved the Urbanization Capstone Concept in 2019
 - MC task to develop operating concept for MDO in UE
- Question to be explored: Does the proposed concept enable NATO to be better prepared for MDO in UE?
- Main elements to be experimented: Principles (6) and requirements (16 Capability Cards) as outlined in the MDO in UE concept.
 - Principles (Agility, Creativity, Interaction, Interconnectivity, Understanding and Unity)
 - 4 x vignettes – adequate representation of potential conflict spectrum and military tasks in urban setting



M&S objective in the Use Case

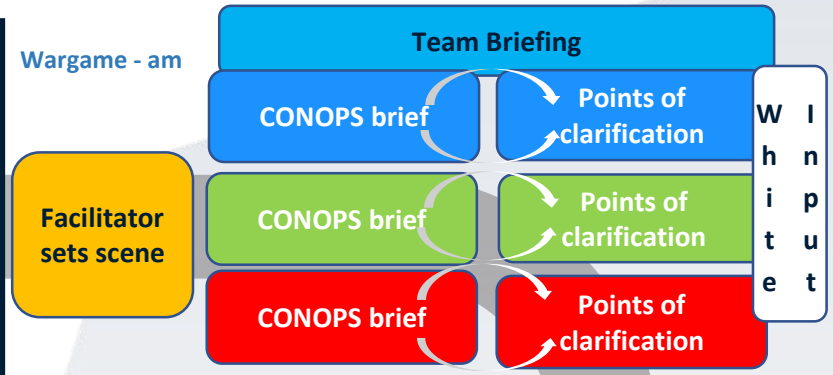
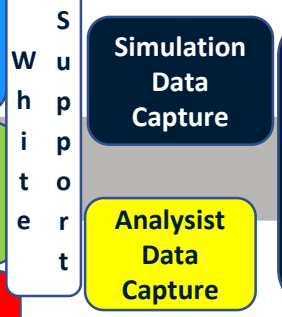
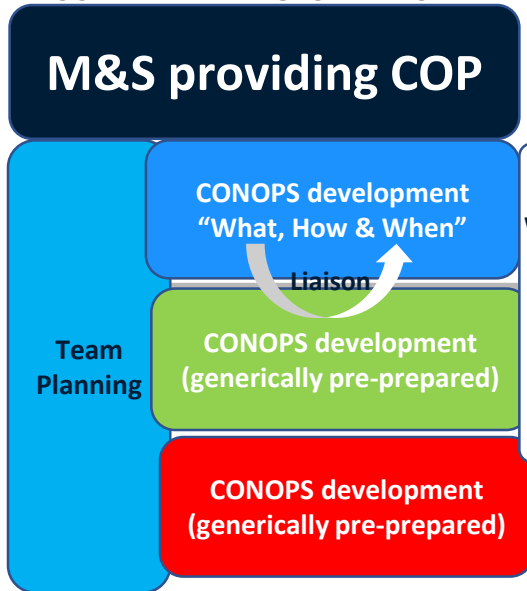
- Objective 1 (primary): M&S support to the WG lifecycle
- Objective 2 (secondary): Simulation to generate data for quantitative analysis to support the MDO in UE concept validation



Wargame Turn Cycle – Blue lead*

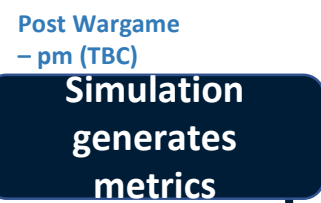
Planning - pm

Vignette Brief
(Strategic Planning Guidance)



Senior Mentor Guidance

Qualitative & quantitative analysis
Focus on "Principles"



Combined Hot Wash – led by Senior Mentor
Focus on "Capability Card, Event, Synchronisation & CONOPS Comparison"

Blue Team 1 Leader

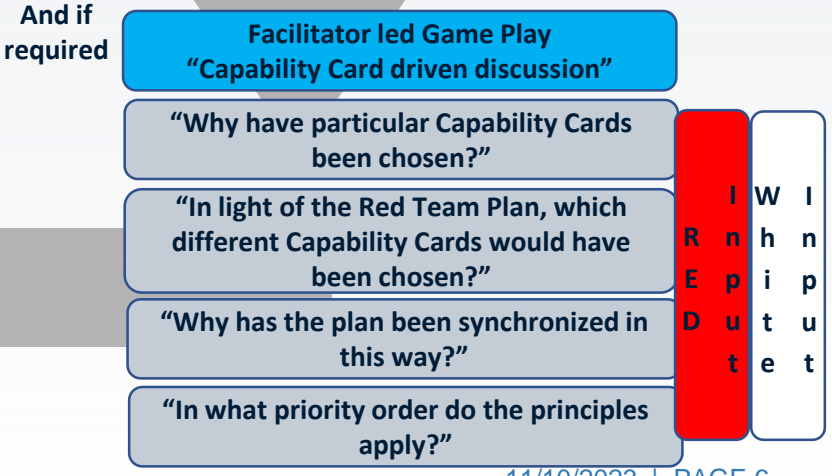
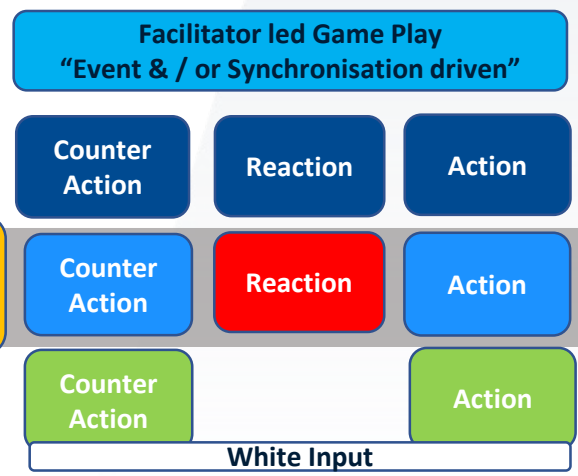
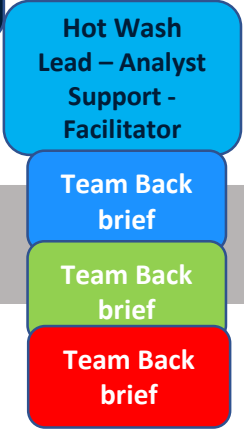
Blue Team 2 Leader

Blue Team 3 Leader

Facilitators

Analysists

Simulation support to Senior Mentor

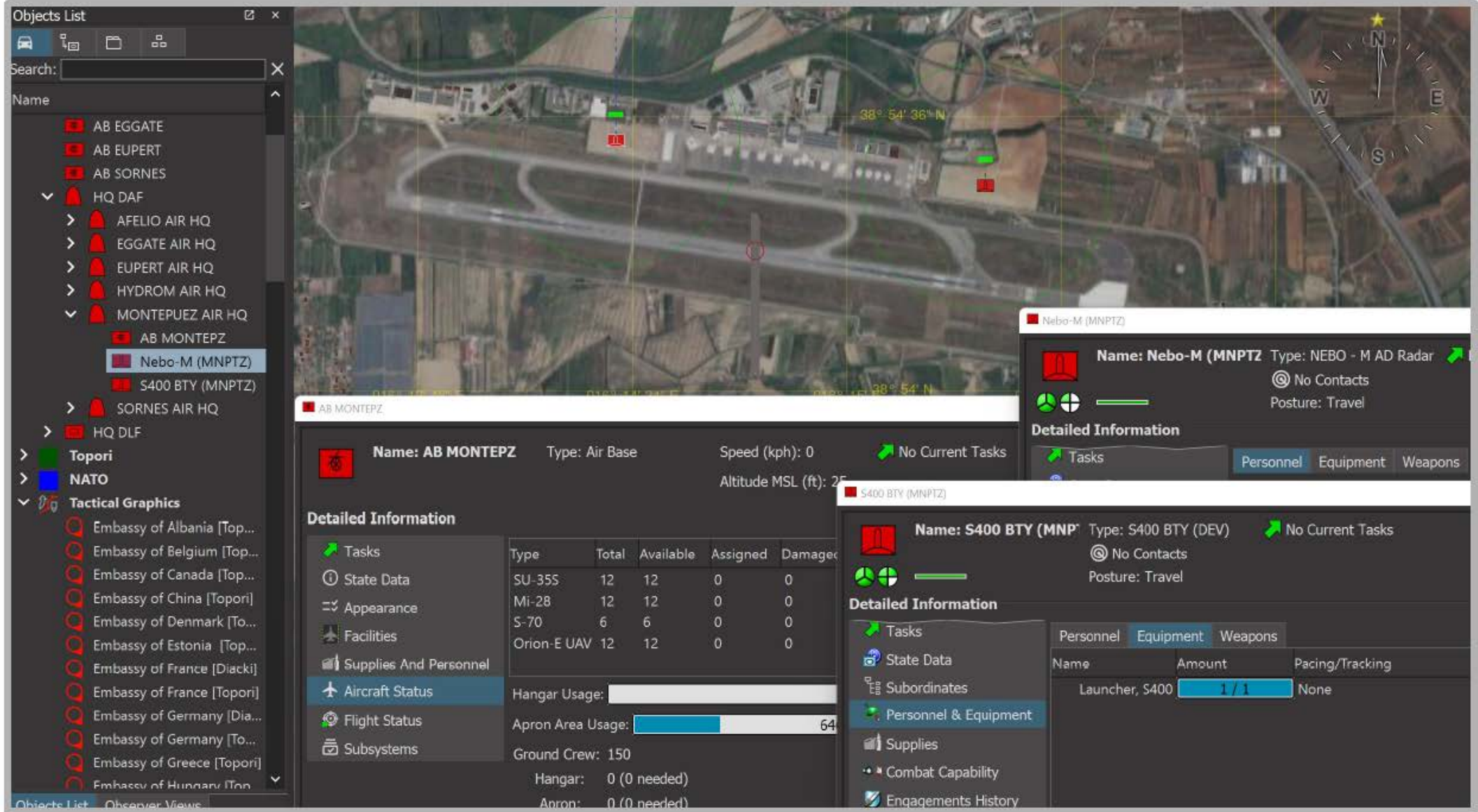




ALLIED COMMAND TRANSFORMATION

Simulation system providing Common Operational Picture (COP)

Simulation providing COP – Information Management System



Objects List

- AB EGGATE
- AB EUPERT
- AB SORNES
- ▼ HQ DAF
 - ▶ AFELIO AIR HQ
 - ▶ EGGATE AIR HQ
 - ▶ EUPERT AIR HQ
 - ▶ HYDROM AIR HQ
- ▼ MONTEPUEZ AIR HQ
 - AB MONTEPZ
 - Nebo-M (MNPTZ)
 - S400 BTY (MNPTZ)
- ▶ SORNES AIR HQ
- ▶ HQ DLF
- ▶ Topori
- ▶ NATO
- ▼ Tactical Graphics
 - Embassy of Albania [Top...]
 - Embassy of Belgium [Top...]
 - Embassy of Canada [Top...]
 - Embassy of China [Topori]
 - Embassy of Denmark [To...]
 - Embassy of Estonia [Top...]
 - Embassy of France [Diacki]
 - Embassy of France [Topori]
 - Embassy of Germany [Dia...]
 - Embassy of Germany [To...]
 - Embassy of Greece [Topori]
 - Embassy of Hungary [Top...]

AB MONTEPZ (Type: Air Base)

Name: AB MONTEPZ Type: Air Base Speed (kph): 0 No Current Tasks
Altitude MSL (ft): 25

Detailed Information

Tasks	Type	Total	Available	Assigned	Damaged
State Data	SU-35S	12	12	0	0
Appearance	Mi-28	12	12	0	0
Facilities	S-70	6	6	0	0
Supplies And Personnel	Orion-E UAV	12	12	0	0

Hangar Usage:

Apron Area Usage: 64

Ground Crew: 150

Hangar: 0 (0 needed)

Apron: 0 (0 needed)

Nebo-M (MNPTZ) (Type: NEBO - M AD Radar)

Name: Nebo-M (MNPTZ) Type: NEBO - M AD Radar No Contacts
Posture: Travel

S400 BTY (MNPTZ) (Type: S400 BTY (DEV))

Name: S400 BTY (MNP... Type: S400 BTY (DEV) No Current Tasks
No Contacts
Posture: Travel

Detailed Information

Personnel	Equipment	Weapons
Name	Amount	Pacing/Tracking
Launcher, S400	1 / 1	None

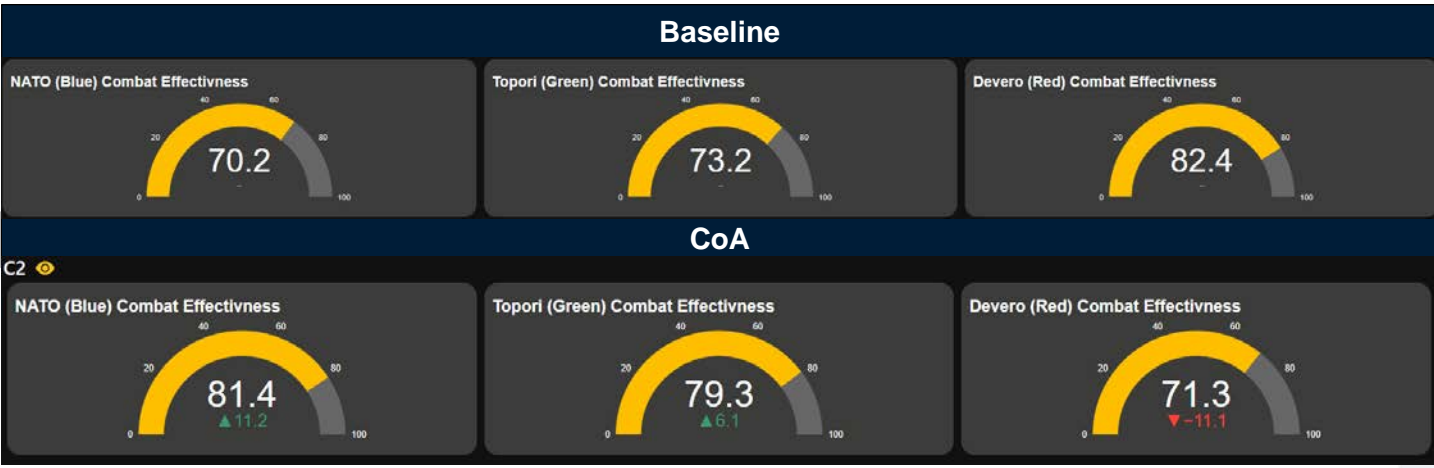


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Simulation Report to Planners

COA Title: V1	Duration of Simulation Run: D+3	Wargame Group No: 1
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Capability Cards Played: 1,2,5,6,7,8,9,10,11,12,14



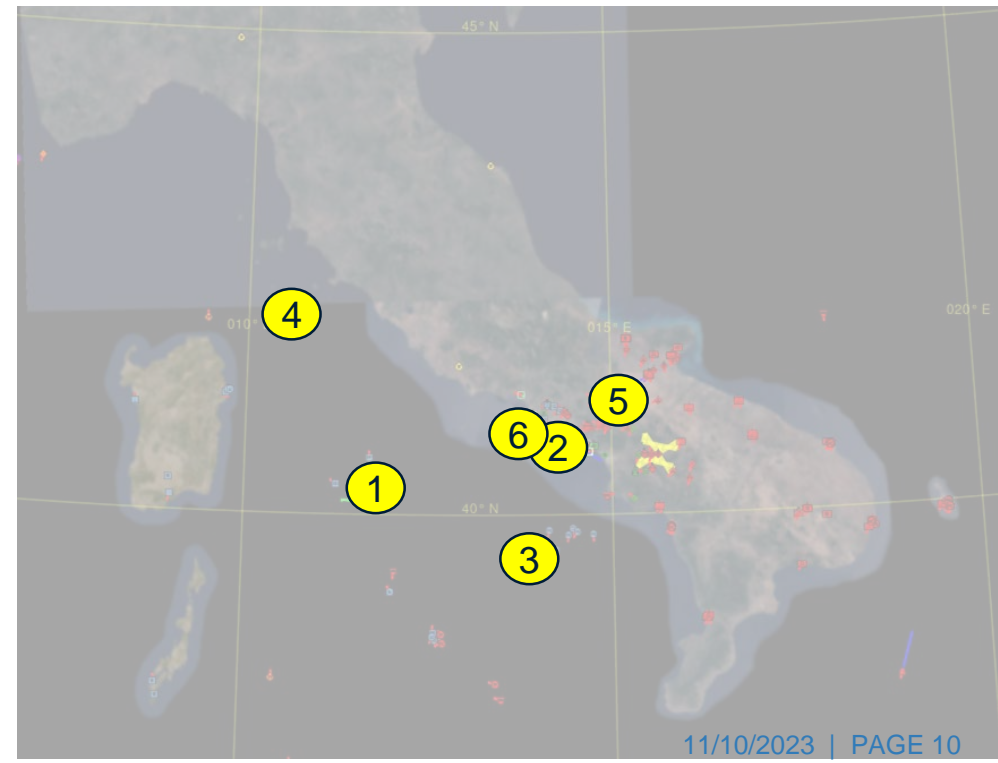
Analysis:

- CELLs 1's MDO approach appears to be more successful than the Joint Task Force approach during D+53-56.
- BLUES ability to FIND and EFFECT impacted most on RED's; AD, Long Range Fires and AIR
- This resulted in reduced BLUE, GREEN and WHITE Casualties.

Key Events:

- D+53: RED Attacks BLUE/GREEN= Port blocked, DDG51/Amphib T1 Attacked/QEC, AD degraded, C2 degraded, Mvt in City slowed, eFP and GREEN Fwd Bdes DELAY. USCG arrives, BLUE degrades RED A2AD and Air Asslt against eFP Bde
- D+54: BLUE/GREEN continues DELAY, continued attacks on key BLUE A2D and C2. RED SF/DUF Attack at Airport. NRF Div prepares hasty urban defence. Amphib TT Reserve, CSG 2 and SSN arrives. BLUE SOF degraded RED Space C2
- D+55: BLUE/GREEN continues withdrawal, continued RED attacks on key BLUE/GREEN HVTs.

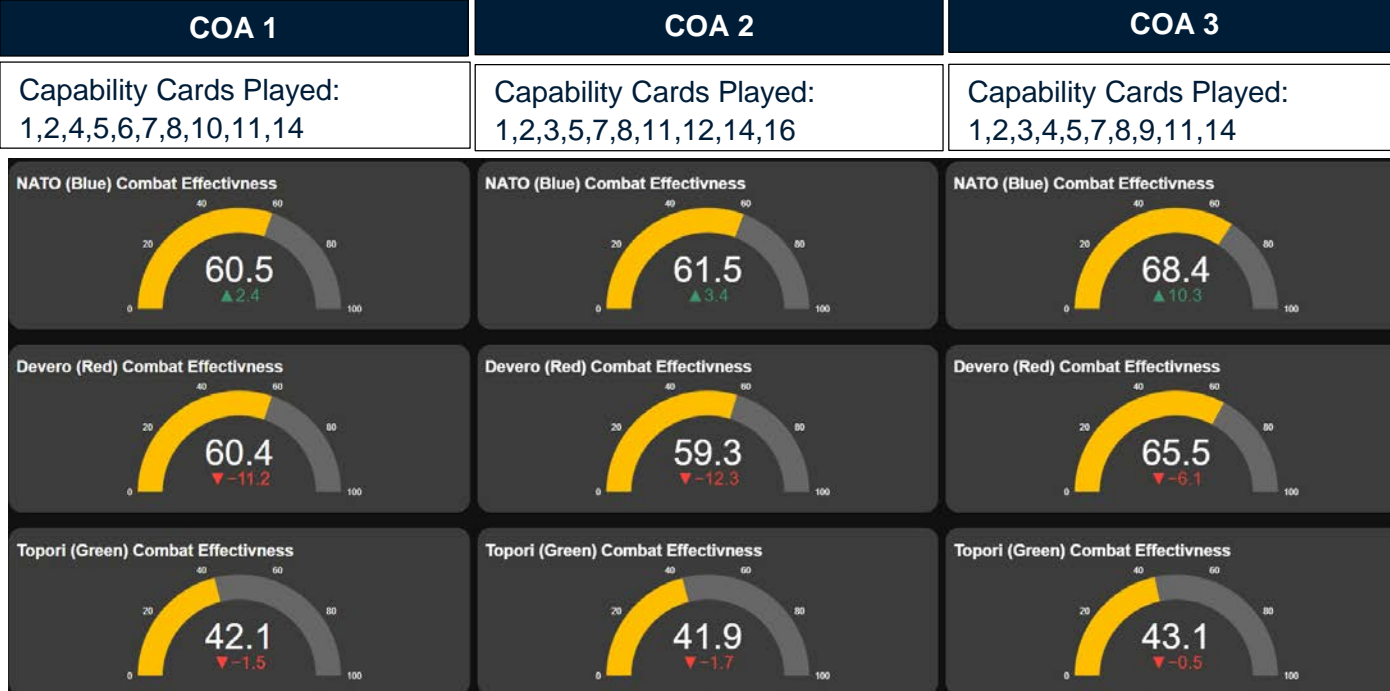
- Observations:**
1. Impact of DDG51 in DEFENDING LCC
 2. DEFEND NECTOR Port
 3. Attack against Amphib TF1
 4. Effects on TOPORU and NATO Air Defences
 5. DELAY action
 6. Attacks on TOPORI Government





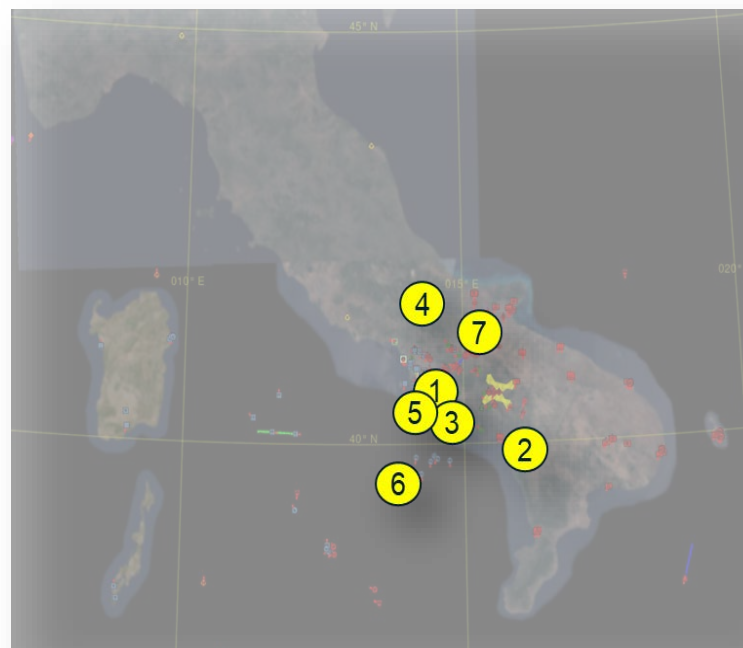
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Simulation Report to Senior Mentor



H: split from Blue

Platforms available



Observations:

- Defence of NECTOR** - Increased ability to acquire and prosecute targets. Faster resupply, through novel logistics approaches. Enhanced ability to enable the civilian authorities, to minimise civilian interference with military operations whilst minimise adverse effect on population.
- RED threatens ZEETH** - Zeeth is now cut off as 2nd Corps moves across South Nector. The Port of Zeeth is no longer available as alternative SPOD and RED now own the Humanitarian problem in Zeeth.
- IDP and Civilian Flows** - Better freedom of movement, through enhanced coordination between civil authorities, NGOs, IDPs. Water space management issues caused by evacuation of IDPs by small boats.
- AIR Superiority** - AIR environment remains contested. Both sides are able to develop favourable AIR situation (Freedom of Action, limited by time and space). Overall, the situation is improving for BLUE.
- RSOM** - Better protection from Cyber AIR and Fires. Better coordination of IDPs to maintain inload and to protect population. RSOM Blue capacity significantly impacted by damage to Ports and loss of Zeeth.
- Carrier Attack** - BLUE will have to expend significant resources to continue to protect the Carrier Strike Groups from Air launched Hypersonic Missiles. This would be a significant effort for BLUE counter ISR, particularly Space.
- Resistance** - Both sides are conducting 'behind the lines' activities using SOF, the population and 3rd party actors to disrupt each other's C2, logistics, and follow on forces.

Key Events:

D+ 59: Bridges are blown by **GREEN**. Urban Defence operations begin, **BLUE** AMPHIB TT Reserve /MEF embarked

D+60: **RED** reaches river, Zeeth captured by **RED**. Carrier (Queen Elizabeth) seriously damaged

D+61: **RED** crosses river and enters Urban Environment



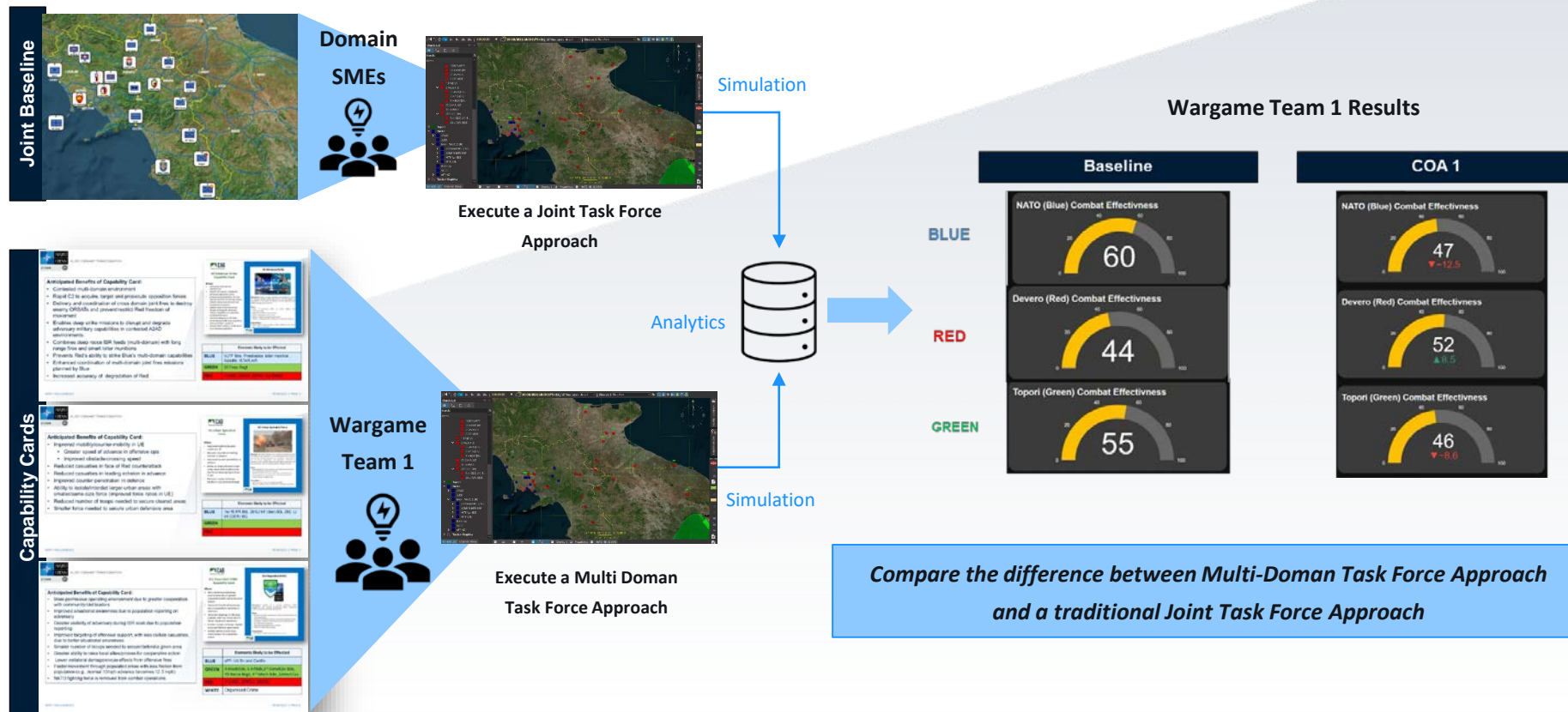
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Simulation to generate data for quantitative analysis to support the concept validation

Methodology

Experiment design

- Independent (WG#, CONOPS, Vignette, Selected Capability Cards)
- Dependent - Principles Metrics (Agility, Creativity, Interaction, Interconnectivity, Understanding, Unity)
- Controlled (Terrain, Scenario, Weather)



Results

Comparison between executed Baseline CoA and WG planned CoA by three planning teams for each vignette

Delta to Baseline in Scores per principle and per Vignette						
	<i>Principle/Vignette [score]</i>	Training	Vignette1	Vignette2	Vignette3	Vignette4
WG#1	Agility	0	0	0	0	0
	Creativity	-29	1	4	2	0
	Interaction	0	0	-2	3	0
	Interconnectivity	-16.5	-24.5	5.3	6.2	0
	Understanding	-25	0	0	0	0
	Unity	-29	1	4	2	0
WG#2	Agility	0	0	4	0	0
	Creativity	-9	3	7	6	0
	Interaction	0	7	3	2	0
	Interconnectivity	0.5	-24.9	9	8.2	0
	Understanding	0	0	0	0	0
	Unity	-20	3	7	6	0
WG#3	Agility	0	0	0	0	0
	Creativity	-9	8	2	0	0
	Interaction	0	7	-2	2	0
	Interconnectivity	0.5	-5.9	7.3	4.2	0
	Understanding	0	0	0	0	0
	Unity	-20	8	2	0	0

Summarized scores from Vignette #2 and #3 per each WG team

<i>Sum score from WG#1, #2, #3 from Vignette 2 and3</i>				
<i>Principle/WG# [score]</i>	WG#1	WG#2	WG#3	Sum
Agility	0	4	0	4
Creativity	6	13	2	21
Interaction	1	5	0	6
Interconnectivity	11.5	17.2	11.5	40.2
Understanding	0	0	0	0
Unity	6	13	2	21

Main takeaways

- **Simulation shall not distract players from planning activities**
- **M&S personnel needs to be well trained to interact with players and to translate simulation results**
- **Conceptual modelling of effects in five operational domain is of the key importance**
- **Simulation shall be used in the WG rehearsal to demonstrate expected effects of actions decided by planers**
- **Concept owner, analyst, experiment designer and modelling and simulation SMEs need to synchronize their effort from the very beginning of a concept design**

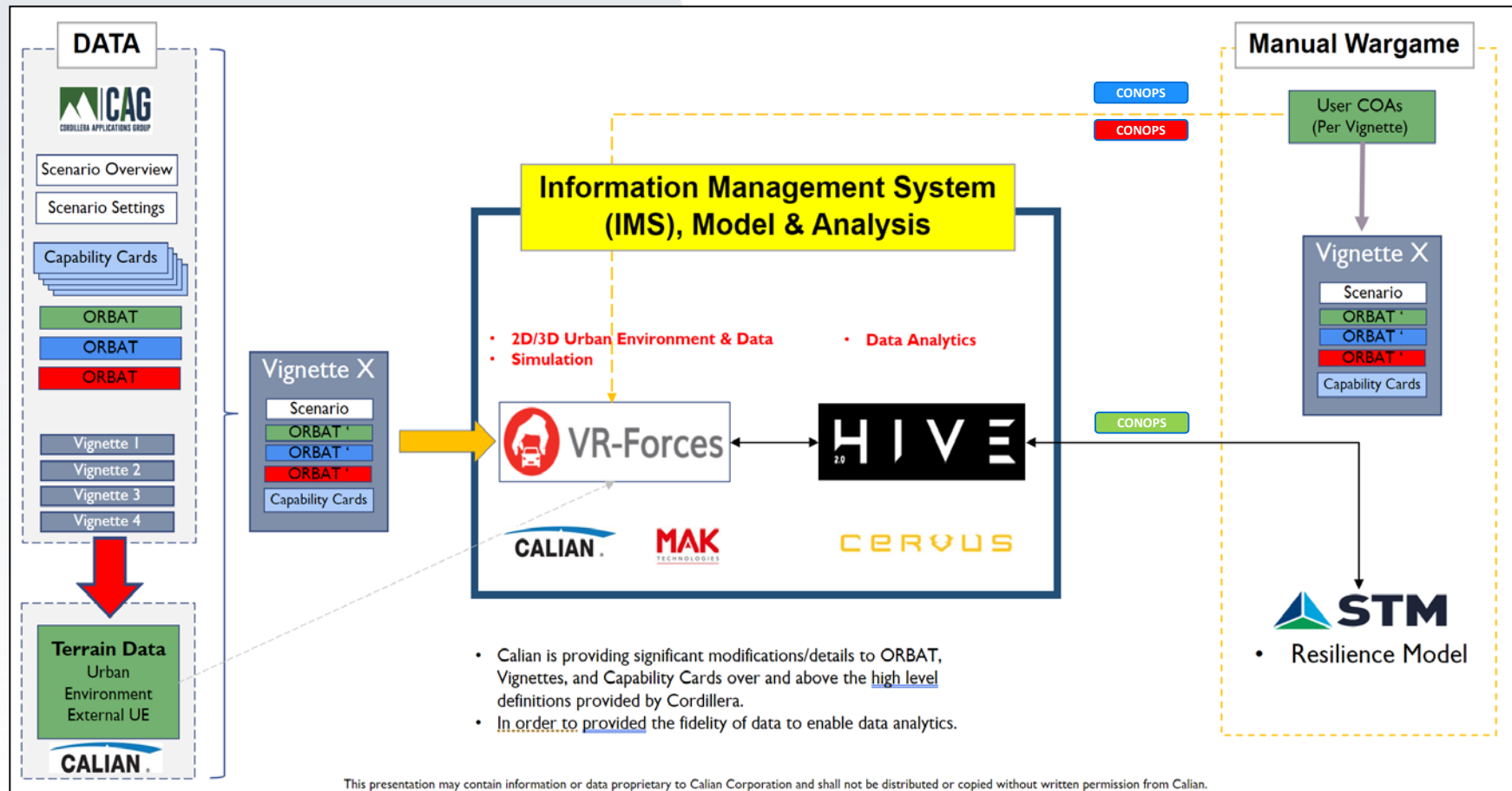
- **Limitation:**
 - **No single simulation solution covers MDO requirements**
 - **Best practice on metrics and their connection to simulation data**
 - **Speed of plans upload into a simulation**
 - **WG documents production management**

Questions?



M&S to support WG and analysis – main components

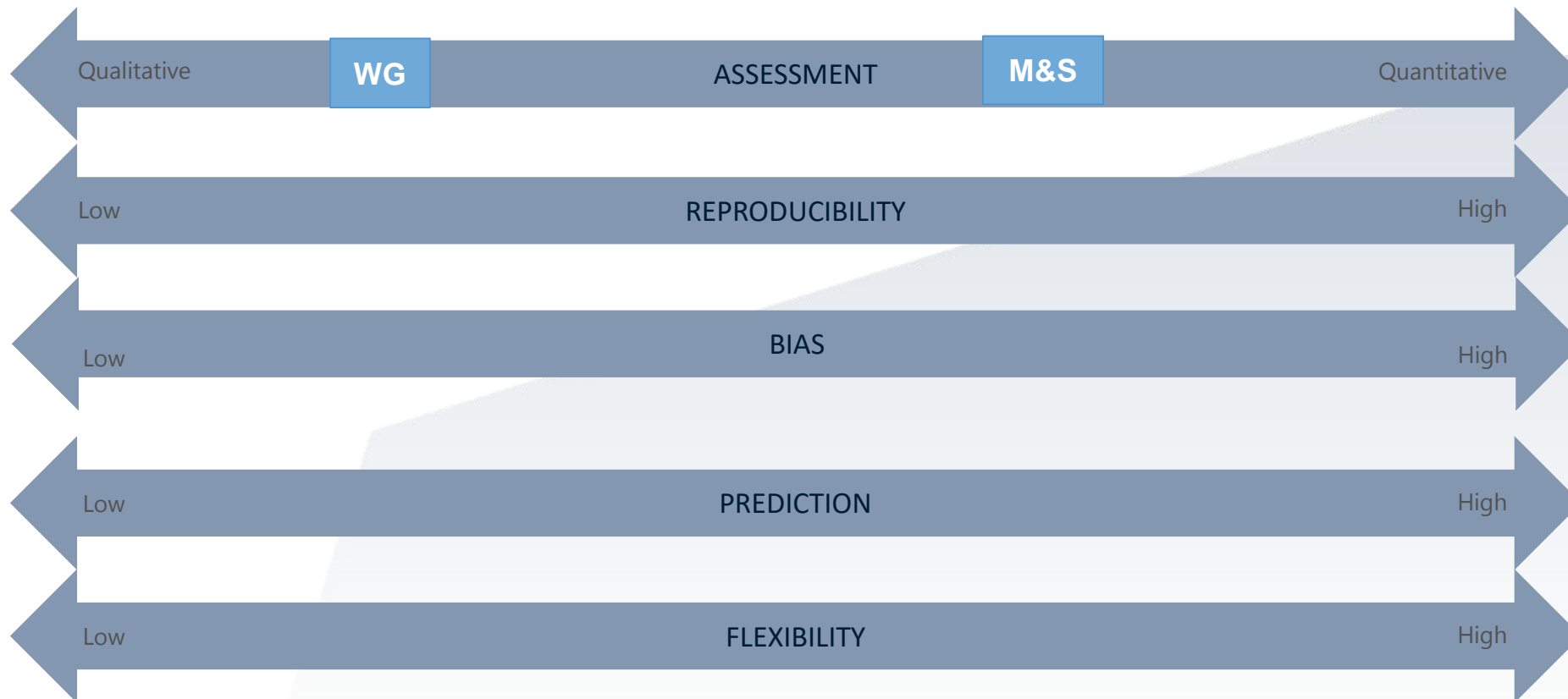
Scenario, Capability Cards, CONOPS, Manual Wargame, Simulation, Analysis





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M&S and Manual WG synergy



Knowledge withstanding scientific scrutiny