Measuring Team Collaboration in a Distributed Coalition Network

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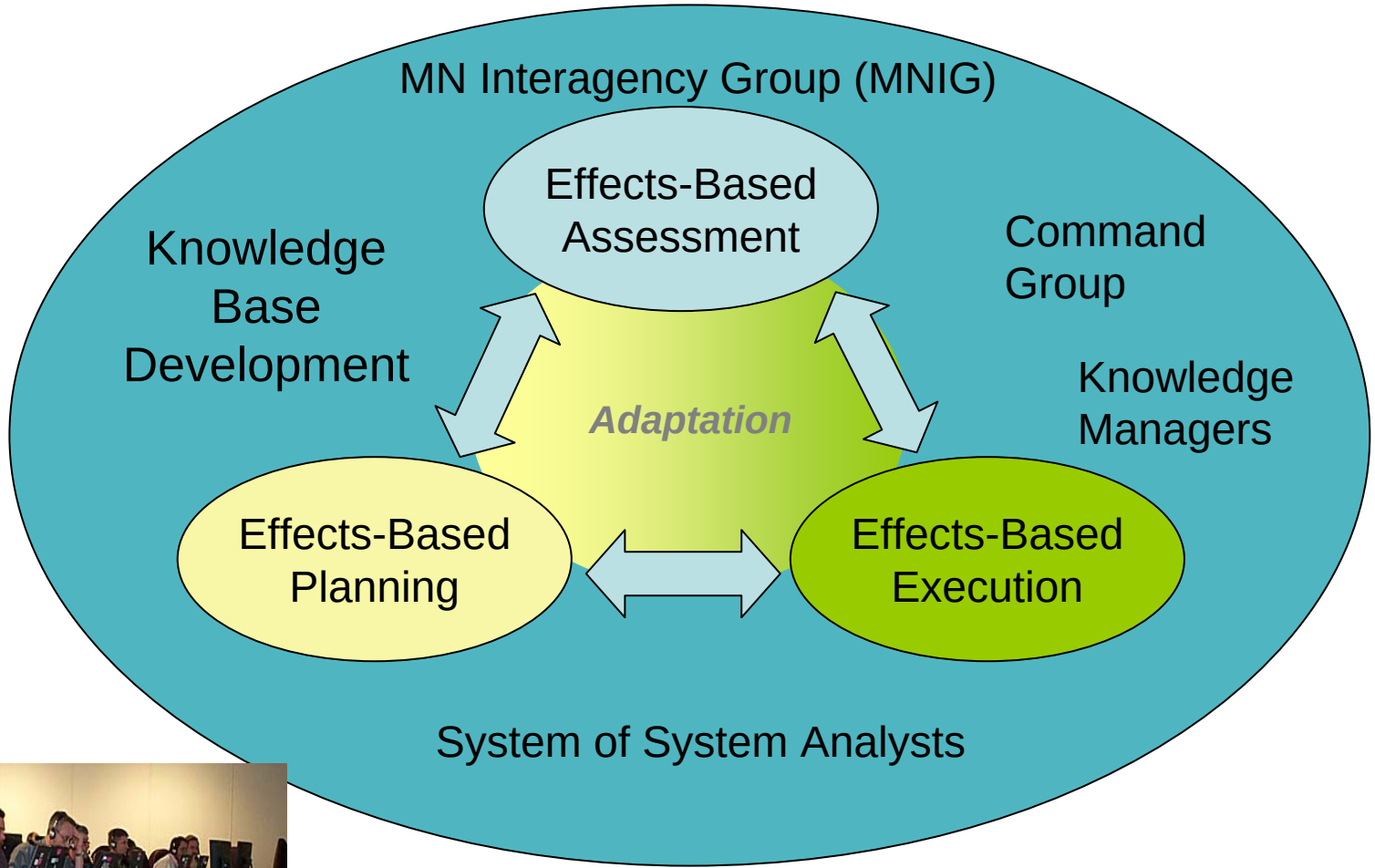
Outline

- Introduction to the experiment setting
- Methodology for measuring team collaboration
- Data Analysis
- Findings
- Conclusions

MNE4 Objectives

- Experiment aim: To develop future EBO **processes**, **organizations** and **technologies** at the operational level of command.
- Focus on cross-functional staff groups
- Staff (n=131) distributed among partner nations
- Use of IWS collaborative system (text chat, VOIP)

The Main Staff Groups in MNE 4



Team Collaboration Measures

- Workload
  - NASA TLX, administered every day
- Trust in Team and Technology
  - Administered once mid-experiment
- Perception of Information Quality
  - Administered once, at end of experiment
- Team Process
  - Administered once, mid-experiment
- Roles and Responsibilities
  - Administered once, mid-experiment

Demographics Results

- On average, 66% of participants had prior experience with MNE activities
- Of participants who reported military experience, 84% reported 16 or more years
- Of these participants, 21% reported no multinational experience, 22% reporting less than one year, and 43% reporting 1-3 years

Workload Results

- NASA TLX chosen for high validity, operator acceptance, low intrusiveness (Hill et al., 1992)
- Measures of workload dimensions for Mental, Physical, Time Pressure, Performance, Effort, Frustration
- 12 days of data
- Workload was an indicator of daily balance in staff assignments, tool compatibility, organizational ‘health’

Results

- Significant interaction of week*group *Wilk's λ* F (84,455) = 1.41, *p* = .016
  - Univariate ANOVAs showed significant effects for
    - satisfaction with own performance (F (14,7) = 2.91, p = .001
      - Wk1perf, significant F (7,96) = 3.72, p = .001
      - Wk2perf, significant F (7,99) = 2.90, p = .008
      - Wk3perf, significant F (7,96) = 2.26, p = .036
    - frustration felt (F (14,7) = 2.04, p = .018
      - Wk1frust, significant F (7,96) = 3.27, p = .004
- Wk1perf: CG significantly higher than EBP, EBE, EBA, KM, SOSA
- Wk2perf: CG significantly higher than EBE, MNIG, SOSA
- Wk3perf: CG significantly higher than EBP, EBE, MNIG, SOSA
- Wk1frust: MNIG significantly higher than EBE, KM, Red/Green, SOSA

Trust in Team and Technology

Survey Question	N	Mean	SD
1. My team was open to ideas from all	109	5.7982	1.4258
2. I was comfortable sharing ideas with team	109	5.8624	1.3015
3. Team members were kept informed	109	5.1009	1.6327
4. Collaborative Technology made it possible for my ideas to be understood	109	4.7615	1.4136
5. Collaborative Technology is an efficient way to work in distributed environment	109	4.7982	1.6146

No significant differences among groups. Questions rated on 1(low) – 7 (high) scale.

Perception of Information Quality

Variable	Survey Question	df	Mean Square / Standard Deviation	F	Sig.
INFO1	Information was accurate	6	3.278/1.290	2.542	.025
		102			
INFO2	Information was appropriate	6	4.551/1.504	3.026	.009
		102			
INFO3	Information was accessible	6	2.743/1.969	1.393	.225
		102			
INFO4	Information was relevant	6	2.865/1.586	1.806	.105
		102			
INFO5	Information was timely	6	4.500/1.800	2.501	.027
		102			
INFO6	Information was complete	6	8.401/1.777	4.727	.000
		102			
INFO7	Information was sufficient	6	7.589/1.866	4.068	.001
		101			
INFO8	Information was concise	6	5.544/1.903	2.914	.012
		101			
INFO9	Information was interpretable	6	4.766/1.793	2.659	.020
		101			
INFO10	Information was understandable	6	3.863/1.739	2.222	.047
		101			

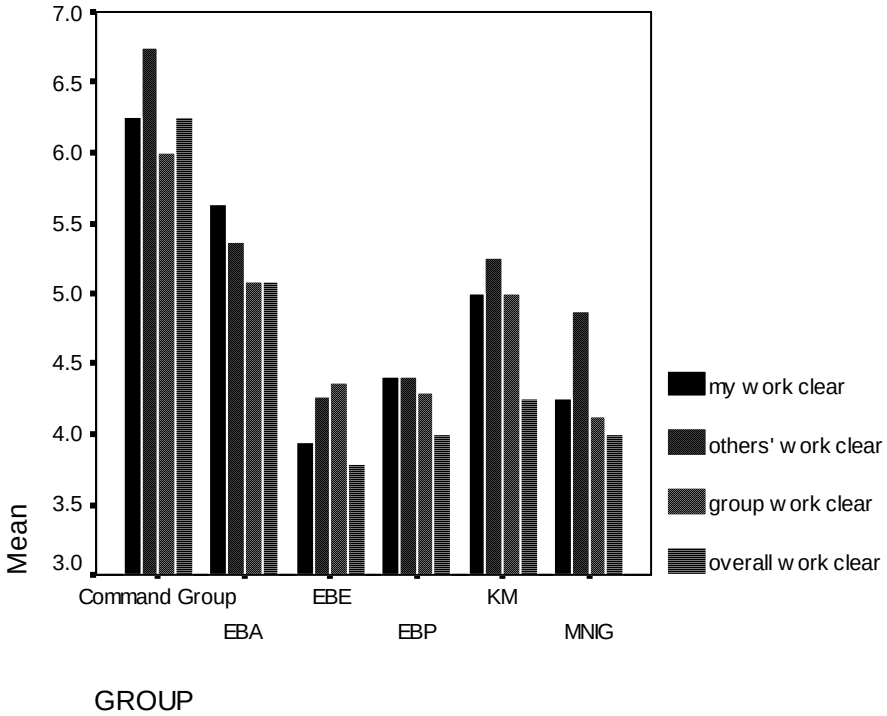
Information Quality Results

- General agreement that information was not accessible (question 3, M=2.74) or relevant (question 4, M=2.86).
- Command Group rated information quality higher than other groups (filtering)
- MNIG and EBE groups rated the quality of information for most categories lower than other staff groups.
  - Continuing EBE problems with type of information needed to conduct operations
  - MNIG:
    - Connectivity problems
    - Organizational culture issues
      - Unfamiliarity with the military planning process
      - Viewed process as rigid and time-constrained

Team Process

Variable	df	F	Sig.
My team was effective in sharing information	6	2.477	.028
	98		
My team was effective in assigning roles	6	2.688	.019
	98		
My team was effective in assigning responsibilities	6	3.208	.006
	98		
	104		
My team was effective in communicating ideas	6	2.347	.037
	98		

Team Process Results

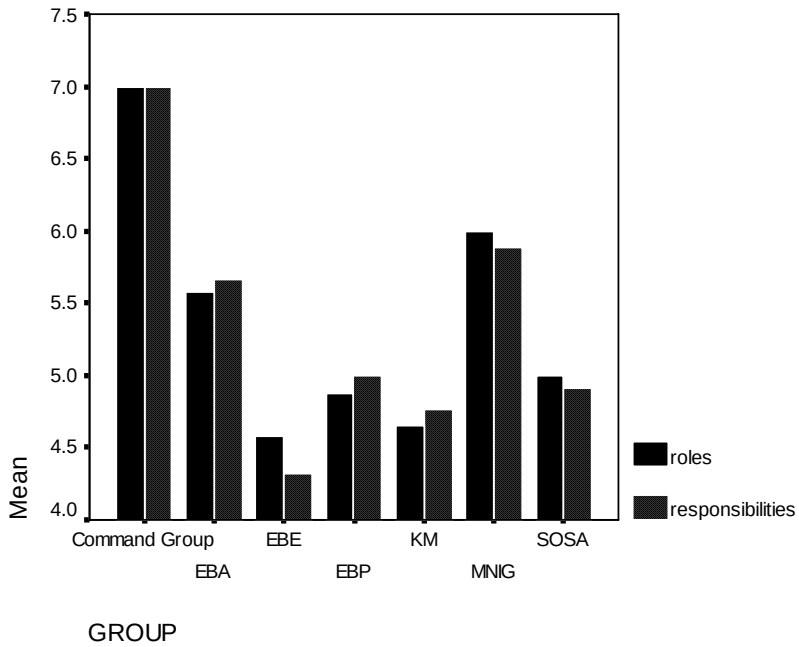


- Larger groups had lower scores, suggesting difficulty with distributed team process management.
- The smaller SOSA group also had lower scores, reflecting the individual nature of this team.
- The KM group also had lower scores, reflecting the lack of tasks requiring group activity.
- The lack of assignment of responsibilities is a significant negative feature.

Roles and Responsibilities

Question		Sum of Squares	df	Mean Square	F	Sig.
1. I was clear of what was expected of me	Between Groups	33.572	5	6.714	1.972	.093
	Within Groups	251.978	74	3.405		
	Total	285.550	79			
2. It was clear what others were to do	Between Groups	29.548	5	5.910	2.445	.042
	Within Groups	178.840	74	2.417		
	Total	208.387	79			
3. It was clear what other groups were to do	Between Groups	16.686	5	3.337	1.494	.202
	Within Groups	165.264	74	2.233		
	Total	181.950	79			
4. It was clear how all groups should work together	Between Groups	30.383	5	6.077	2.372	.047
	Within Groups	189.567	74	2.562		
	Total	219.950	79			

R/R Results



- The large EBE and EBP groups had lower overall scores.
- EBE, EBP, KM, and MNIG demonstrated difficulty knowing what other groups were to accomplish.
- This is likely related to an understanding of the Concept of Operations for MNE 4 and pre-experiment training, but would certainly be an area of concern for an actual staff.

Conclusions

- Trusting relationships developed
- Lack of effective team processes
- Lack of understanding of inter-team relationships
  - Integration of MNIG into military process
  - Non-military actors are unique and cannot simply be add-ons
  - Roles and Responsibilities are important considerations

Conclusions (Cont)

- Unequal distribution of effort, performance, and frustration
  - Frustration
    - MNIG lacked understanding of military staff process
    - Military frustrated by software tools
  - Performance
    - Smaller teams perceived their performance higher
- Information Quality
  - Complete and sufficient, but less timely, understandable, and accurate
  - Knowledge Management systems need to evolve