DEFENCE R&D DÉFENSE

Organizational Agility

Olympic Event Case Studies

Philip S. E. Farrell, Ph.D.

Marie-Eve Jobidon, Ph.D.

Defence R&D Canada – Toronto

Simon Banbury, Ph.D.

CAE Professional Services Canada

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- Munich and Vancouver overview
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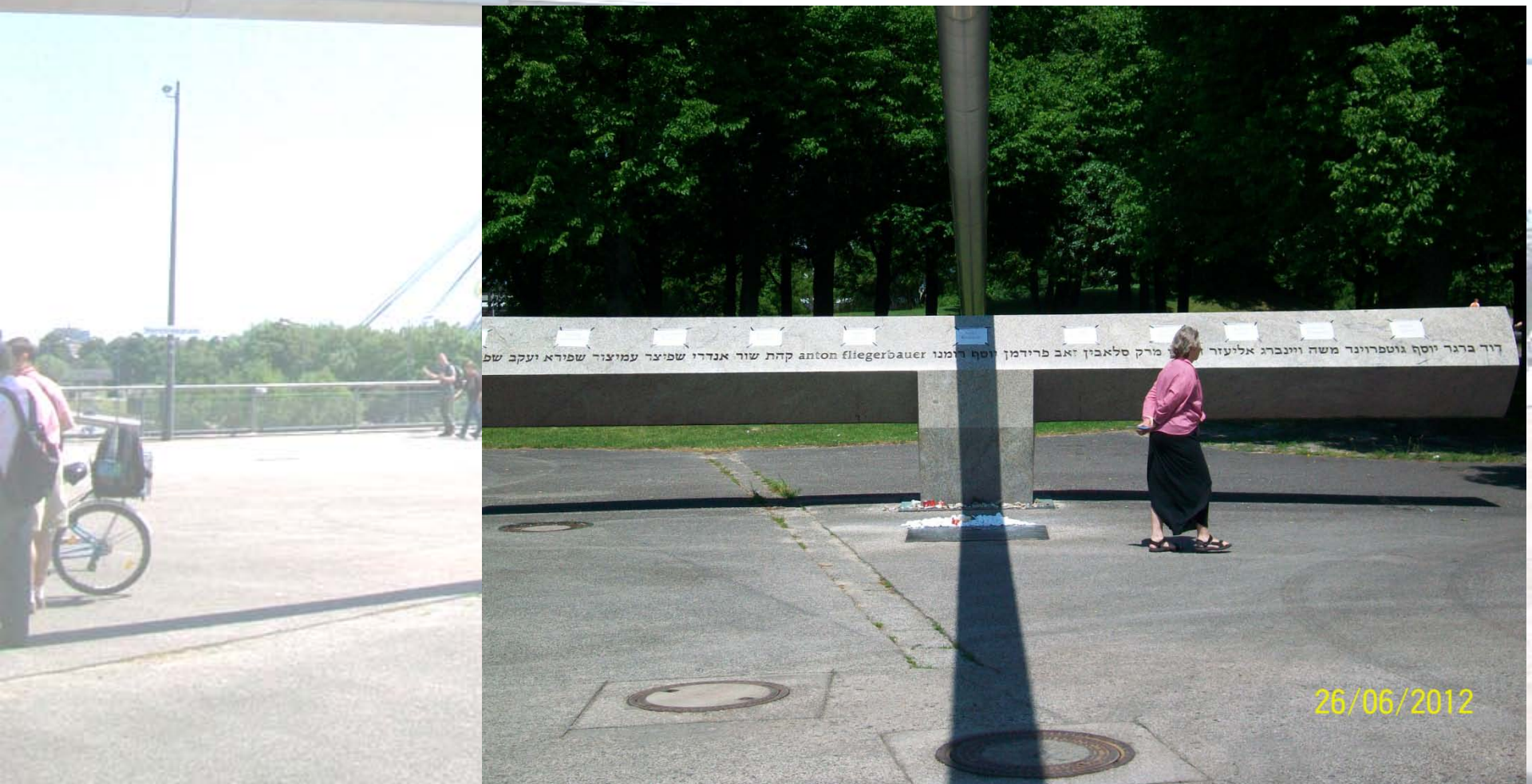
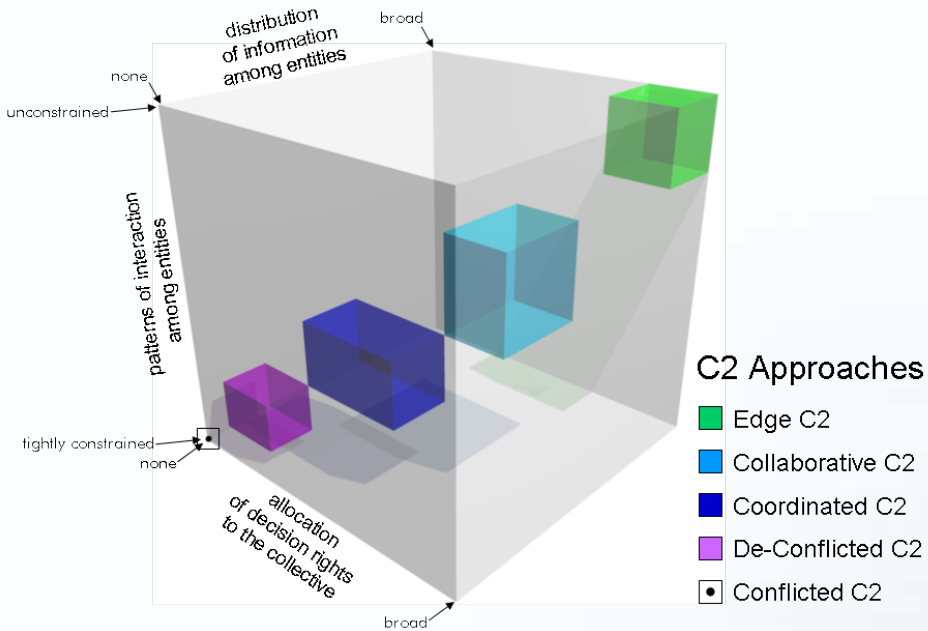
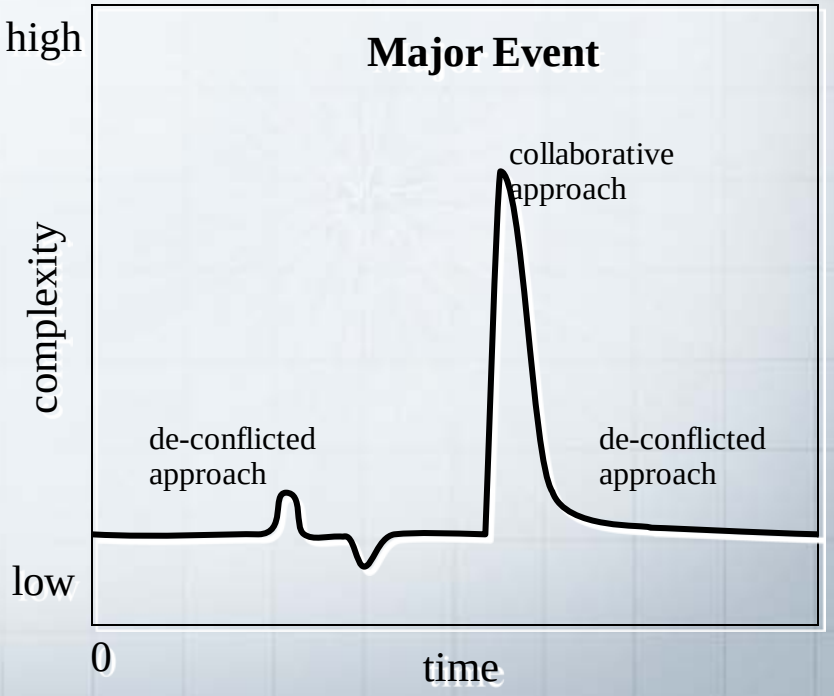
Introduction

- Complex Endeavours will require the ability of entities to transition from one C2 approach to another as the situation complexity changes



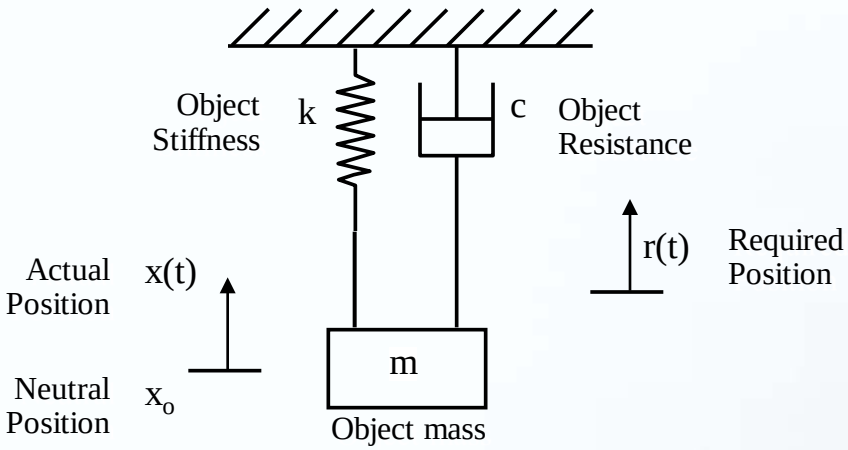
Introduction



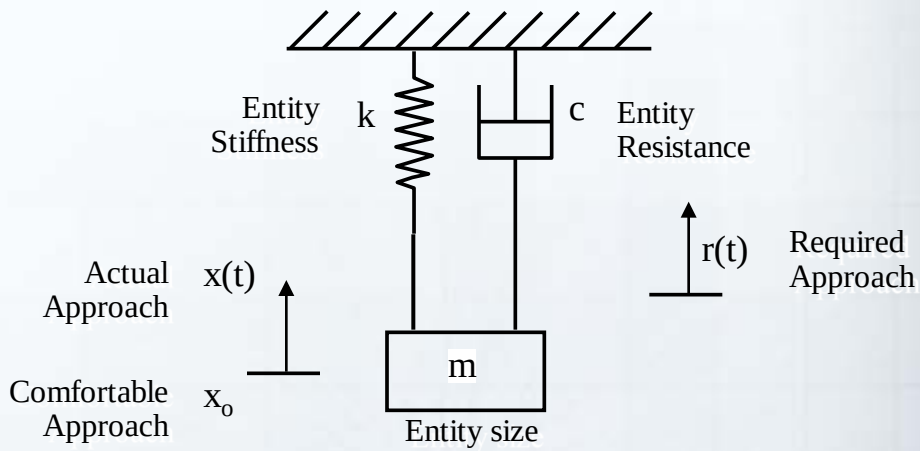


Organizational Agility (transition model)

Object Motion in 3D Space



Entity Motion in C2 Approach Space

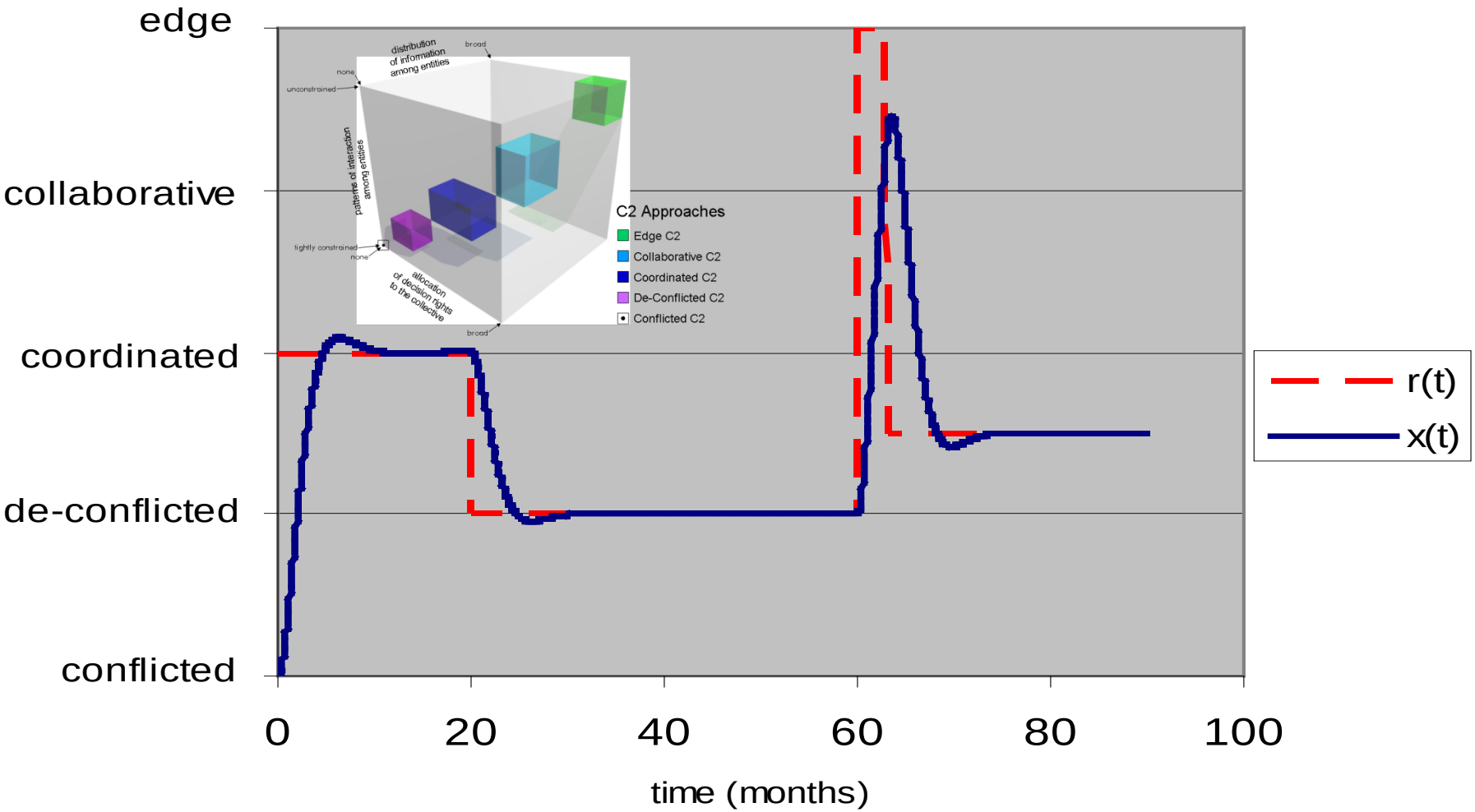


Equation of Motion

$$k[r(t) - x_o] = m\ddot{x}(t) + c\dot{x}(t) + k[x(t) - x_o]$$

External Forces | Momentum Forces | Resistance Forces | Restoring Forces

Organisational Agility (transition model)



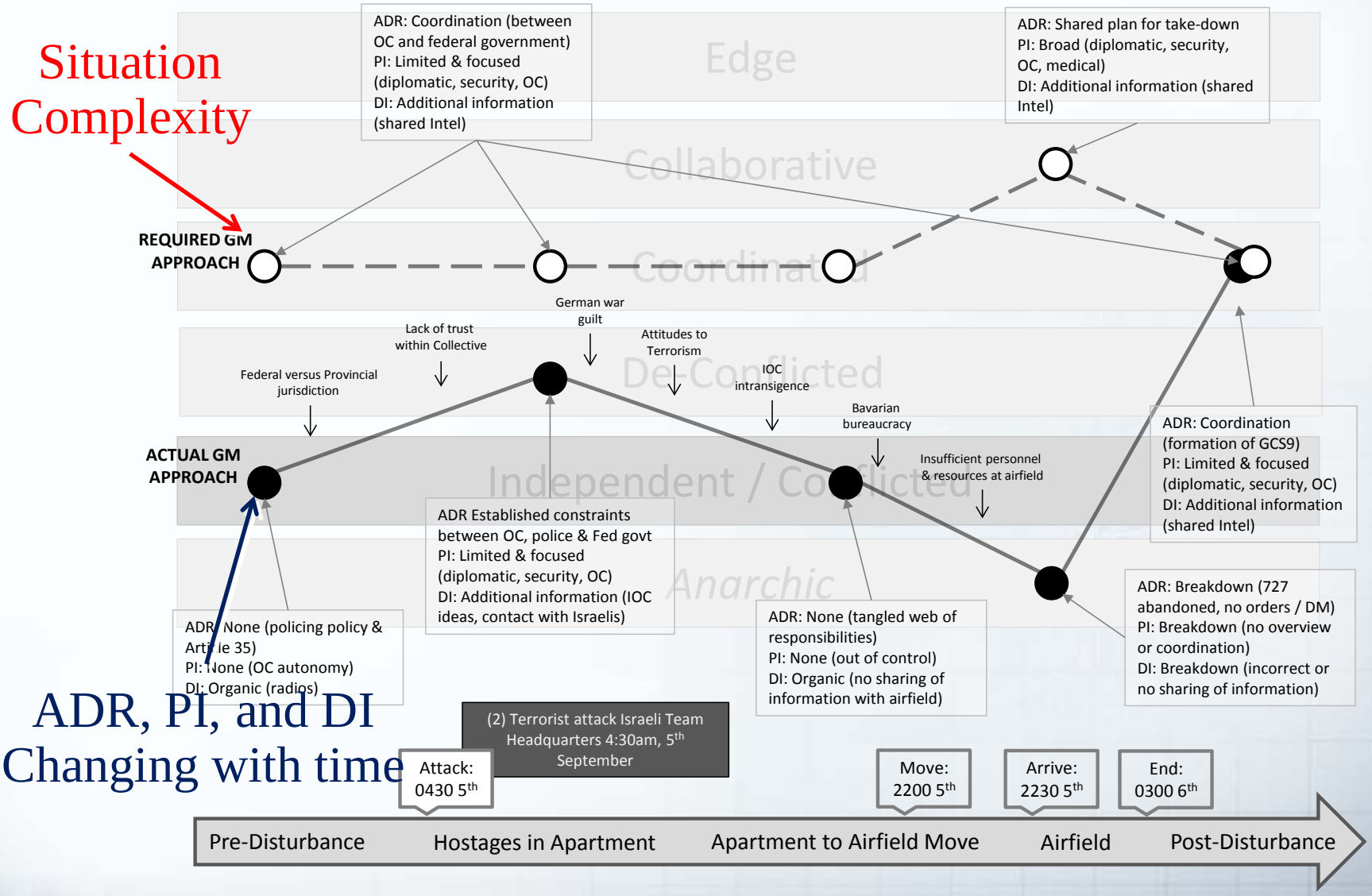
Munich Overview

- Phase 1 (pre-terrorist attack)
- Phase 2 (hostages in apartment)
- Phase 3 (apartment to airfield)
- Phase 4 (at the airfield)
- Phase 5 (post-terrorist attack)
- Collective
  - Federal, State, and Municipal German Governments, Israeli Special Forces, Ministry of Interior, Ministry of the Interior for Bavaria, Mayor of Munich, German Chancellor, West German Boarder Guards, City of Munich, Munich Police, International Olympic Committee, Olympic Organizing Committees, Government of Israel, Arab League
- Terrorist Attack

Munich Results

Variables	**Name**	**All Time Periods**
ADR	Allocation of Decision Rights	√
DI	Distribution of Information	√
PI	Patterns of Interaction	√
r(t)	Required approach	(inferred from Situation Complexity)
x(t)	Actual approach	(inferred from ADR, DI, PI)
x_o	Comfortable approach	√
Parameters		
m	Entity size	√
c	Resistance (lack of trust)	√
k	Stiffness	√
Behaviours		
	Compensatory	
	Anticipatory	√
	Adaptive	
	Learning	√
Other Attributes		
	Situation Complexity	√
	Resilience	√
	Transition Effectiveness	√
	Transition Efficiency	√
	Robustness	
	Responsiveness	
	Disturbance Rejection	

Munich Results



Munich Results

- Organizational Agility inconclusive
  - Although we see the collective moving in the C2 Approach space (necessary condition),
  - The actual approach undermatches the required approach (sufficient condition)!

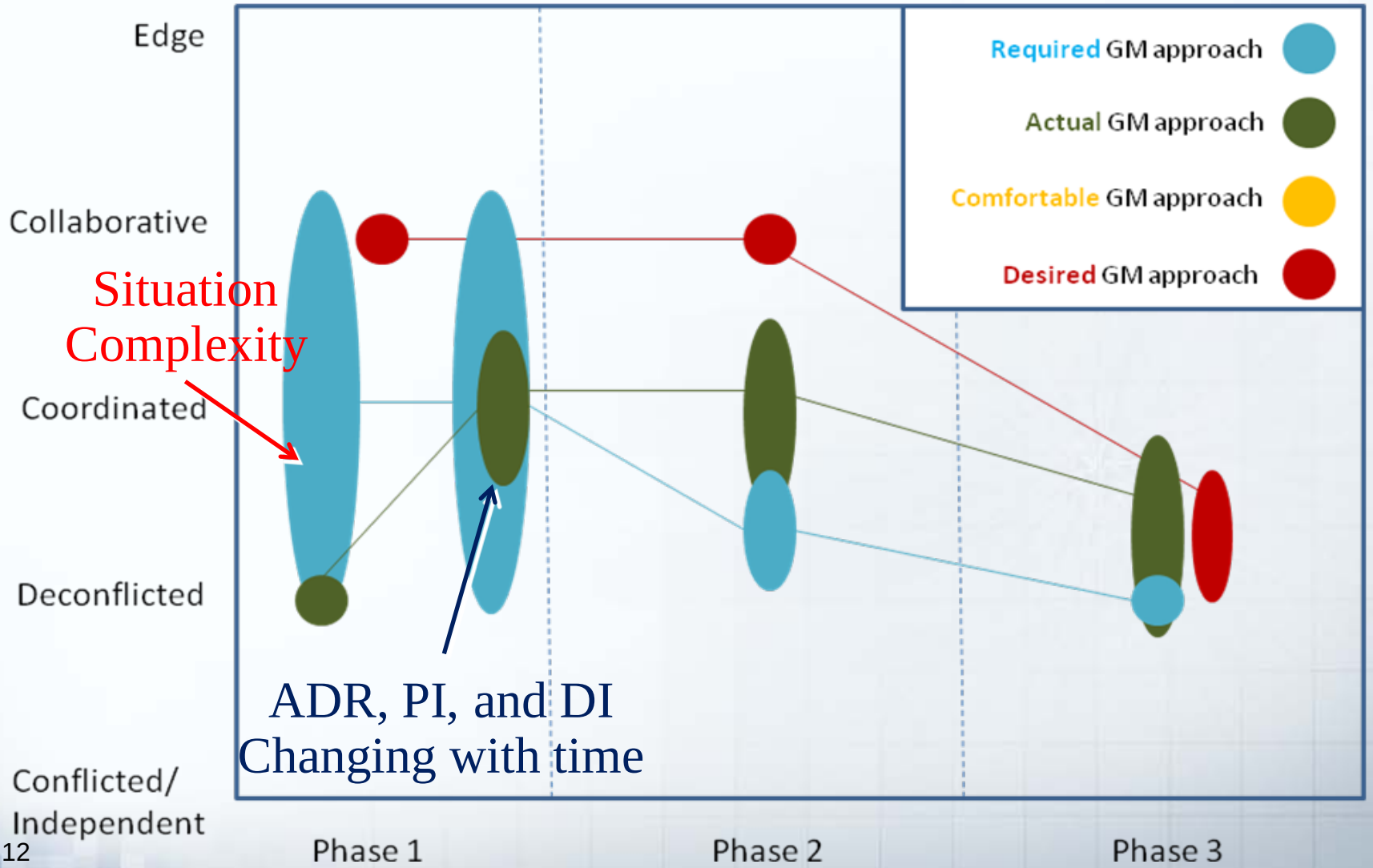
Vancouver Overview

- Phase 1 (2007 – 2010)
  - Exercise Bronze, Silver, and Gold
- Phase 2 (2 weeks in Feb 2010)
  - Olympic Games
- Phase 3 (Mar – Jun 2010)
  - After the Olympic Games leading up to G8/G20
- Collective
  - Royal Canadian Mounted Police, Canadian Forces, Vancouver Olympic Committee, British Columbia Police, Vancouver Police, Vancouver West Police, Boarder Patrol, Coast Guard (US and Canadian)
- No major incidents

Vancouver Results

	Concept	Phase 1 Pre-Event	Phase 2 During Event	Phase 3 Post-Event
Variables				
ADR	Allocation of Decision Rights	√		
DI	Distribution of Information	√	√	
PI	Patterns of Interaction	√		
r(t)	Required approach	√	√	
d(t) *new*!	Desired approach	√	√	√
x(t)	Actual approach	√		
x_o	Comfortable approach			
Parameters				
m	Size	√	√	
c	Resistance	√		
k	Stiffness			
Behaviours				
	Compensatory			
	Anticipatory	√		
	Adaptive			
	Learning	√		√

Vancouver Results



Vancouver Results

- Organizational Agility inconclusive
  - Little to no movement in the C2 Approach Space during the event (necessary condition), and
  - The actual approach overmatches the required approach (sufficient condition)!

Model Refinements

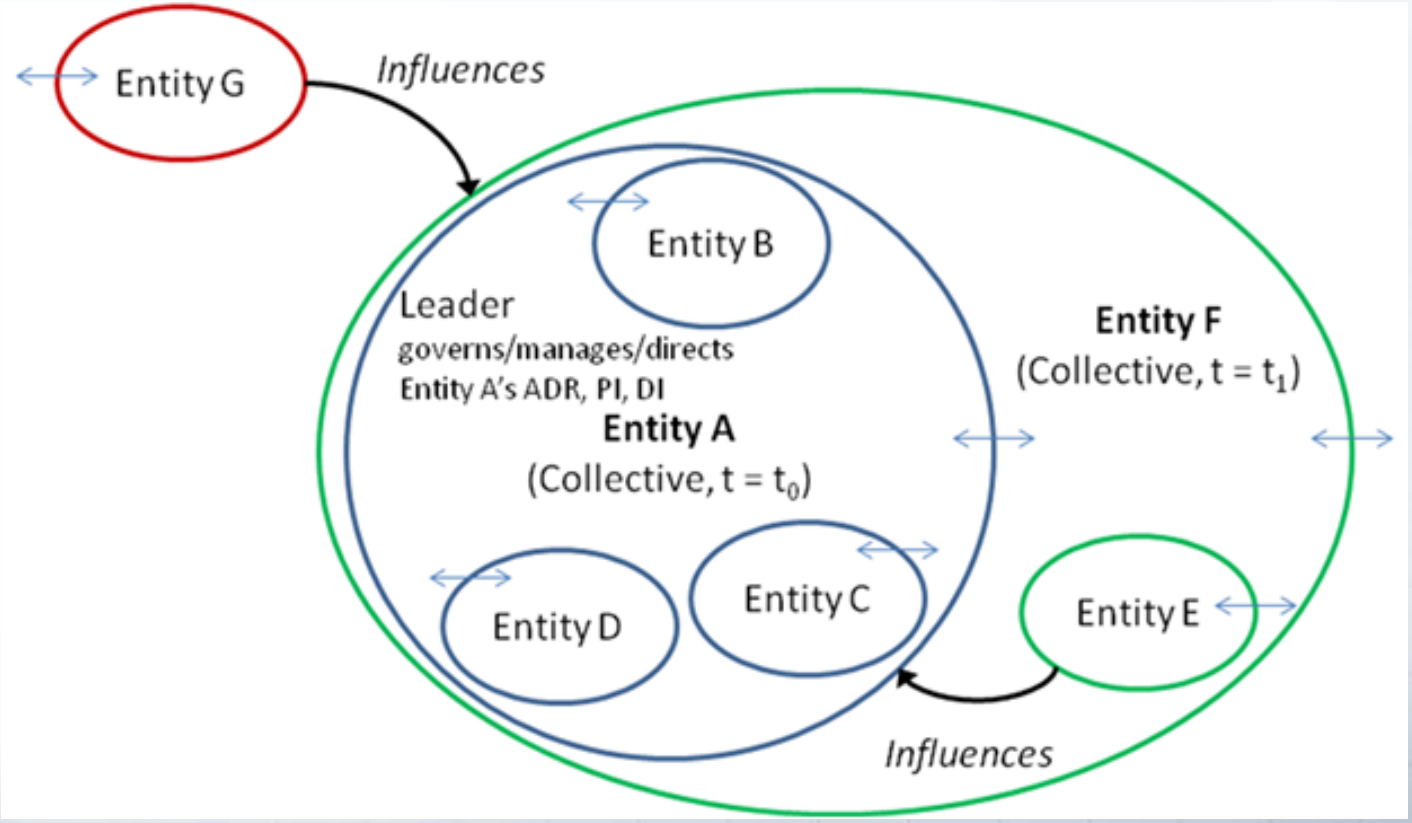
- Role of Leadership
- Beyond Conflicted Approach
- Off-diagonal Approach
- Desired Approach
- Comfortable Approach
- Size as a function of time
- Agility Model, Risk and C2 Maturity

Model Refinements

- Size as a function of time

$$k[r(t) - x_o] = m\ddot{x}(t) + c\dot{x}(t) + k[x(t) - x_o]$$

$$k\,[(r(t) + d(t))/2 - x_o(t)] = m\,\ddot{x}(t) + [c+\dot{m}]\,\dot{x}(t) + k\,[x(t) - x_o(t)]$$



Agility, Risk and C2 Maturity

- ‘Over- and Under-matching’ leads to Risk Assessment

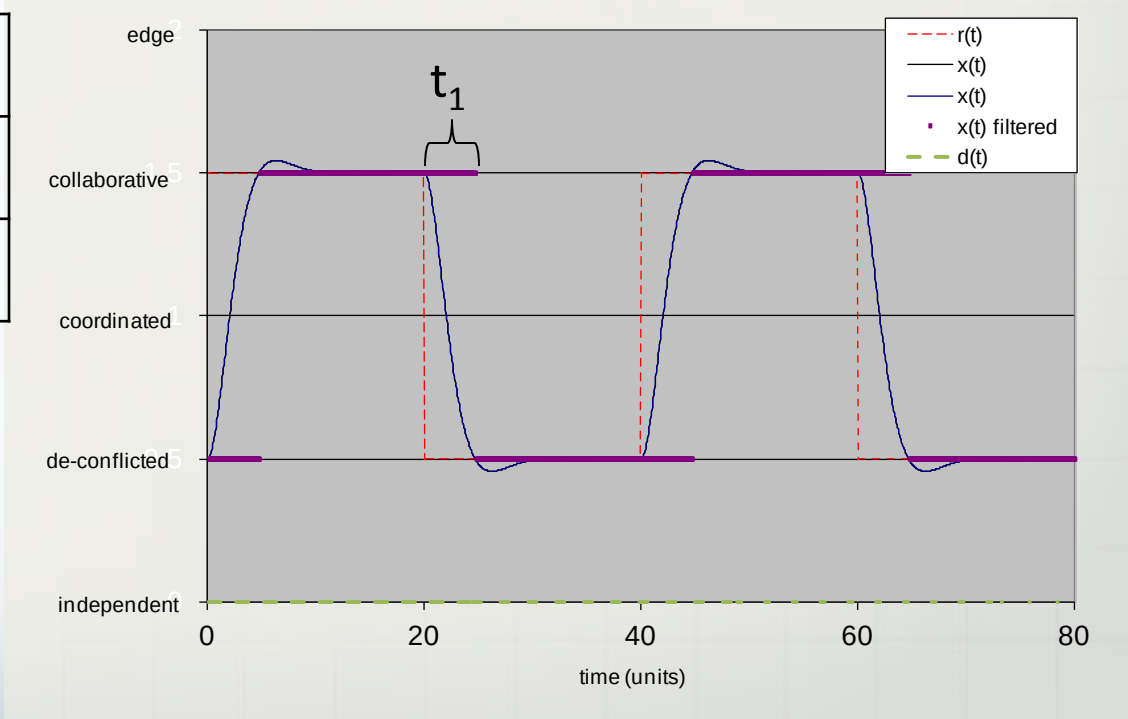
Table 5: Risk Assessment along the dimensions of Probability and Impact

	Low Impact Events	**High Impact Events**
Low Probability Events	Required: De-conflicted Actual: Co-ordinated Therefore: no risk	Required: Collaborative Actual: Co-ordinated Therefore: some risk
High Probability Events	Required: Co-ordinated Actual: Co-ordinated Therefore: no risk	Required: Edge Actual: Co-ordinated Therefore: significant risk

Conclusion

- Evidence was found for Organizational Agility variables
- New insights were found towards refining the model
- Final Paper will report on experiments exploring m, c, and k.

	Low stiffness	High stiffness (2x)
Low size	t_1	$t_2 > t_1$ overdamped
High size (2x)	$t_3 \approx t_2 > t_1$ underdamped	$t_4 = t_1$



Questions?

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