



Derivation of MOEs for Operational/Strategic Objectives using Systems Thinking

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“There is always an easy solution to every human problem – neat, plausible, and wrong”
H. L. Menken

“Everything should be as simple as possible – but no simpler”
A. Einstein



Requirements for a System of Measures

- Predicts how well we are achieving the objective
 - dynamic behavior of the environment
 - effects of actions taken in the environment
- Provides guidance on
 - required actions to stay on target
 - unintended consequences of actions
 - information and intelligence requirements
 - decision criteria (governing factors) for decision making
- Can be
 - built in time to be of use
 - maintained without huge overhead
 - examined and modified
- Need a logical and repeatable process for building the system of MOEs based on the objective and potential COAs



Use of a System of Measures

- No model or system dealing with strategy can replace deeply skilled, knowledgeable and experienced SMEs
- Primary use of the system is to help SMEs
 - organize their thoughts so they can make the decisions
 - further develop their understanding of the environment
 - communicate between each other
 - Communicate with policy and decision makers
- It's a thinking tool for experts



Two Thoughts

➤ Predictive Simulation

- Achieving the Objective will occur in the Future
- Measures of Effect are performed in the Present and Past
- Therefore must be able to predict future performance based on current measurements

➤ Qualitative Model

- If you can't build a qualitative model, then you can't build a quantitative one
- Qualitative models are easier to build than quantitative
- Therefore must be able to build a qualitative model first in order for a quantitative model to be credible

➤ Quantitative Model

- Build onto the qualitative model
- Use for research, not decision making
- Don't show the policy makers / decision makers



Why use Systems Thinking?

- Starts with focus on Objective
 - Builds cause-and-effect model around specific objectives
 - Forces analysts to prioritize
 - Is tractable and modifiable
- Qualitative Approach
 - Uses professional judgment within a disciplined logic based process
 - Combines professional judgment from multiple sources
 - Makes all assumptions explicit
 - Explores dynamic interactions between effects/objectives
 - Identifies unintended consequences of decisions
- Reductionist – NOT Holistic
 - Operational/Strategic ... not tactical
 - Built within context of specific Objectives/Problem
- Directly supports decision making
 - Cause and effect feedback loops generate the governing factors
 - Identifies unintended consequences and risks of COAs
 - Describes interactions between objectives
 - Develops decisions required to reduce risk and enhance effects



Approach

1. Identify the Decision Space
 - Formulate objectives
 - Scope out COAs to be considered
2. Build a Broad Perspective
 - Identify priority perspectives (PMESII)
 - Identify required subject matter experts
3. Create Depth Perception
 - Do a root cause drill-down on each priority perspective
 - Identify causal factors
4. Explore Interactions for each Objective
 - Develop cause and effect loops for each perspective and integrate them
 - Analyze system behavior
5. Explore Interactions across Objectives
 - Integrate cause and effect loops across objectives
 - Analyze system behavior
6. Explore Dynamic Effects of Decisions on the System
 - Identify unintended consequences and risks of decisions across objectives
 - Identify decisions to deal with risks and unintended consequences
7. Identify information required to assess progress
 - Identify which cause and effect factors we should measure
 - Build and execute collection plan





CAVEATs

- This analysis is provided as an example of the kind of analysis proposed using the Systems Thinking analytic methodology.
- The approach came out of the commercial world, (see: <http://www.cqm.org/journal/journal-pdfs/11.1-whole-issue.pdf>, pages 53 -- 64) and has been modified for operational/strategic use



1. Identify the Decision Space



Example Objective: Maritime Security Operations

- Maritime Security Operations (MSO) Objectives in a Region might be:
 - AQAM deterred
 - AQAM disrupted and destroyed
 - WMD proliferation prevented



Example Decision Scope: Maritime

➤ Attack

- Find AQAM
 - Intercept and capture WMD
 - Board COI
- Engage AQAM
 - Kill and capture AQAM members
 - Anti piracy/banditry operations

➤ Defend Assets

- Passive Defense
 - Harden facilities
 - Assess vulnerabilities
- Active defense
 - Defend assets (by Coalition)
 - Train RNMF to defend assets

➤ Pressure the Environment

- Pinpoint Pressure
 - Board vessels
- Area Pressure
 - Revisit SLOCs
 - Patrol
 - Exercise
 - Visit Ports

➤ Win Hearts and Minds

- Target key individuals
 - Distinguished Visitor Interaction
 - Pay for information
- Target Populations
 - Information Operations
 - Public affairs
 - Provide assistance at sea



2 Build a Broad Perspective



Priority Perspectives (PMESII) for MSO

PMESII	Perspective	Rationale	Owner
Political	Coalition	Must keep Coalition engaged to maintain military capability in region.	██████████
	Regional Governments	Must keep regional governments engaged and focused for Coalition legitimacy and effectiveness.	██████████
	Regulation	Operating in high seas and territorial waters is highly restrictive. AQAM and militants will switch between them as scarce Coalition resources switch their focus in the region.	██████████
	US Domestic Politics	Must keep US Domestic political support for US Mission in the region in order to maintain Naval assets.	██████████
Military	AQAM	Al Qaeda and Affiliated Movements (and regional militants) will react to and be proactive against the Coalition.	██████████
	Operational Capabilities (N3)	N3 staff and other operational organizations must be able to execute current and future operations and objectives while gathering possibly large amounts of novel information.	██████████
Economic	ROI	Coalition is interested in minimizing financial costs of Coalition operations while maximizing effects.	██████████
Social	Regional Publics	Regional publics support of the Coalition, regional governments, and AQAM is critical.	██████████
Information	Intelligence Capabilities (N2)	N2 staff and other friendly intelligence organizations must support current and future operations and objectives with information and intelligence that they are not currently collecting.	██████████
Infrastructure	Shore Based Naval Support	The regional ports and port related infrastructure provides critical capabilities for the Coalition and is a strategic communications enabler. Must protect it, keep permission to use it, and keep Coalition footprint down.	██████████



Identify Required SMEs

PMESII	Perspective	Rationale	Owner	SMEs
Political	Coalition	Must keep Coalition engaged to maintain military capability in region.	██████████	██████████
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3 Create Depth Perception



Engage with Identified SMEs

- Interview SME(s) for each perspective
 - Provide them with the Decision Scope (Objectives and possible COAs) to bound the problem
 - Ask them “what is important about your perspective with respect to the Scope of the problem?”
 - Drill down on “why” each answer is important
 - Obtain a short point paper
- Review SME literature
- Build Depth perception product
- Review with SME(s) and modify as needed



MSO: AQAM Perspective

Point Paper from SME discussing why the perspective is important within the context of the Objective and possible range of actions

SUMMARY

Motivated AQAM will respond to Coalition 3GW MSO actions with 4GW techniques that damage political support for the Coalition in the Region and at home.

DISCUSSION

Whether AQAM is deterred is driven by their perception of the benefit to cost and risk of operating. Deterrence is a function of target as well as motivation. There are three levels of deterrence possible defined by AQAM reactions. First, marginally deterred, AQAM may switch to focusing their attacks on regional civilians, on coalition forces ashore and on less well protected infrastructure which is designed to support the well-being of regional civilians. AQAM may couple these attacks with a strategic communication campaign claiming that the instability that is hurting the region is caused by the presence of Coalition Forces in the region. Second, partially deterred, a more dangerous adaptation would be if AQAM temporarily withdrew to upgrade their capabilities before launching more capable, dangerous and effective new attacks. This would provide a period of calm, indistinguishable from the situation in which AQAM was fully deterred (or never present in the first place). In essence, deterrence becomes escalatory. The apparent success of the Coalition will create pressure to re-allocate forces away from the Maritime domain and to reduce OPTEMPO associated with deterrence, thus amplifying the effect of the attacks when they do occur. Again, these attacks would likely be accompanied by strategic communication this time aimed at Coalition domestic audiences. If on the other hand the Coalition upgrades its capabilities during this pause faster than AQAM does then the attacks when they come will be more effectively defeated. Third, fully deterred, AQAM switches to land routes. However this is indistinguishable from a pause while they upgrade. Even if the Coalition is successful at deterrence, any attempt to relax deterrence will result in a resurgence of use by AQAM of the Maritime Domain unless the Coalition is simultaneously successful with all its objectives and Lines of Operation. Apparent success or failure in deterring attacks both have the capability of reducing political support for the Coalition. Home (domestic) support conflates domestic population and domestic government since for most Coalition members the domestic political system is democratic.

However, note that the idea that anyone who is willing to go on a suicide mission would be deterred by mere presence is problematic. Furthermore, it is not in fact known whether AQAM are using the maritime domain and without being detected, or are not using it from choice, or are not using it because they are deterred. It is tempting but entirely illogical to claim that because the Coalition is not finding AQAM in the maritime domain that the Coalition is therefore deterring them.

AQAM do not have operational/strategic depth in the area, and cannot hope to take on the Coalition head-on in combat. They expect heavy casualties if they are found and targeted, and so will plan on turning any attempt by the coalition to disrupt and destroy them, or to seize WMD, into a propaganda coup by ensuring high collateral damage and civilian casualties. They are traditionally good at strategic communication (unlike the traditional Coalition forces) and so we can expect to see a rapid dissemination of their version (video and images) of any interaction with Coalition forces on the internet.

Winning the strategic communications war is critical to defeat AQAM

FACTORS

Frequency of attacks on protected/coalition targets

Lethality of attacks

Regional popular support for Coalition

Domestic support for Coalition

Perceived risk/benefit

Frequency of attacks on vulnerable/regional targets

Anti coalition propaganda

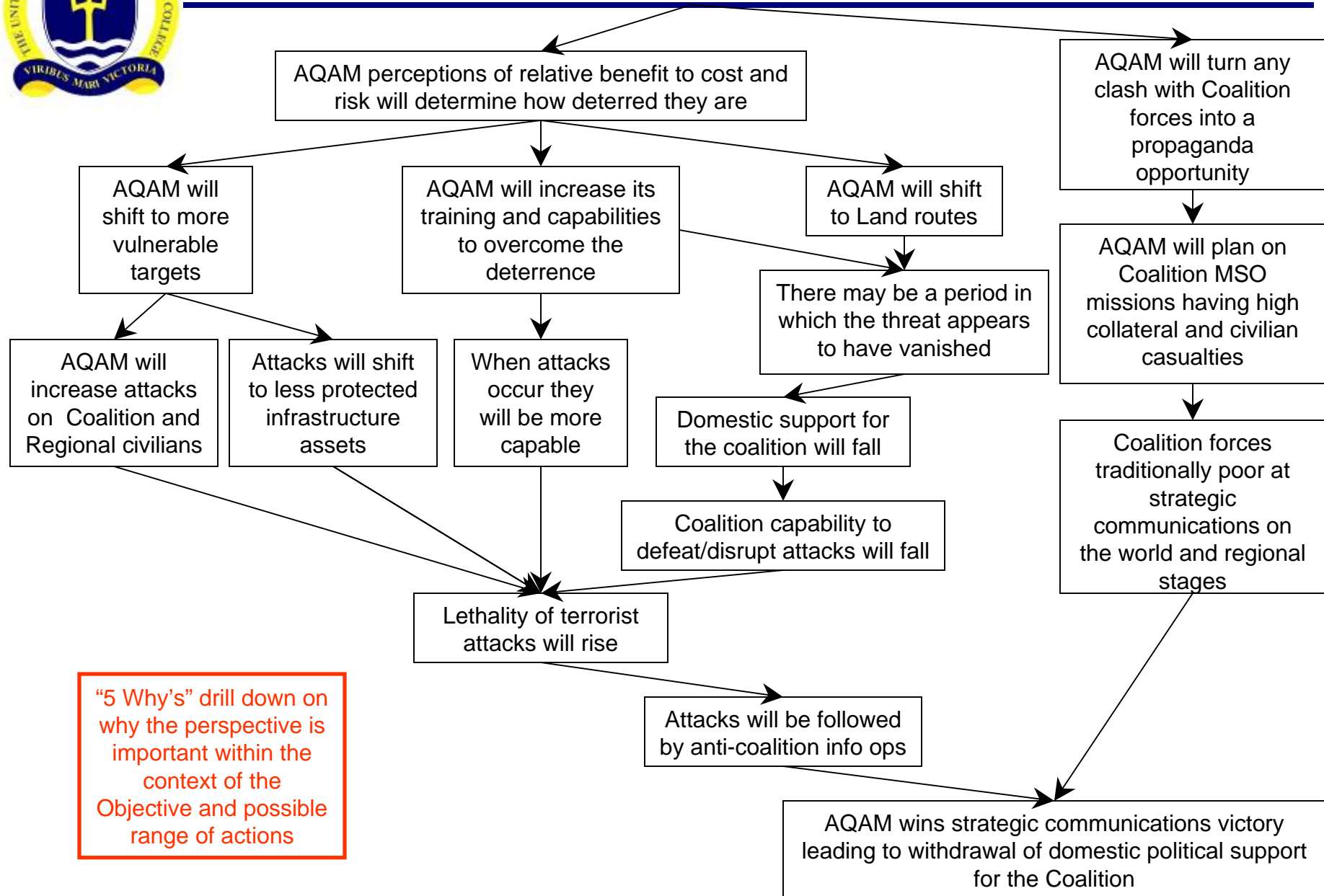
Regional Government support for Coalition

AQAM capabilities

Time spent upgrading capabilities



MSO: AQAM Perspective



“5 Why’s” drill down on why the perspective is important within the context of the Objective and possible range of actions



Rationale for Impact Decisions

All perspectives are important. However there is duplication between perspectives, and some perspectives are more important than others. The process focuses on a subset of core perspectives and develops cause and effect diagrams for these Perspectives only while using information from all the perspectives thus not losing information from any of the perspectives.

Coalition: Core to the analysis. Develop Coalition Cause and Effect Diagram.

Regional Governments: Core to the analysis. Develop Regional Governments Cause and Effect Diagram.

Regulation: The Coalition has little control or influence over international law dealing with international waters, and its (inter) actions in territorial waters are duplicated by other perspectives. Use Regulation Factors in other perspectives' cause and effect diagrams.

US Domestic Politics: The Coalition has little control or influence over US (or non-US) domestic political support for the mission except through its success or otherwise at that mission, which is handled by other perspectives. Use US Domestic Politics Factors in other perspectives' cause and effect diagrams.

AQAM: Core to the analysis. Develop AQAM Cause and Effect Diagram.

Operational Capabilities (N3): The Coalition operational capabilities are extremely good, and their potential for creating problems is handled by other perspectives (such as Regional Publics). Use Operational capabilities Factors in other perspectives' cause and effect diagrams.

ROI: Costs are relative to results in political eyes, and the apparent lack of tangible benefits of MSO with respect to terrorism is handled by the AQAM perspective. Political pressures are handled elsewhere, as are the regional public and government reactions to coalition operations. Regional publics responses to economic burdens placed on them by MSO are handled by Regional Publics perspective. Use ROI Factors in other perspectives' cause and effect diagrams.

Regional Publics: Core to the analysis. Develop Regional Publics Cause and Effect Diagram.

Intelligence Capabilities (N2): The Coalition intelligence capabilities are extremely good, and their potential for creating problems is handled by other perspectives (such as Regional Publics). Use Intelligence Capabilities Factors in other perspectives' cause and effect diagrams.

Shore Based Naval Support: Core to the analysis. Develop Shore Based Naval Support Cause and Effect Diagram.



4 & 5 Explore Interactions

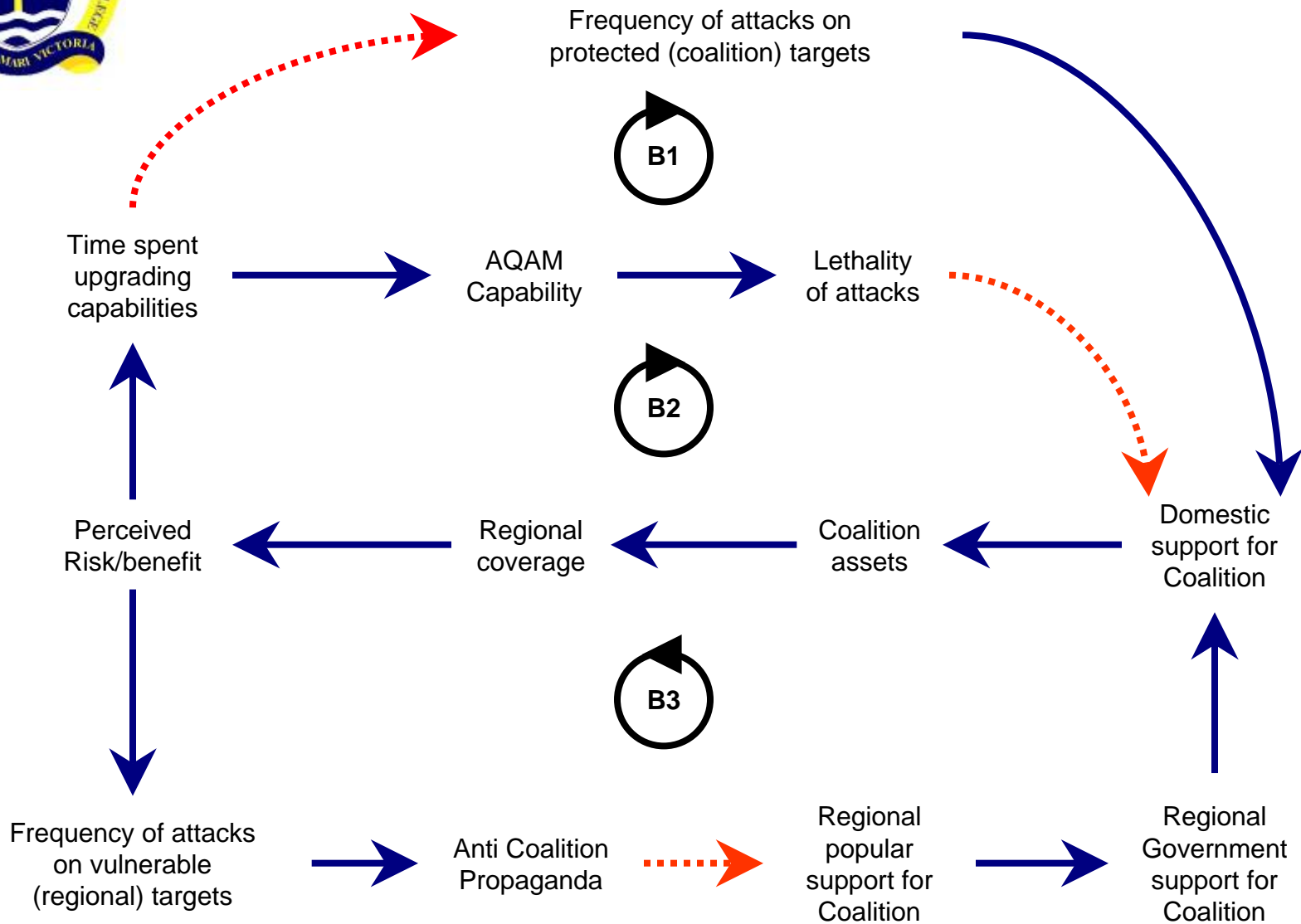


Develop Cause and Effect Diagrams

- Develop a cause and effect diagram for each perspective with a high relative impact (4 or 5)
 - Coalition
 - Regional Governments
 - AQAM
 - Regional Publics
 - Shore Based Naval Support
- Use relevant factors from all perspectives
 - takes low relative impact perspectives into account
 - while keeping the analysis manageable by ruthlessly focusing on high priority items
- Analyst can re-prioritize perspectives and add or remove perspectives from cause and effect diagrams under direction from Commander's guidance



MSO: AQAM Cause and Effect Diagram





MSO: AQAM Cause and Effect Diagram

Name of, and story told by, each loop

- **Balancing Loop B1: “Frequency of attacks on protected (coalition) targets”**
 - Frequent terrorist attacks on hardened targets and coalition assets (if not too lethal) will generate domestic political support for the coalition (since they demonstrate the need for the Coalition). Domestic political support for the coalition will result in maintaining or increasing coalition assets and capability and hence a rise in AQAM’s perception of risk to benefit. AQAM will switch from attacking protected/hardened targets to attacking vulnerable regional targets and to upgrading their own capabilities, with a drop in frequency of attacks on protected coalition targets.
- **Balancing Loop B2: “Lethality of attacks”**
 - As the AQAM perceives the risk/benefit rising, i.e. as deterrence succeeds, they will temporarily withdrew to upgrade their capabilities before launching more capable, and therefore lethal, attacks. This would provide a period of calm, indistinguishable from the situation in which the AQAM were fully deterred (or never present in the first place). The apparent success of the Coalition will create pressure to re-allocate forces away from the Maritime domain and to reduce OPTEMPO associated with deterrence, thus amplifying the lethality of the attacks when they do occur (see loop B1). Lethality will soften domestic political support for the coalition. Any lack of lethality will be a propaganda problem for the AQAM, demonstrating their futility.
- **Balancing Loop B3: “Frequency of attacks on vulnerable regional targets”**
 - As AQAM perception of risk/benefit goes up, AQAM switch towards attacking Regional civilians and vulnerable regional infrastructure, and engage in a propaganda war blaming the coalition for the regional instability. AQAM’ skill at crafting strategic communications tailored for different audiences (regional population, coalition domestic) will critically effect the success of this propaganda campaign. This results in a drop in regional population support and domestic (home) support for the Coalition, compounded by Regional Governments’ responses to popular unrest and Home Governments’ responses to Regional Governments. The loop continues through Coalition capabilities back to the AQAM’s perception of risk/benefit.



6. Explore Dynamic Effects of Decisions

Example



- Decision
 - Increase Boardings to pressure the environment
- Identify Leverage Points on Integrated Causal and Effect Diagram
 - “Coalition Visibility” up, and
 - Terrorist “Perceived risk/benefit” up
- Walk through the Loops



Leverage Points

1. “Coalition Visibility”

- Decision Action forces this leverage point up, and keeps it up despite the balancing nature of the loop containing it:
- “Anti-Coalition Propaganda aimed at Region” up
- “Regional Government support for Coalition” down
- “Domestic Support for Coalition” down
- Political pressure to drop visibility, I.e. to reduce boardings
- And if we continue Boardings long enough, AQAM “Perceived risk/benefit” falls

2. “Perceived Risk/Benefit” (to AQAM)

- Decision Action forces this leverage point up, and keeps it up despite the balancing nature of the loop containing it:
- “Perceived risk/benefit” initially up
- “Time spent upgrading capabilities” up
- “Lethality” up
- “Anti-coalition propaganda aimed at Coalition” up
- “Domestic support for Coalition” down
- Ultimately AQAM “Perceived risk/benefit” falls



Compare and Select COAs

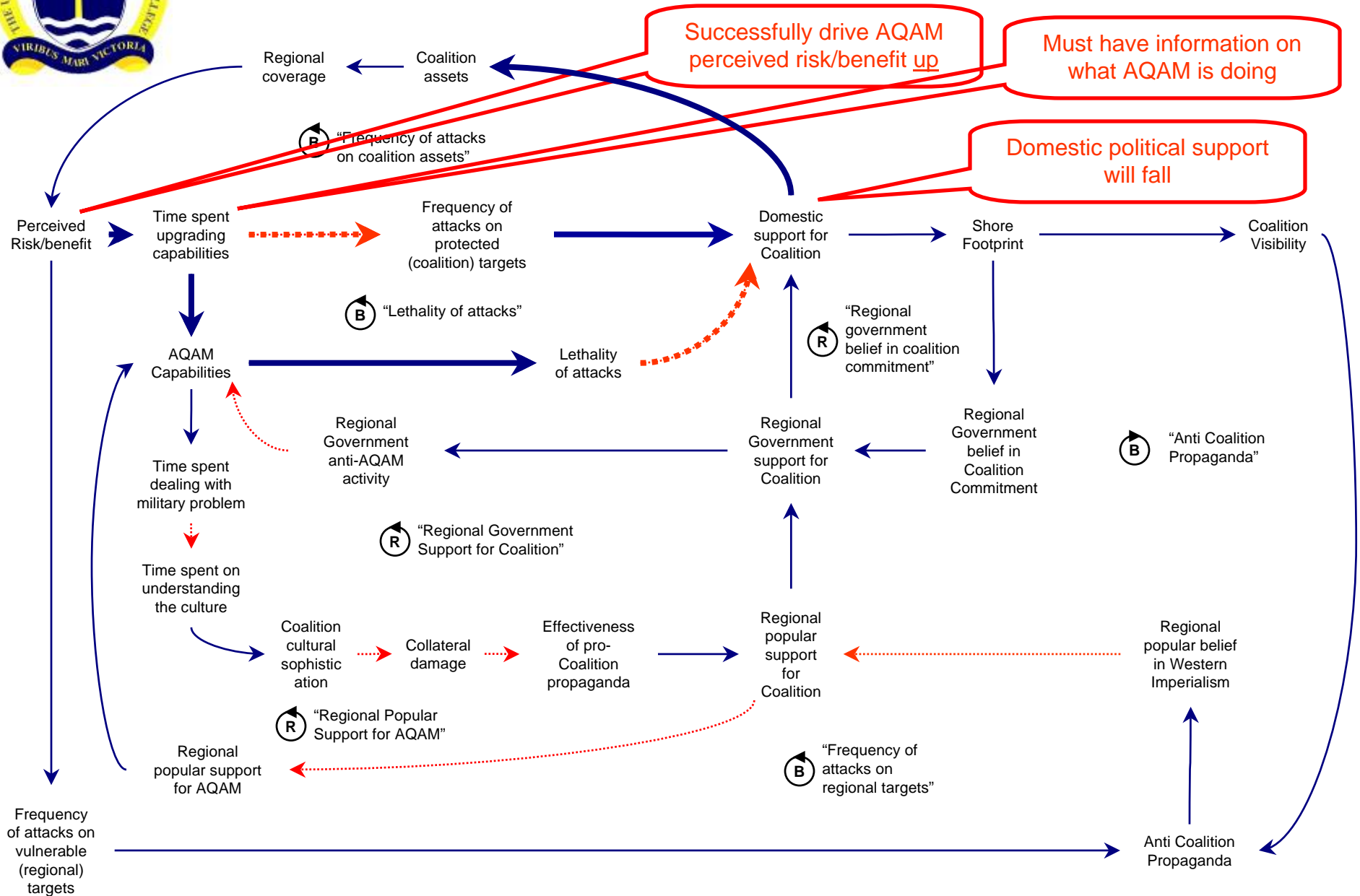
- All combinations of Decision must be tested against the Cause and Effect Diagram for unintended consequences and interactions
- The loops are the decision's governing factors
- Risks for each assessed
- Actions to mitigate the risks designed
 - Strategic Communications Operations each tailored for Regional Governments, Regional populations, Domestic Governments, Domestic populations
 - Harden defenses of critical infrastructure and Coalition forces



7. Information Requirements



Example





The End