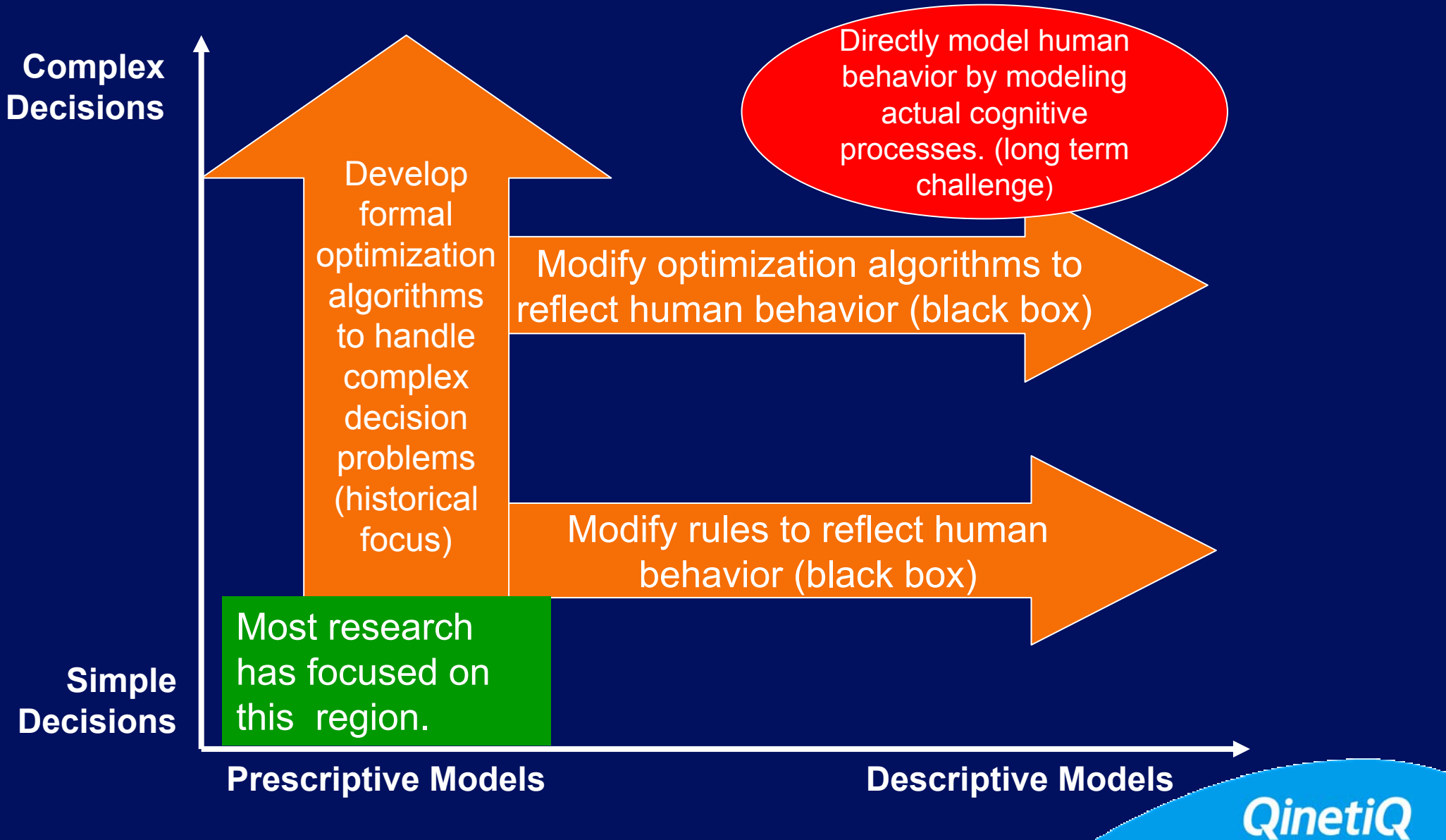


From simple prescriptive to complex descriptive models: an example from a recent command decision-making experiment.

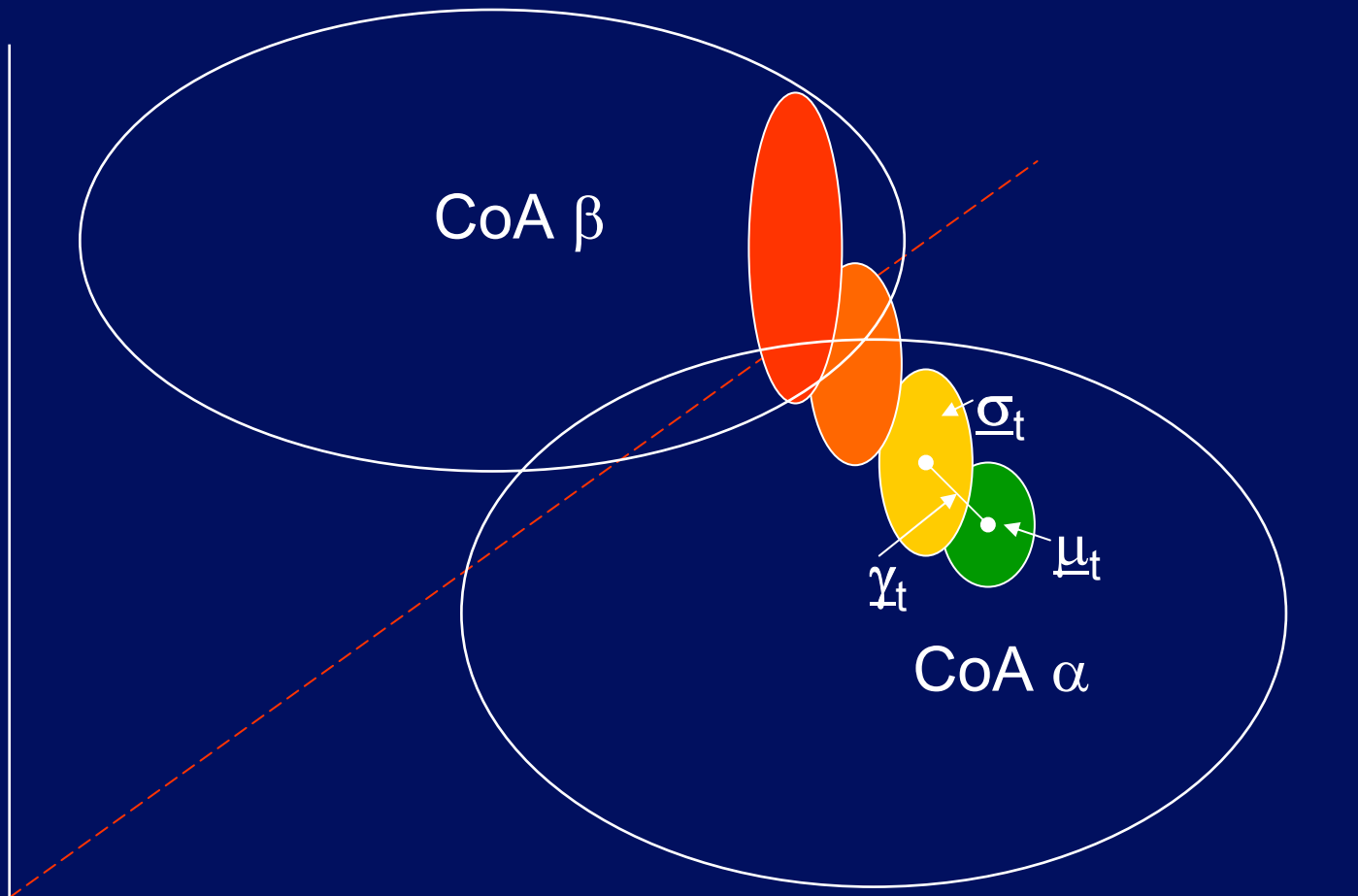
Lorraine Dodd, Jim Moffat, Graham Mathieson, Jim
Smith

Strategies for Improved Models

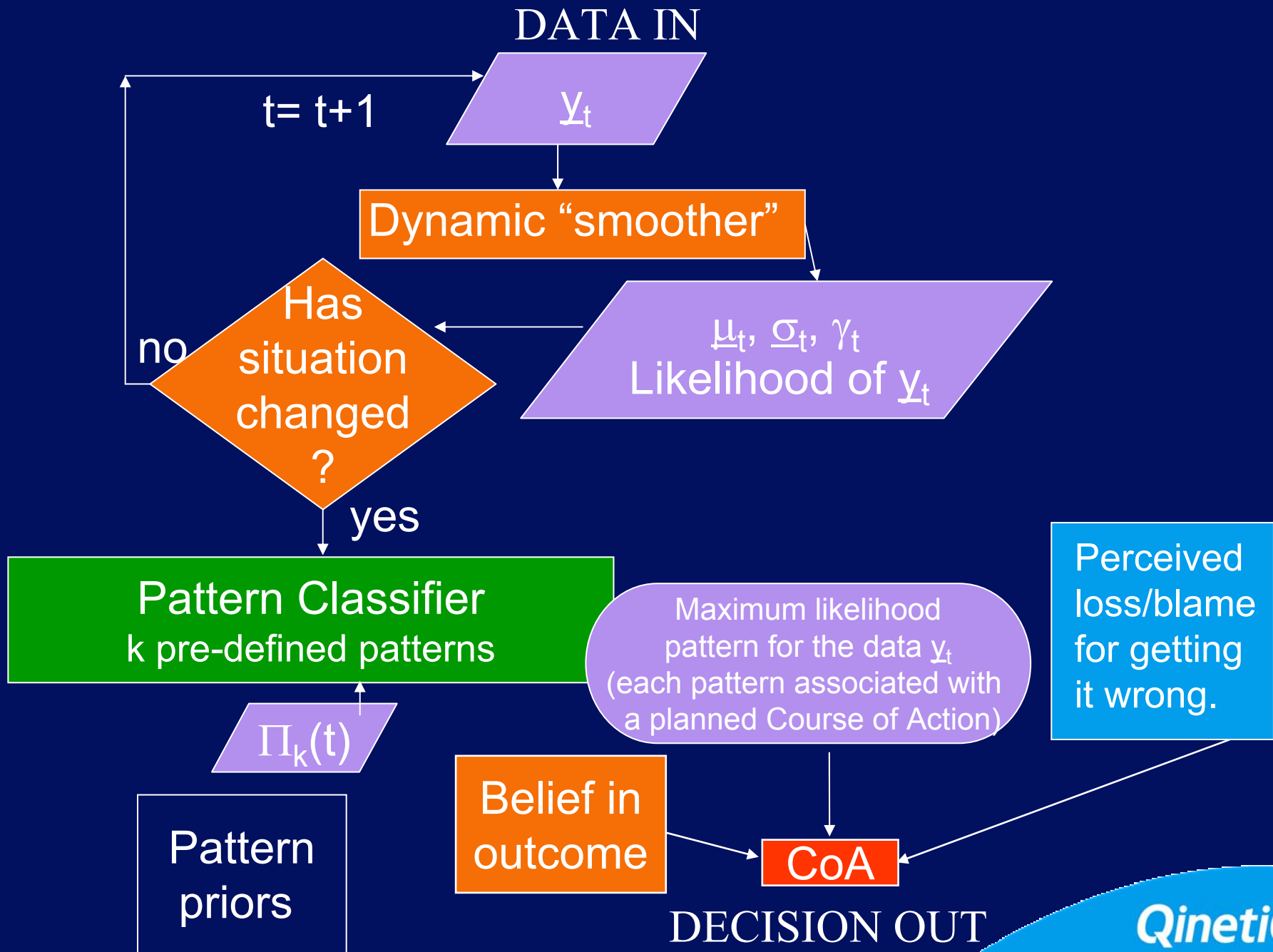


Configuration Space - Klein Pattern Matching Course of Action selection

Perceived
enemy
strength



Perceived own
strength

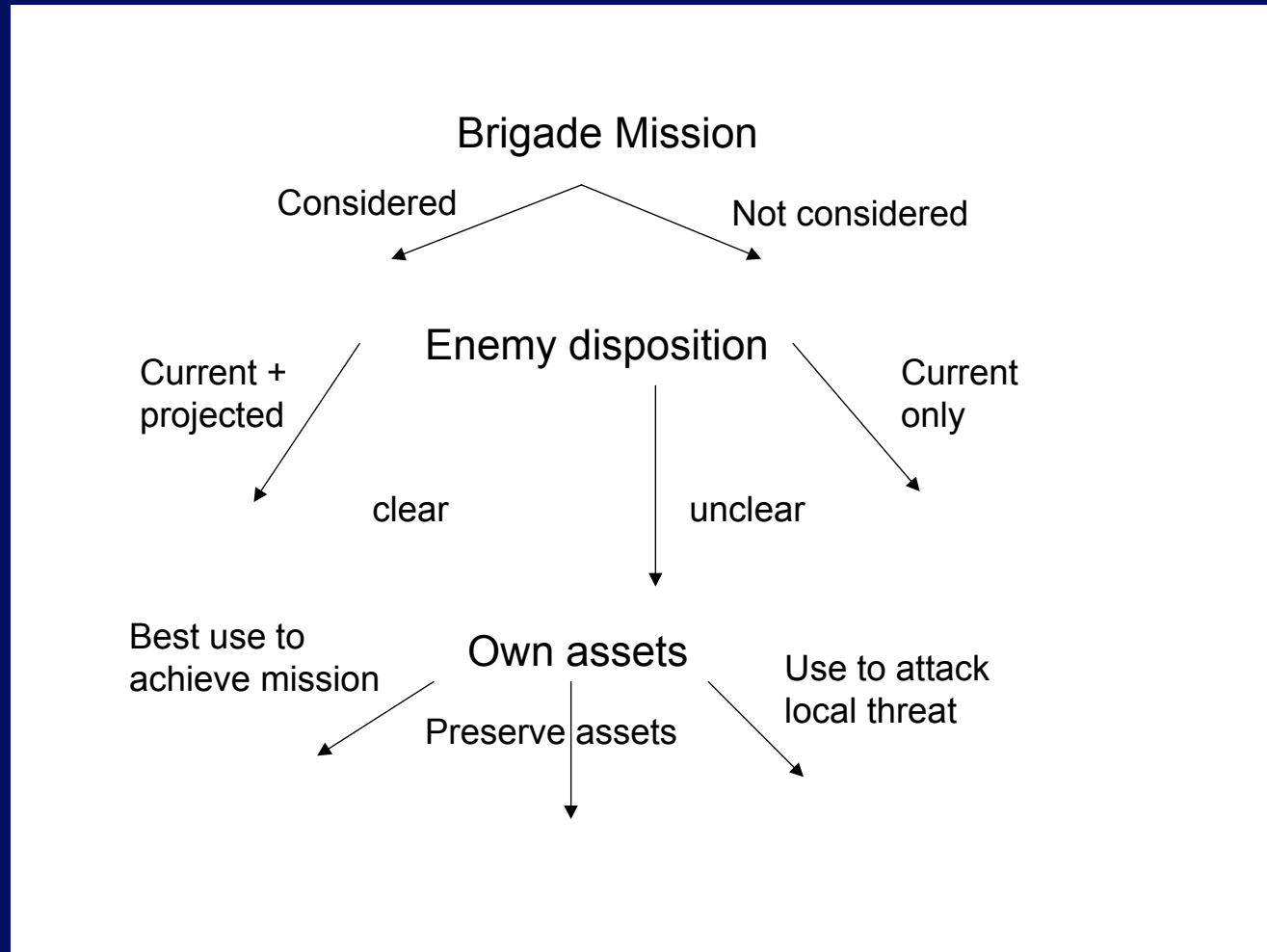


RPD experimental games

Command decision-making experiments to explain variability in decision output due to human element: 24 subjects

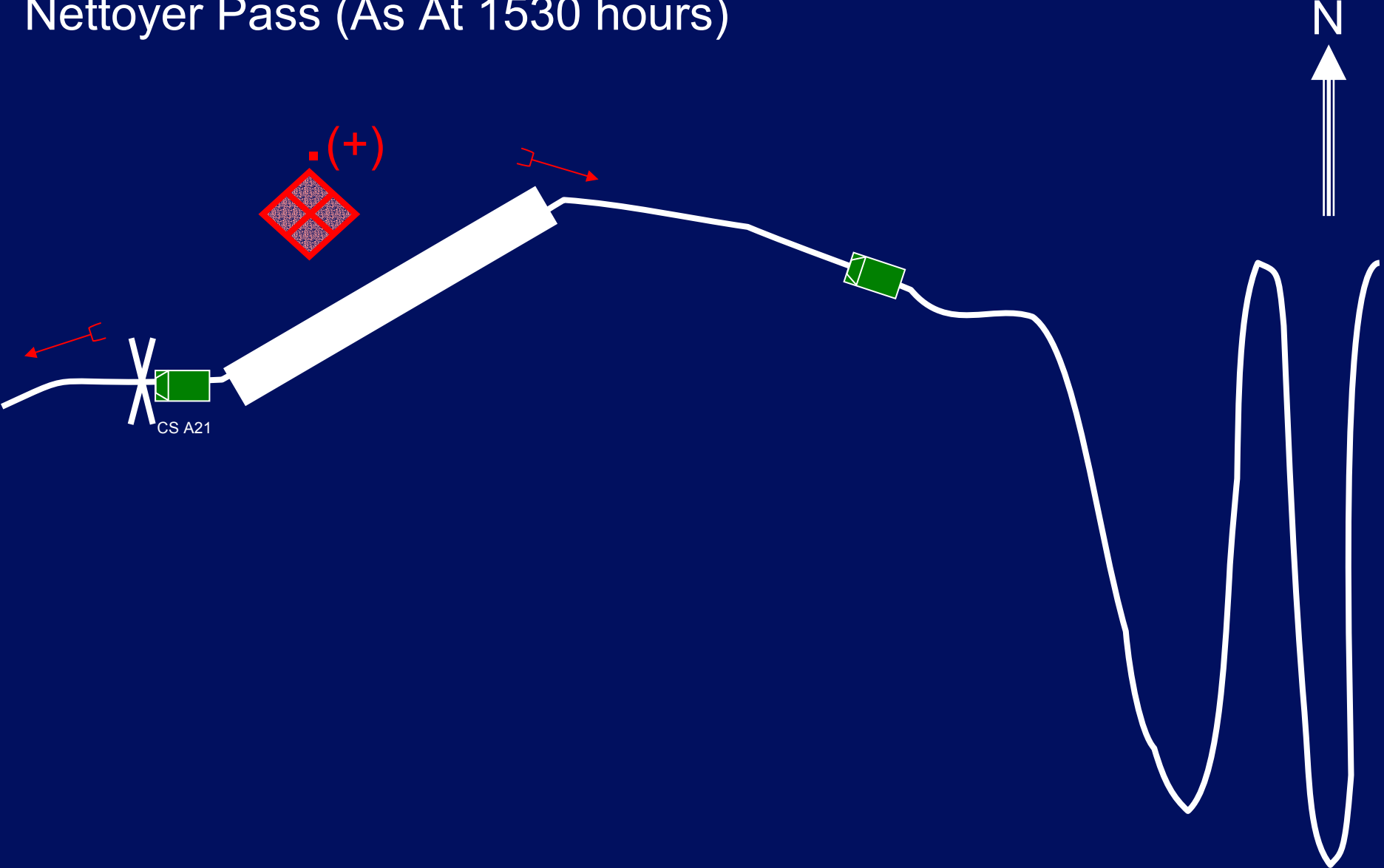
- War-fighting scenario
 - Battle-group command decision for an armoured (3,0) BG in a delay/disrupt mission.
- Peace-support scenario
 - similar level of command but decision concerning small armed units protecting a UN convoy

Routes through Situation Assessment





Nettoyer Pass (As At 1530 hours)



Situation assessments

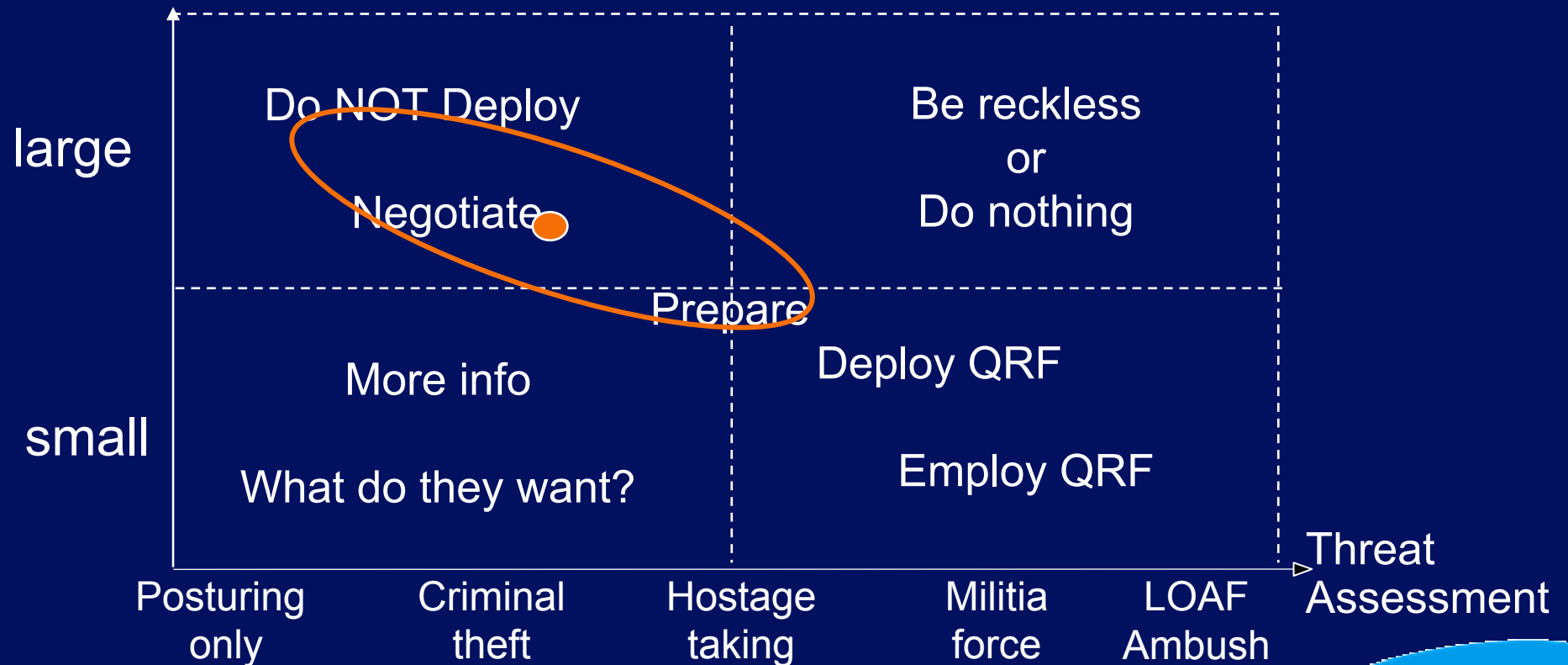
- Show of presence
- Provocation
- Theft of kit/convoy supplies
- Kidnap hostages
- All the above are possibilities
- Ambush set-up by LOAF

Selected courses of action

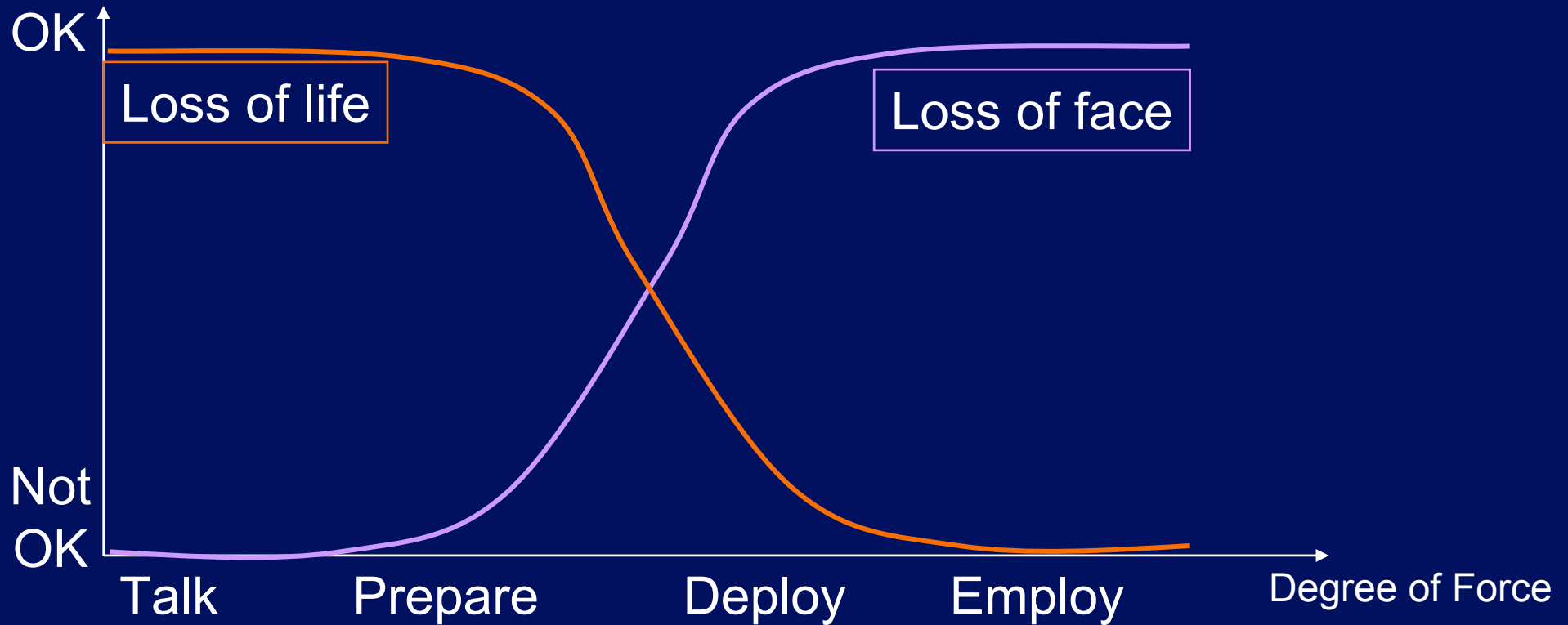
- Negotiate
- Ask for more information - what IVCP want
- Prepare Coy forces (move arty into range)
- Deploy QRF
- Withdraw convoy
- Defensive deployment / target LOAF

Situation Assessment: Simplified State Space

Magnitude of potential loss of life

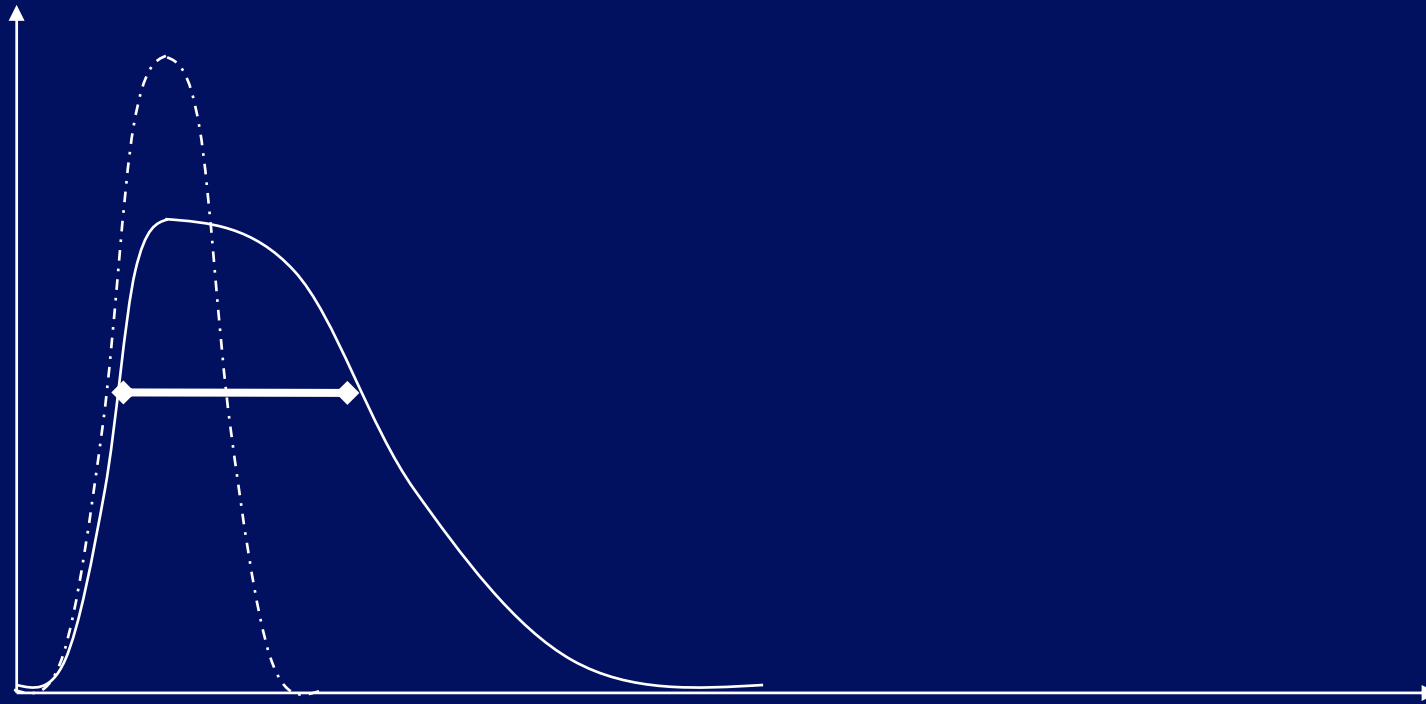


Ok/not-OK value judgement



Predictability of outcome

Belief(outcome)



Outcome (e.g. number of lives lost)

Threat Assessment and Risk Assessment

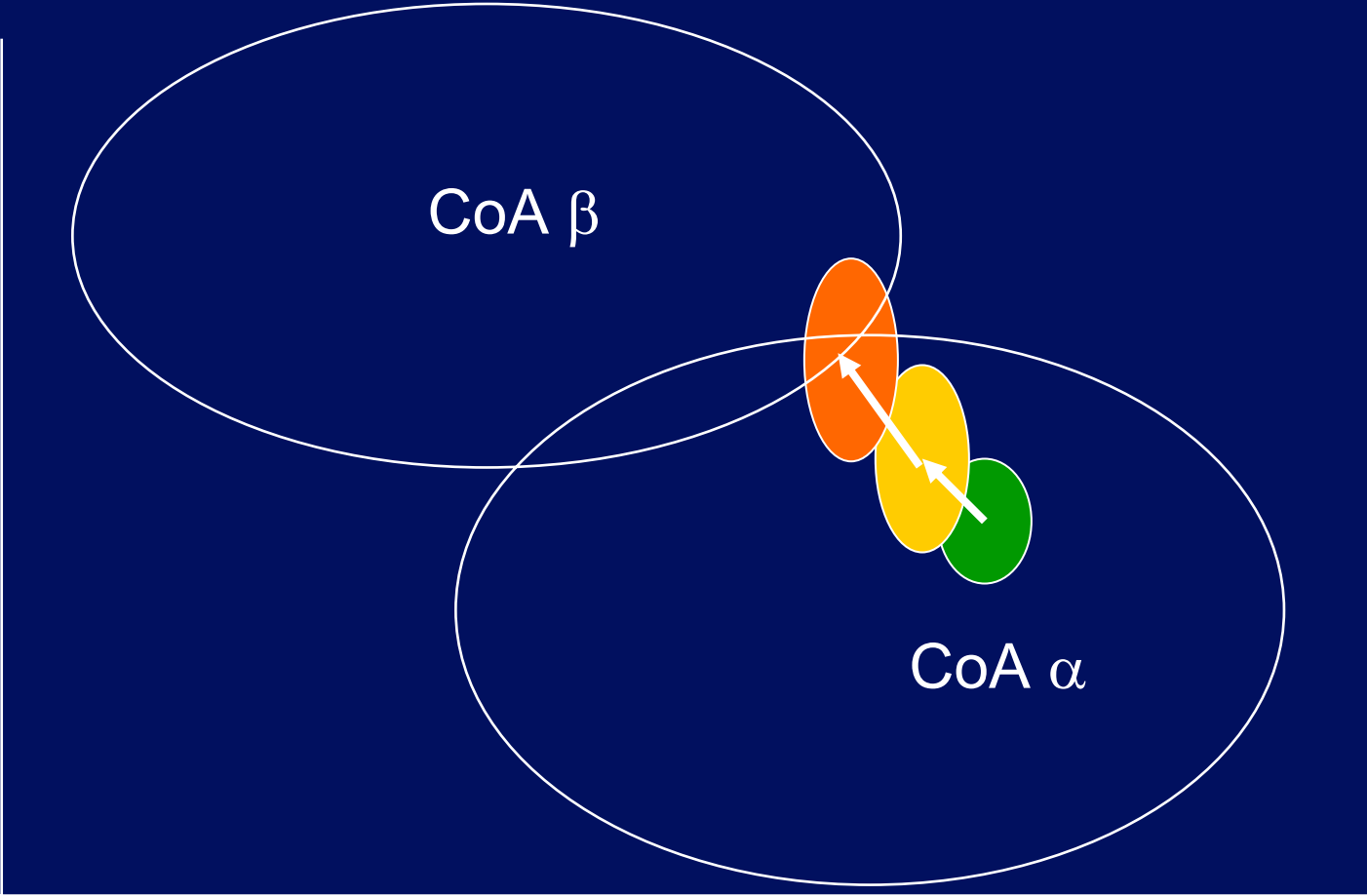
Previous mathematical model combined TA and RA to minimise expected loss and showed that when there are conflicting local and global OK functions the decision space has two minima.

If the functions can be brought closer together then the two minima converge to give one “best” CoA. Otherwise the decision flips between the two according to:

- movement through the threat assessment space
- movement in the comfort zone boundaries

Changing situation assessment has effect on Course of Action selection

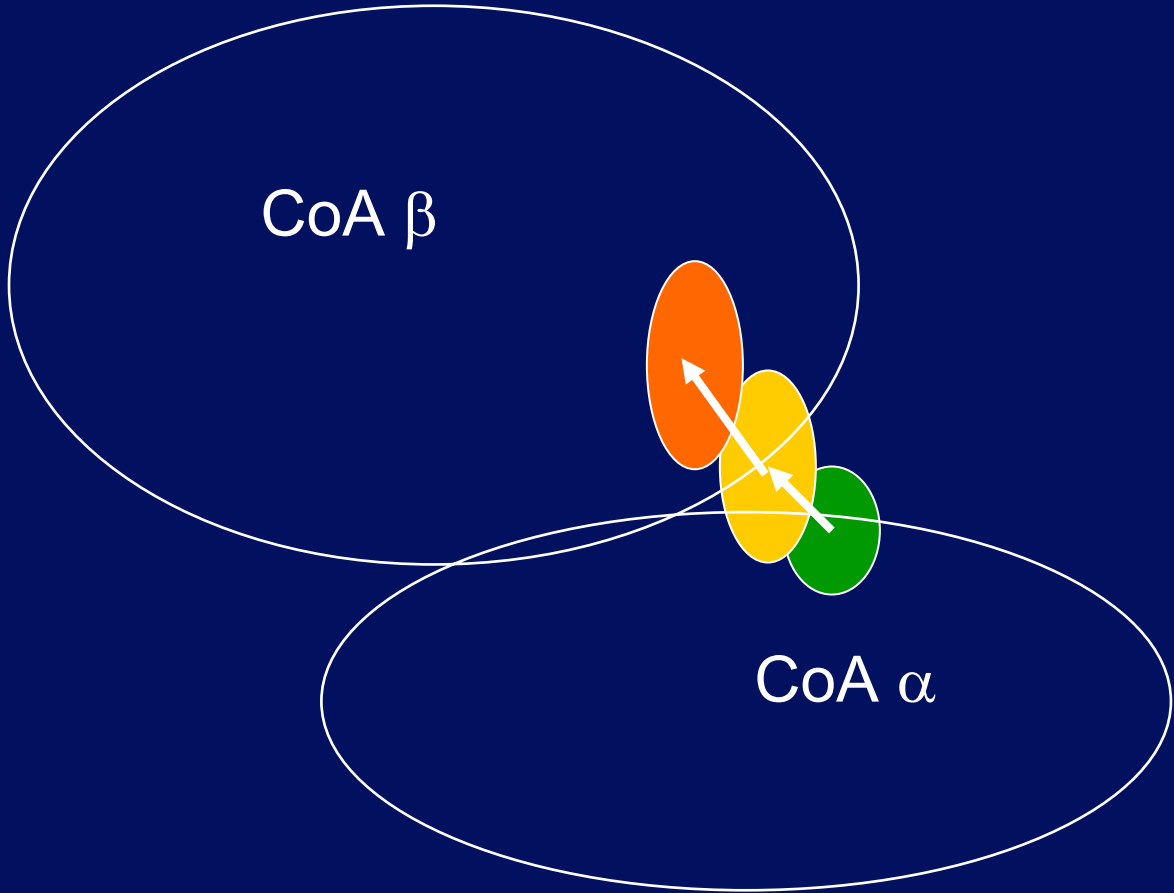
Perceived enemy strength



Perceived own strength

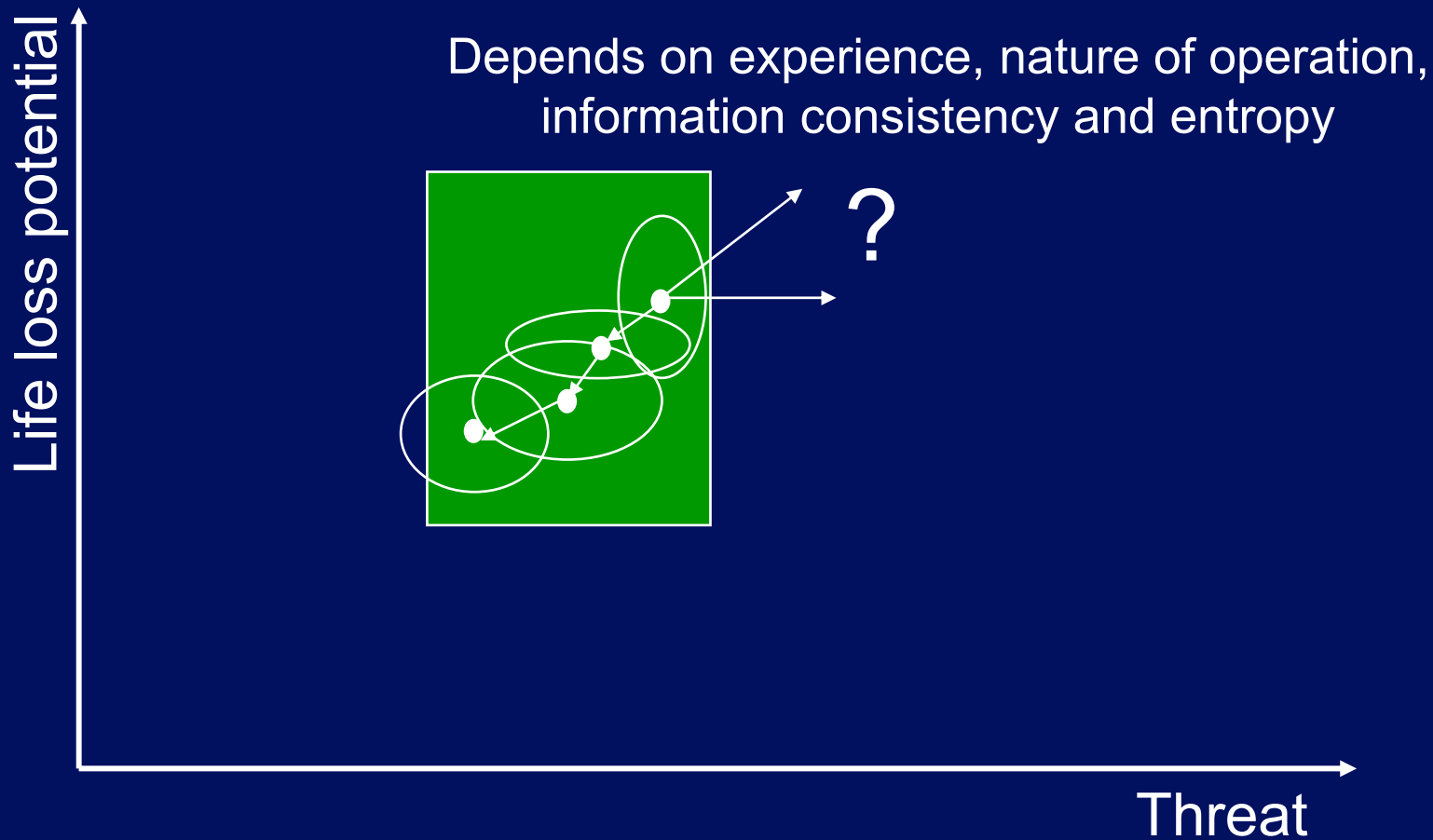
Changing position of comfort zones has effect on Course of Action selection

Perceived
enemy
strength

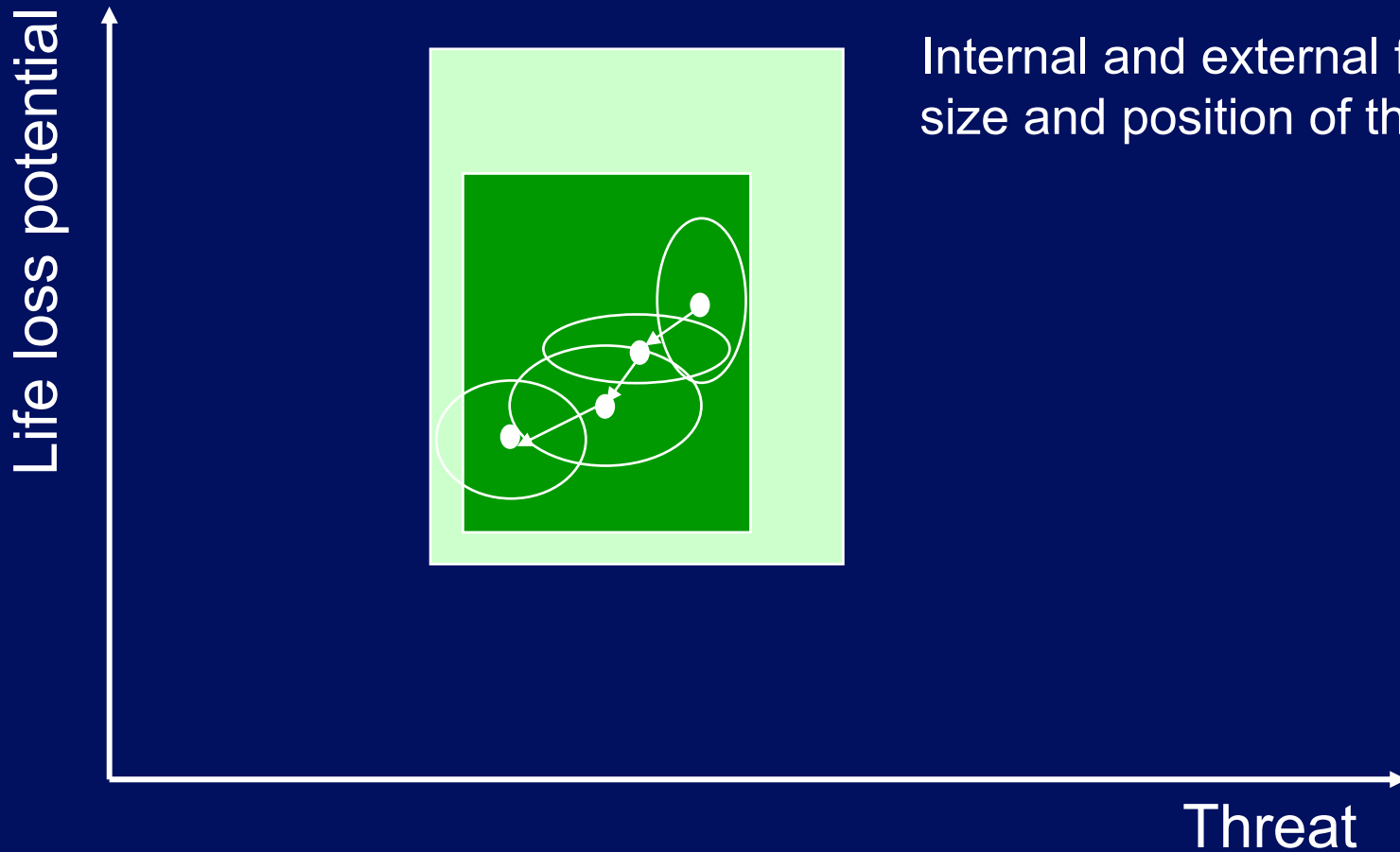


Perceived own
strength

Belief, predictability and precision

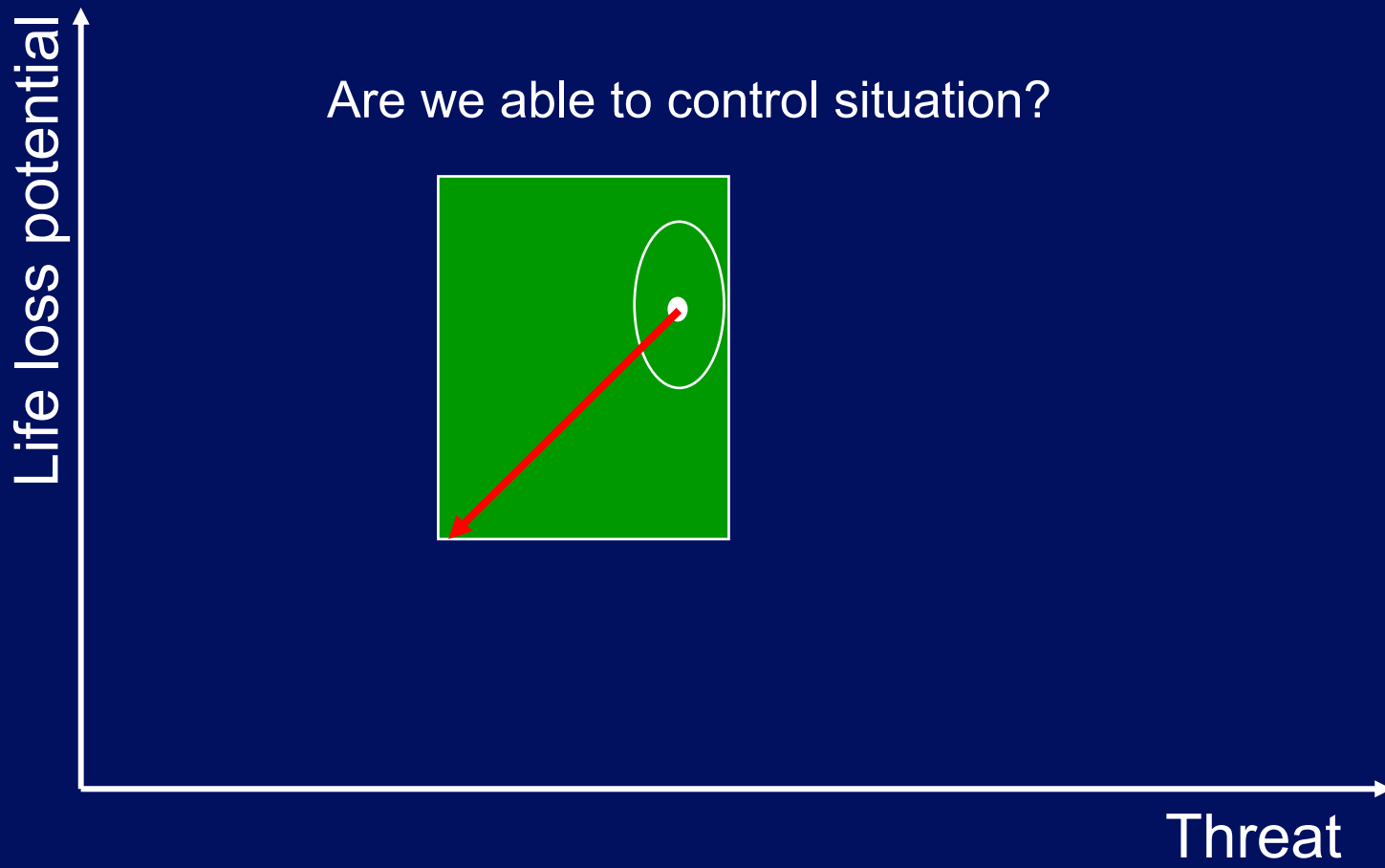


Local versus Global Criticality



Internal and external factors change size and position of the comfort zone

Controllability



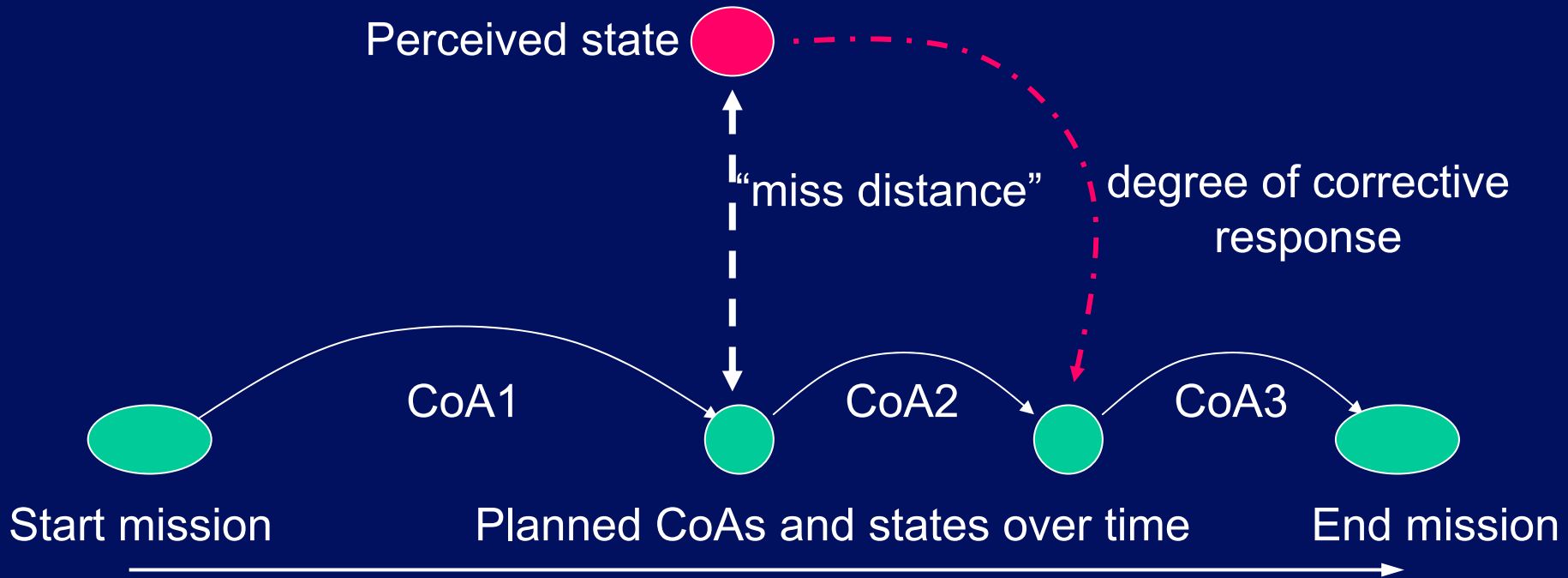
Conclusions open to debate and more study

- Experience and training tend to affect the subject's position in situation state-space
- Personality and personal values seem to affect the comfort zone boundaries and global factors also move the boundaries
- Information is a bias factor on the position in situation-space and entropy affects projection and ability to be precise
- C2 network structures affect controllability
- Creative CoA generation is enhanced control

Assumptions

- Situation Assessment and Course of Action generation / selection are inextricably tied; classification of the perceived situation creates the feasible set of Courses of Action
- For a bounded operational setting, a 'state' (generic class of situation) can be defined on a small set of state variables
- The envelope of expected states can be represented by a state transition network; each transition represents a high-level Course of Action
- The domain under consideration is land tactical conflict

CoA Selection: State Transitions



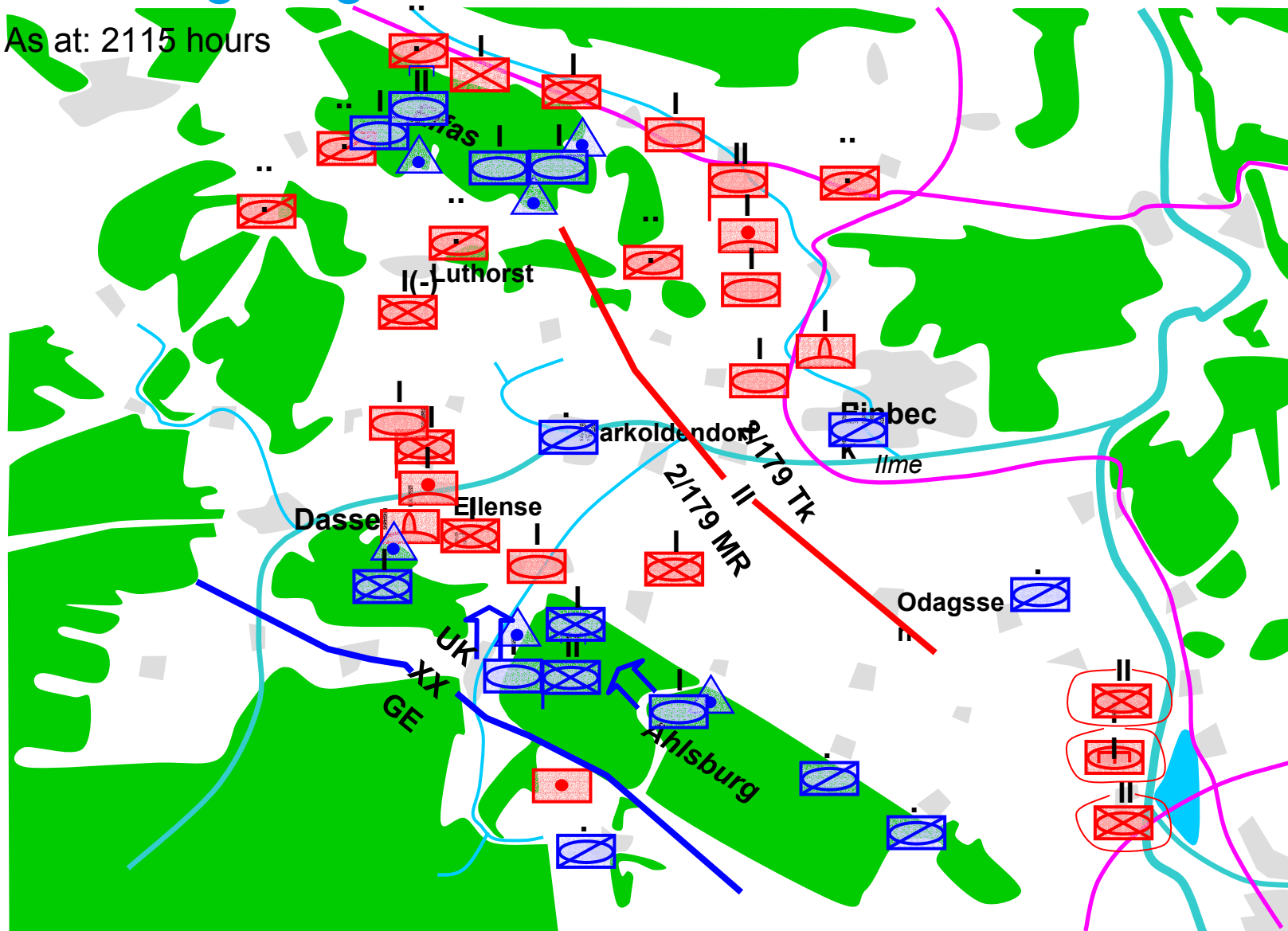
- Clarity/sentience of desired mission aim or end-state
- Interpretation of current situation/ enemy intent
- Is corrective action feasible given time and resources?
- If so, what are potential consequences of action?
- Should I carry out action, more recce or change plan?

Risk Assessments

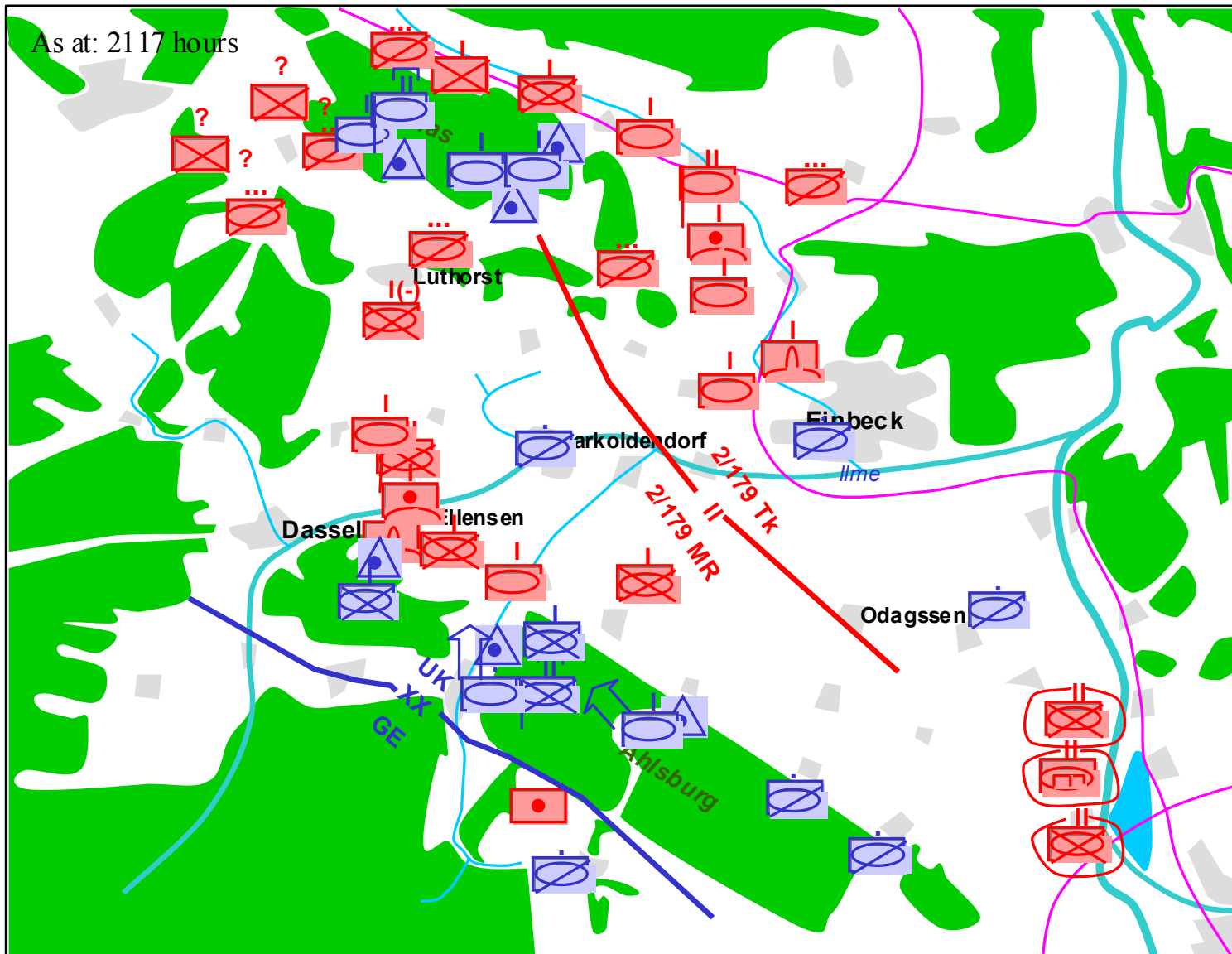
- War-fighting
 - casualties
 - ability to be effective with tanks against infantry
 - success of Bde mission
 - own life threatened and that of own units
- peace support
 - civilian casualties / hostages
 - theft of weapons and supplies
 - time pressure

War-fighting scenario

As at: 2115 hours



War-fighting scenario



Situation assessments

- Enemy committing to axis/axes
- Enemy link-up to secure gap
- Enemy by-passing/leapfrogging my position
- Enemy blocking to isolate/fix me
- Encirclement/envelopment of my position
- Unclear on axis - could be feint

Selected courses of action

- Attack armoured units to North
- Attack descant units in West
- Use of Arty to support/prepare attacks
- Move East to secure safe route out
- Stay in hides and do nothing
- Request information and more recce
- (Report situation and defer to Brigade)