

**ANALYSIS PERSPECTIVES
ON
DEFENSE MODELING
AND SIMULATION**

**VINCE ROSKE
DEPUTY DIR, J8
(WARGAMING, SIMULATION & ANALYSIS)
THE JOINT STAFF**

NEWTONIAN AGE OF ANALYSIS

“SYSTEM” IS:

- DEFINABLE
- CONSTRAINED
- CONTROLLABLE



ISSUES INCREASINGLY COMPLEX & NONLINEAR

IN THE “NEWTONIAN” SENSE

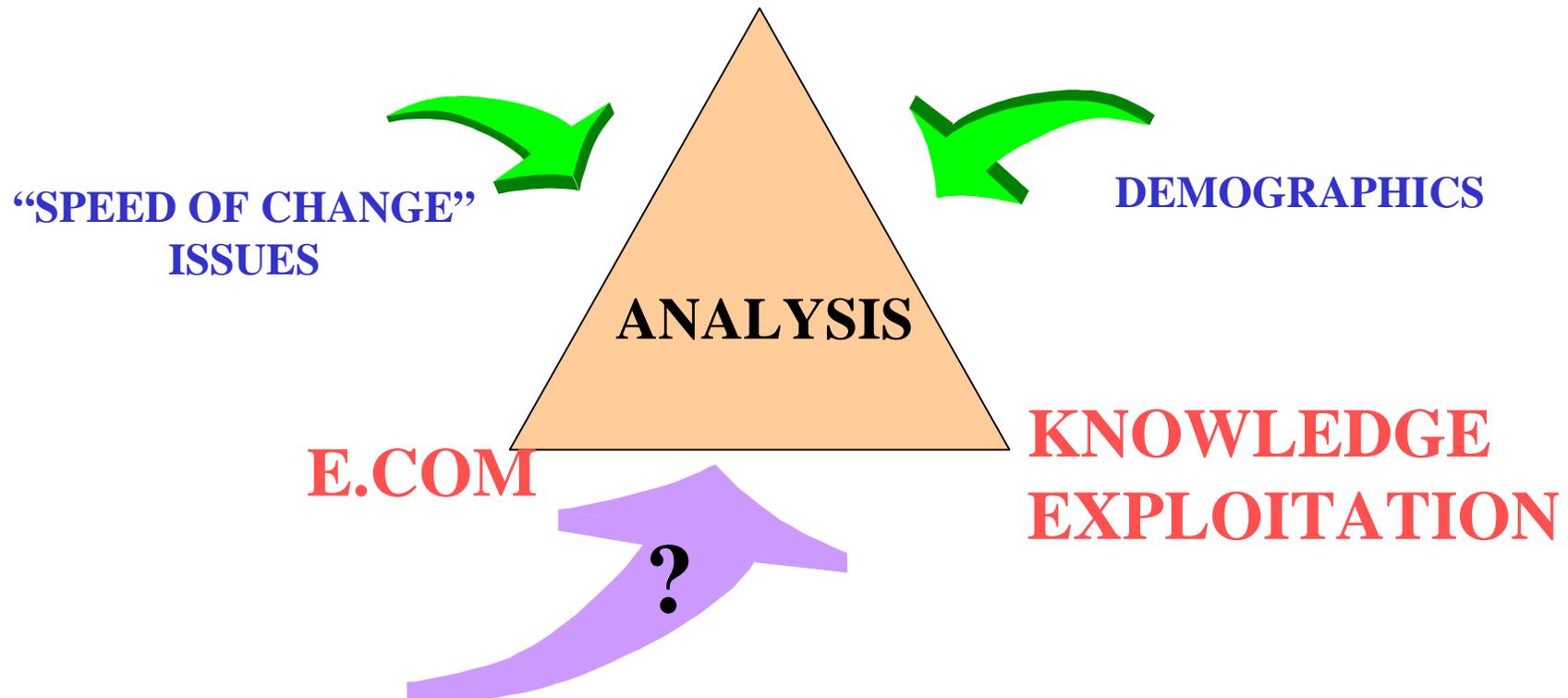
- LITTLE “CONTROL” OF THE “SYSTEM”
 - BOUNDARIES CAN CHANGE
 - EMERGENT BEHAVIORS;
 - ACTORS CHANGE BEHAVIOR
 - SYSTEMS CHANGE DESIGN
 - UNINTENDED CONSEQUENCES

EXAMPLES:

- DRUG INTERDICTION -HE CHANGES THE RULES!!!
- EFFECTS BASED CONFLICT
 - PRECISION OPERATIONS; INDIRECT EFFECTS

“BLURRING” AND DEFENSE ANALYSIS

COMPLEXITY SCIENCE

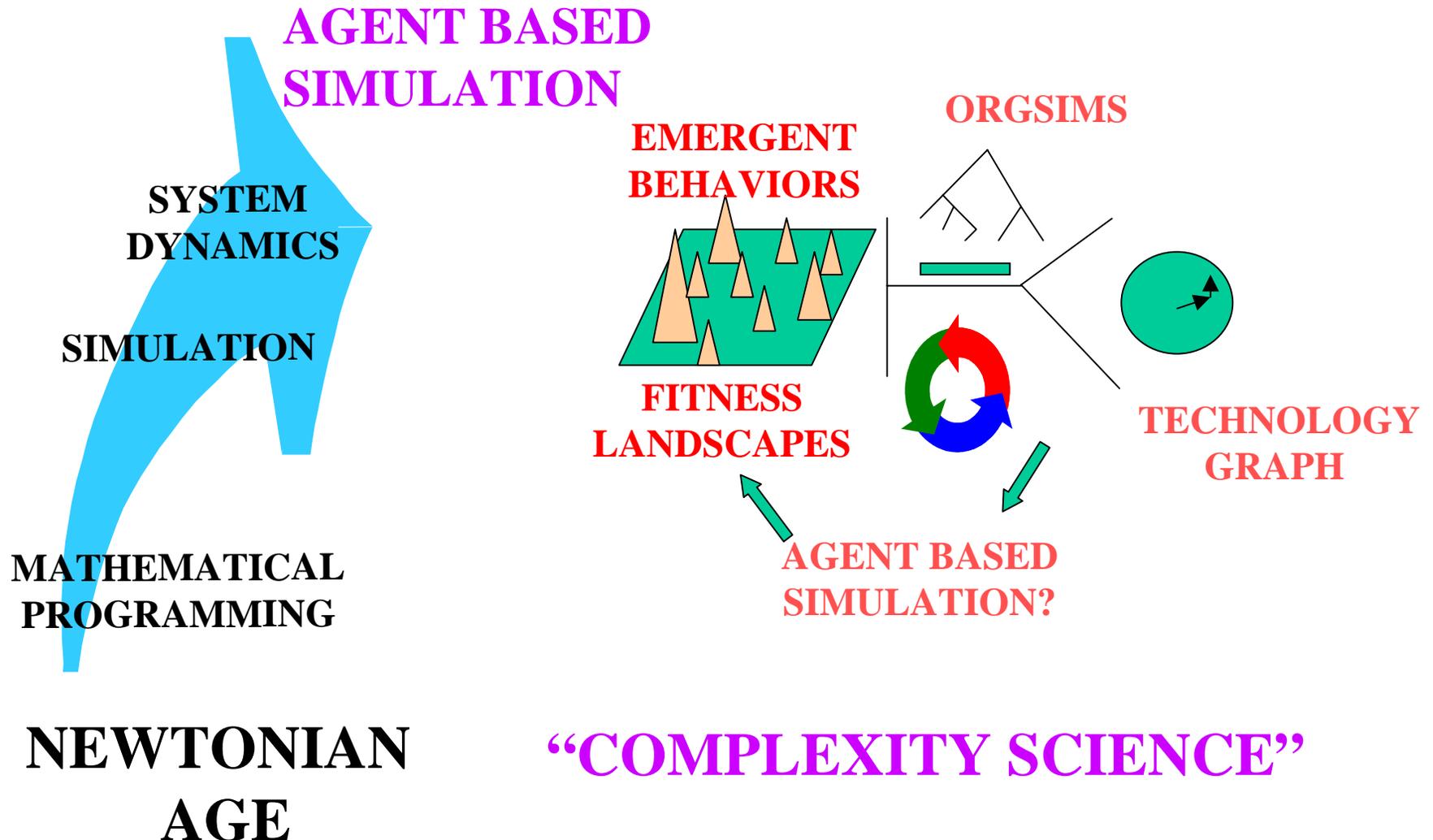


INDUSTRIAL AGE ANALYSIS
(OPTIMIZATION, SIMULATION, SYSTEM DYNAMICS)

IMPLICATIONS?

- **“THE CAPITAL OF PRODUCTION (BIG MODELS) BECOME A LIABILITY”**
 - **“NIKE DOESN'T MAKE SHOES”.**
 - **MODELS FRAME/FIXATE HOW WE PERCEIVE AND APPROACH ISSUES.**
- **“TO ACHIEVE BEST COMMAND, YOU MUST GIVE UP CONTROL”.**
- **“PEOPLE” ARE NOT OUR MOST IMPORTANT RESOURCE; THEY COME AND GO TOO QUICKLY. WE MUST LEARN TO RAPIDLY EXPLOIT WHAT THEY KNOW, KEEP IN THE CULTURE WHAT OF THAT IS ENDURING, AND MAKE THEIR DEPARTURES AN ASSET”**
 - **MILITARY “RETENTION” AND GENERATION Y?**

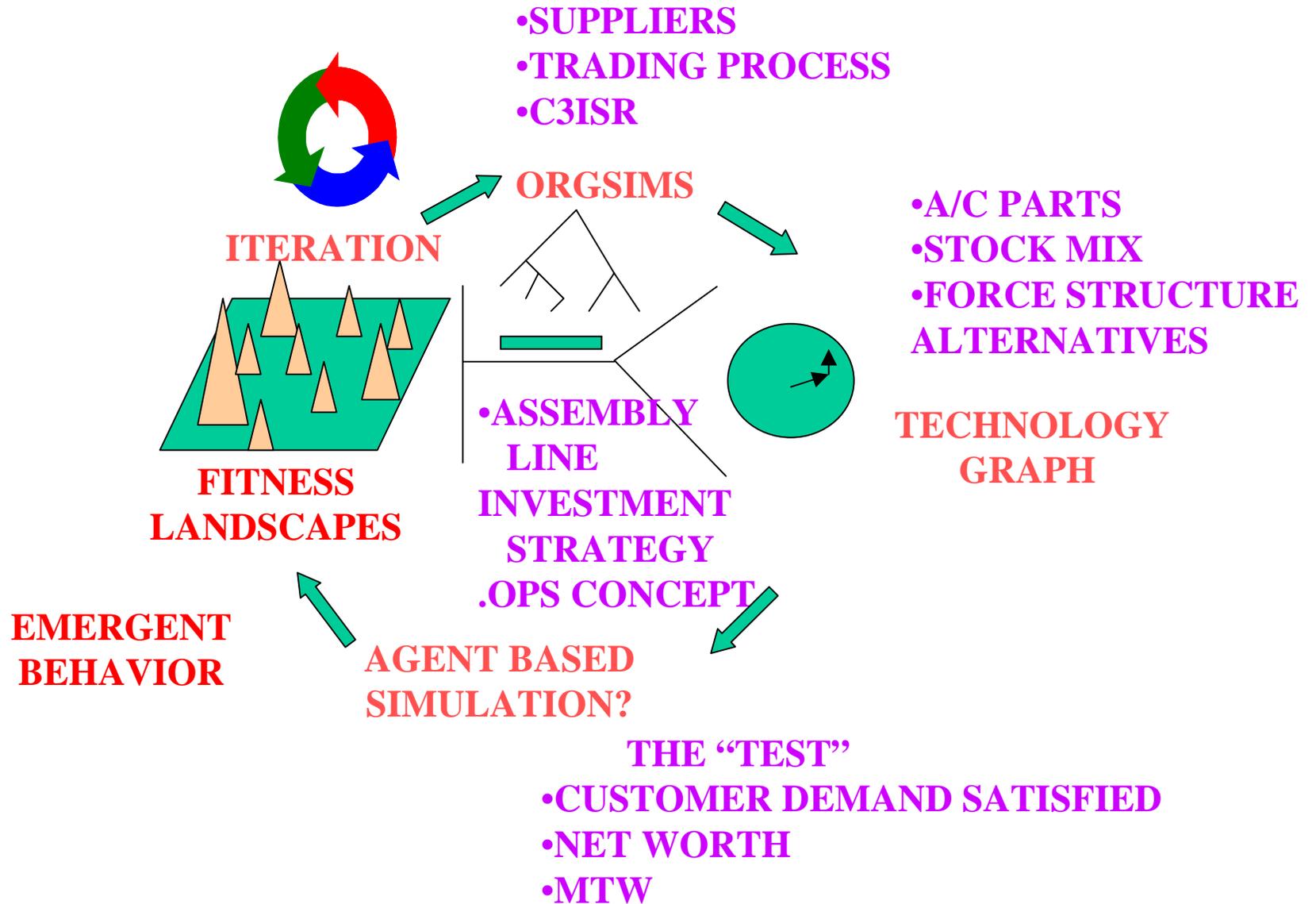
THE CHANGING FACE OF DEFENSE ANALYSIS



“CHANGING FACE OF ANALYSIS EXAMPLES

- THE OTHER “BOEING 777” STORY**
- INVESTMENT PORTFOLIO MANAGEMENT**
- DRUG INTERDICTION STUDY**

EXAMPLE ALGORITHMS



ANALYSIS RECIPE

1. WHAT IS THE QUESTION?

2. WHAT IS THE “REAL” QUESTION?

3. WHAT SHOULD THE FINAL SLIDES LOOK LIKE?

4. WHAT DO WE ALREADY KNOW?

5. HOW DO GET THE MISSING INFORMATION?



•SURVEY, TEST, MODEL, SIMULATE?

COLLABORATION

- THE PURPOSE OF ANALYSIS IS TO **ENLIGHTEN THE DEBATE.**

- THE DEBATE IS ULTIMATELY AMONG THE **STAKEHOLDERS.**

TO THE EXTENT THAT THE **STAKEHOLDERS COLLABORATE** IN THE ANALYSIS PROCESS,

- THE ANALYSIS **PROCESS ITSELF BECOMES THE ANALYSIS PRODUCT.**

SIMULATION DESIGN

“THE RANGE OF DETAIL”

M&S REQUIREMENTS DRIVEN BY:

- STAKEHOLDERS EXPERTISE IN THEIR A STOVEPIPE.**
- SYSTEM REPRESENTATION VS POM.**
- “MORE IS BETTER” DESIGN PRINCIPLE.**

NUMEROUS ARTICLES:

- LIMITS OF DETAIL.**
- CHAOS (BUTTERFLY WINGS TO THUNDERS STORMS).**
- BALANCE.**

YET:

ABSENT PRACTICAL GUIDANCE TO PROTECT SIMULATION DEVELOPERS AND ANALYSTS FROM THE TYRANNY OF DETAIL.

CHALLENGES FOR DEFENSE ANALYSIS M&S

1. ADVANCING THE APPLICATION OF **AGENT BASED SIMULATION**.
 - INCORPORATING **MOTIVATIONS** AND **DEGREES OF FREEDOM** IN THE ACTORS & THE SYSTEM DESIGN.
2. ADVANCING THE APPLICATION OF **COMPLEXITY SCIENCE**.
 - ADAPTIVE, ROBUST SOLUTIONS** IN THE FACE OF **EMERGENT BEHAVIORS**.
3. DEFINING THE SCIENCE OF “**APPROPRIATE DETAIL**” FOR SIMULATION DEVELOPMENT.
4. APPLYING M&S FOR **KNOWLEDGE EXPLOITATION**.