Some research results obtained with DKE:

A dynamic war-game for experiments

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Project: The Need for Information in Future Wars

Agenda

- Dynamic decision making and microworld research
- DKE
- Experiment 1
- Experiment 2

Dynamic decision making and microworlds

Dynamic decision making

- It requires a series of decisions
- The decisions implemented are not independent
- The state of the environment changes both, autonomously and as a consequence of the decision maker´s own actions
- Time is an important factor

Microworlds

- Computer simulations of real world decision environments
- An attempt to preserve the ”ecological validity” of field research without losing the experimental control of the laboratory
- Woodcuts
- Wargames

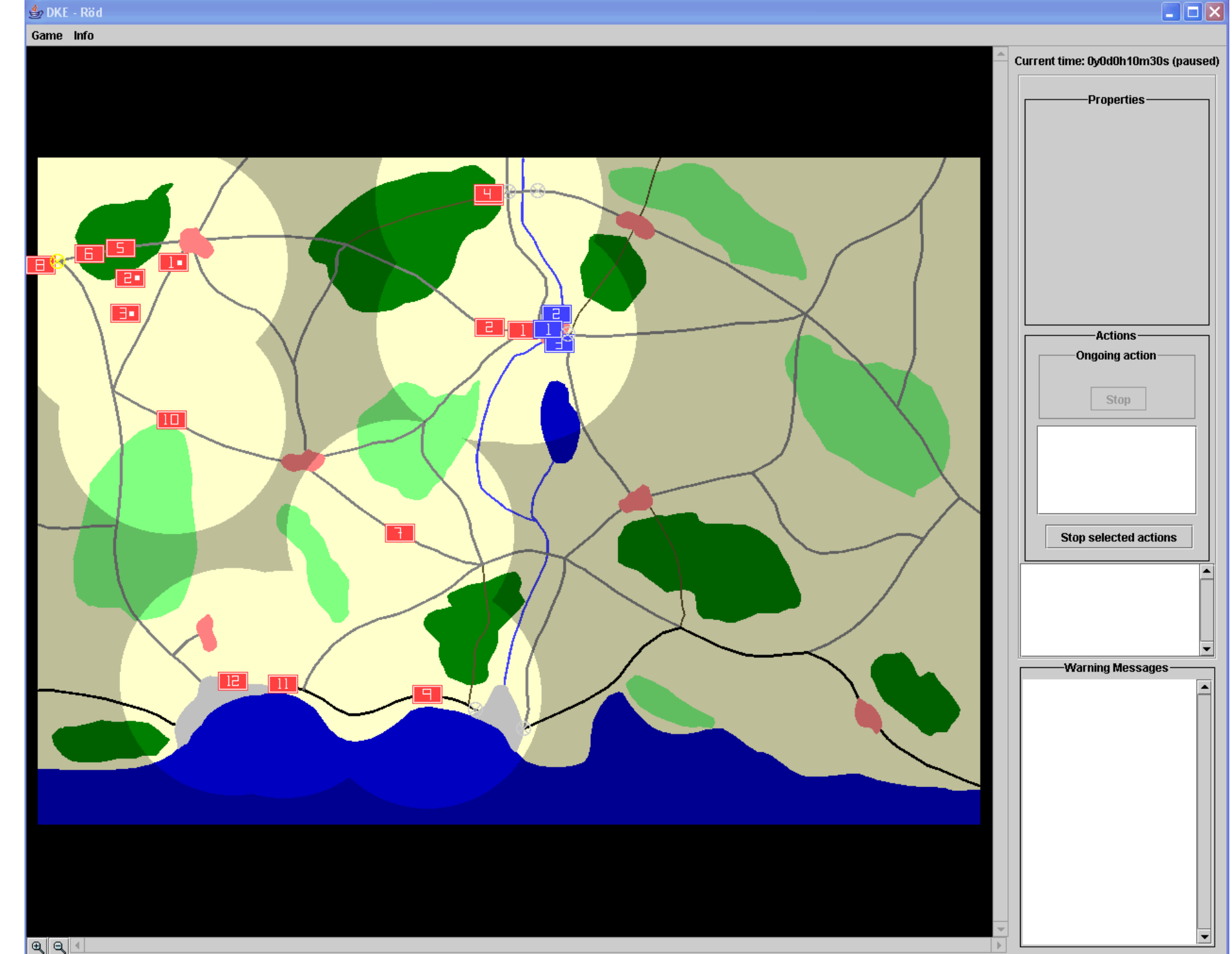
DKE

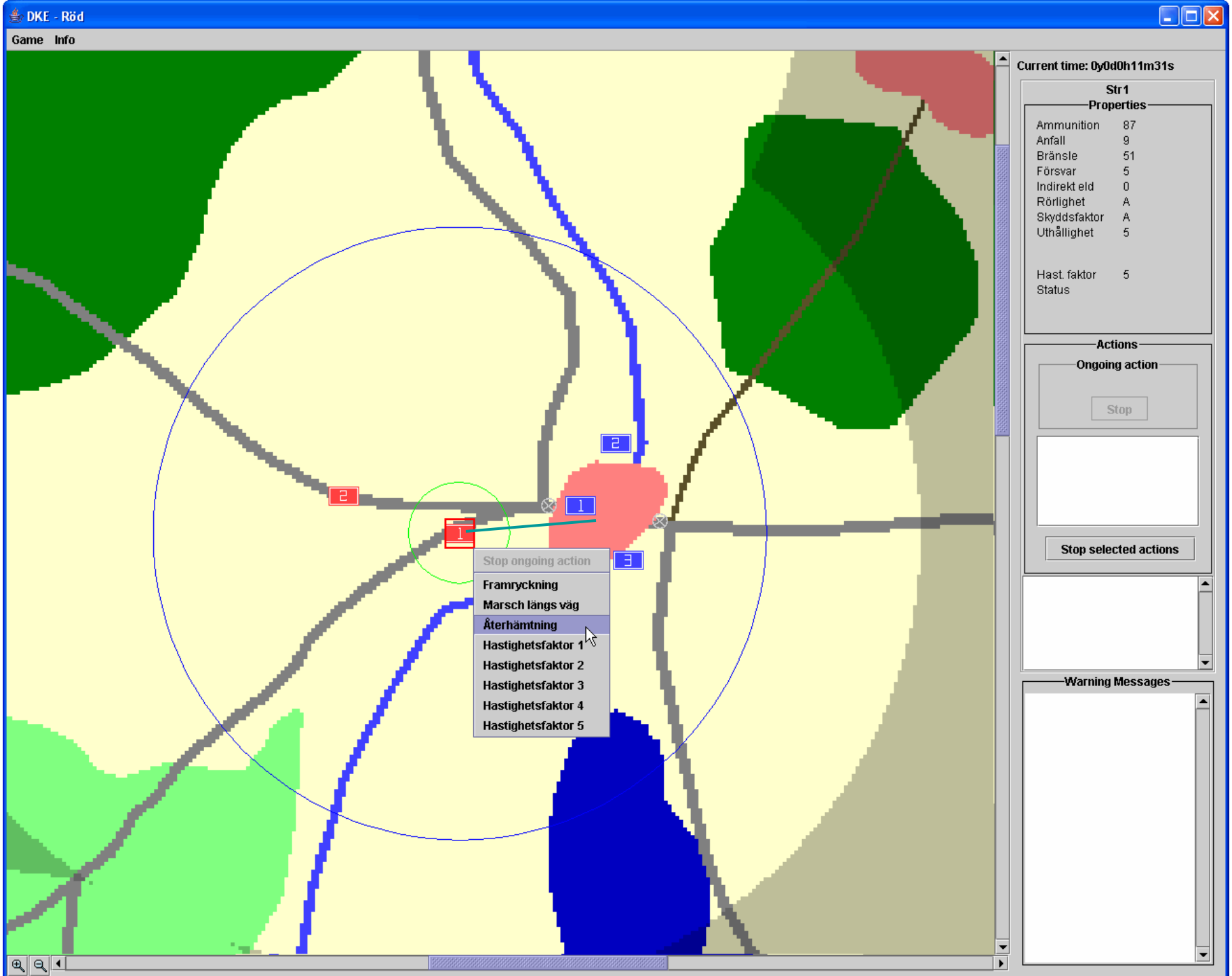
Why DKE?

- Experimental control
- Data recording
- A more complex and warlike microworld
- Real time

What is DKE?

- **Multiplay (no singleplay) dynamic wargame**
- **Based on GECCO**
- **Runs under GPL**


DKE - Röd
Game
Info
Current time: 0y0d0h10m30s (paused)
Properties
Actions
Ongoing action
Stop
Stop selected actions
Warning Messages


DKE - Röd
Game
Info
Current time: 0y0d0h11m31s
Str1
Properties
Ammunition 87
Anfall 9
Bränsle 51
Försvar 5
Indirekt eld 0
Rörlighet A
Skyddsfaktor A
Uthållighet 5
Hast. faktor 5
Status
Actions
Ongoing action
Stop
Stop selected actions
Warning Messages
Stop ongoing action
Framryckning
Marsch längs väg
Återhämtning
Hastighetsfaktor 1
Hastighetsfaktor 2
Hastighetsfaktor 3
Hastighetsfaktor 4
Hastighetsfaktor 5

DKE - God's Eye

Game Info

Current time: 0y0d0h0m0s (paused)

Properties

Actions

Ongoing action

Stop

Stop selected actions

Warning Messages

Distribution of DKE

- Swedish National Defence College (FHS)
- Swedish Defence Research Agency (FOI) in Linköping
- Norwegian Defence Leadership Institute (FIL)
- Defence Science & Technology Organisation (DSTO) in Australia.
- University of Melbourne

Experiment 1

Information superiority

- **Superiority in the information domain (timeliness, completeness etc)**
- **Superiority in the cognitive domain**
- **Superiority in the physical domain**

Perfect information?

- ”We must recognize that there is a limit to our ability to reduce the fog and friction of war and that in many cases it may not even be possible”.
- ”Visionaries who have proclaimed that we will have total awareness or that we will eliminate the fog of war are indeed false prophets – and dangerous ones at that”.

(Alberts, Garstka, Hayes & Signori, 2001)

Relative information superiority (i)

What counts is not the absolute level of certainty but the relative advantage of one adversary over the other.

(Alberts, Garstka & Stein, 1999)

Relative information superiority (ii)

Commander 1		Commander 2
Perfect information	diff (x)	Inferior information
Less than perfect	diff (x)	Inferior information

The information superiority is of the same value in both cases

Research question

- Is the widespread opinion true?

Answer

The results from experiment 1 (as well as ten other experimental studies) lend no support to the widespread opinion that only the relative information superiority counts.

Relative information superiority

Commander 1		Commander 2
Perfect information	diff (x)	Inferior information
Less than perfect	diff (x)	Inferior information

The information superiority is of the same value in both cases

Consequences

- **In situations characterized by less than perfect information it may prove difficult to create superiority in the cognitive and physical domains by means of investment in information superiority. Other measures may be needed.**

- **Decision support systems and training to support officers ability to cope with uncertainty.**

Experiment 2

Problems in C^2 (i)

Two important problems in Command and Control is to cope with uncertainty and to make timely decisions.

Gathering more information can reduce uncertainty, but collecting and processing information takes time.

Problems in C^2 (ii)

Consequently there is a conflict between reducing uncertainty and making timely decicions.

The commander who waits for near perfect information will be defeated by one who acts on ”good enough” information.

(Alberts, 1996)

The challenge (i)

Todays information technology can provide commanders with enormous amounts of information about the situation in the battlespace.

So much information can lead to ”information overload” and thereby to delays in the decision making process.

At the same time the ever-increasing tempo of modern warfare requires that the time to decision must be decreased.

The challenge (ii)

A central problem in the creation of future information systems will therfore be how to, better than before, select information so that the amount is kept down, but still with a content sufficient for good decisions.

Principal solution 1

- Role based operational picture
- Information push
- Information restriction

Principal solution 2

- Need based operational picture
- Information pull
- No information restrictions

Research question

- Wich solution is to be preferred?

Experimental design

Players provided with a role based operational picture were pitted against players provided with a need based opartional picture under two conditions of speed selection.

Result

None of the two principal solutions was superior to the other in any condition.

Considerations

- **Earlier findings using single play task have favoured the role based alternative.**
- **The role based information was optimized for the task.**

Conclusion

End in a draw – a step forward for the need based alternative.

Continuation

- The URANOS-project
- Selection of information for C^2
- Coping with uncertainty