

Learning Networks and Learning Design

Citation for published version (APA):

Koper, R. (2005). *Learning Networks and Learning Design*.

Document status and date:

Published: 23/04/2005

Document Version:

Peer reviewed version

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

<https://www.ou.nl/taverne-agreement>

Take down policy

If you believe that this document breaches copyright please contact us at:

pure-support@ou.nl

providing details and we will investigate your claim.

Downloaded from <https://research.ou.nl/> on date: 08 Oct. 2021

Open Universiteit
www.ou.nl



Learning Networks for Lifelong Learning

Rob Koper (rob.koper@ou.nl)
Educational Technology Expertise Center
Open University or the Netherlands

Paper at:

<http://jasss.soc.surrey.ac.uk/8/2/5.html>

Unfold CoP Meeting

Barcelona, April 20, 2005

Learning Networks for Lifelong Learning

A learning network is a *group of persons* who *create, share, support* and *study* learning activities & units of learning in a specific knowledge *domain*.

So, a network in the following sense

A group of persons:

- connected to each other in a **social** sense
- connected to each other in a **technical** sense
- connected to relevant **learning activities (& tools)**
- connected to each other in order to **learn**
from & with each other
(also producing new learning resources)
- ✓ as independent as possible of constraints like:
location, institution, job, time, specific technologies
- ✓ persistent over time to support lifelong learning in a
certain field

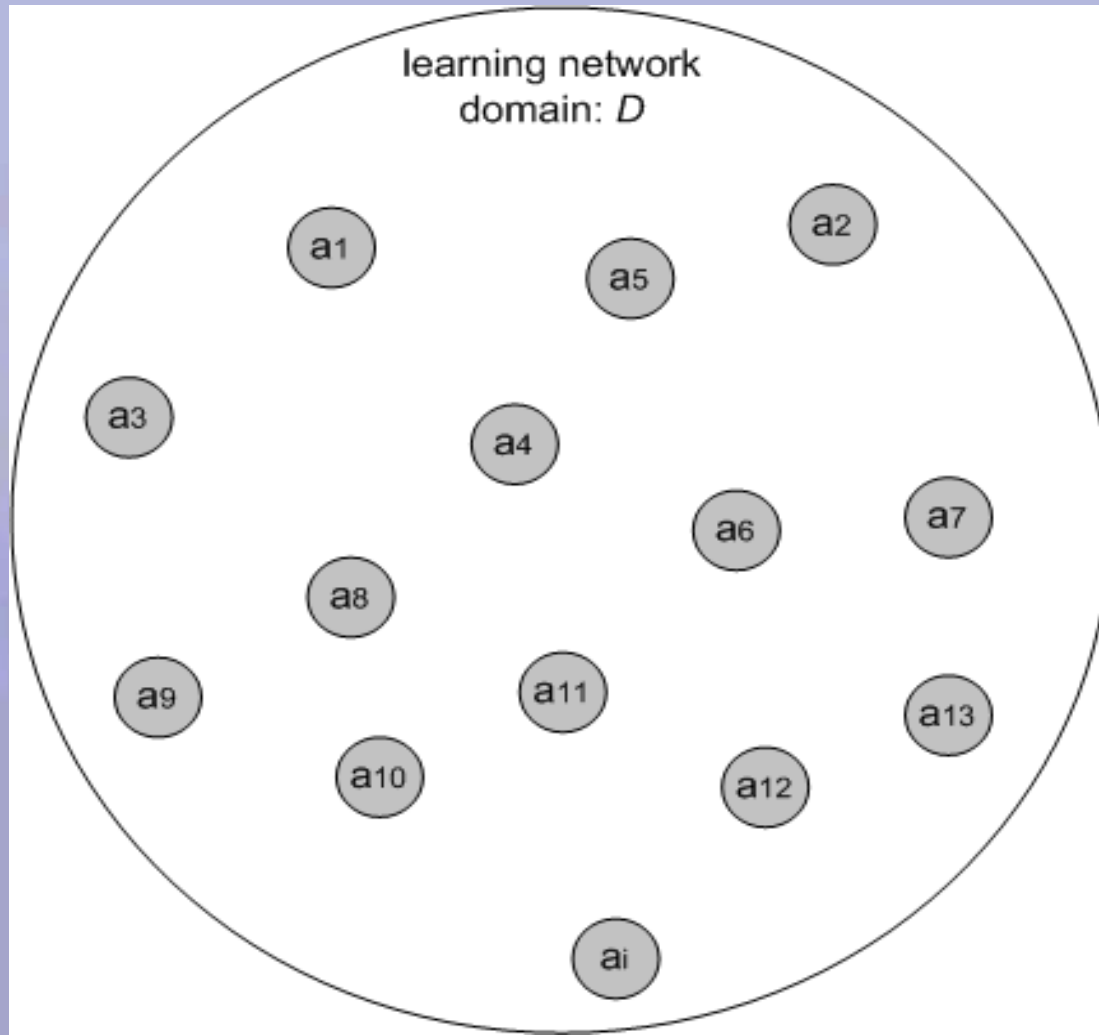
How to realise Learning Networks for Lifelong Learning?

Several views of a Model of a Learning Network

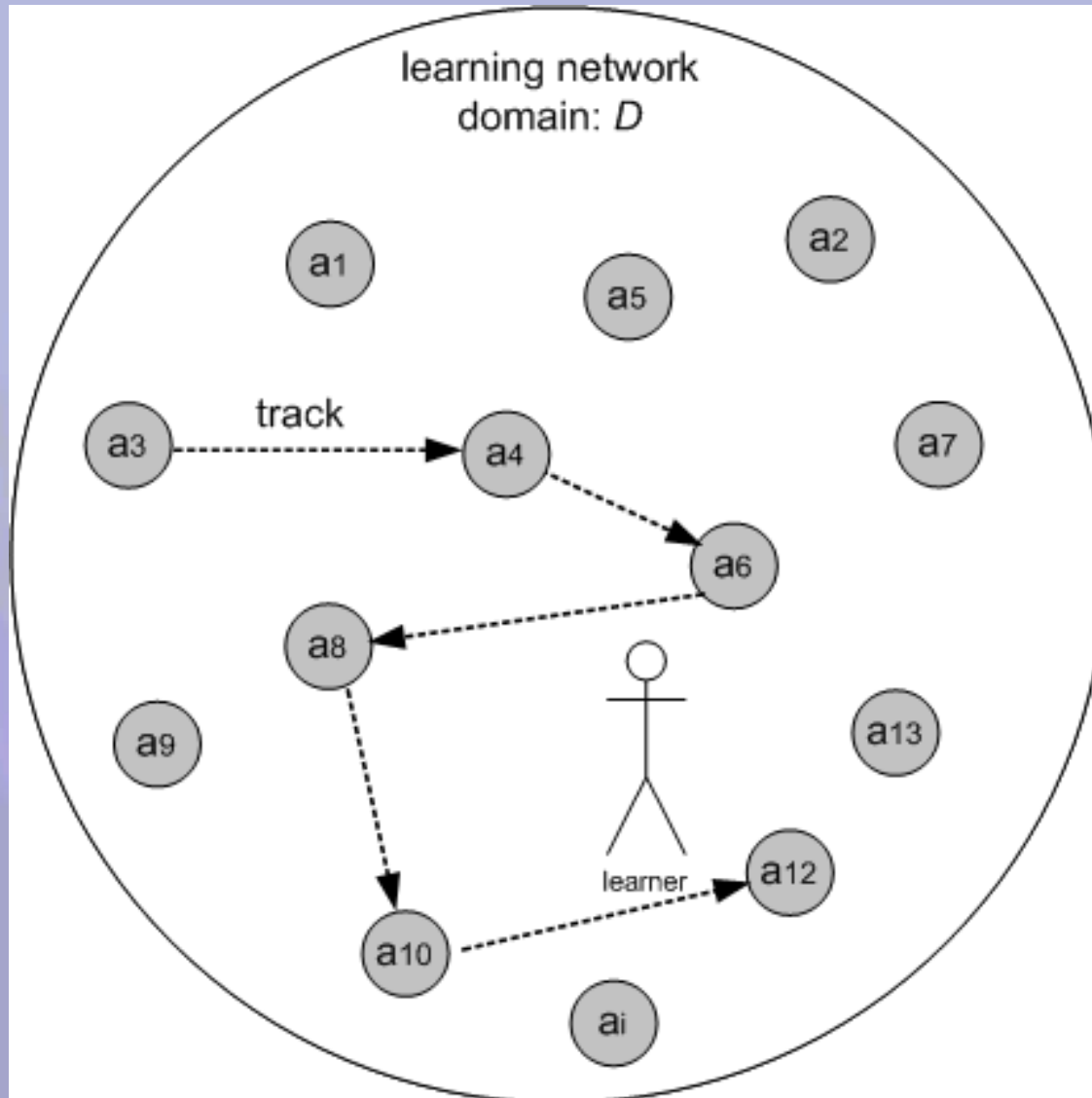
- Learning Network modelled as a Graph
- Use Case Model
- Architectural Model

Graph Representation of a LN

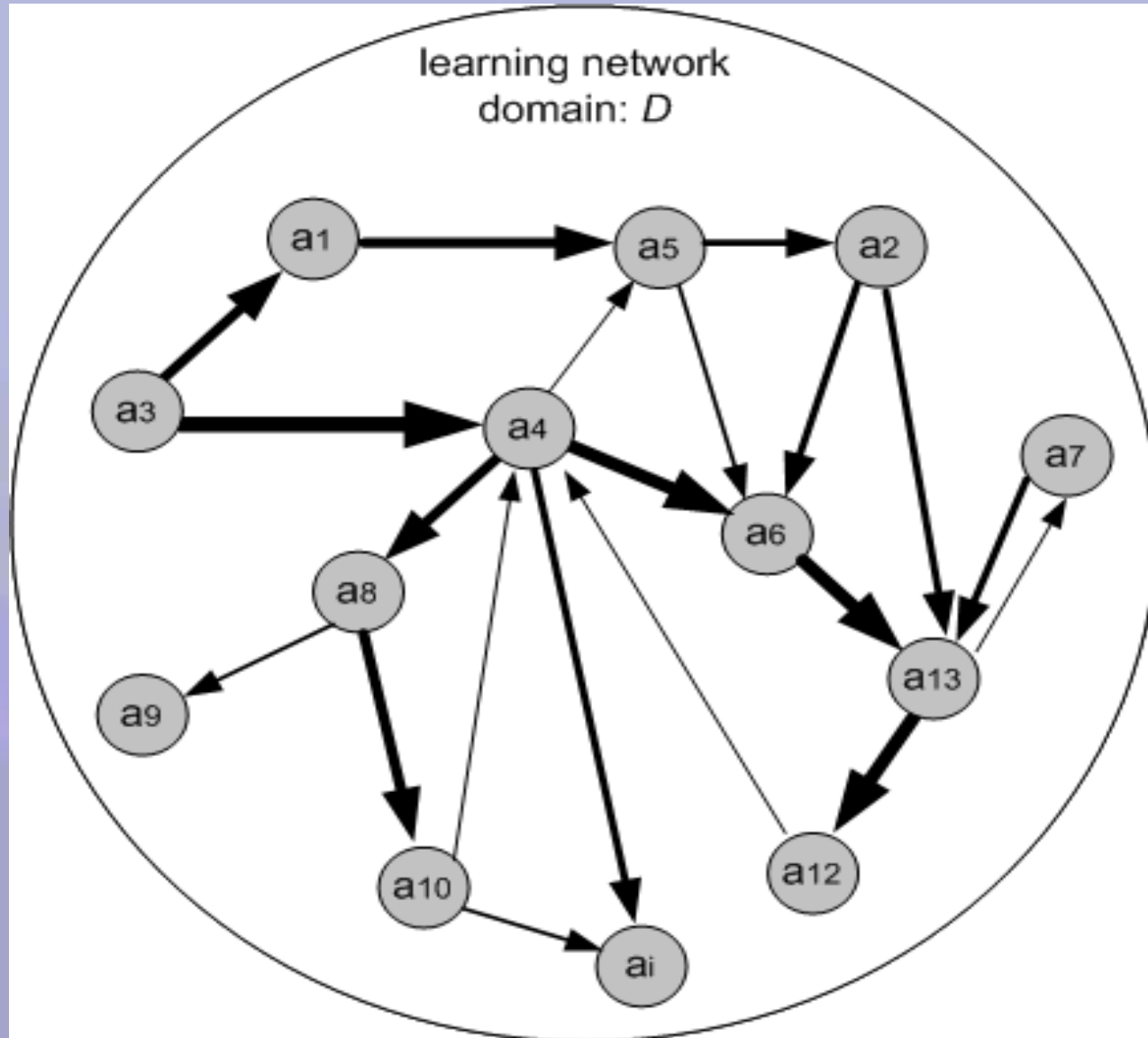
A *learning network* can be represented as a graph of '**activity nodes**' (runs of units of learning) within some knowledge domain



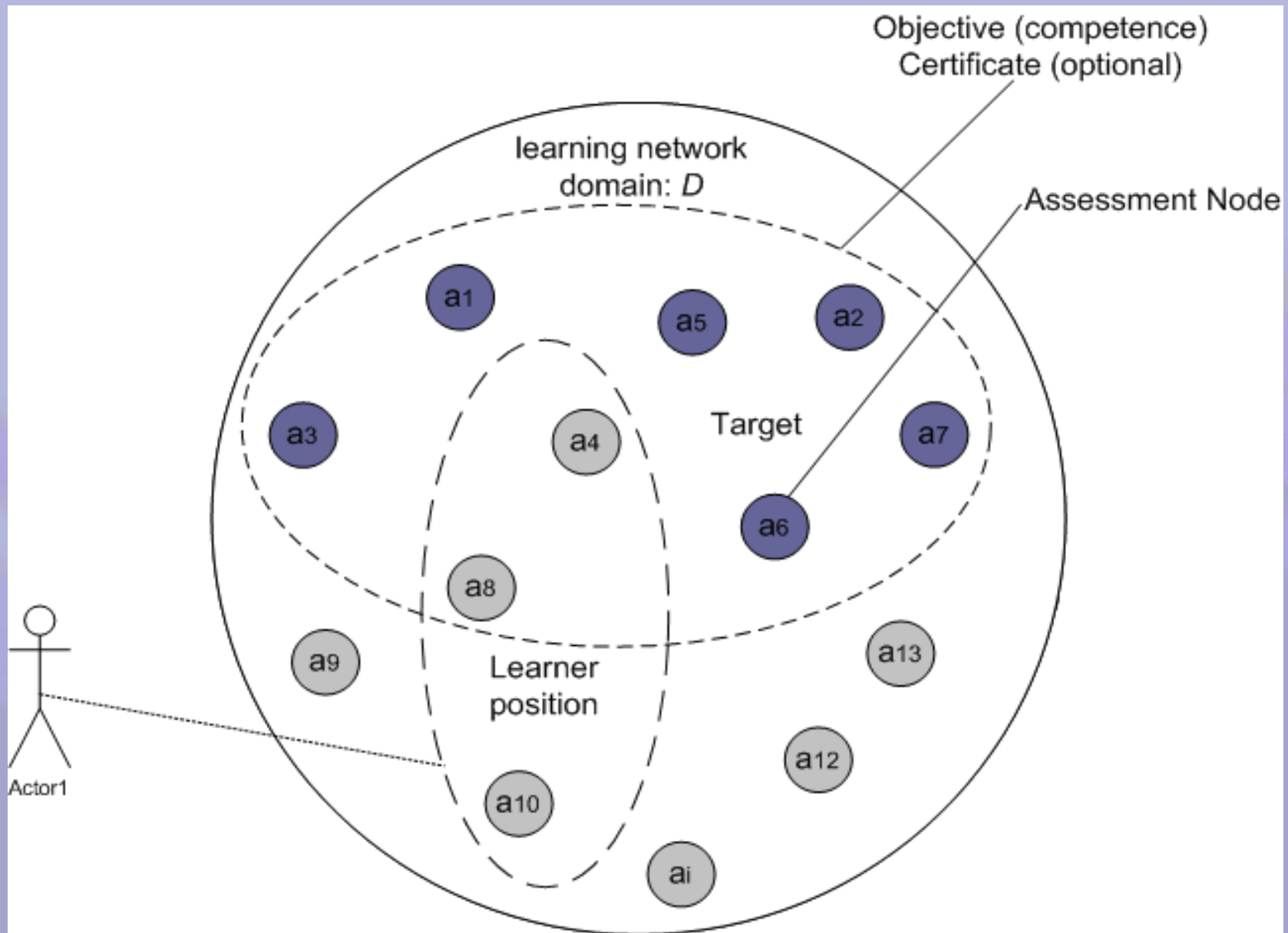
LN Graph with a learner track



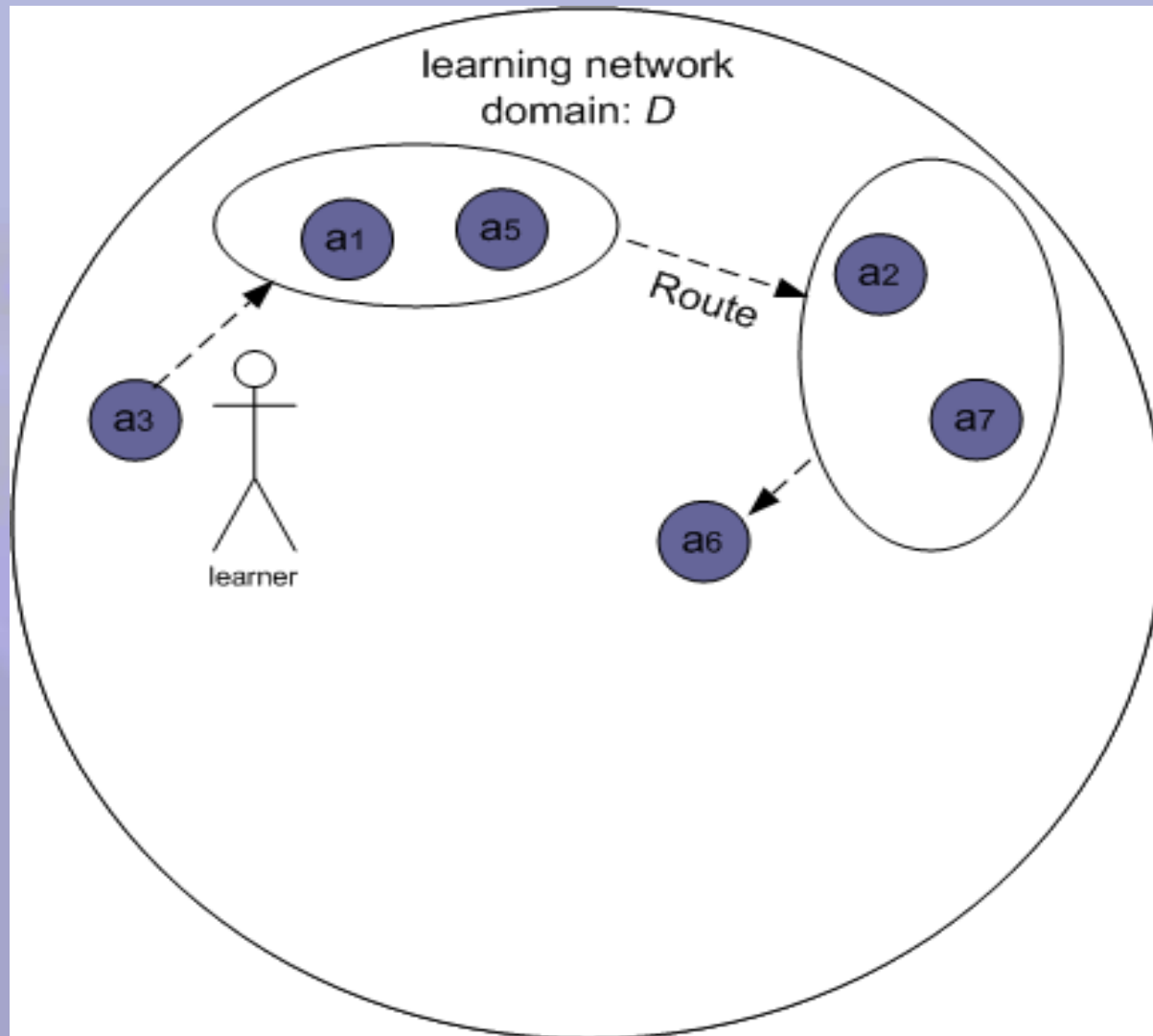
Patterns of Collective Tracks Emerge



Learner Positions and Objectives



Planned Learner Routes ("curriculum")

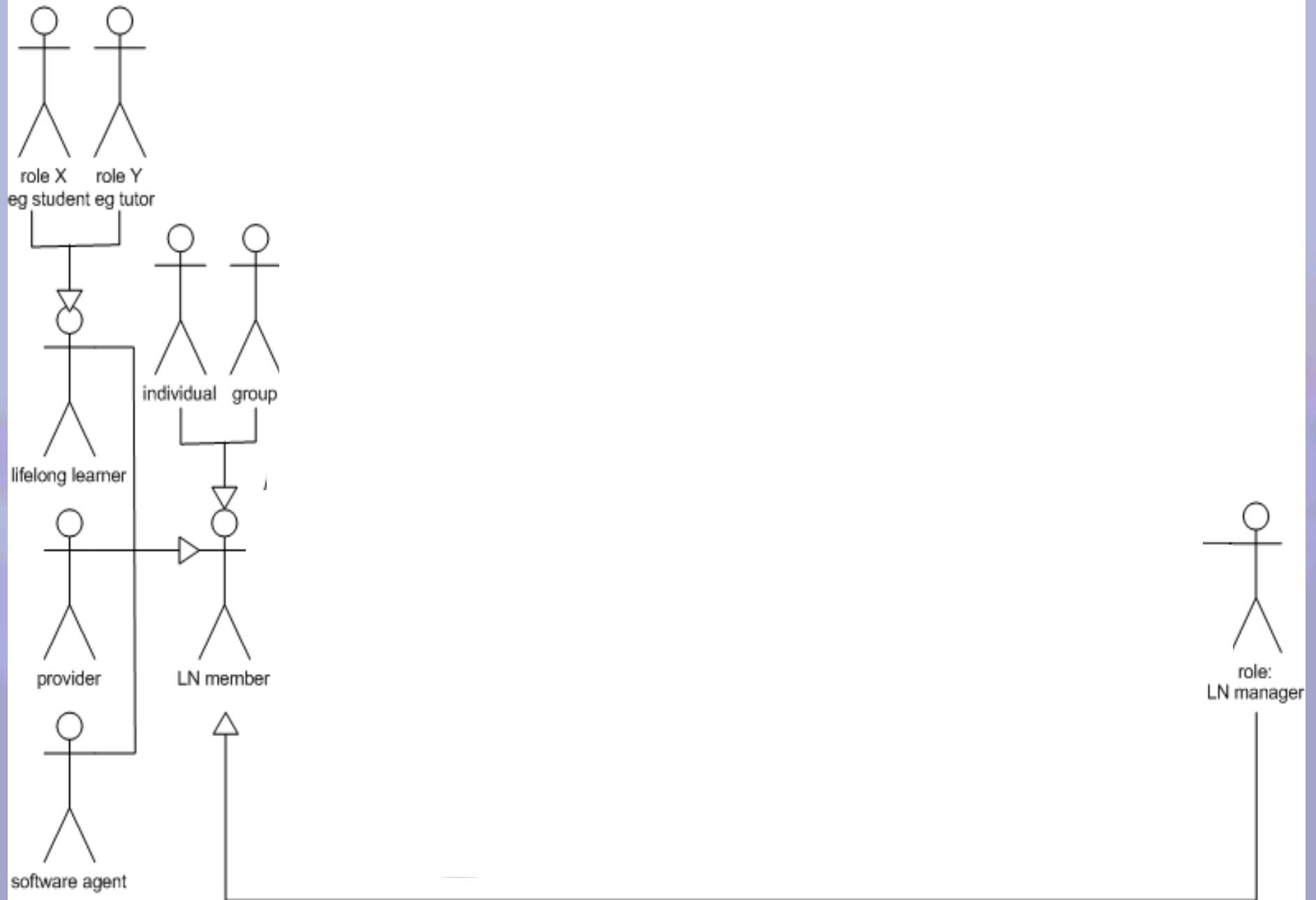


What activities do users perform in
a Learning Network?

=> Use Case Model

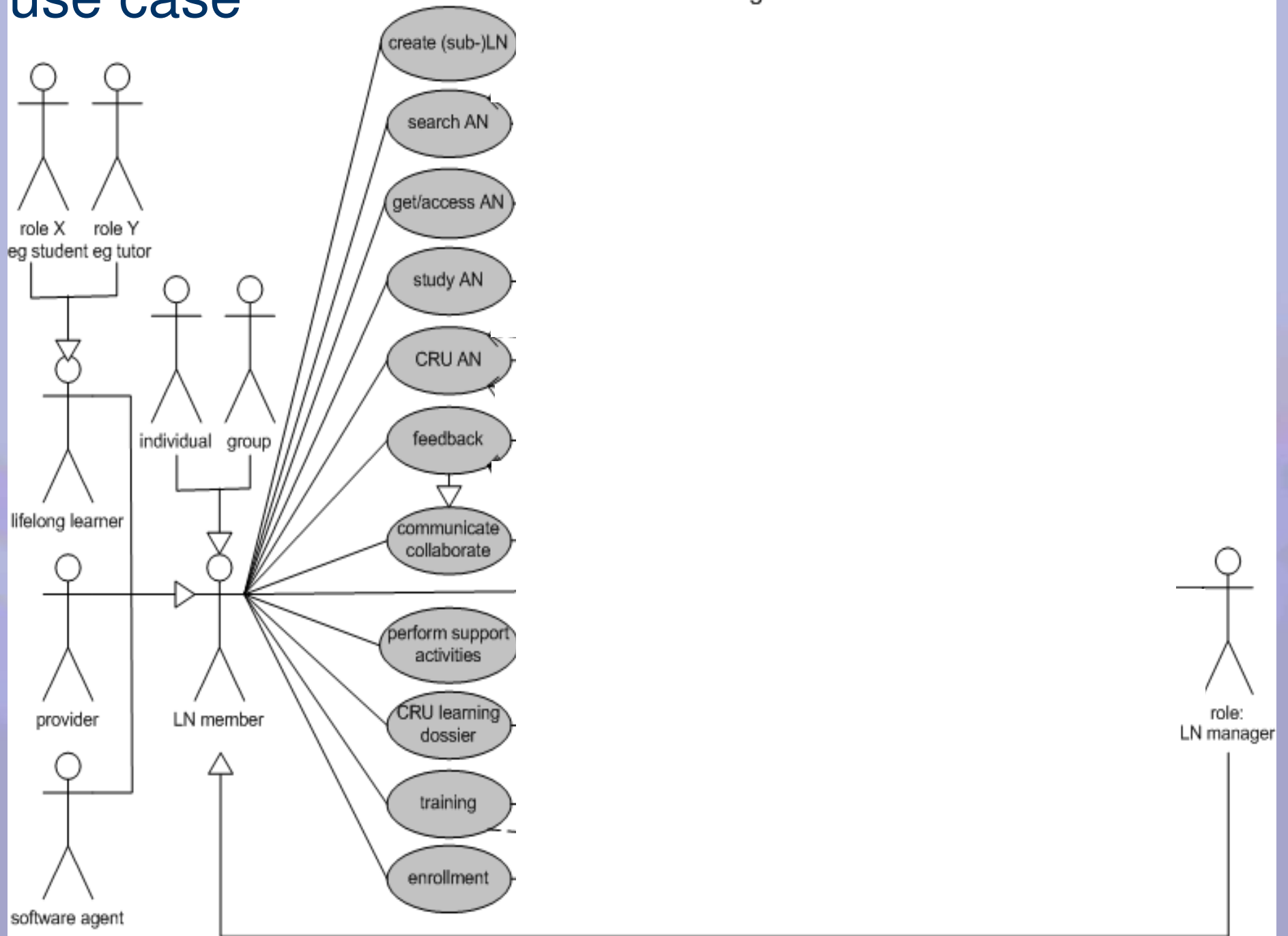
use case

Learning Network



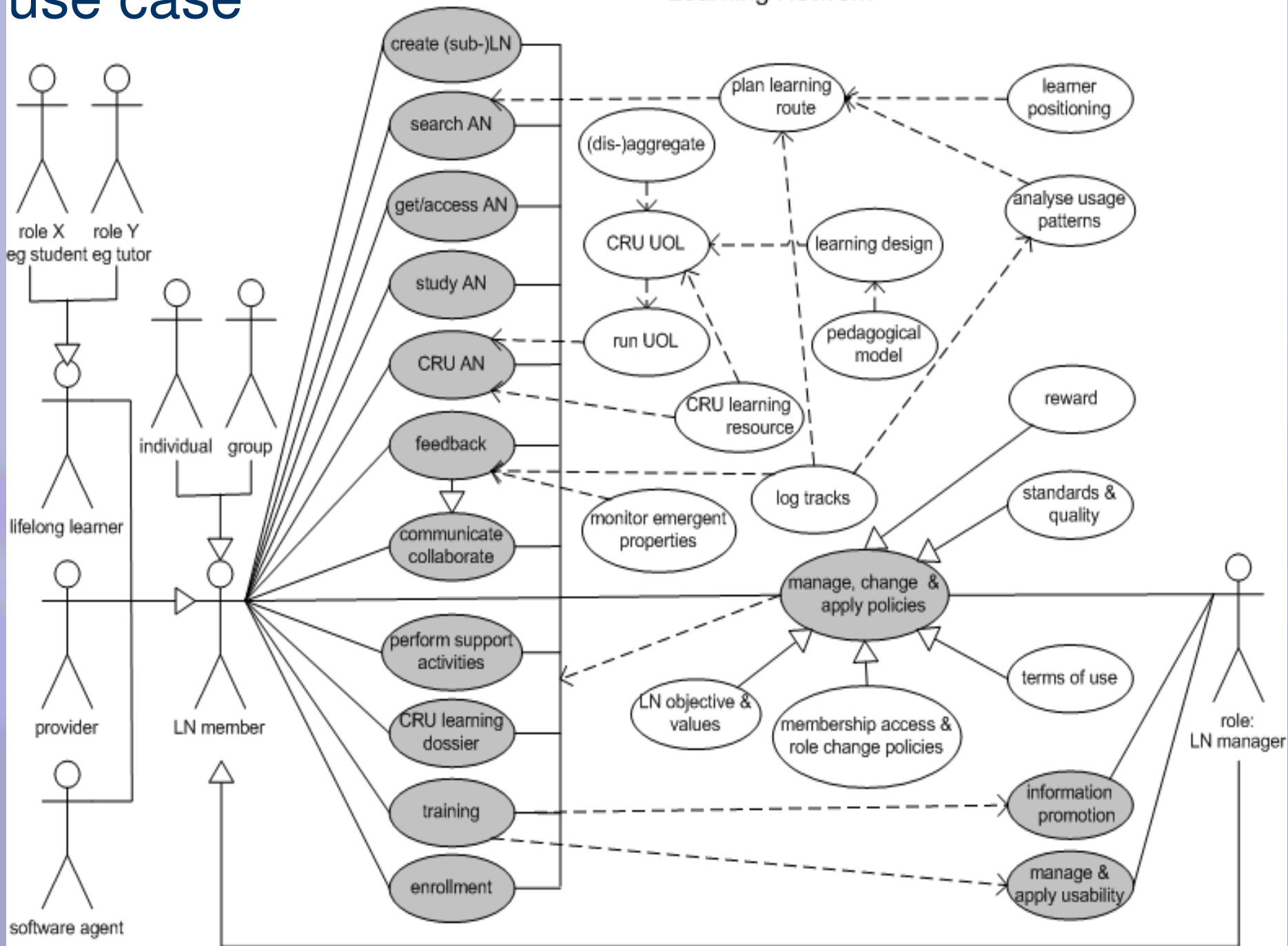
use case

Learning Network



use case

Learning Network

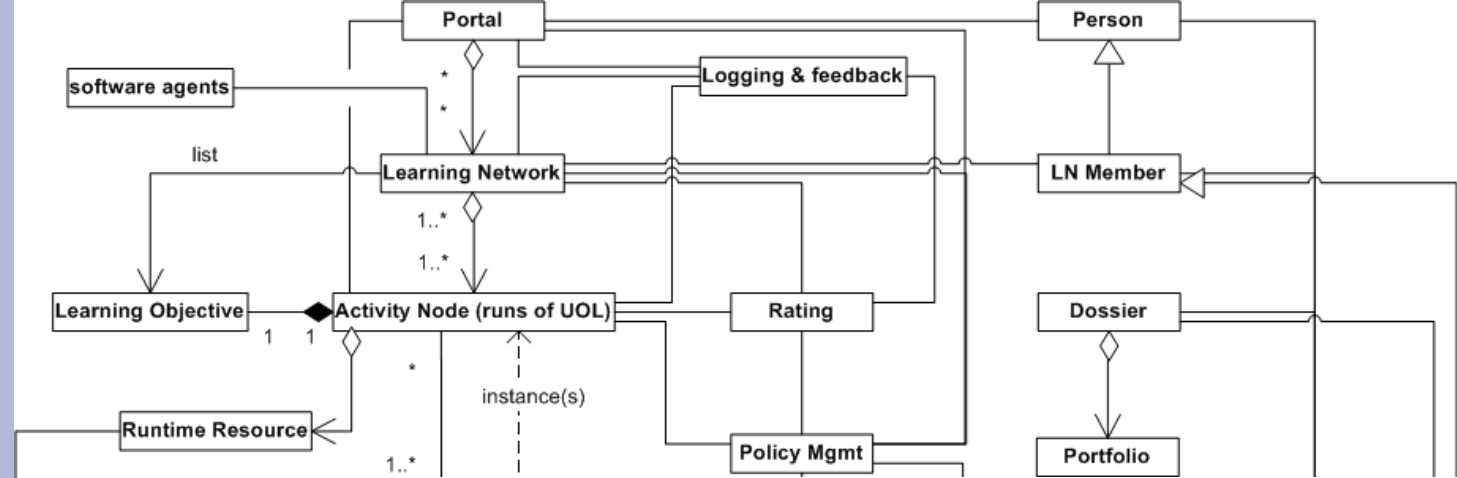


What are the functional components that can be identified in a Learning Network Infrastructure?

=> Architectural Model

Architecture

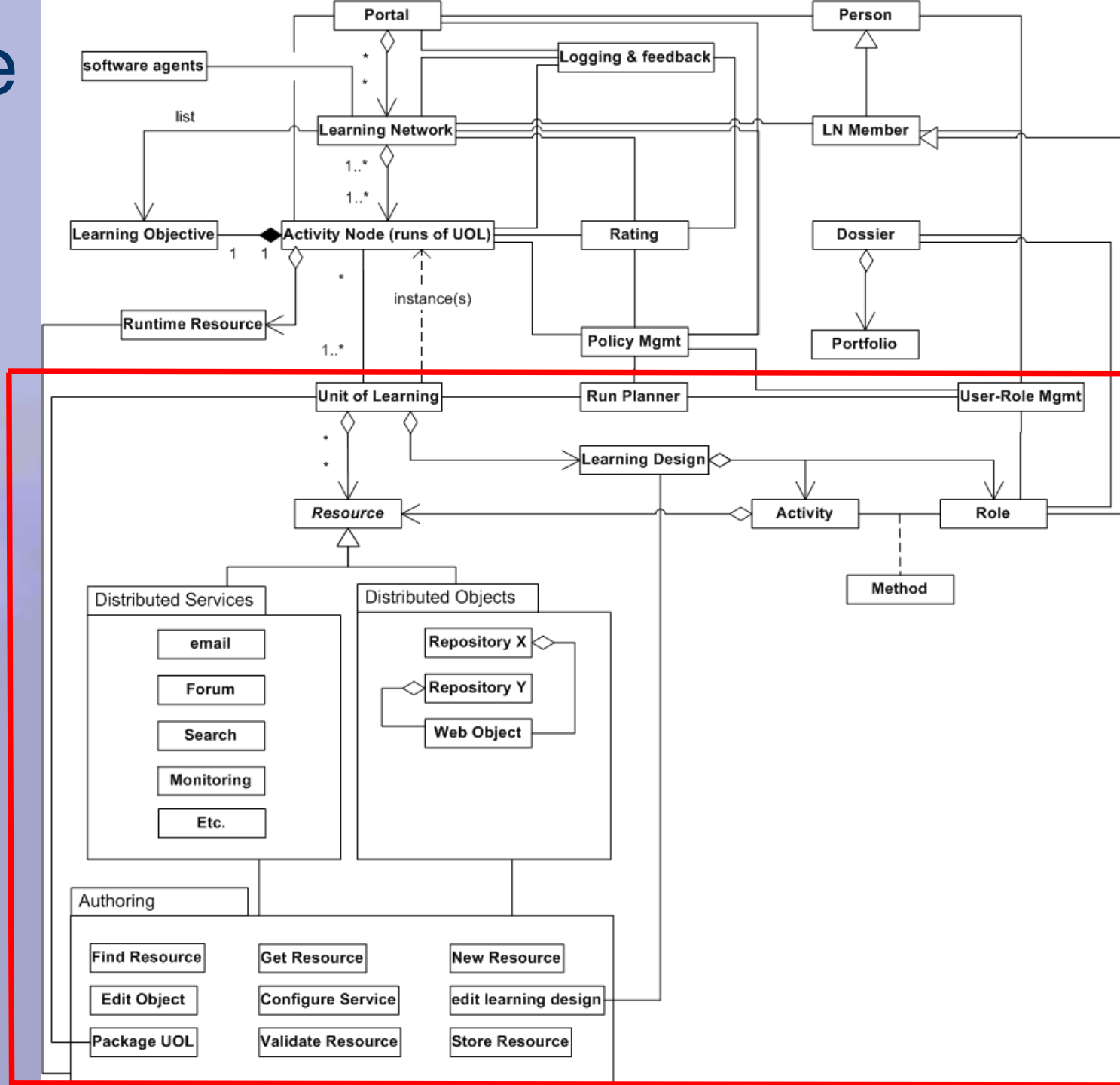
(see:
special issue
BJET
Technology
& Lifelong
Learning
Nov. 2004)



Architecture

(see:
special issue
BJET
Technology
& Lifelong
Learning
Nov. 2004)

LD tools



Three Core Issues in a Learning Network

1. How to **make & use** pedagogical well designed, interoperable and reusable units of learning in the LN?
2. How to **position** learners in a LN?
3. How to help learners to **navigate** in the LN?

ad 3. Now in more detail:
How to setup **Navigational** support
within a Learning Network

Navigation questions within LNs

- I want to know something more about topic X, is there an adequate unit of learning available?
- What is, for me, the best route to attain a certain learning objective (or certificate, diploma, ...)?
- I have done X and Y, what would you advise me to do next?
- ...

Problems with navigation in LNs

- In any field per definition a *very large number* of possible units of learning,
- of a *variable quality*
- The number of units of learning *change* rapidly over time
- Nobody has a real *overview* of actual quality, number of possibilities, ...

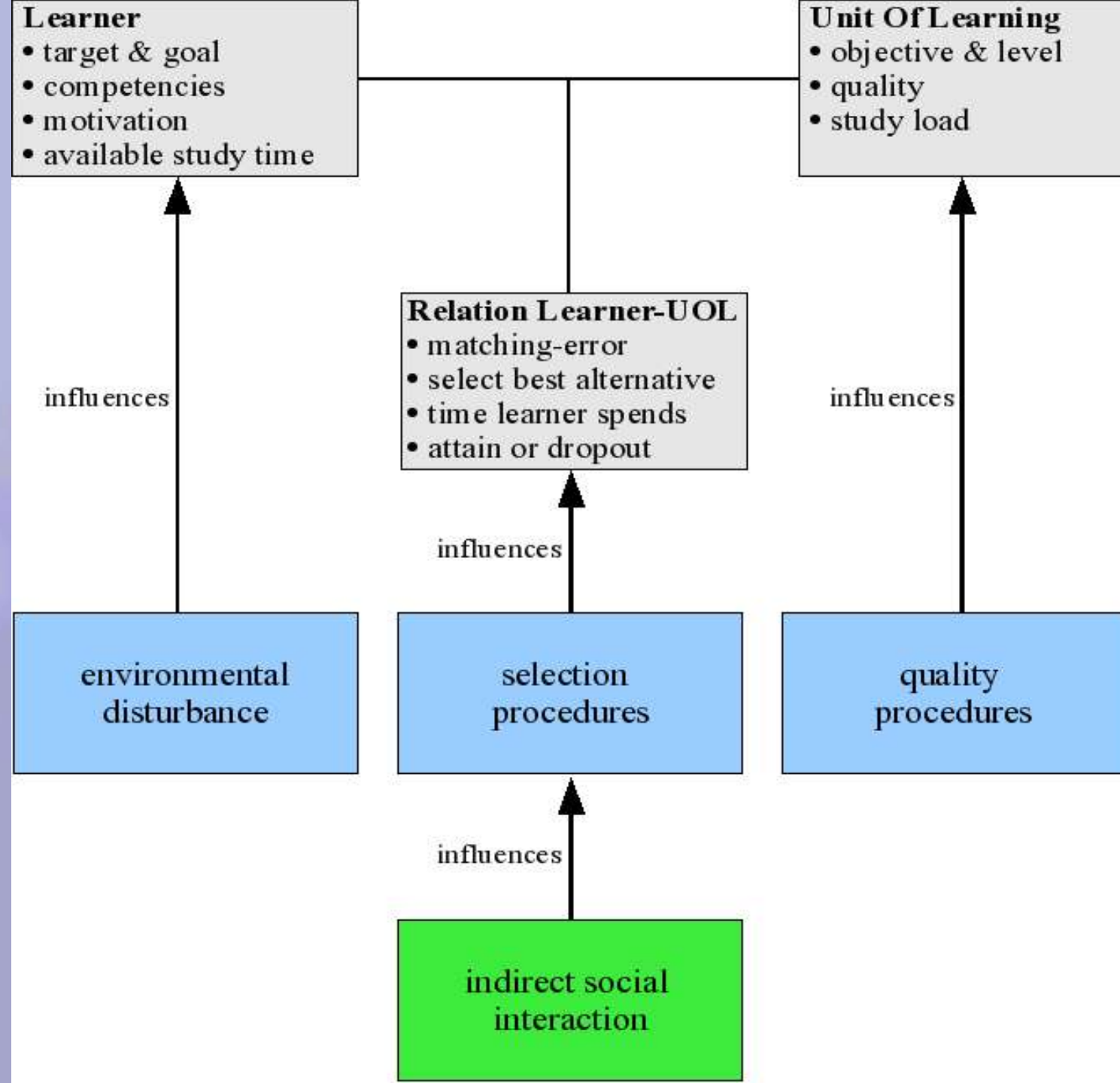
So,

How to Organize a Learning Network
under such constraints?

Our Approach

- Use of self-organisation principles from complexity theory, specifically principles of indirect social feedback ('stigmercy')
- Use of bio-inspired theories ('pheromones')
The paths of successful predecessors are used for advice

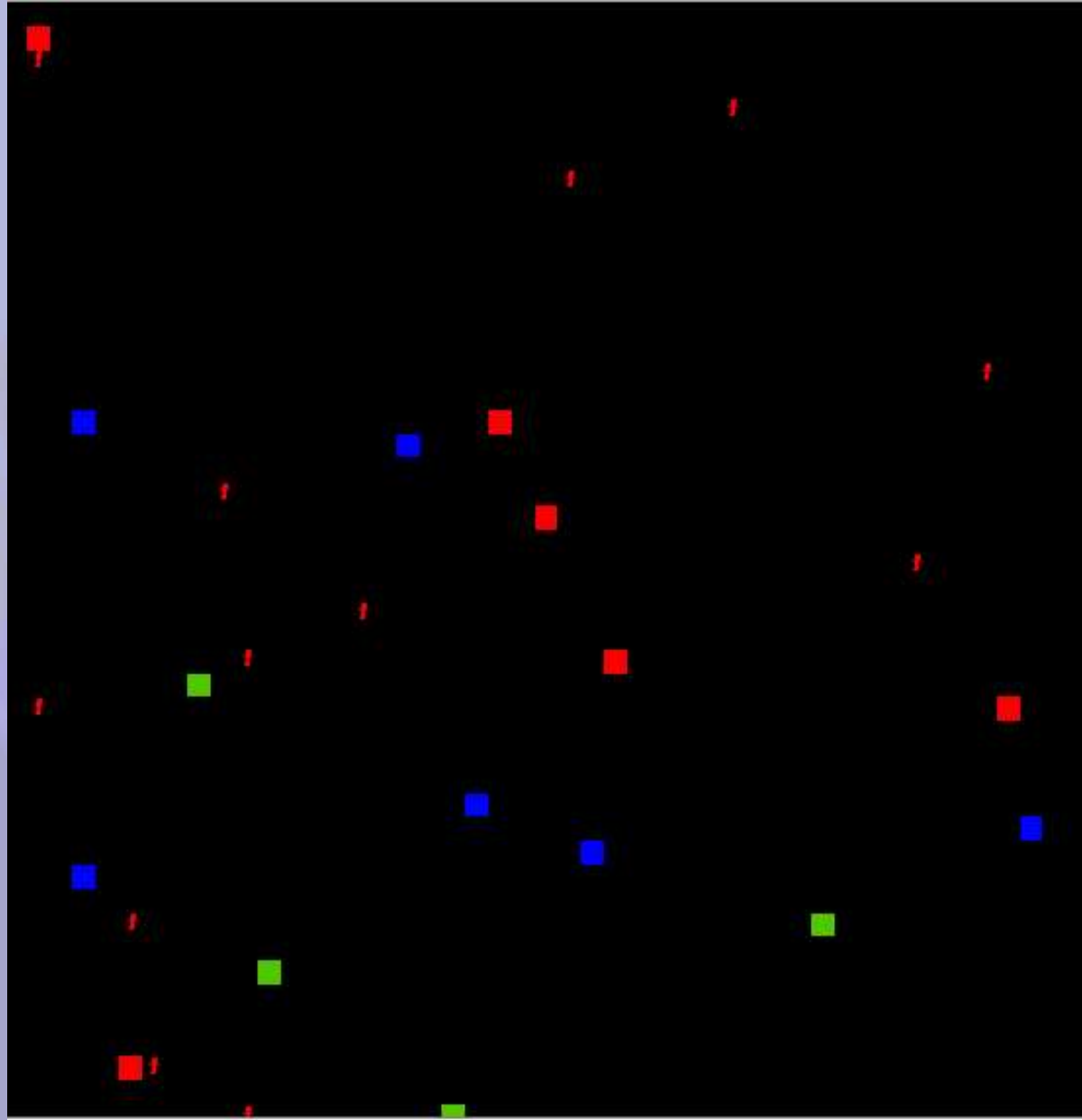
Model



Netlogo Simulation of a LN

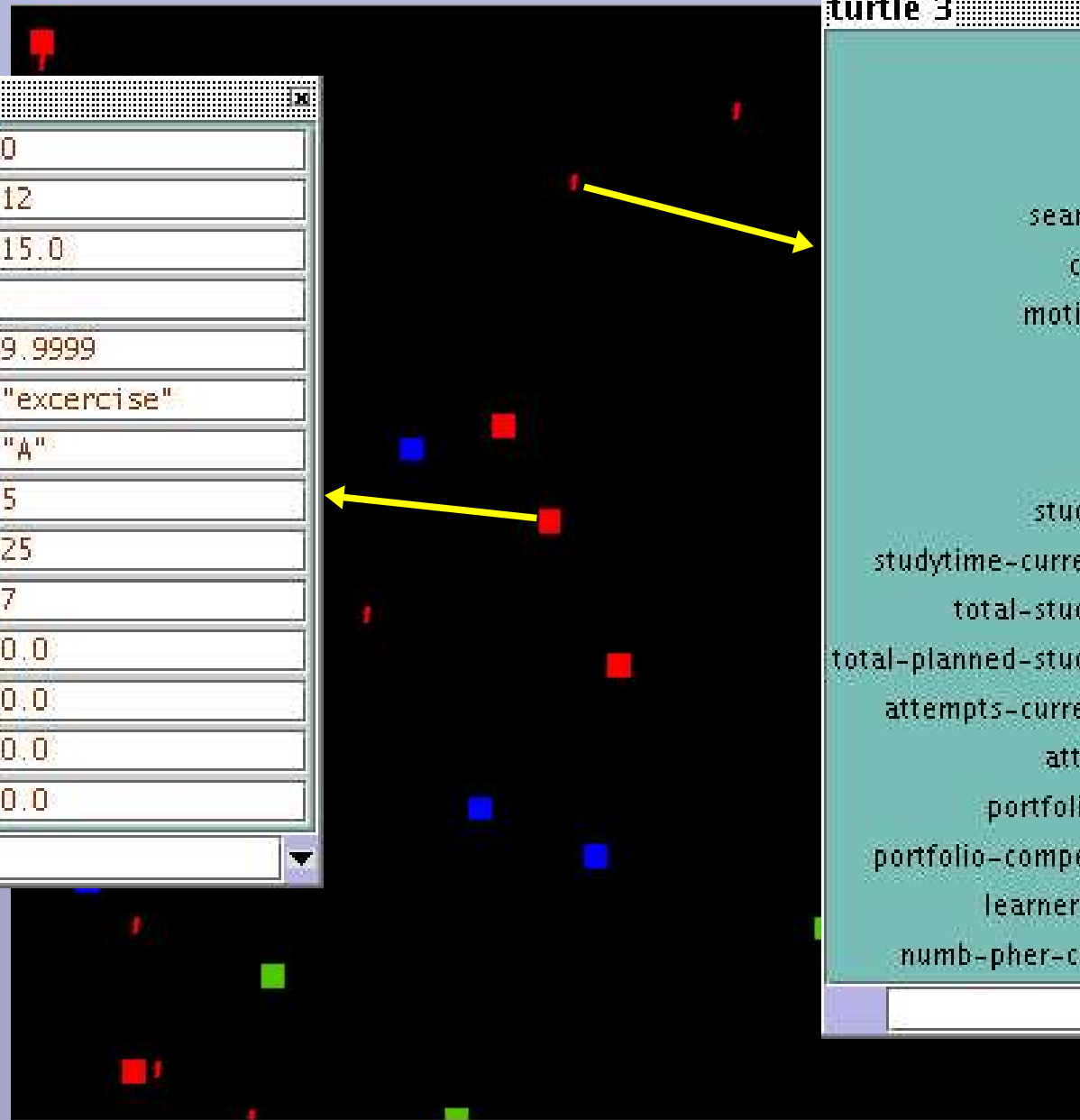
- Multi-agent simulation environment for research
- See Draft publication in handouts

Learners + Units of Learning in a LN



Properties

patch 0 12	
pxcor	0
pycor	12
pcolor	15.0
plabel	
plabel-color	9.9999
an-type	"exerci se"
an-objective	"A"
an-level	5
an-studytime	25
an-quality	7
an-student-contribution	0.0
an-number-started	0.0
an-number-succeeded	0.0
an-avg-studytime	0.0



turtle 3	
goal	[["B" 2]]
target	["B" 2]
to-do	0.0
search-an	["B" 2]
current	"searching"
motivation	.4727094179075353
cl-a	0
cl-b	1
cl-c	1
studytime	15
studytime-current-an	0
total-studytime	4.681044239829234
total-planned-studytime	45.0
attempts-current-an	0
attempts	1.0
portfolio-ans	[[-12 -7]]
portfolio-competence	[["B" 1]]
learner-costs	209.0
numb-pher-choices	0.0

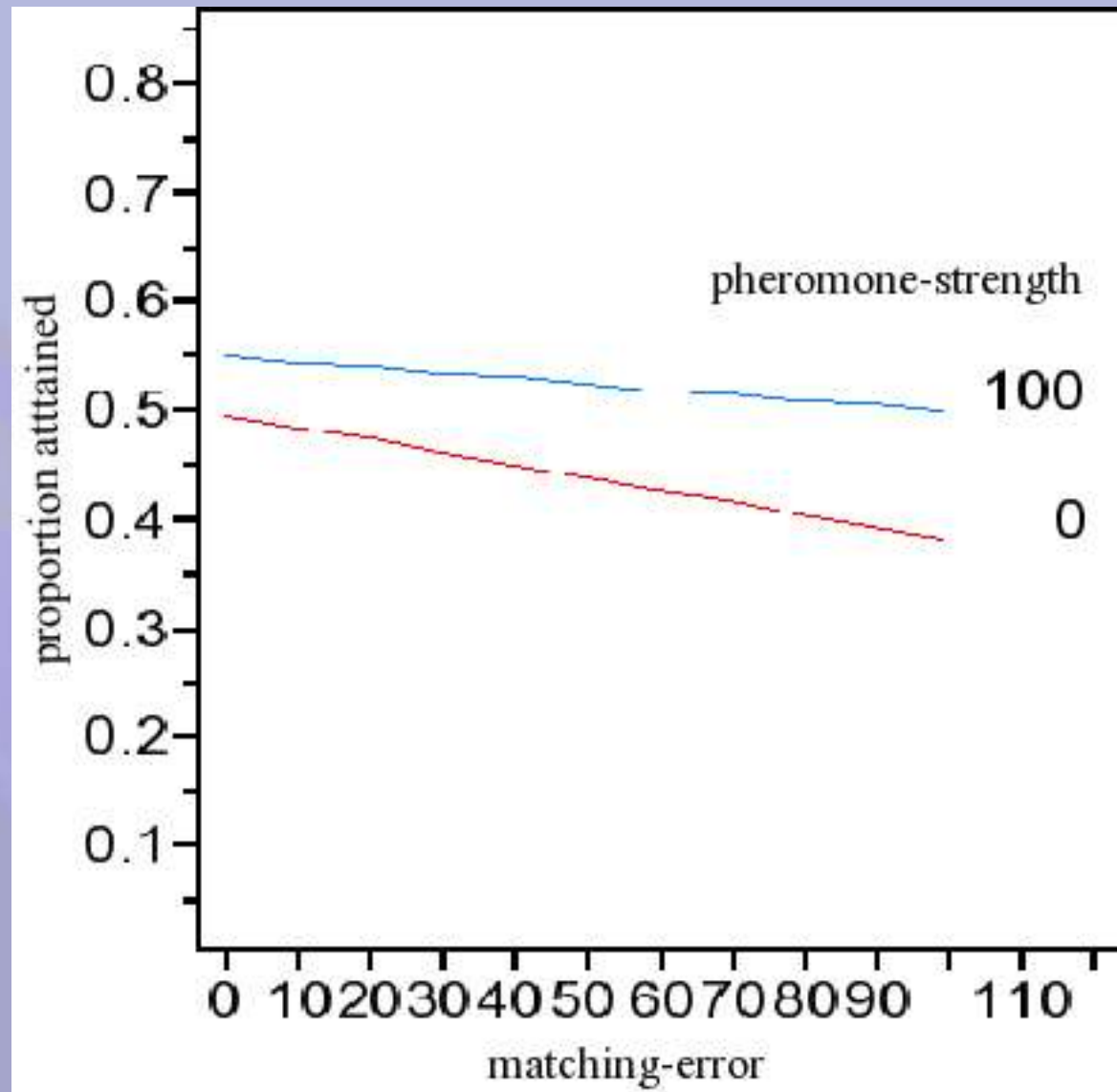
One of the Experiments with the Simulation

- Problem: what is the effect of indirect navigational feedback on study success (number of students that attained objective)?
- 2^4 factorial design:
 - pheromone strength (0 or 100%)
 - matching error (0 or 100%)
 - disturbance in learner environment (0 or 100%)
 - quality of the unit of learning (0-100% or 100%)
- N=12 replications in every condition
- Every replication runs 260 simulation weeks (5 years). In total 49920 week cycles (runs about 10 hours on fast computer)

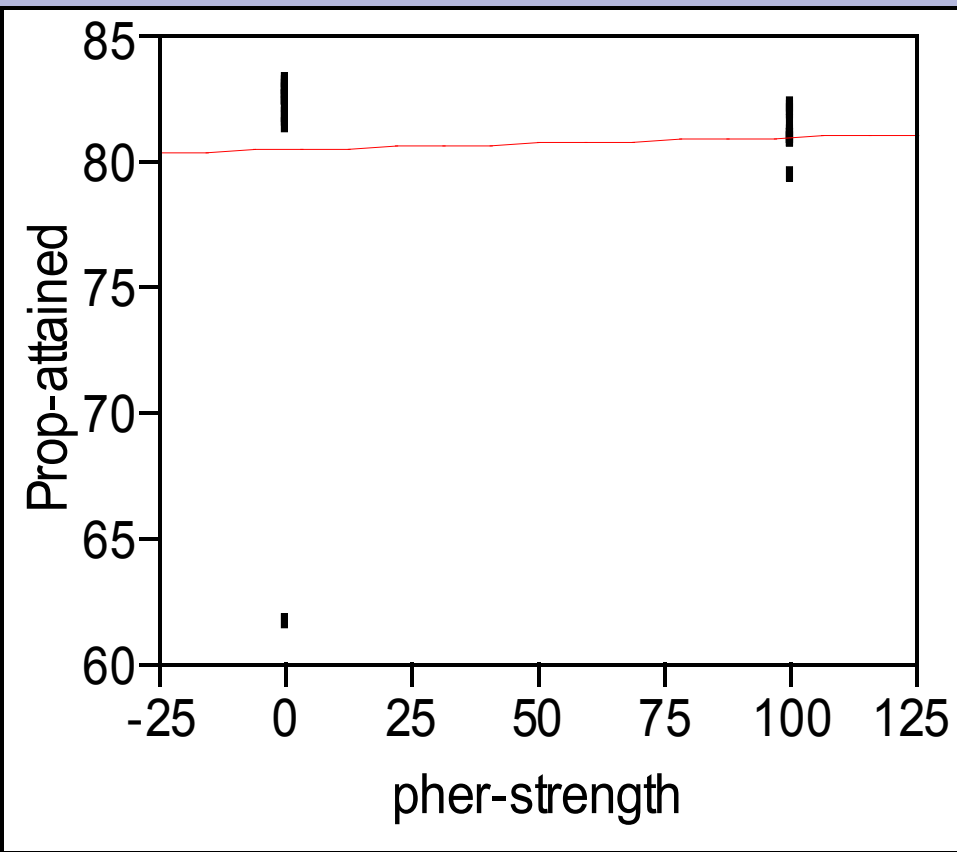
Outcome

- All main effects significant + interactions:
pher-strength * matching error
pher-strength * quality of unit of learning

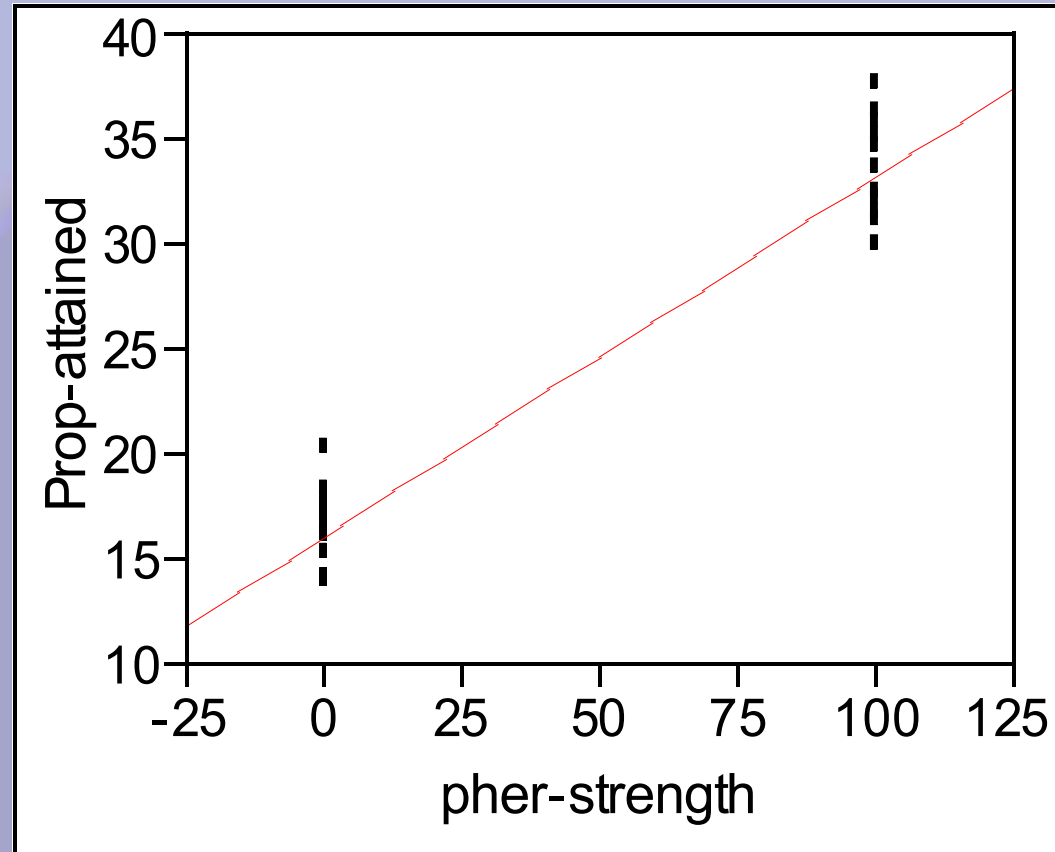
Interaction Pher * Matching-error



best versus worst case



no matching error, 100% quality
and no disturbance ($F = 0.7816$)



100% matching error, 0% quality
and 100% disturbance ($F = <.0001$)

Outcome

- Overall influence Pheromones: 9% increase in proportion of students who attained their objective
- Matching-errors are compensated by pheromones
- Some quality variance is compensated by pheromones

(more details: see draft paper)

Thank You

More info:

www.learningnetworks.org

dspace.ou.nl