Learning Networks for Lifelong Learning

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

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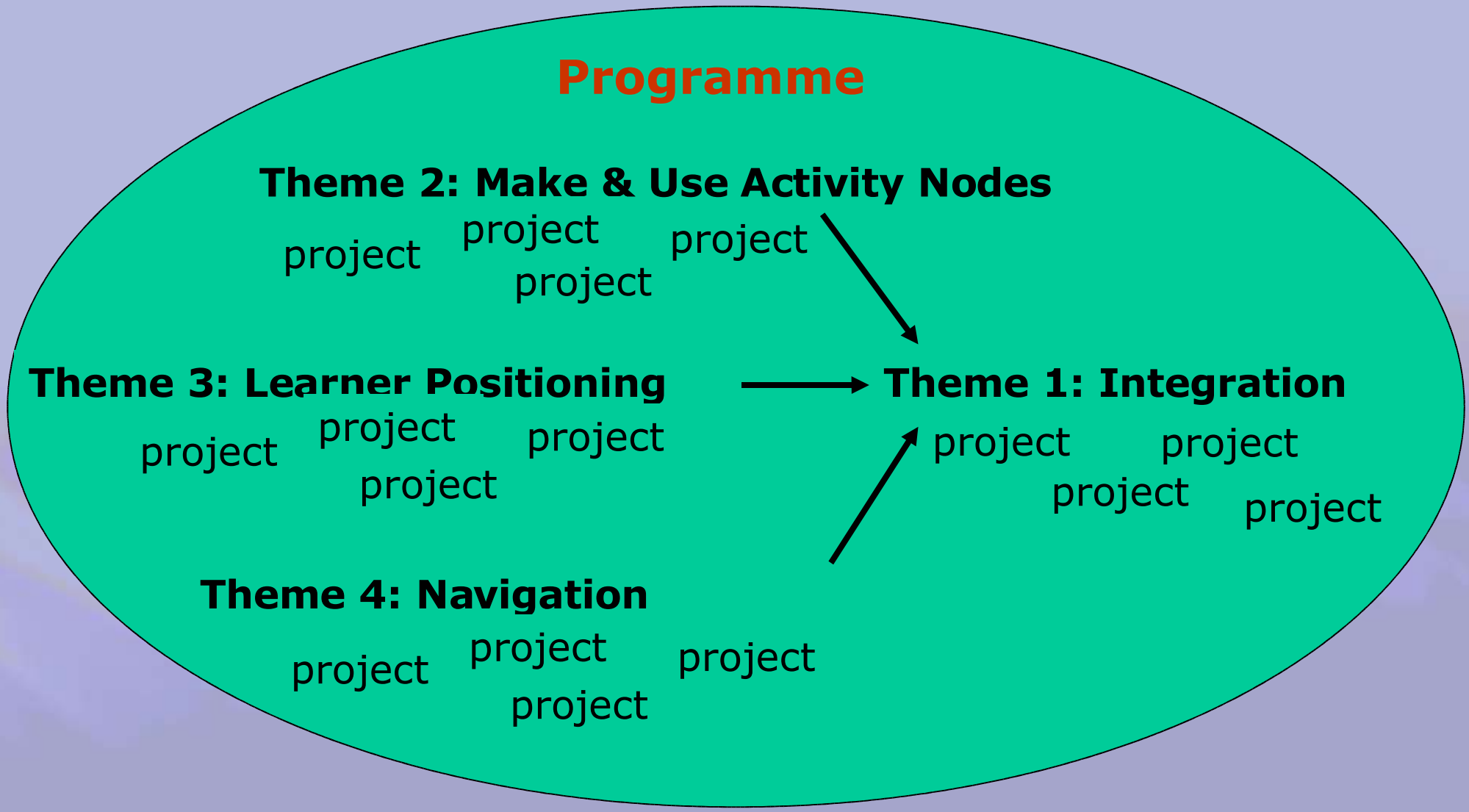
Content

- Background: Learning Networks Programme
- More in detail:
  Model and Simulation of a LN:

  “Increasing Learner Retention in a Simulated Learning Network using Indirect Social Interaction”
  (draft article)

Programme Learning Networks for Lifelong Learning

- Internal OUNL/OTEC programme 2003-2008, with additional external funded projects
- Aim: development of new learning technologies to support lifelong learning
- Major outcome types:
  - models and theories
  - specifications of learning technologies
  - prototypes of new technologies
- Dissimination via: publications, open source channels (sourceforge), specification bodies


Programme
Theme 2: Make & Use Activity Nodes
project
project
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Theme 3: Learner Positioning
project
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Theme 1: Integration
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Theme 4: Navigation
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Learning Networks for Lifelong Learning

A learning network is a *group of persons* who *create, share, support* and *study* learning resources ('*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 resources**
- 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

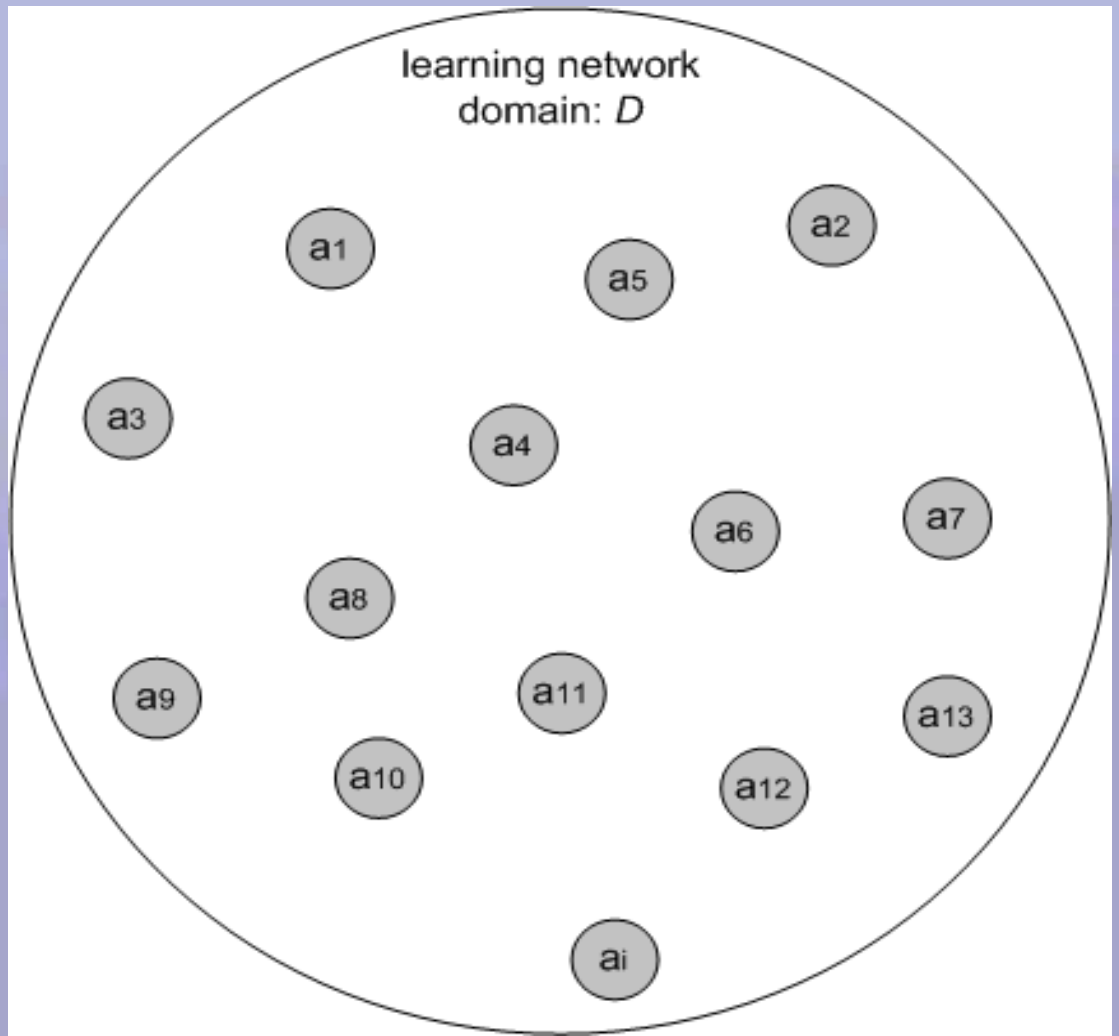
How to realise Learning Networks for Lifelong Learning?

Several views of a Model of a Learning Network

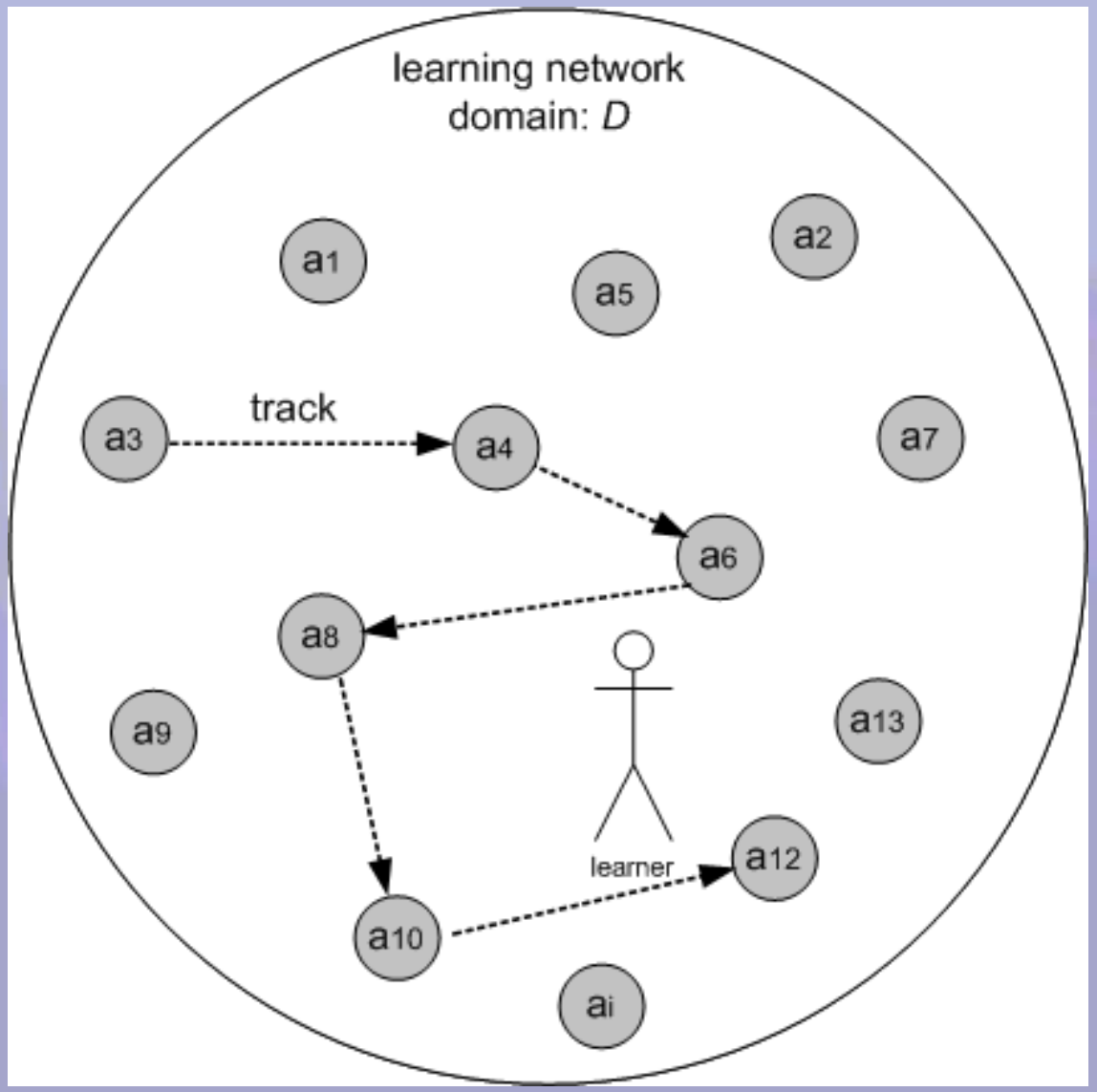
- Learning Network modelled as a Graph
- Use Case Model
- Architectural Model

Graph Representation of a LN

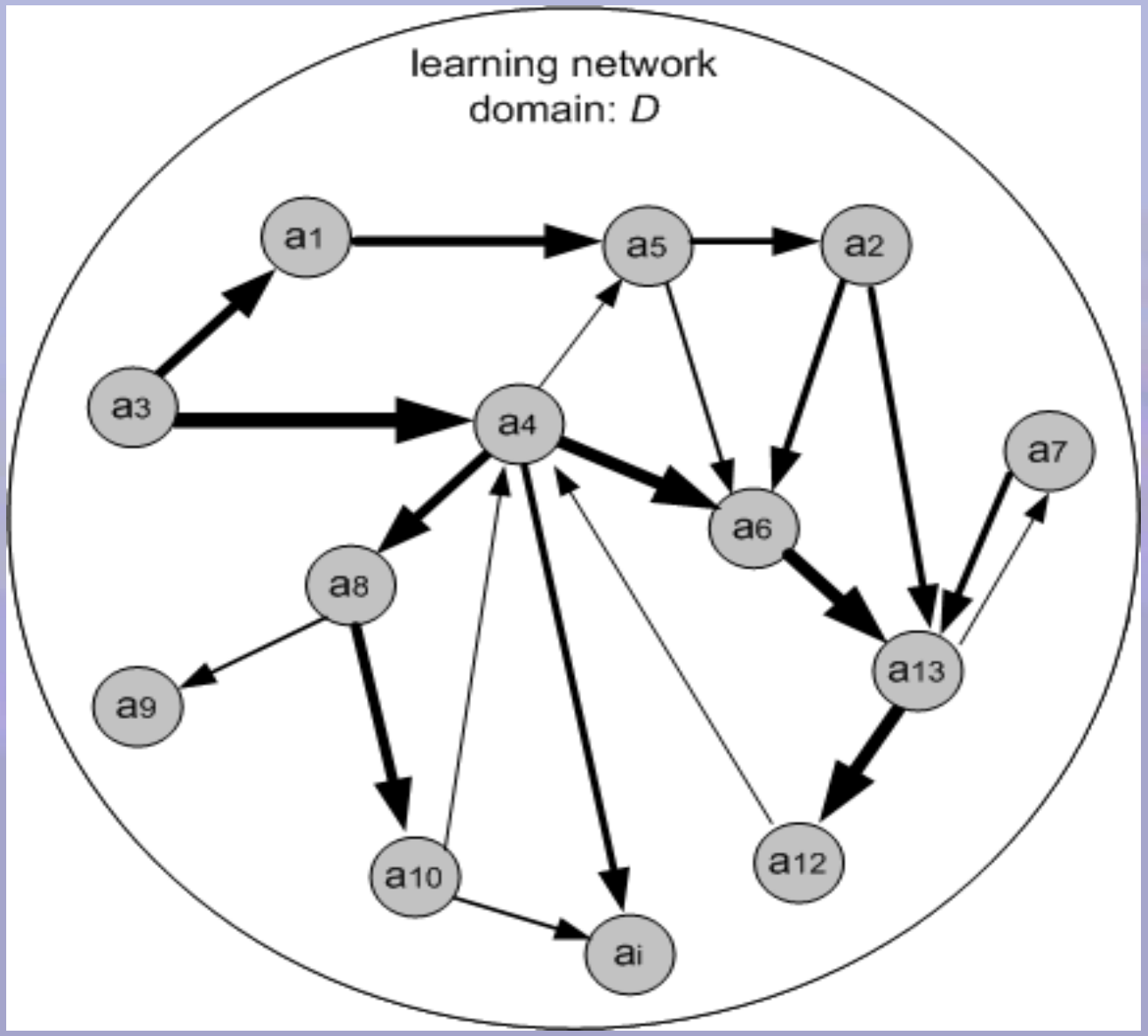
A *learning network* can be represented as a graph of '**activity nodes'** (runs of units of learning) within some knowledge domain



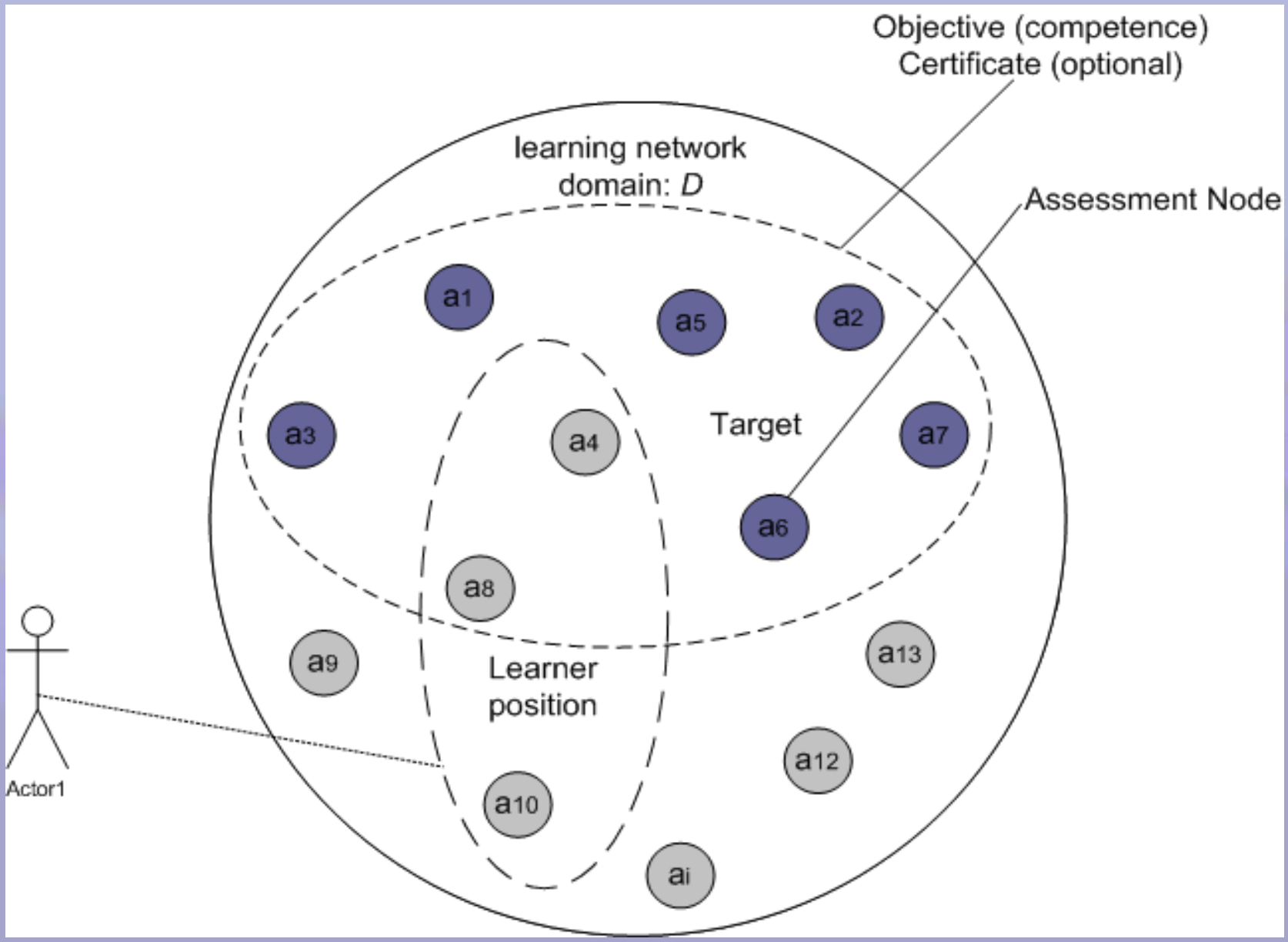
LN Graph with a learner track



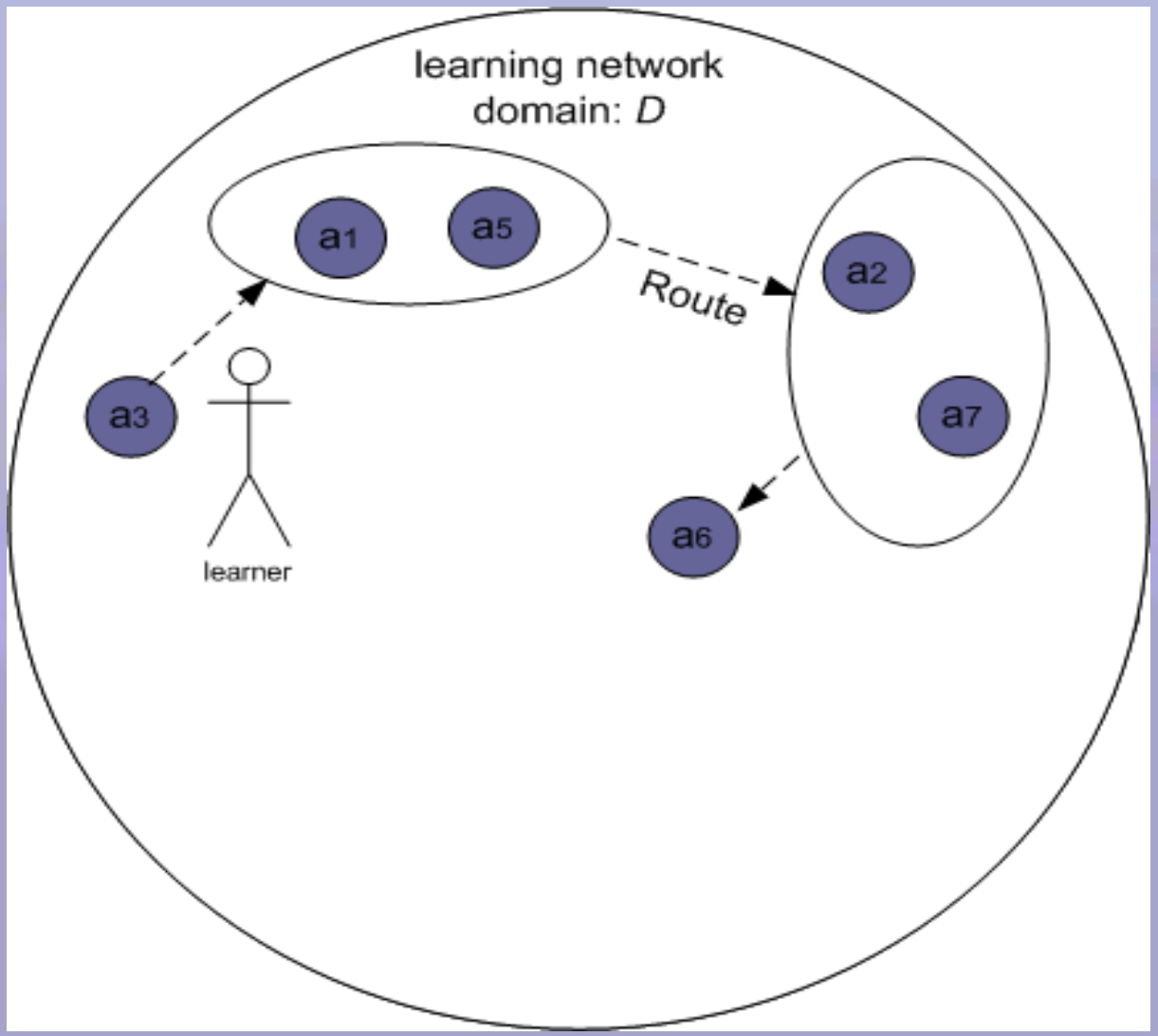
Patterns of Collective Tracks Emerge



Learner Positions and Objectives



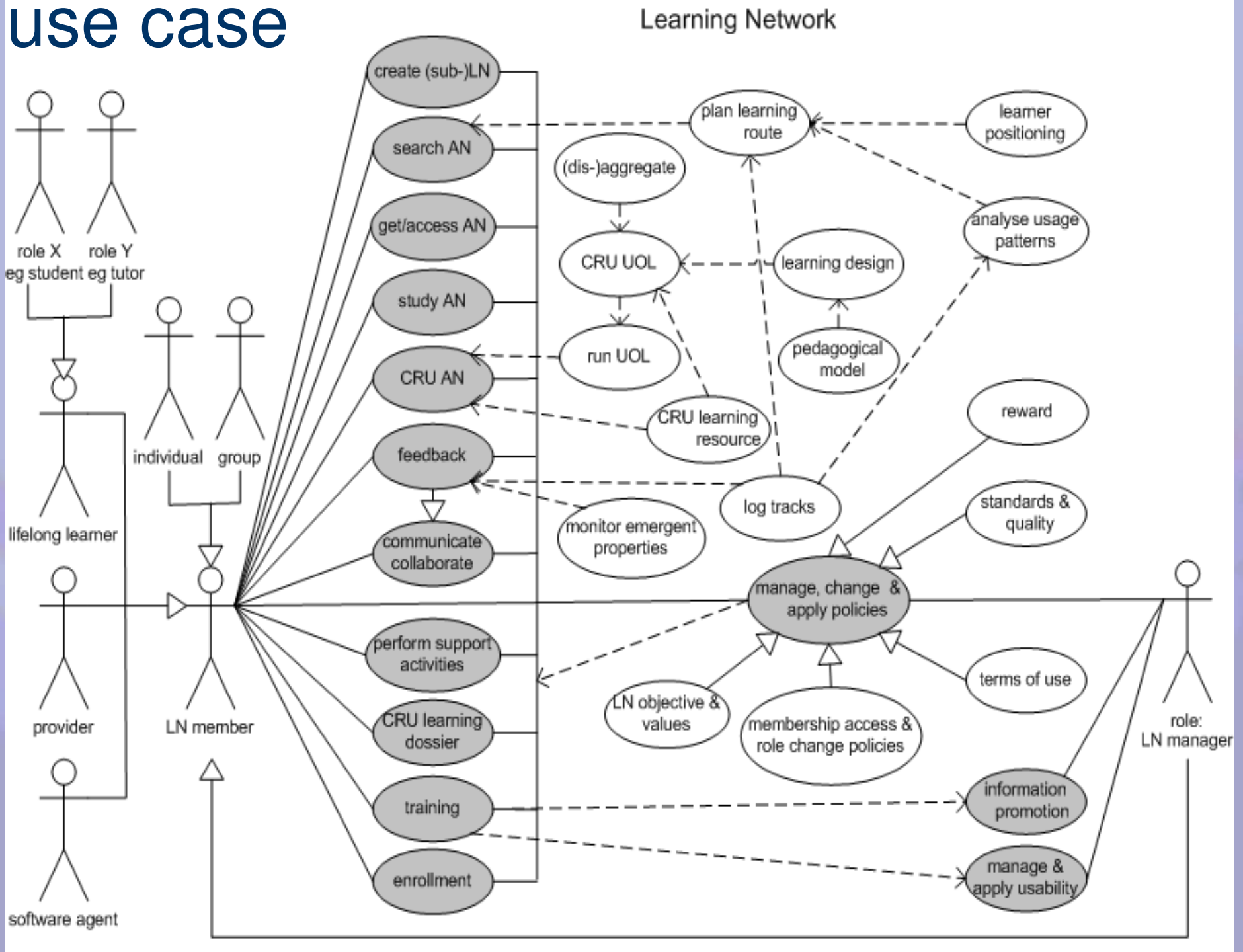
Planned Learner Routes ("curriculum")



What activities do users perform in a Learning Network?

=> Use Case Model

use case

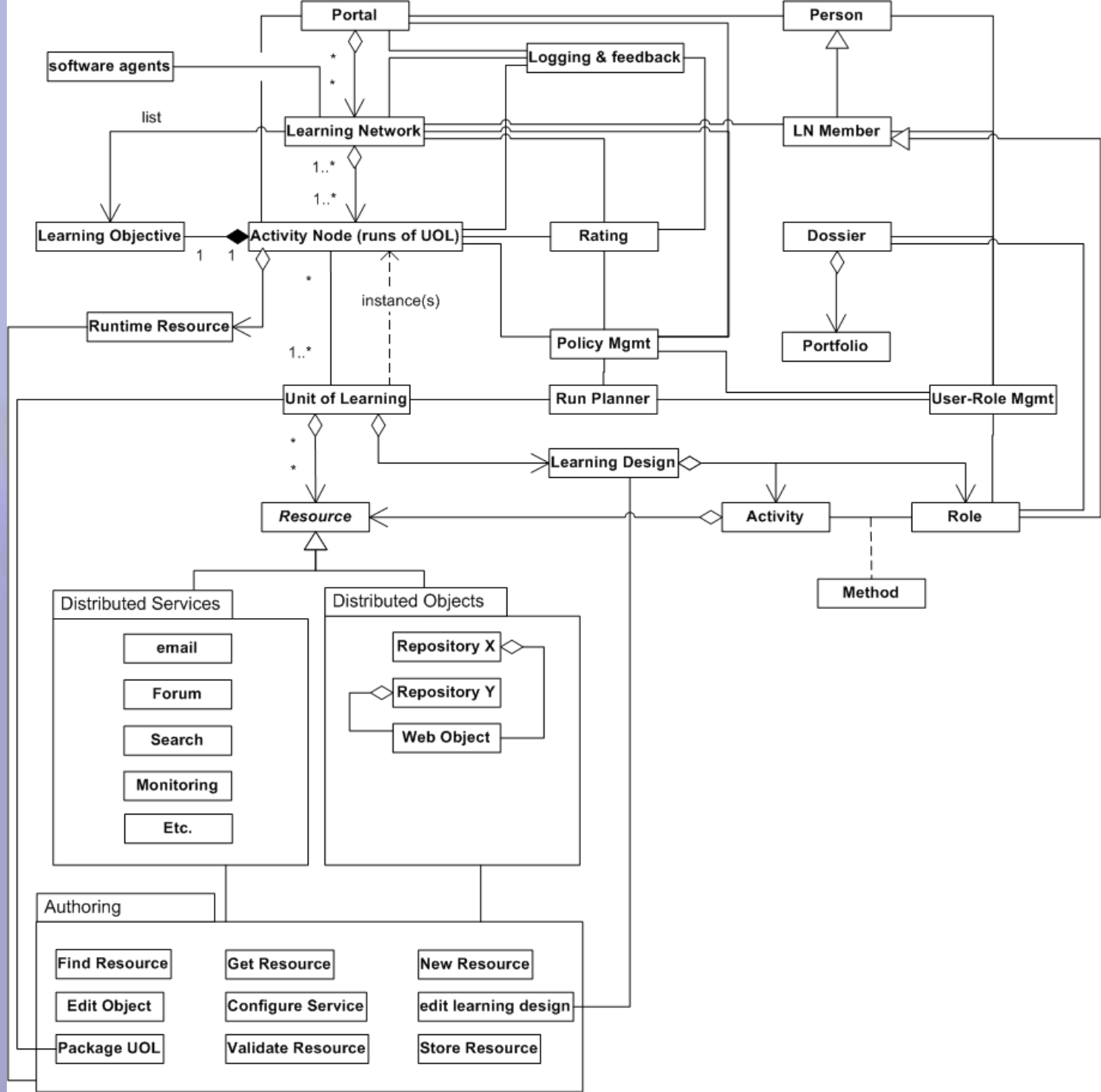

Learning Network
role X
eg student
role Y
eg tutor
individual
group
lifelong learner
provider
LN member
software agent
create (sub-)LN
search AN
get/access AN
study AN
CRU AN
feedback
communicate collaborate
perform support activities
CRU learning dossier
training
enrollment
plan learning route
(dis-)aggregate
CRU UOL
run UOL
CRU learning resource
monitor emergent properties
learning design
pedagogical model
learner positioning
analyse usage patterns
reward
log tracks
standards & quality
manage, change & apply policies
terms of use
LN objective & values
membership access & role change policies
information promotion
manage & apply usability
role: LN manager

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)



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 1. Make & Use Units of Learning

- **IMS Learning Design** is used to model the units of learning within the LN
- **User-friendly Tools** editing, cm, runtime
- **Quality mechanisms** to support the building and identification of high quality units of learning
- **Community Policies** to stimulate authoring, use and reuse
- ...

Variety of Projects in the Programme (ASA, Alfanet, CopperCore, Unfold, Telcert, Jisc/open framework project)

ad 2. Learner Positioning

- Interoperable, secure **ePortfolios**
- **Assessment** issues (e.g. of informal required competences)
- **Mapping** of competences of individuals between different, but comparable learning networks
- Formal **accreditation** and examination issues
- **We are looking at**: integrative test framework, renewal, extension of QTI, LSA to support positioning

Projects: testing framework, revision QTI in IMS

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

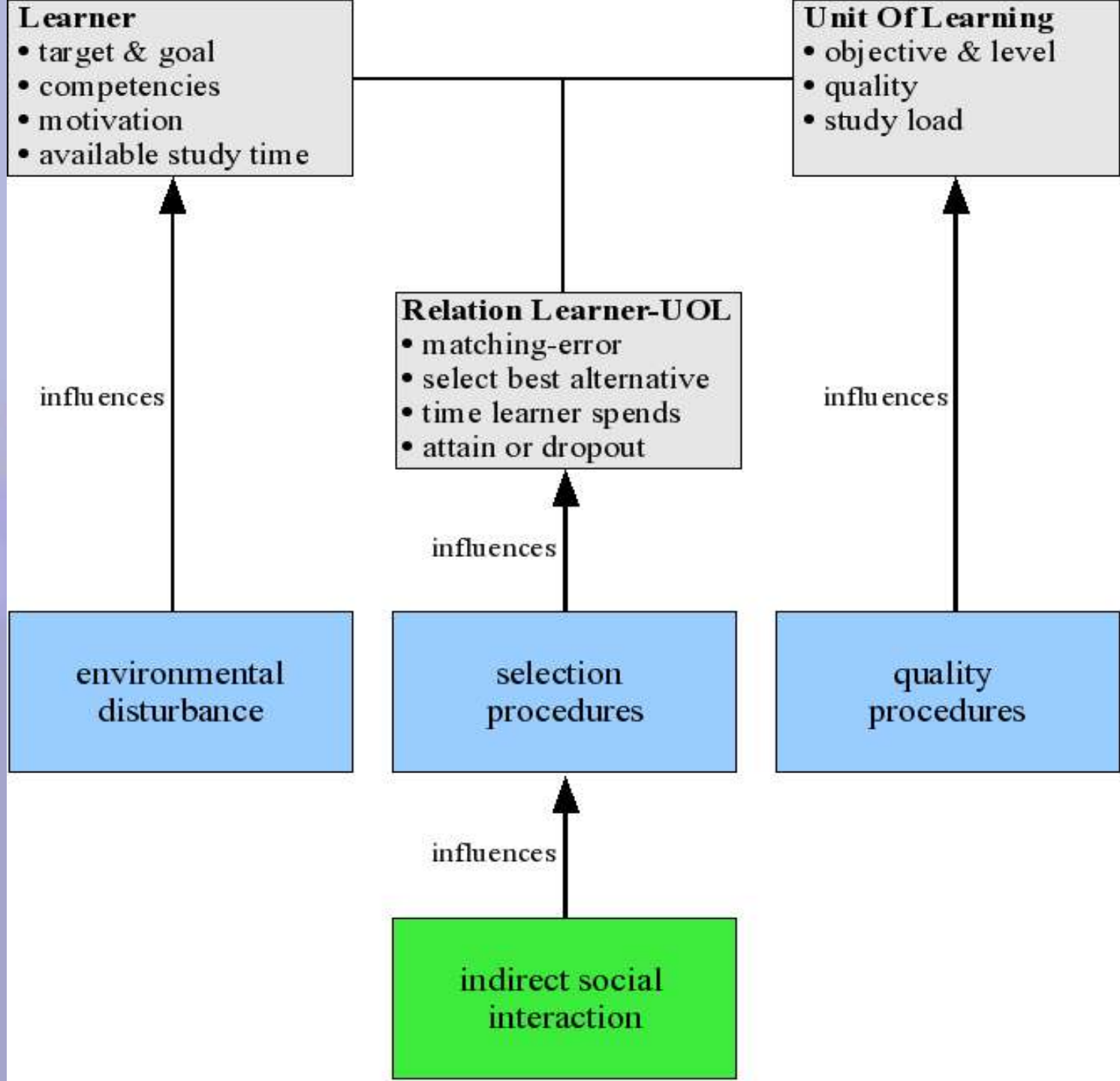
- In any field per definition a very *large number* of possible units of learning,
- of a *variable quality*
- The number of units of learning *change* rapidly over time
- Nobody has a real *overview* of actual quality, number of possibilities, ...

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

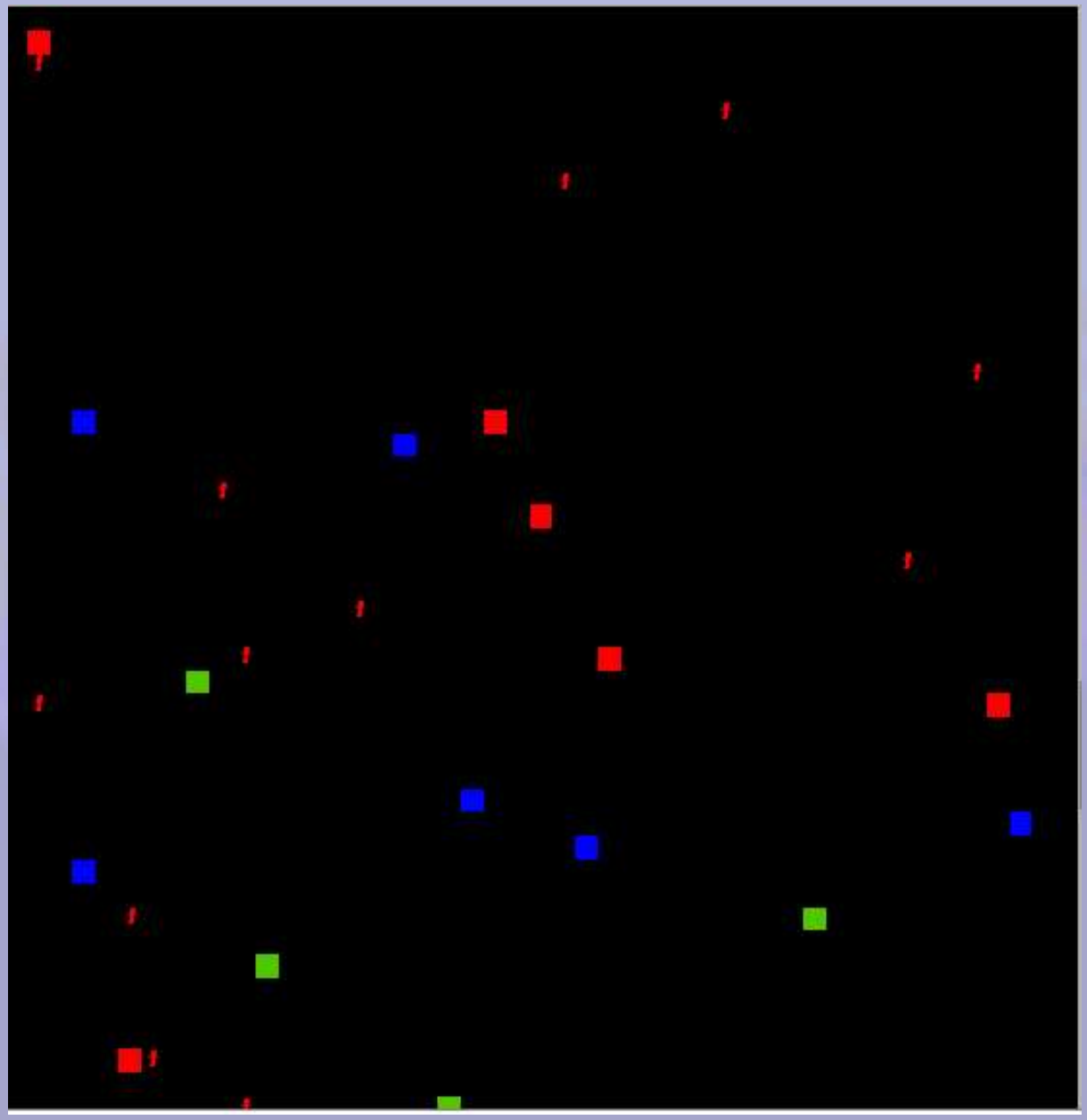
Model


Learner
• target & goal
• competencies
• motivation
• available study time
Unit Of Learning
• objective & level
• quality
• study load
Relation Learner-UOL
• matching-error
• select best alternative
• time learner spends
• attain or dropout
influences
influences
influences
influences
environmental disturbance
selection procedures
quality procedures
indirect social interaction

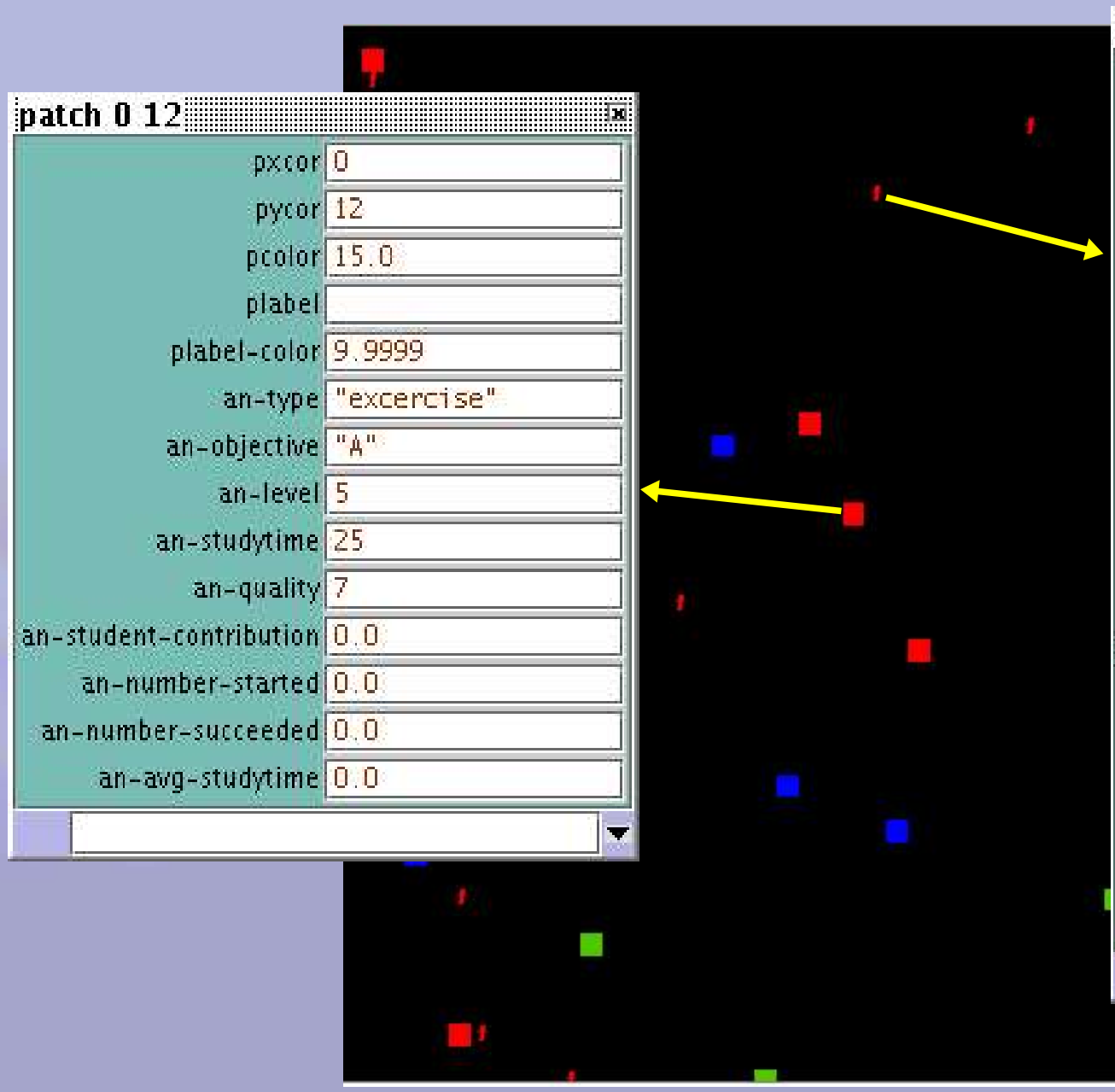
Netlogo Simulation of a LN

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

Learners + Units of Learning in a LN



Properties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pycor 12
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plabel-color 9.9999
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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
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target ["B" 2]
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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
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portfolio-competence [["B" 1]]
learner-costs 209.0
numb-pher-choices 0.0

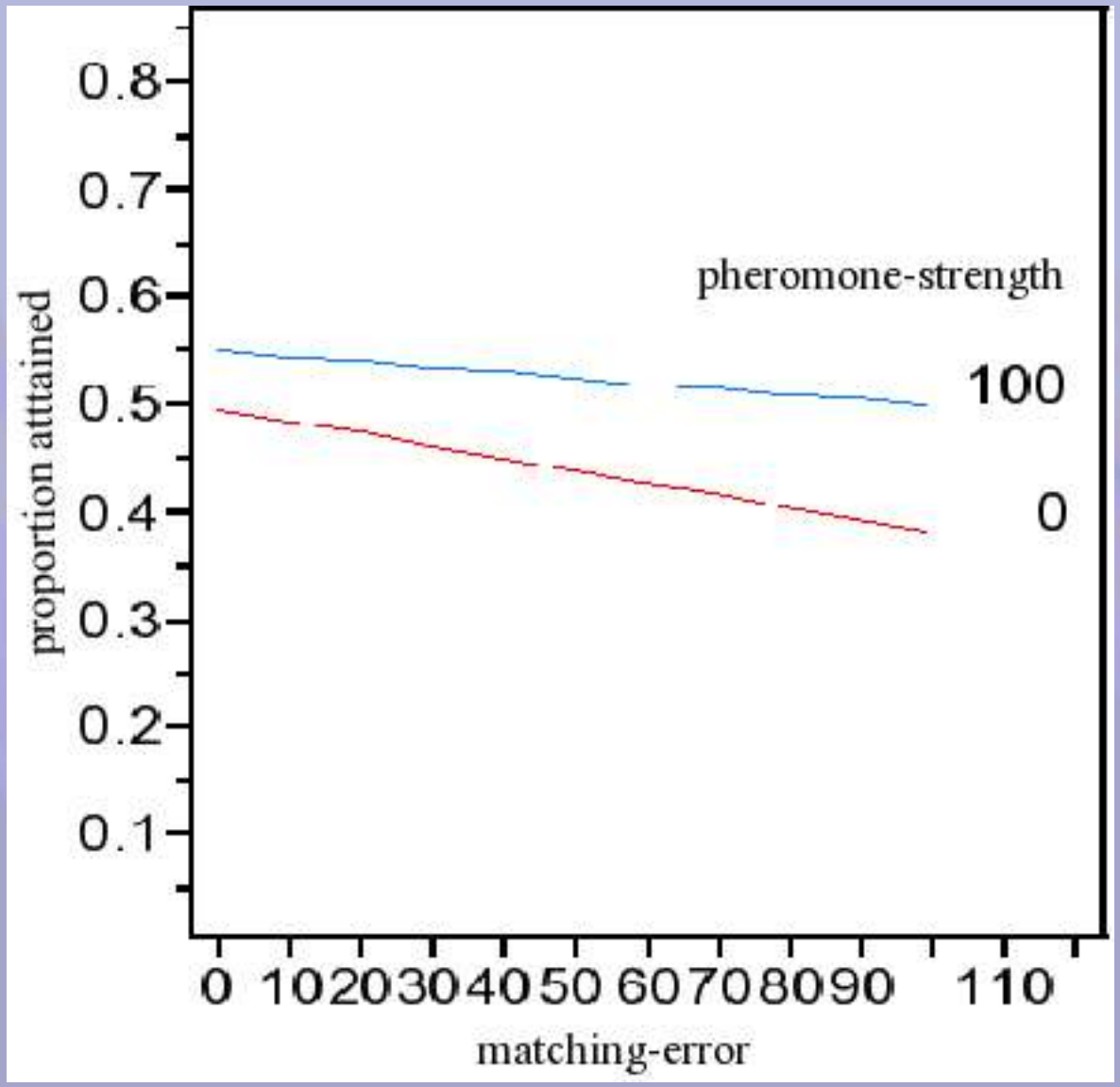
One of the Experiments with the Simulation

- 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)

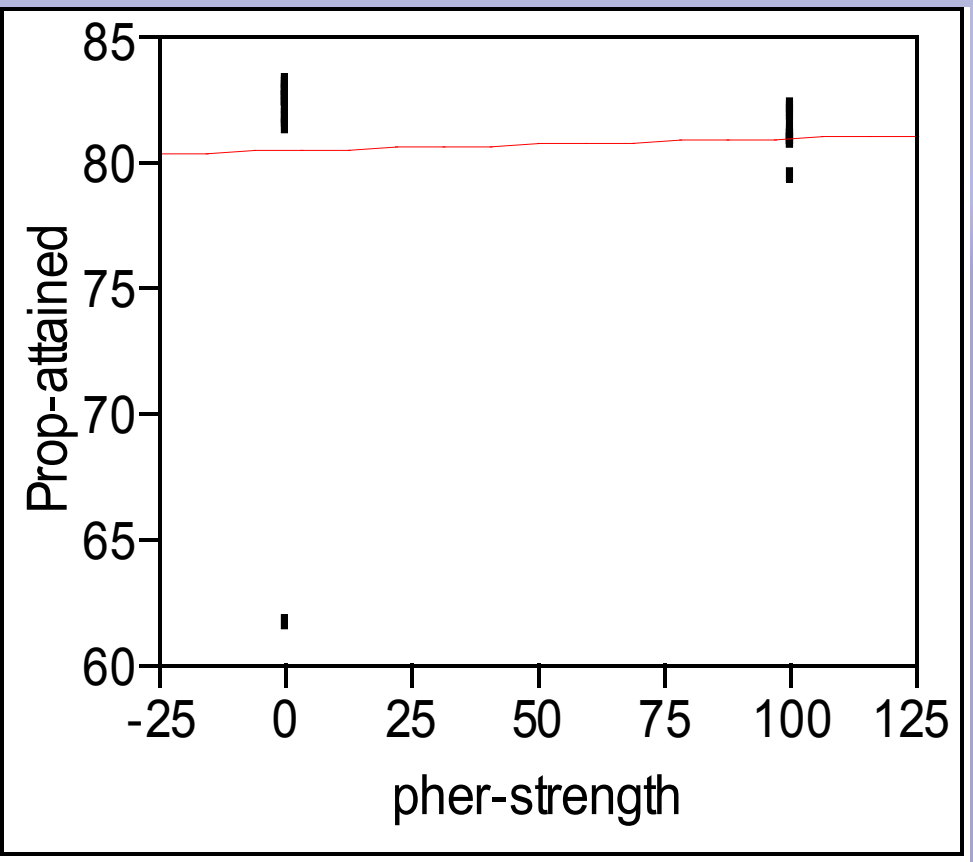
Outcome

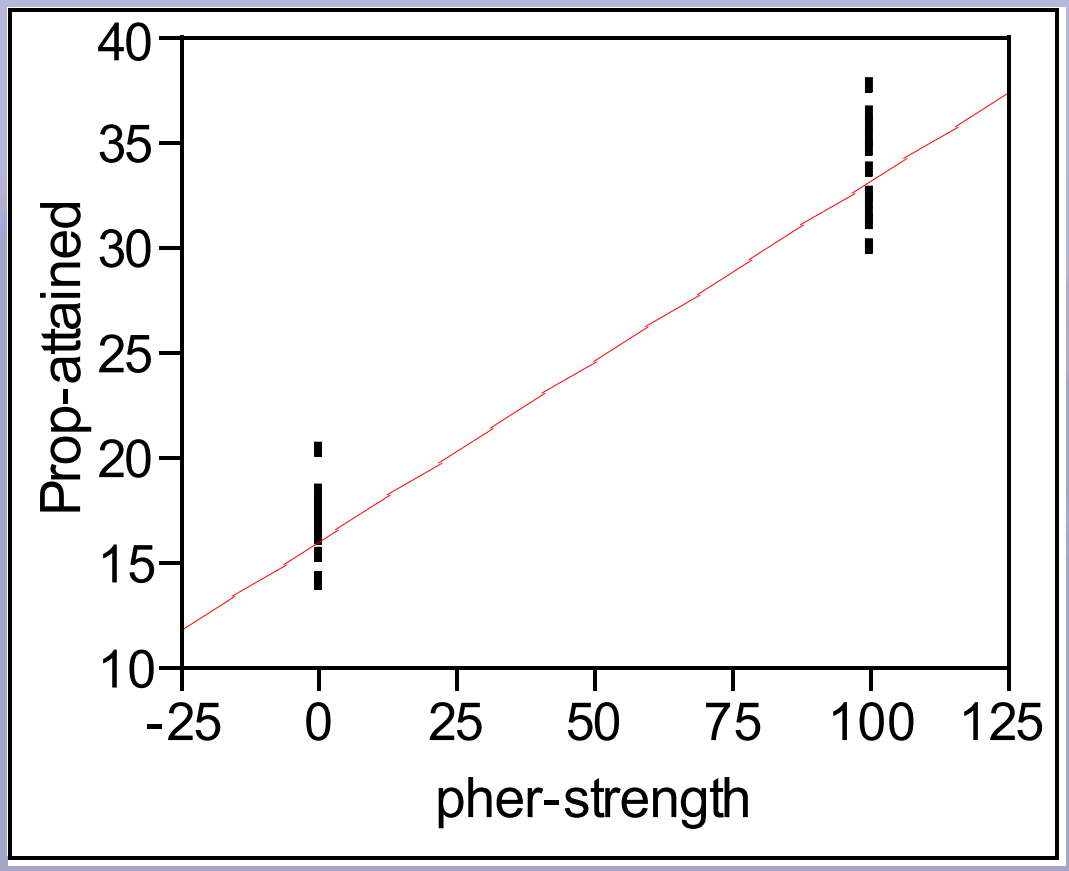
- All main effects significant + interactions:
  pher-strength * matching error
  pher-strength * quality of unit of learning

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