

Organisational Issues in e-Learning

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Content

- Summary of current problems in e-learning
- Focus: future perspective of e-learning
- Reframe e-learning agenda to establish future: “Learning Networks for Lifelong Learning (LN)”
- What are LN & identify key issues
- How to develop LN (requirements, architecture)
- How to organise LNs
- Simulation model of a LN and demonstration of self-organisation issues (indirect social feedback)
- Look very briefly at two implementations

Conference Summary

Current Problems in e-learning

- lack of good e-learning models & theories
- lack of sound pedagogical approaches
- still a lot of non-interoperable solutions (lock-in)
- lots of issues with LOs and metadata
- lack of sustainable approaches
- e-learning still seen as additional to the regular educational strategies of institutions instead of part of their core-business
- teaching staff is not well enough informed/trained (slaves of technical solutions)
- ...

We need a more balanced, integrated and validated approach

- **Balance and integrate:**
 1. Pedagogical issues
 2. Technical issues
 3. Organisational issues

=> multidisciplinary team approach needed
- Develop better, **user-friendly tools** for all actors
- Take enough time for **experimentation** with the models and tools before implementing it at a large scale (developmental approach)
- Develop learning and teaching “**models**” that solve real world problems and can be implemented in practice in a sustainable way

Think “out of the box” for the new e-learning models

- Need to re-frame the landscape of education in terms of support for **lifelong learning**
- **Connect** learners, experts, teachers **across the borders** of schools, work, countries, cultures, etc. in order to stimulate learning and provide multiple & wider perspectives
- Use learning technologies in a sensible way, not monopolising any one of them (use a proper and rich **integrated mix of media**)

Rethink:

What are we doing in
the e-learning field?

What are we trying to accomplish?

One Future Option:

Perceive e-learning as the
organisation of

**“Learning Networks
for Lifelong Learning”**

Learning Networks 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

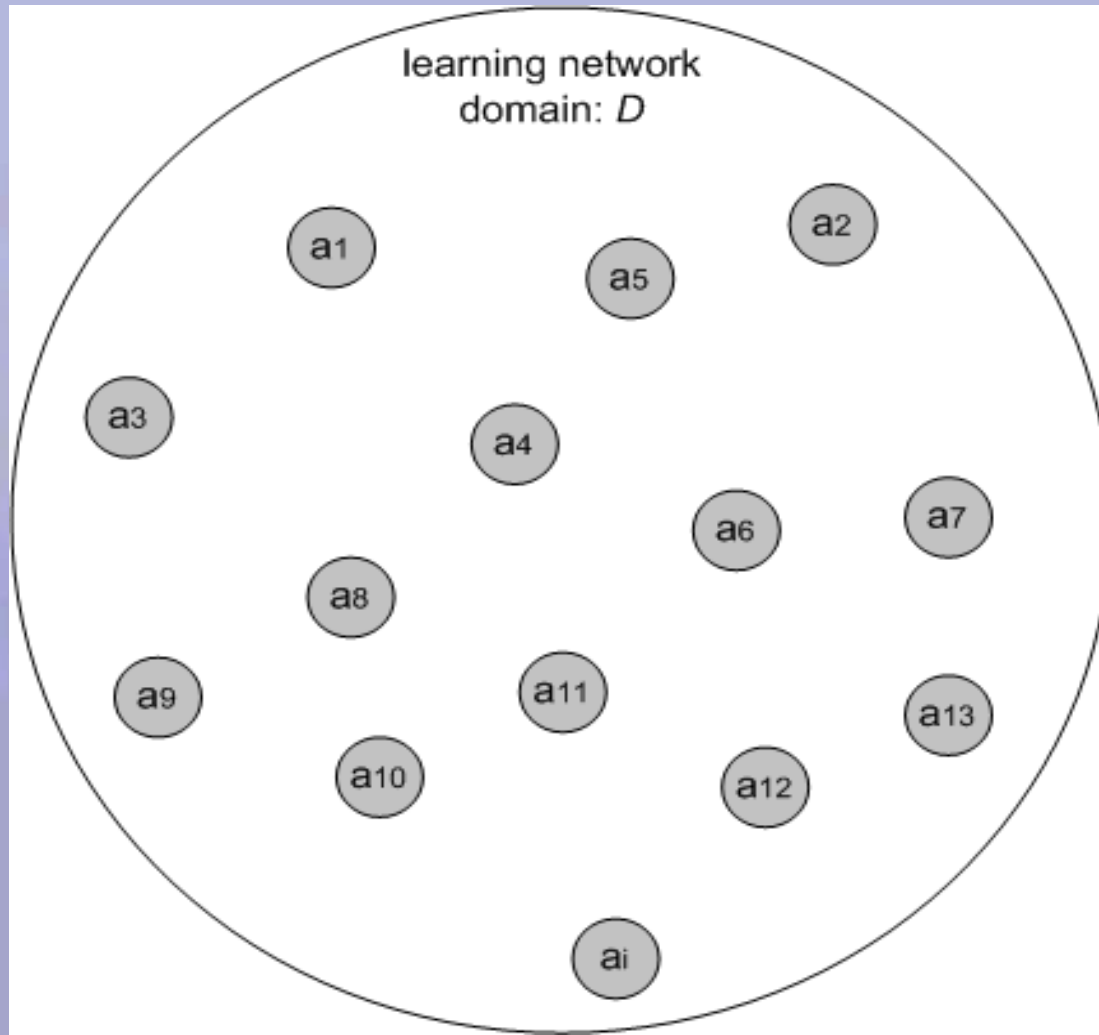
How to realise Learning Networks for Lifelong Learning?

Several views of a Model of a Learning Network

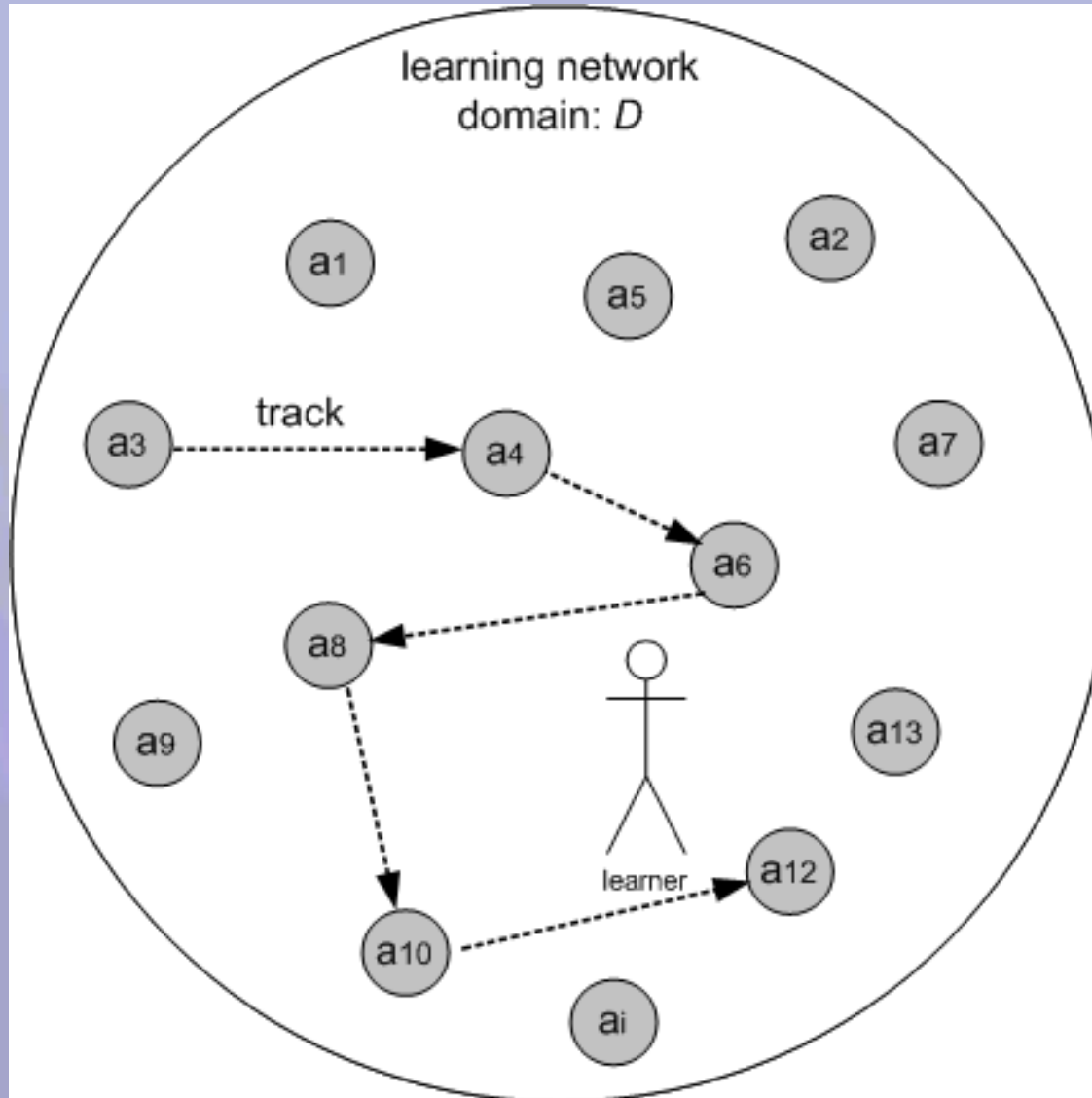
- Learning Network modelled as a Graph
- Use Case Model
- Architectural Model

Graph Representation of a LN

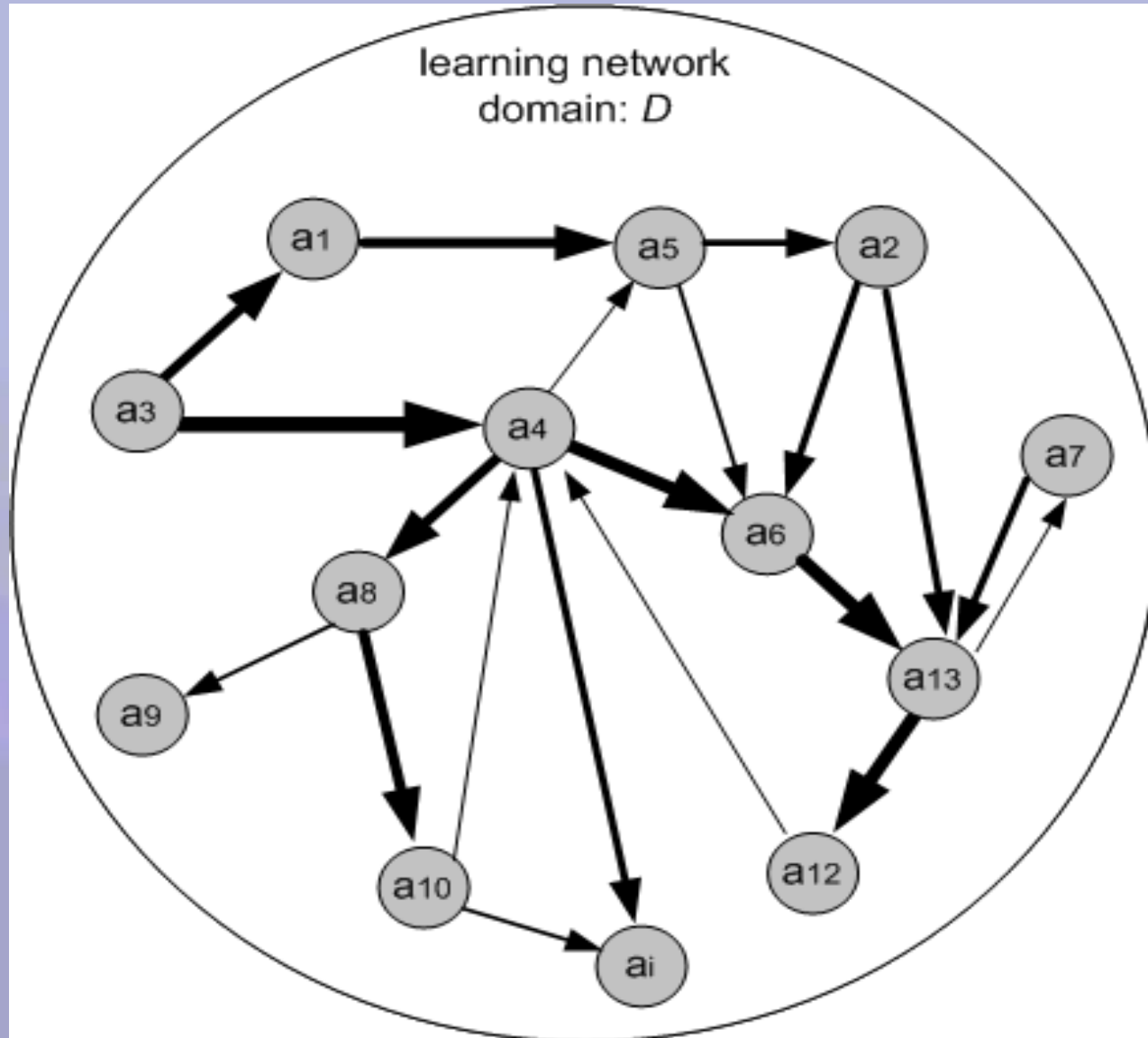
A *learning network* can be represented as a graph of '**activity nodes**' (runs of units of learning) within some knowledge domain



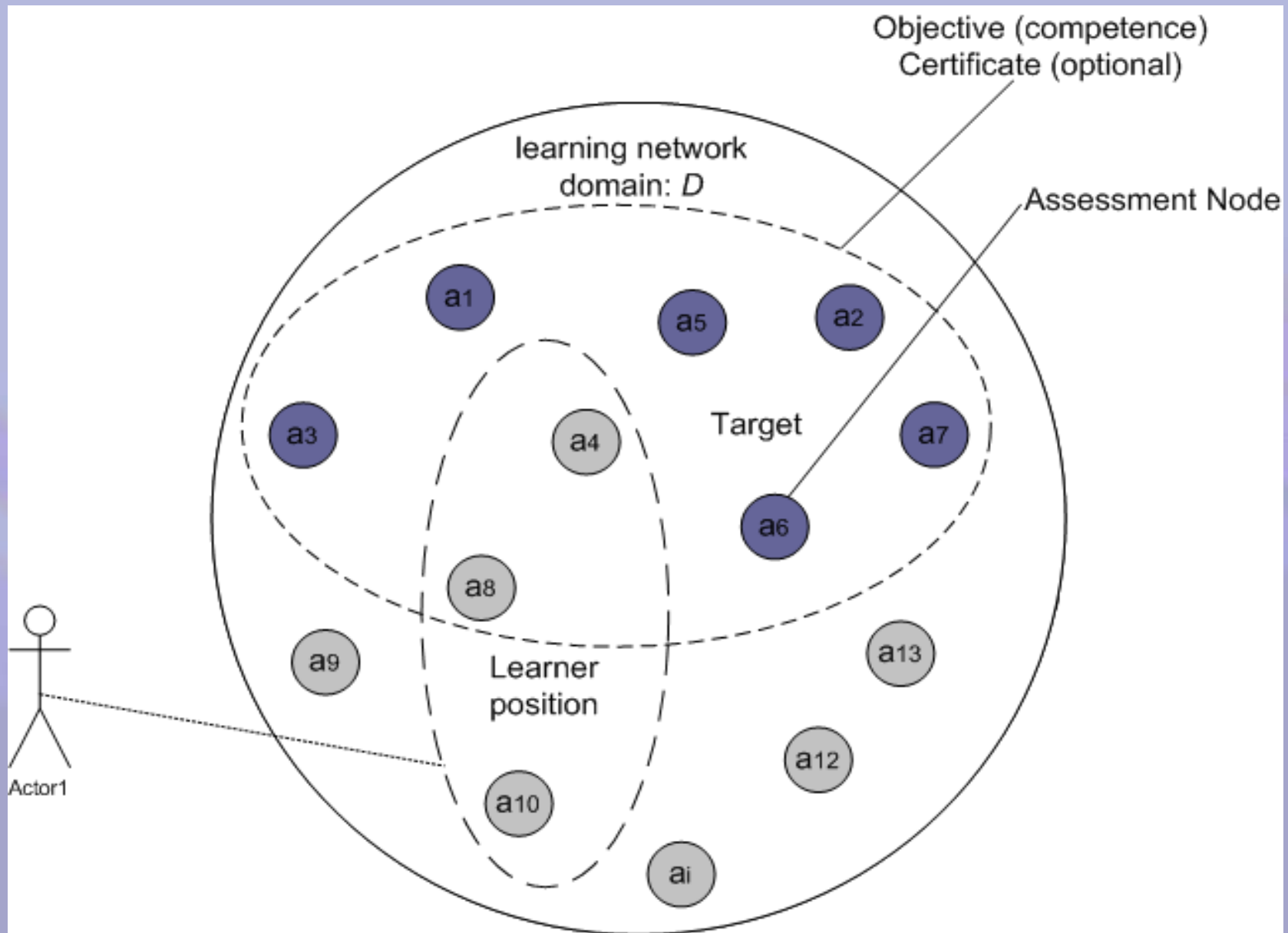
Learners Travel from Node to Node leaving Tracks in it



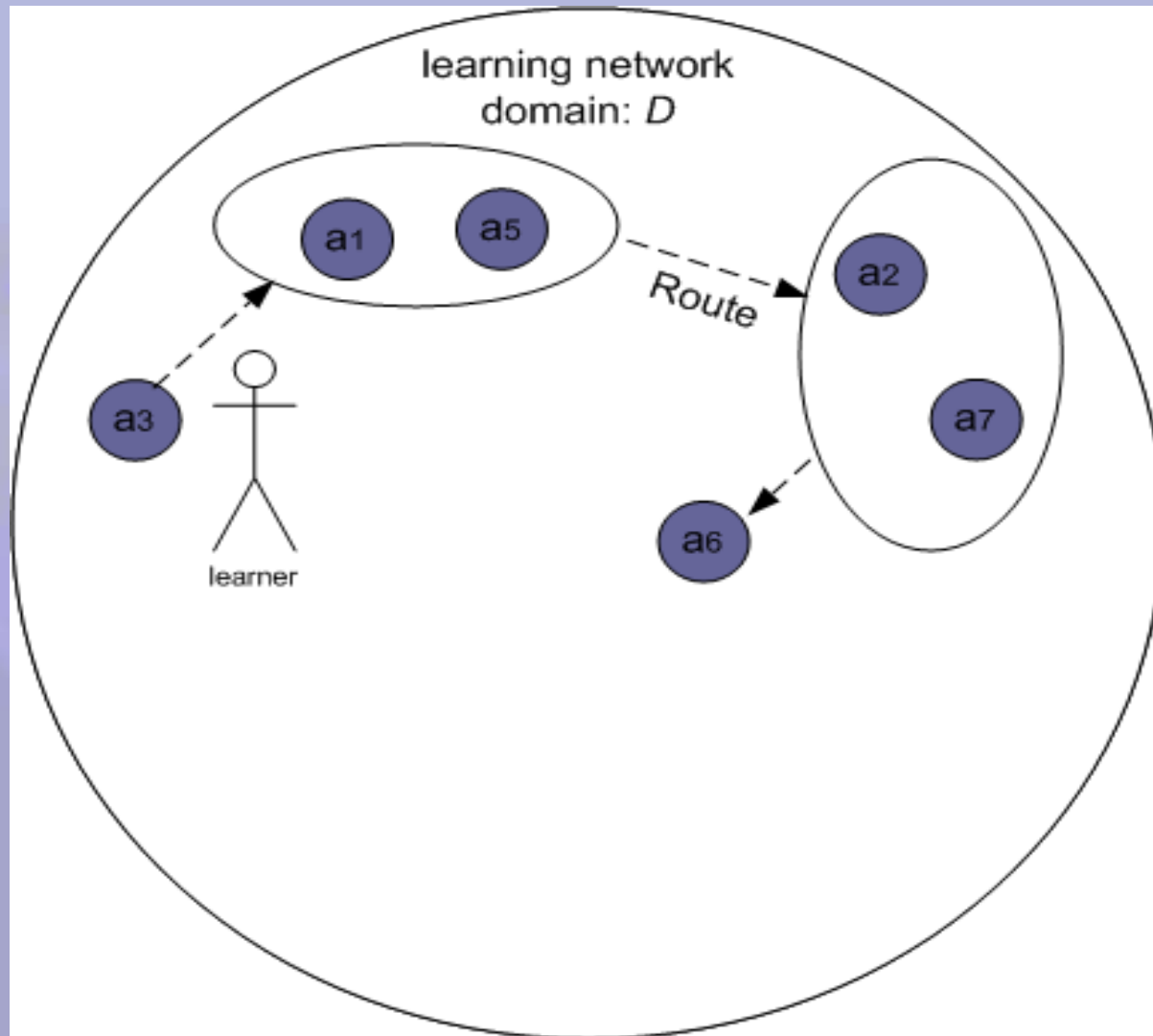
Patterns of Collective Tracks Emerge



Learner Positions and Objectives



Planned Learner Routes ("curriculum")

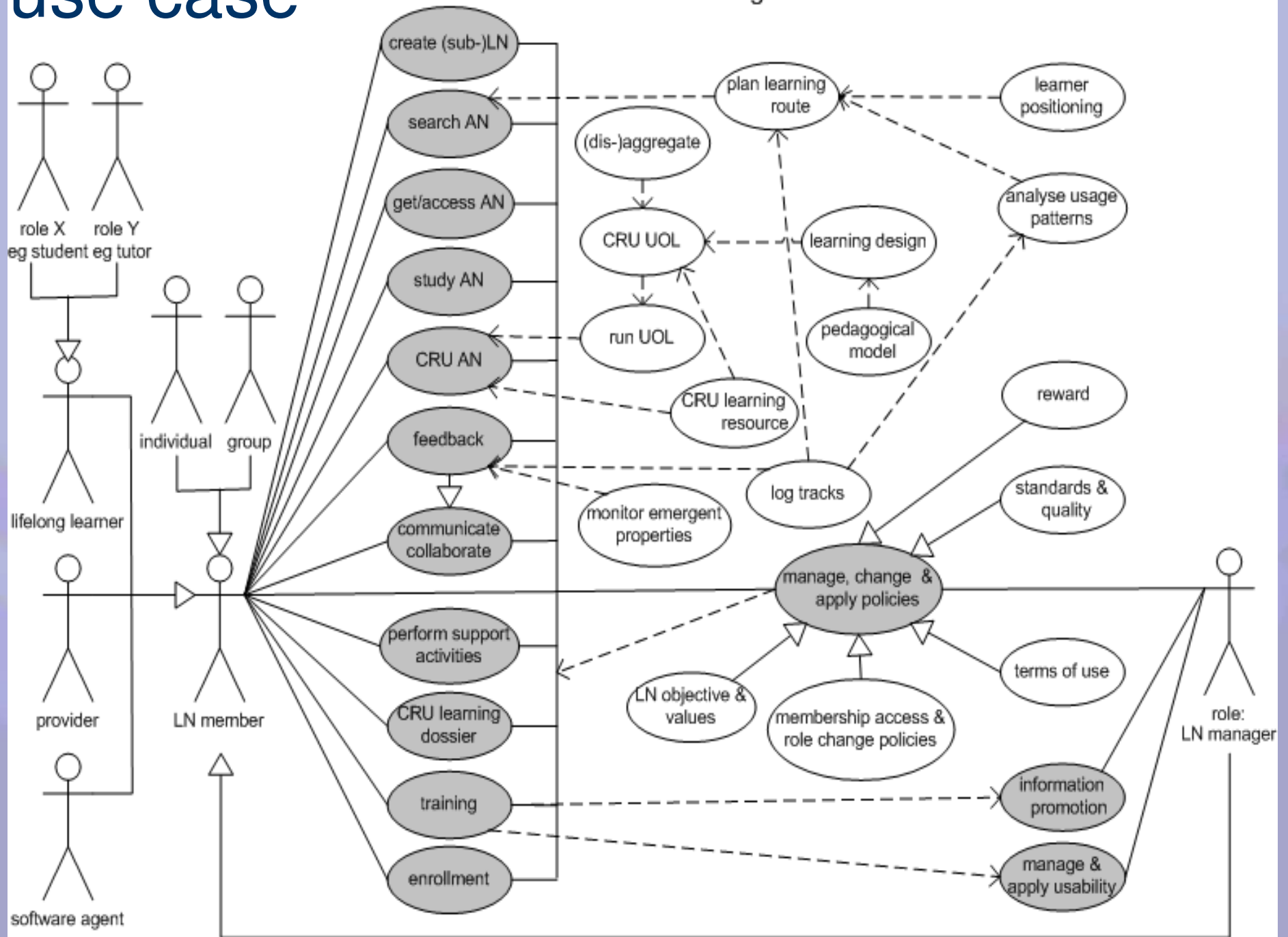


What activities do users perform in
a Learning Network?

=> Use Case Model

use case

Learning Network

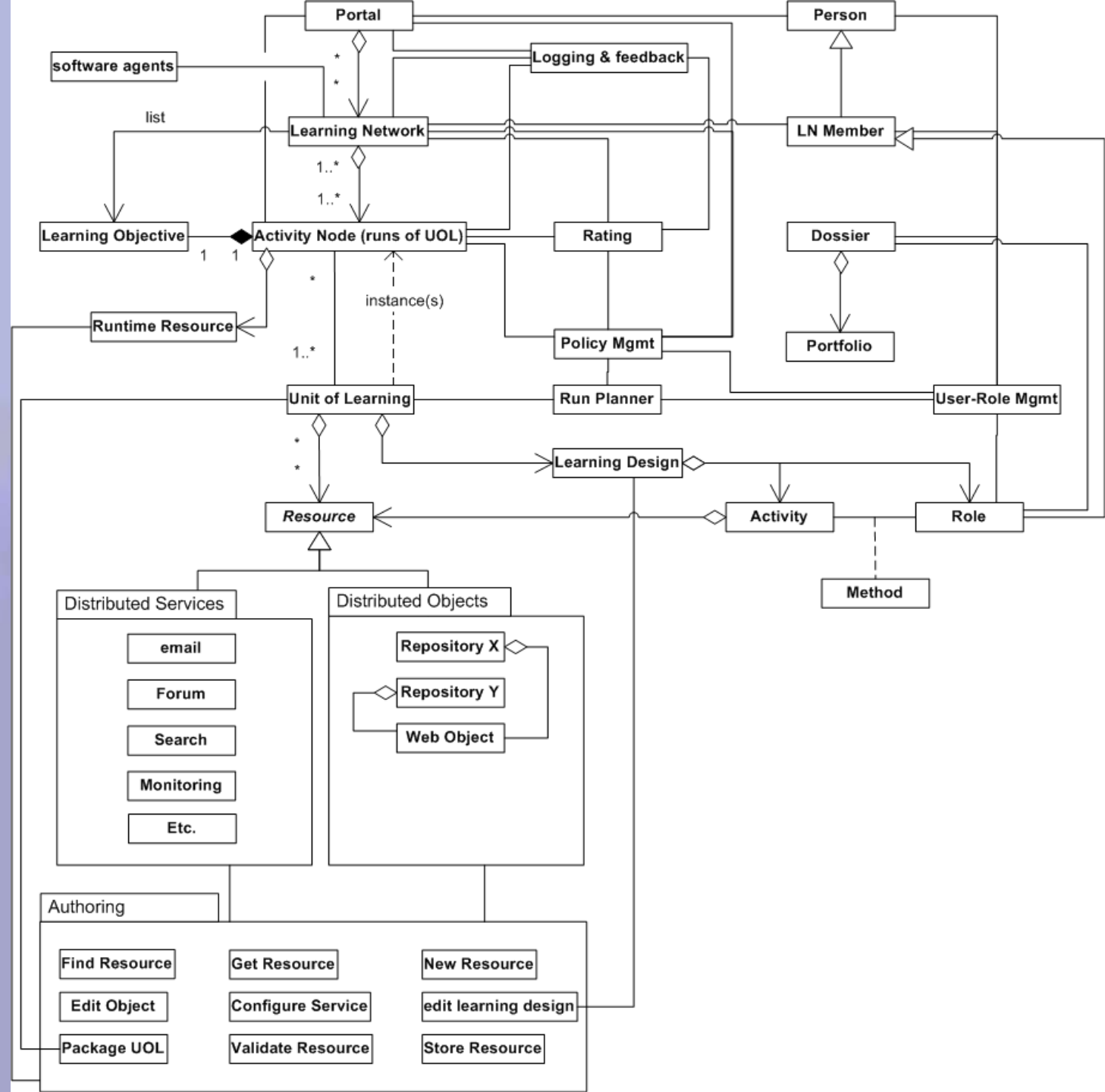


What are the functional components that can be identified in a Learning Network Infrastructure?

=> Architectural Model

Architecture

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



Three Core Issues in Learning Networks

1. How to **make & use** pedagogical sound, 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?

=> one by one, concentrate on navigational/organisational problems

ad 1. Make & Use Units of Learning

- **IMS Learning Design** is used to model the units of learning (instantiated as ANs) within the LN
- **User-friendly Tools** are needed (e.g. Reload, CopperCore with interfaces)
- **Quality mechanisms** to support the building and identification of good quality units of learning
- **Support infrastructure** and mechanisms
- **Economical models** within the network to stimulate authoring, use and reuse, participation of commercial parties
- ...

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

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?
- I want to increase my management skills, what can I do best?
- How do I add subtitles to a video program?
- 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
- Some are good, some are bad (even depending on the needs of the individual learners)
- The number of units of learning change rapidly over time (new ones, deleted/closed ones)
- Nobody has a real overview of actual quality, number of possibilities, ...

So,

How to Organise a Learning Network
under such constraints?

Our Approach

- Use of self-organisation principles from complexity theory, specifically 'pheromones':
- Large number of agents that interact, each leaving some experiential information (pheromones) that can be detected additively by other agents to influence their decisions
- e.g. A large number of persons that have left their footsteps in the grass will communicate a suggestion of a route for new persons walking in the same direction

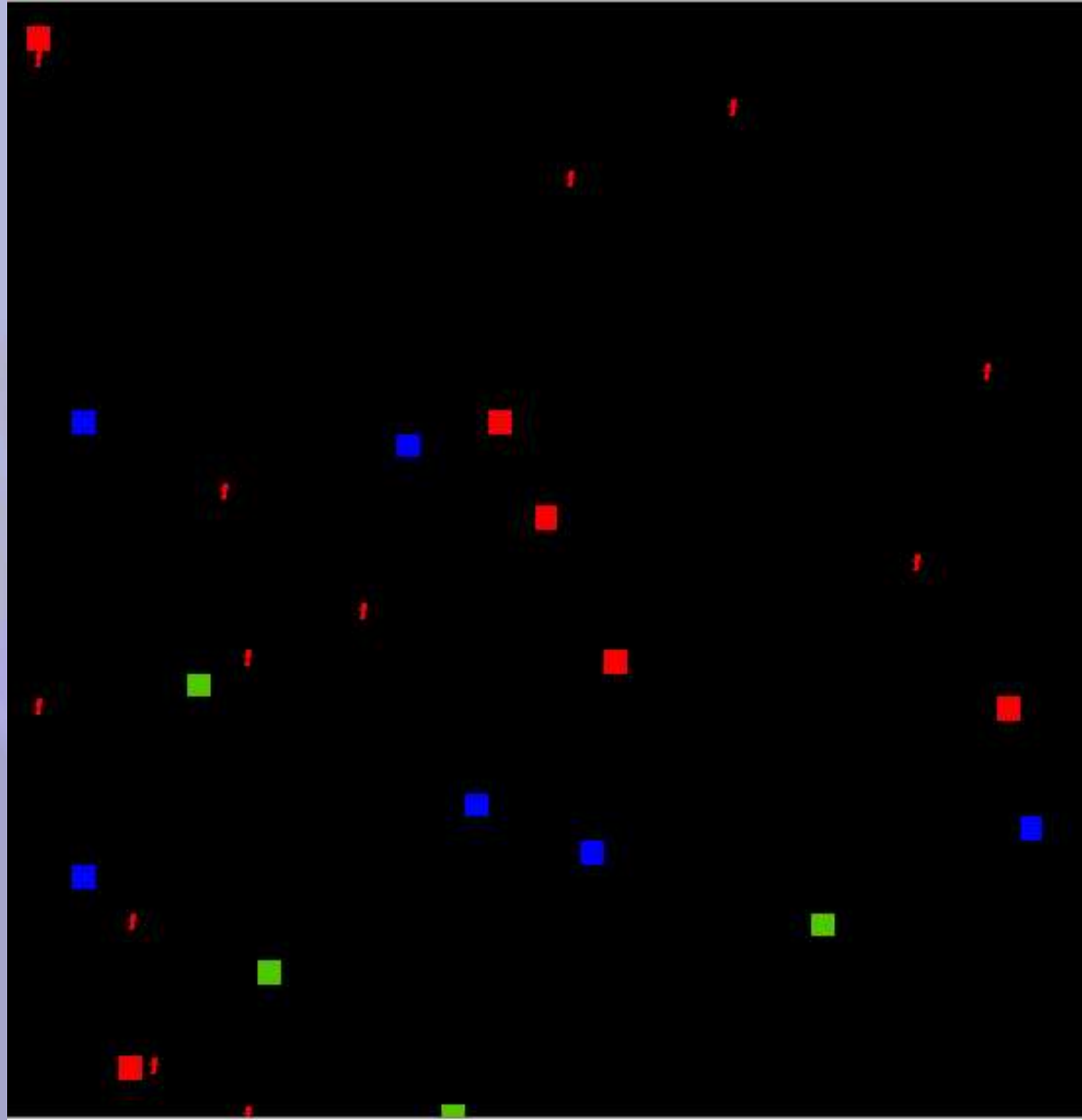
Current Simulation work of LNs

1. How to model a LN in a simulation?
2. How do learners move through a Learning Network?
3. What types of pheromones can we use to support effective, self-organised navigation? (e.g. how can we prevent suboptimal convergence?)
4. What influence do these pheromones have on study success (number of students that accomplish their goals)?

Netlogo Simulation of a LN

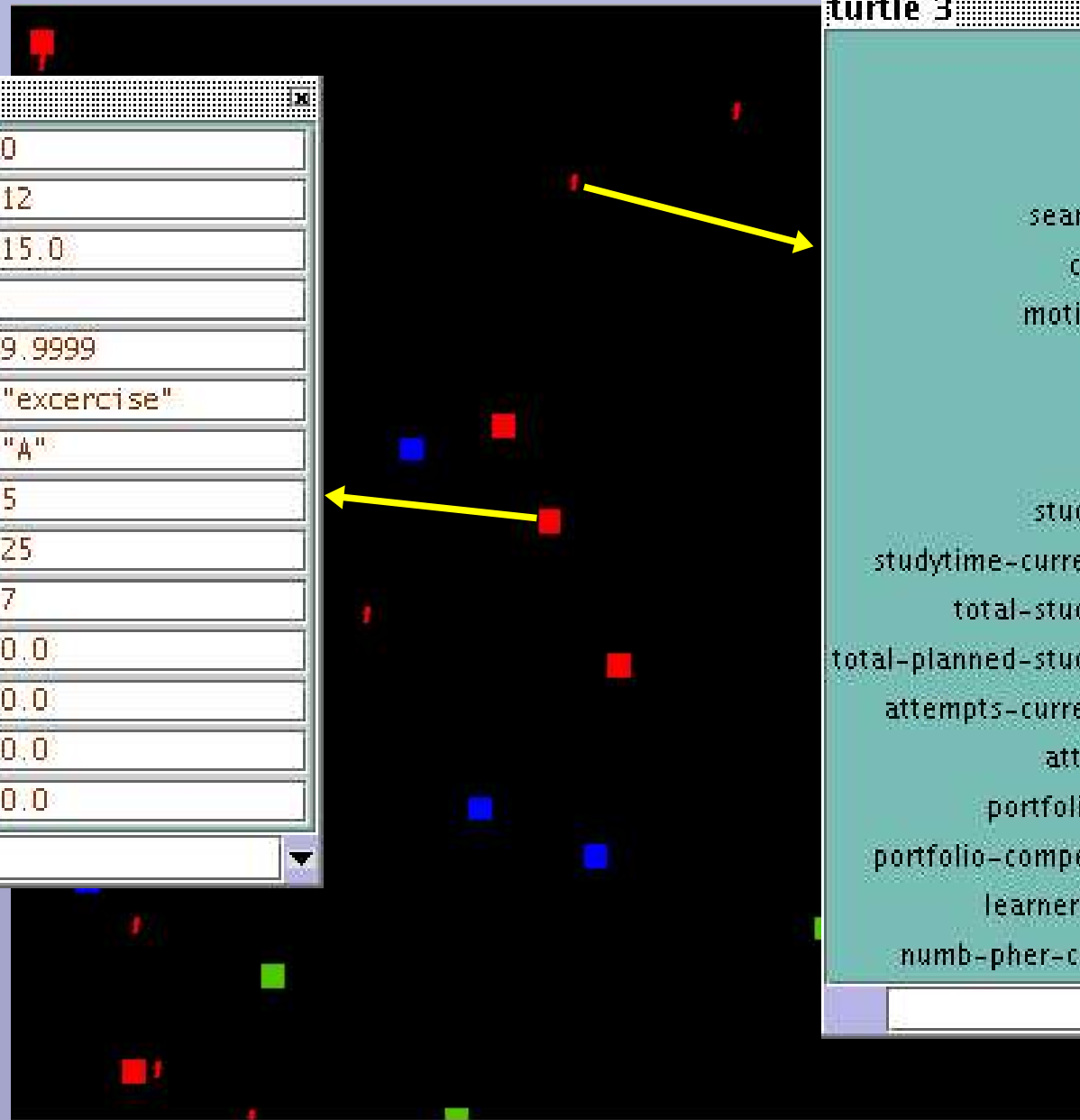
- Multi-agent simulation environment for research
- Still working on it ...

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	"exercice"
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

weeks 1040 On n-learners Off

On input-... Off learners-o...

setup

go

weeks 42

diploma-type no

On dropout Off

On follow-me Off

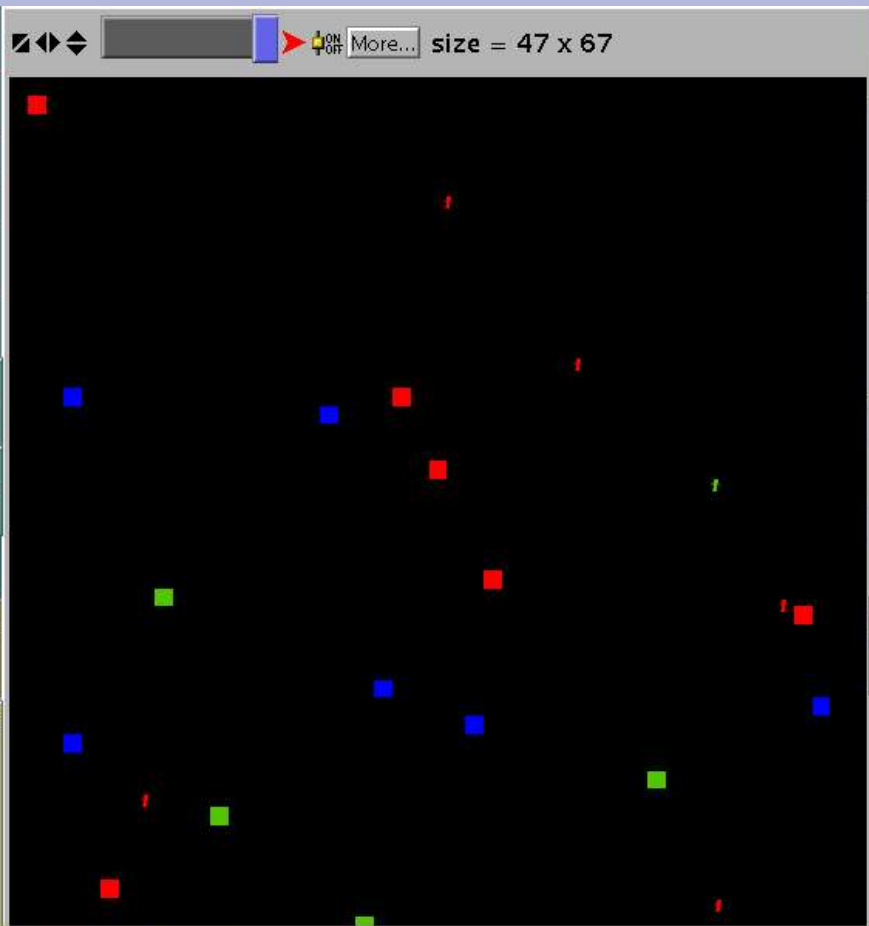
AN-selection-pri... intelligent

pheromone-type converge:rand...

pher-strength 0

pher / # choices (%) 0 / 9 (0%)

On demo Off



diplomas 0 (0%)

objective 1 (7%)

dropout 5 (33%)

tot-restarte 0

new learners 15

searching 9 (60%)

diploma student 0 (0%)

activity-nodes 25

mean-new-learners 20

proportion-diploma 0

matching-error 0

min-AN-... 0 max-A... 100

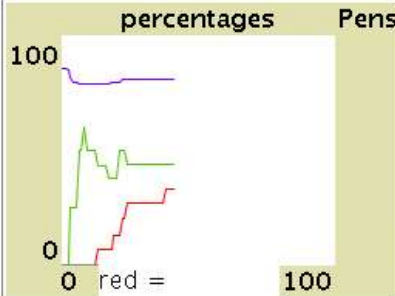
mean-weekly-studytime 6

set-AN-studytime 25

disturbance-chance 0

proportion-restarters 0

Red = A
Green = B
Blue = C



violet = actual / planned studytime
green = an-succeeded /

efficiency	AN succes	std-LatAN
80.573	44.444	0

Command Center

observer: learners contribution: 6270

observer: "institutional costs: 4318030"

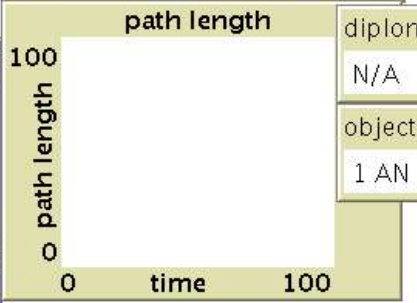
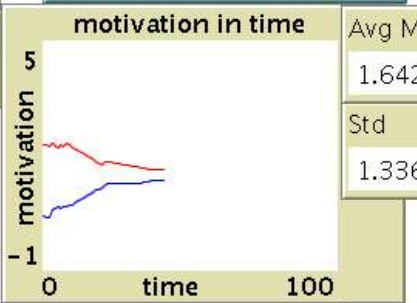
observer: "institutional costs per learner: 226935"

observer: "January week 1, year 1, new learners: 22"

observer: "January week 1, year 1, new learners: 17"

observer: "January week 1, year 1, new learners: 23"

observer: "January week 1, year 1, new learners: 15"

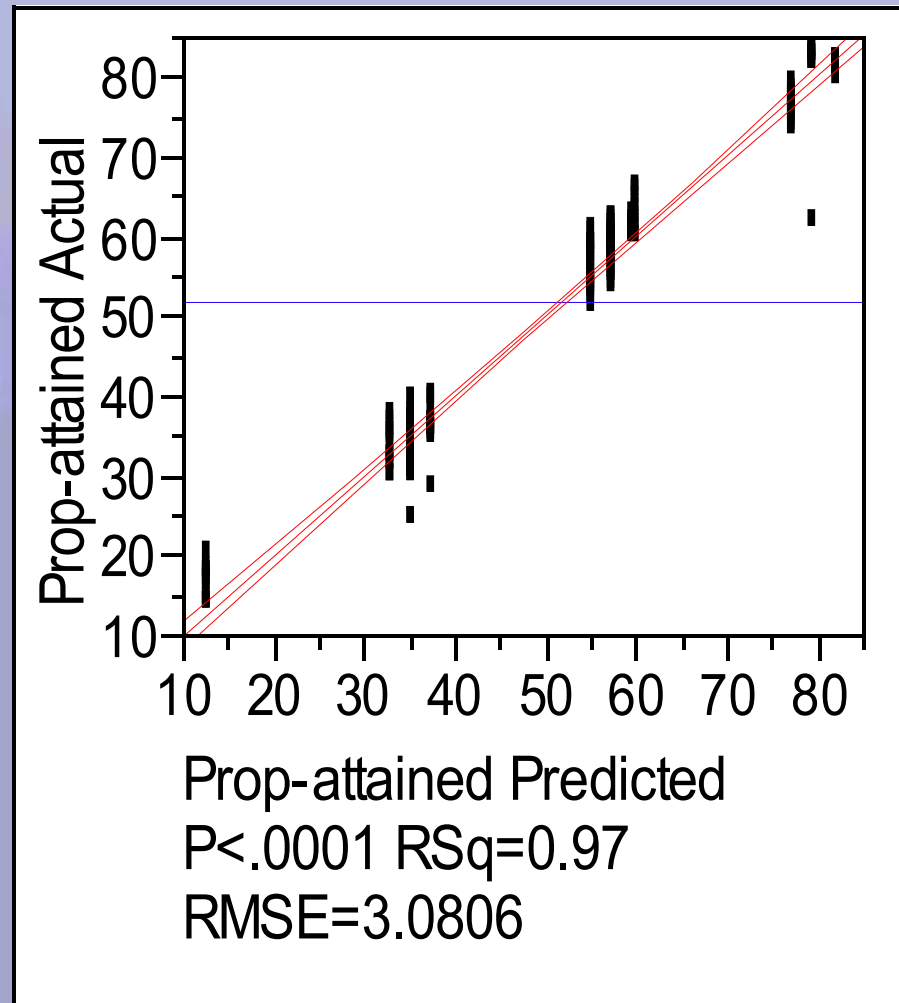


One of the Experiments with the Simulation

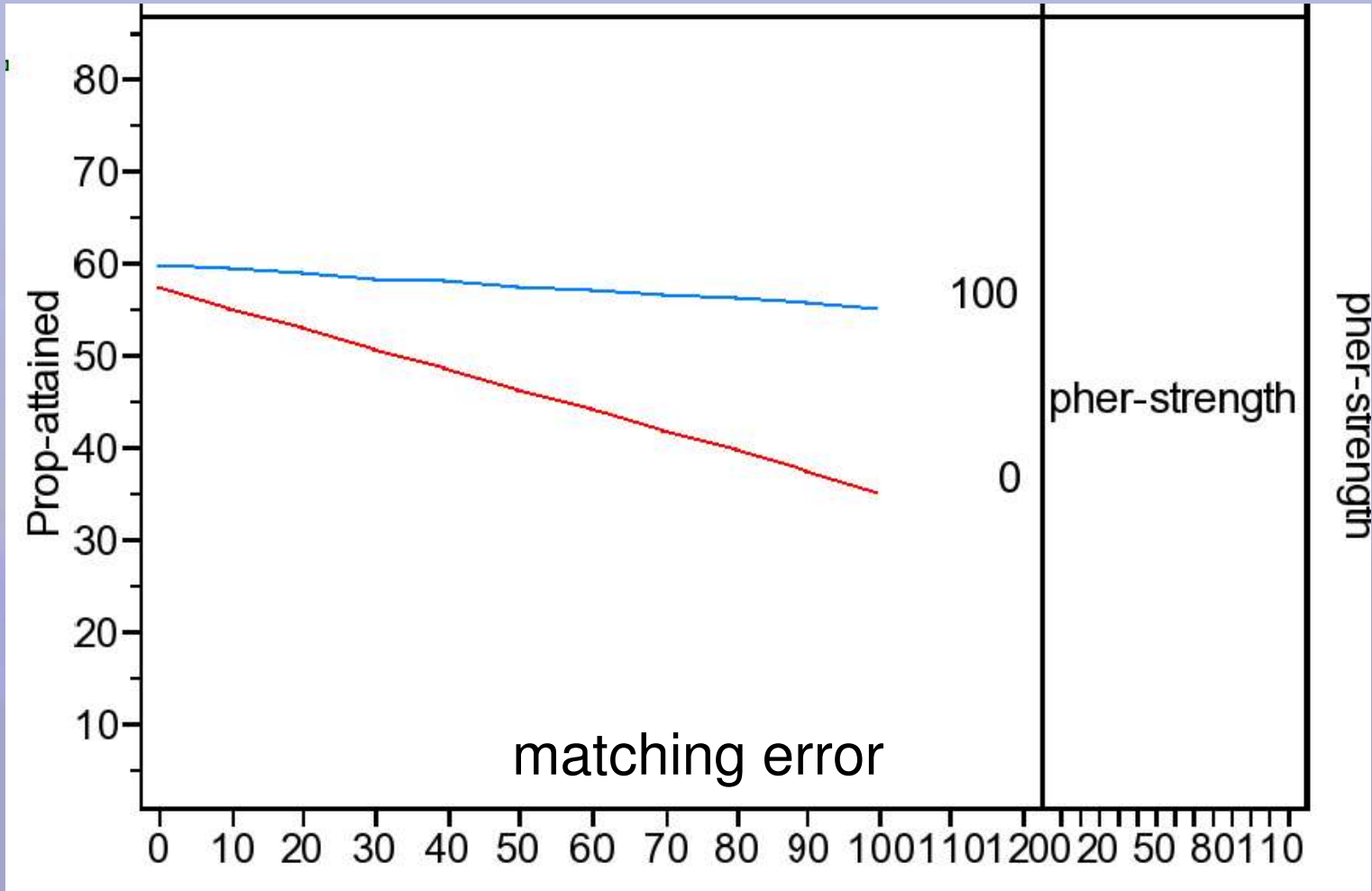
- Problem: what is the effect of indirect navigational feedback on study success (number of students that attained objective)?
- 2^4 factorial design:
 - pheromone (feedback) strength (0 or 100%)
 - matching error (0 or 100%)
 - disturbance in learner environment (0 or 100%)
 - quality of the unit of 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

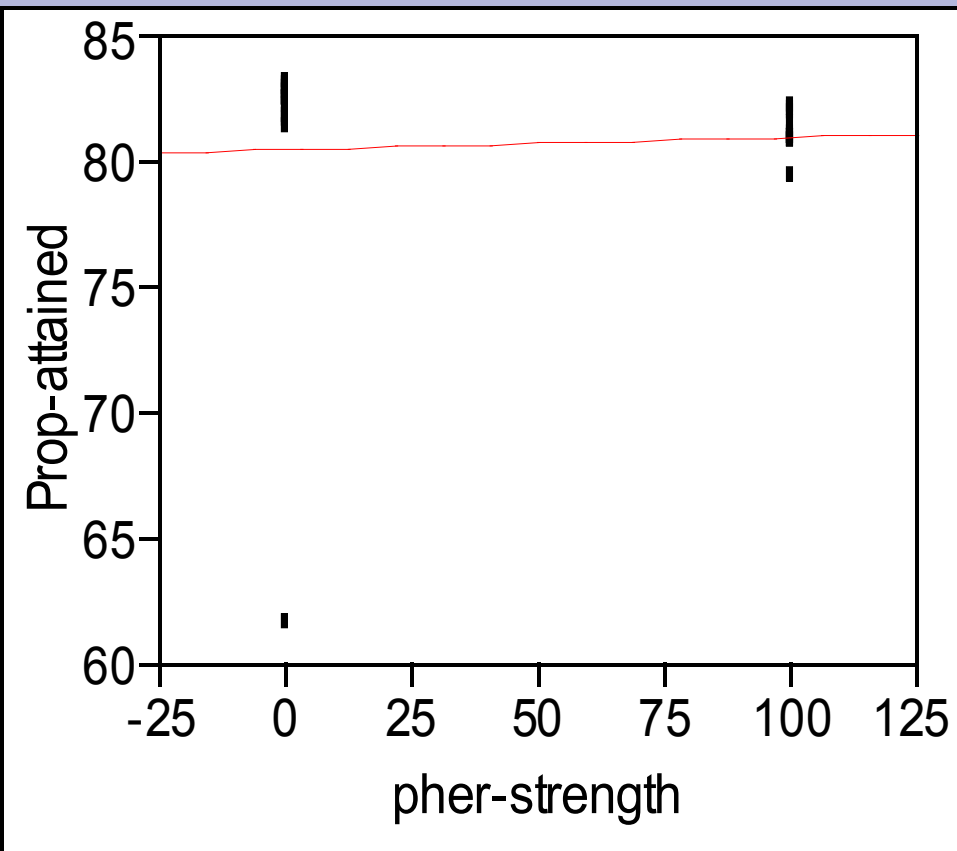
- All main effects significant + interaction pher-strength * matching error



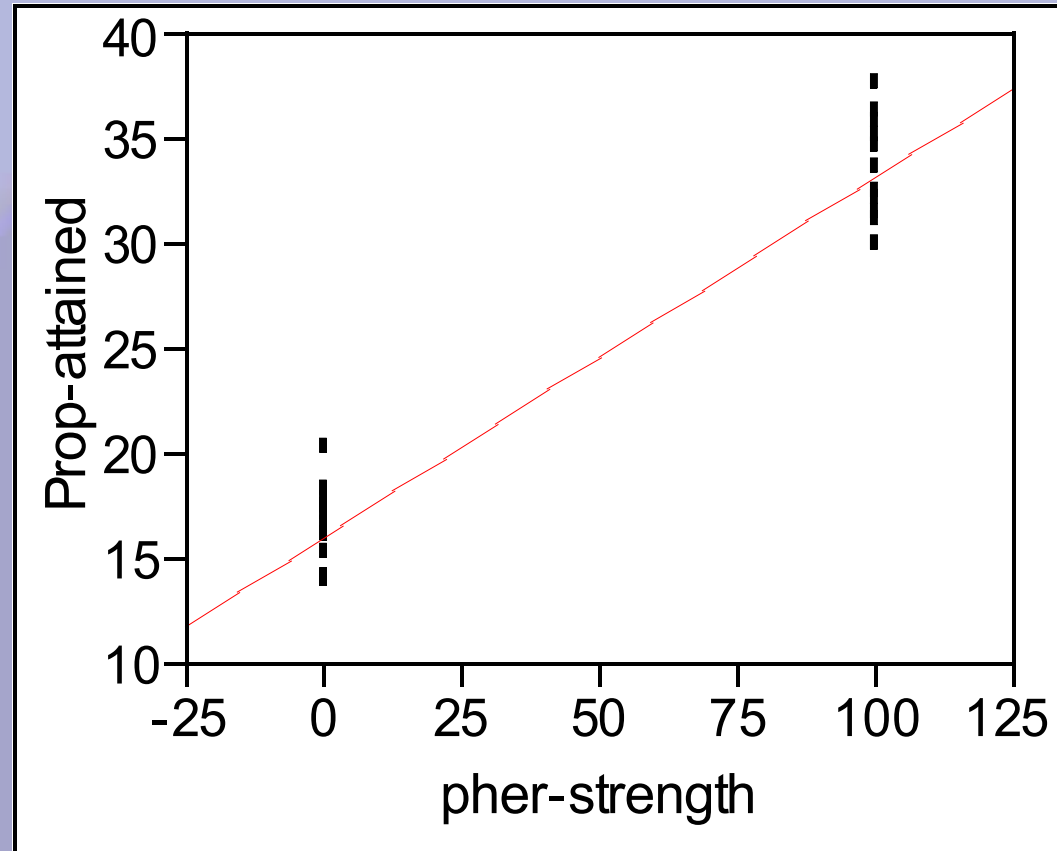
feedback strength * matching error



best versus worst case



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



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

Conclusion

- Within the context of the simulation model:
Adding indirect navigational feedback increases the proportion of learners that attain study success by $\pm 15\%$ when there are matching problems or quality problems
- There are lots of other questions to be answered
...

Why do I show you this?

- Need for better grounded models (“theory”) in e-learning
- Because of the inherent complexity, more complex research designs (e.g. simulation studies) are needed
- Of course this is not enough => test implementations

Groove Pilot

- 2003
- 25 Researchers in our RTD Programme
- Variety of Topics to learn
- Peer-to-Peer / self-organized

Go To

AN: Intro Technology Development Methodology

Forms

RK (Manager)

Back Add Record View by Forms Manager

Invite

Active

RK

Online

FV

HeH

HM

Not Online

- BG
- CT
- DJ
- FB
- HK
- JB
- JM
- MaH
- MiH

Conversation

Hold-to-Talk

Show Chat

Navigate Together

10 records in view **Activities**

Type	Role	Title	Hrs	St...	Q...	Author	Modified Date
Sequence		Perform activities in following order:				RK	26-12-02 16:31
Activity	Learner	Introduction	0.1	Core	***	RK	20-1-03 20:12
Activity	Learner	Technology Development Methodology	24	Core	***	RK	9-2-03 10:16
Activity	Learner	Exercise: define TD questions and problems	8	Core	***	RK	19-1-03 11:12
Activity	Learner	Exercise: generic article	8	Core	***	RK	19-1-03 11:20

Learning objective

Basic knowledge Technology Development

Prerequisites

Basic knowledge of research approaches

Activity Description

- First read the Zulkardi summary of developmental research ([listofresources](#))
- Then, study the article about Developmental Research from Ritchey & Nelson (1996) ([developmentalresearch.pdf](#)). Try to concentrate on aspects related to technology development (developmental research is only a subset of technology development: what aspects are missing?).
- Then, study the other articles in [Methodology](#) like descriptive research, qualitative research, etc.
- Another aspect of Technology Development is the methodology of the development of *new* prototypical tools. One possibility is to use the methods for the development of software (like the [Unified Process](#)). However, in our

[Methodology from Jonassen](#) (see also: [Summaries](#))

Invite

Active

- RK

Online

- FV
- HeH
- HM

Not Online

- BG
- CT
- DJ
- FB
- HK
- JB
- JM
- MaH
- MIH
- PG
- RE
- WV

Suspended

Folders

- Learning Objects (Root Folder)
 - Resources
 - assessment forms journal article
 - Extreme Programming
 - Gibbons
 - listofresources
 - Methodology from Jonassen
 - Summaries
 - Miscellaneous Resources
 - Real World Research
 - Quality
 - ReferenceManager
 - TD Summary
 - Unified Process

Name	Size	Type	Modified Date	Modified By
testlogic-development	84KB	VSD File	9/23/03 6:33:38	RK
read this	1KB	Text Document	1/12/03 9:14:02	RK
TechnologyAndInnovation	183KB	Microsoft Word-document	4/11/03 10:31:12	RK

Folder: Learning Objects (Root Folder)/Resources/TD Summary

4. Methods for Technology Development **12**

- 4.1. [General Test logic in Technology Development](#) 12
- 4.2. [ADDIE](#) 12
- 4.3. [UML](#) 14
- 4.4. [UML in conceptual analysis and functional design](#) 15
- 4.5. [Selection of Diagrams for Learning Technology Development](#) 15
 - 4.5.1. [Package diagrams](#) 15
 - 4.5.2. [Use case diagrams and general requirements](#) 16
 - 4.5.3. [Class diagrams: domain models and vocabularies](#) 18
 - 4.5.4. [Activity diagrams](#) 18
- 4.6. [Use of UML in the technology development programme](#) 19

Conversation

Hold-to-Talk [Icon]

Show Chat [Icon]

Validation

- Purpose: validation of requirements for Learning Networks
- Case described in:

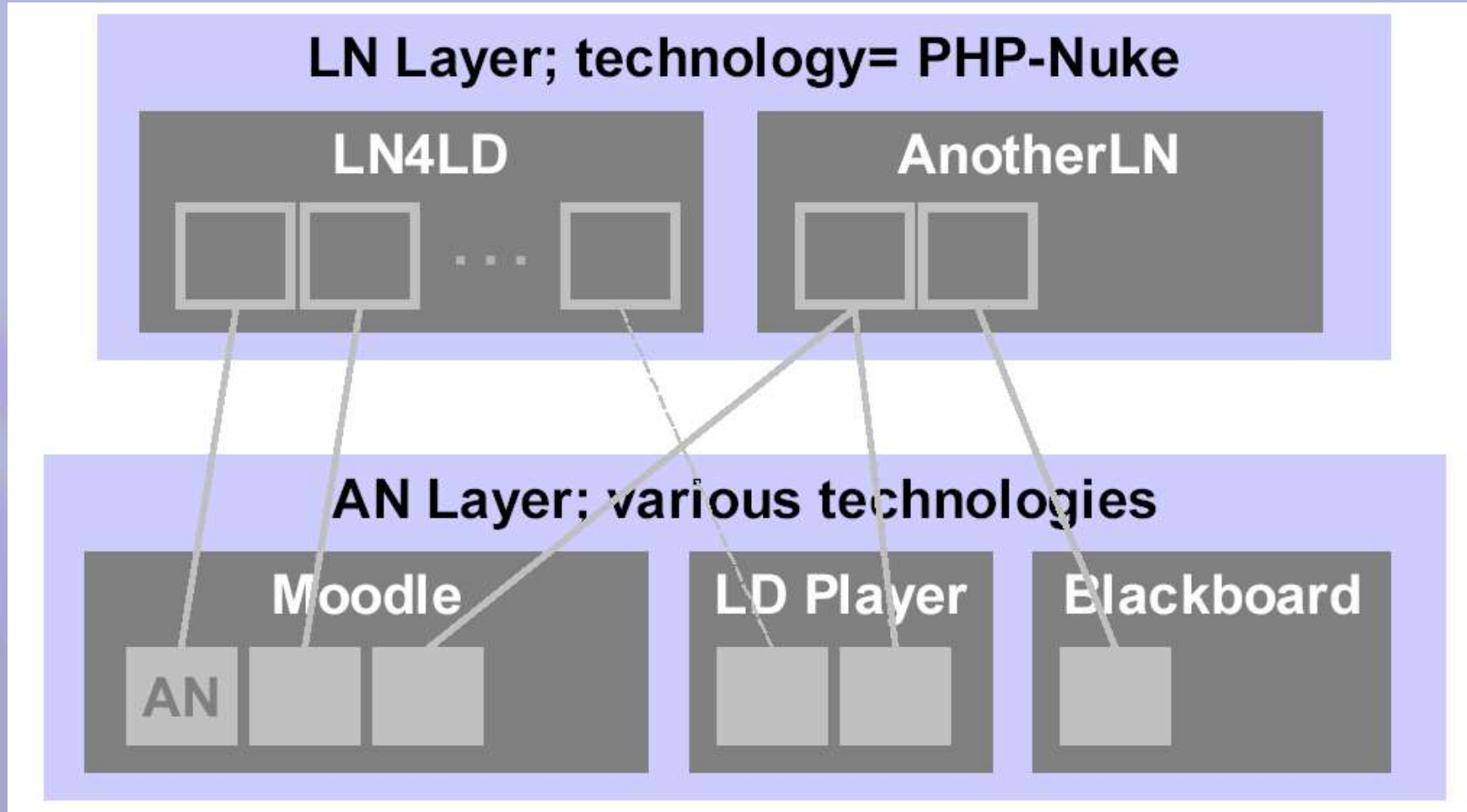
Koper, R. et al (in press). Self-organized distributed networks for lifelong learning: theory and design. *Interactive Learning Environments*.

(preprint: dspace.ou.nl)

Next pilot: Learning Network for Learning Design

- Started July 2004 in UNFOLD project (www.unfold-project.net)
- People around the world interested to learn more about IMS Learning Design and learning design in general
- Self-organised, everyone can create, study or support a unit of learning.
- Join at: <http://ln4ld.learningnetworks.org>

Architecture



Moodle Activity Nodes

Moodle Open Universiteit Nederland

You are logged in as [Rob Koper](#) (Logout)

English - US (en_us) ▼

Main menu

Add... ▼

Turn editing off

Administration

Configuration...

Users...

Courses

Logs

Site files

Admin...

Available Courses

1. Topic List

[How to modify a Unit of Learning](#) ⓘ

[IMS Learning Design and Metadata](#) ⓘ

[Getting started with the IMS LD Specification](#) ⓘ

[Understanding the basics of IMS Learning Design](#) ⓘ

[Experience a representative collection of running Units of Learning](#) ⓘ

2. Scheduled Events

[UNFOLD session at the EADTU 2004 conference](#) ⓘ

3. Previous Events

This site contains learning events (Activity Nodes) used in the Learning Network for Learning Design (LN4LD).



Search courses

How to modify a Unit of Learning

OUNLMOODLE -> SimpleUoL

People

-  Participants
-  Edit profile

Activities

-  Forums
-  Resources

Search

Administration

-  Turn editing on
-  Settings...
-  Facilitators...
-  Participants...
-  Backup...
-  Scales...
-  Grades...
-  Logs...
-  Files...
-  Help...
-  Teacher forum

Courses

-  1. Topic List
-  2. Scheduled Events
-  3. Previous Events

Search courses...

Topic outline

This AN will consist of three assignments:

1. Read and understand the use case description and formalization in LD
2. Modify parts of the formalization by adding an extra activity
3. Modify the formalization by changing the activity sequence or structure

As an example of LD modelling at level A, the Boeing Use Case (training for the replacement of a fuel valve in an aircraft's wing) was taken as starting point and further simplified. (The Boeing Use Case is one of the examples used in the IMS Learning Design Best Practice and Implementation Guide.)

 General forum

1 Understanding the Boeing simplified use case

The original Boeing use case contains a complicated testing procedure which demands the use of conditions and properties, only defined at IMS Learning Design Level B. In the first part, we have therefore left this procedure out, in order to be able to illustrate the design of a Level A instance document. Start by reading the use case description.


 Boeing Use Case

2 Follow the guided tour through the use case formalization process


The creation of a learning design typically is an iterative process, in which one leaps forward and back tracks according to ones personal preferences, the specifics of the use case and one's experience. For the inexperienced, the order suggested here will at least work. UML diagrams primarily are meant to provide an overview and a shared visual insight into complex flows of activities, and secondarily they are an exact way to formally model these flows.

- First read the procedure to move from a narrative to a UML activity diagram.
- Then read the procedure on moving from a UML activity diagram to the XML document instance.
- Finally, take a look at the resulting XML document instance, `imsmanifest.xml`

 Narrative-to-Activity-Diagram Procedure

 Activity-Diagram-to-XML-document procedure

 `imsmanifest.xml`

 Discussion of guided tour

3 Modify parts of the document instance

This activity involves modifying the learning design described above. In order to keep the activity manageable, we will only use part of the design, the Fuel Valve Removal Procedure. Click on the link to view the `imsmanifest.xml` file.

Summary

- Problems in current eLearning
=> Learning Networks for Lifelong Learners
- How to build LNs?
- Key issues: make & use, positioning, navigation
- Simulation of a LN and the influence of navigational feedback (idea of how to do research in this area).
- Test implementations

References

- dspace.ou.nl (publications, preprints)
- In4ld.learningnetworks.org (learning network LD)
- <http://www.unfold-project.net:8085/UNFOLD>