Orchestrating the Student Experience with Social Media Tools

http://homepages.inf.ed.ac.uk/dcspaul/publications/ptas-ppls.pdf

Paul Anderson, Kirsty Hughes, Hamish Macleod, Jessie Paterson

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Overview

The PTAS project

Classifying interactions

Modelling and equivalence of interactions

Some non-functional issues

PTAS Project

- What social media and related tools are people using in the University to support their teaching ?
- How are these being used ?
- What are the common general issues ?
- (How) are they being used to facilitate explicit types of interaction ?

“How can I choose a tool, and find a mode of using it, which will satisfy my pedagogical aims?

It can be difficult to identify an appropriate tool (or a mode of using such a tool) to meet specific pedagogic aims - sometimes the natural use of a particular tool is a good fit, and sometimes it needs creative abuse to make it fit

Interactions

- Is it helpful to think about, and encourage specific interactions among students?
- Can we classify the interactions supported by different social media tools?
- If so, would this be useful in identifying different tools which may be helpful in particular situations?
- Are there some useful interaction models which are not well supported by any existing tools?

What Are People Using?

We interviewed 12 staff members from across the University, with a wide range of experience in online tool use

- Semi-structured interviews
- Loose identification of themes/trends
- Workshop to discuss results

What, how & why ?

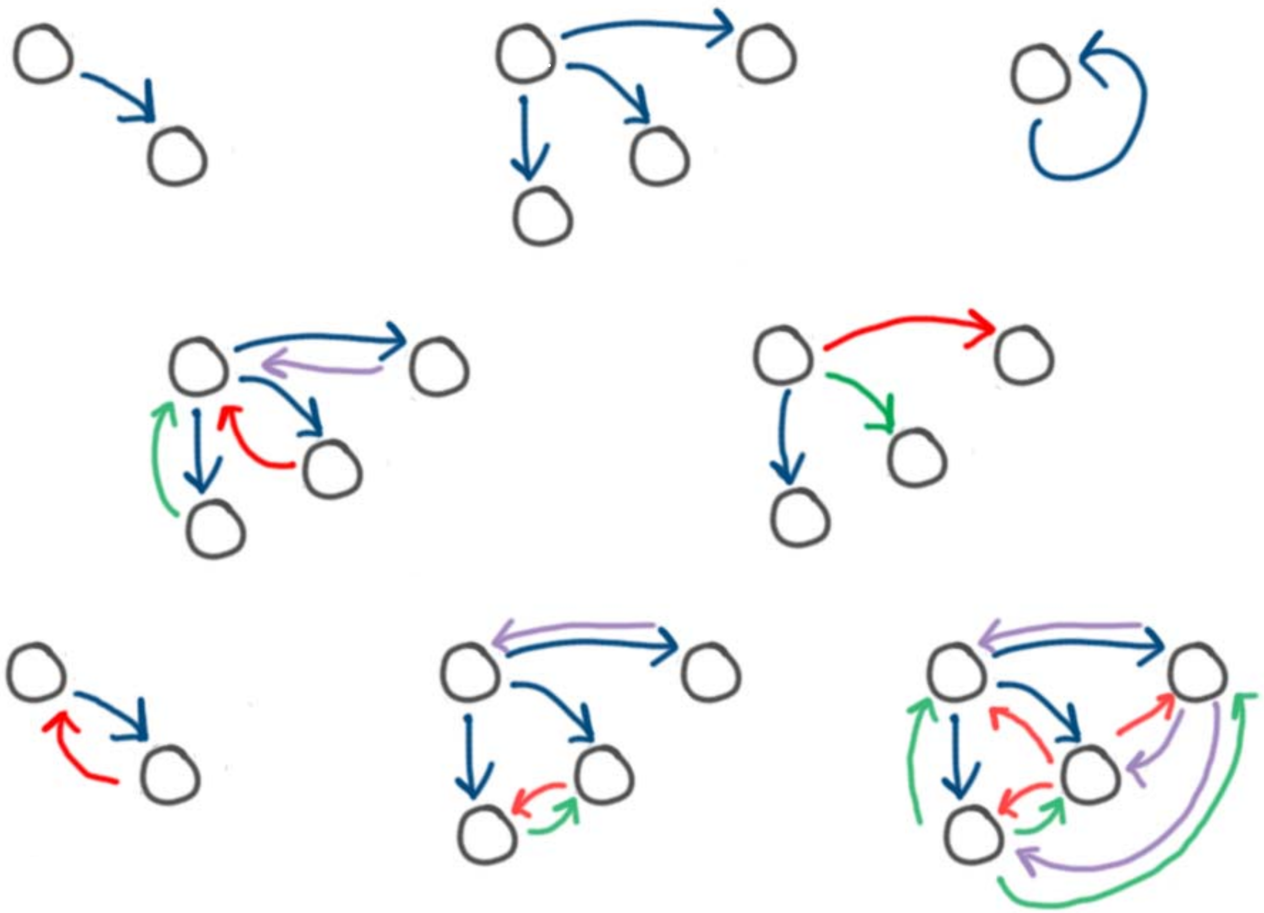
- What tools do people use & why & how?
- Do people have an explicit pedagogical aim for any of these uses?
- What kinds of interactions are involved?
- What works & what doesn't? what are the problems?
- Is there anything people would like to do,
  which they haven't been able to do?

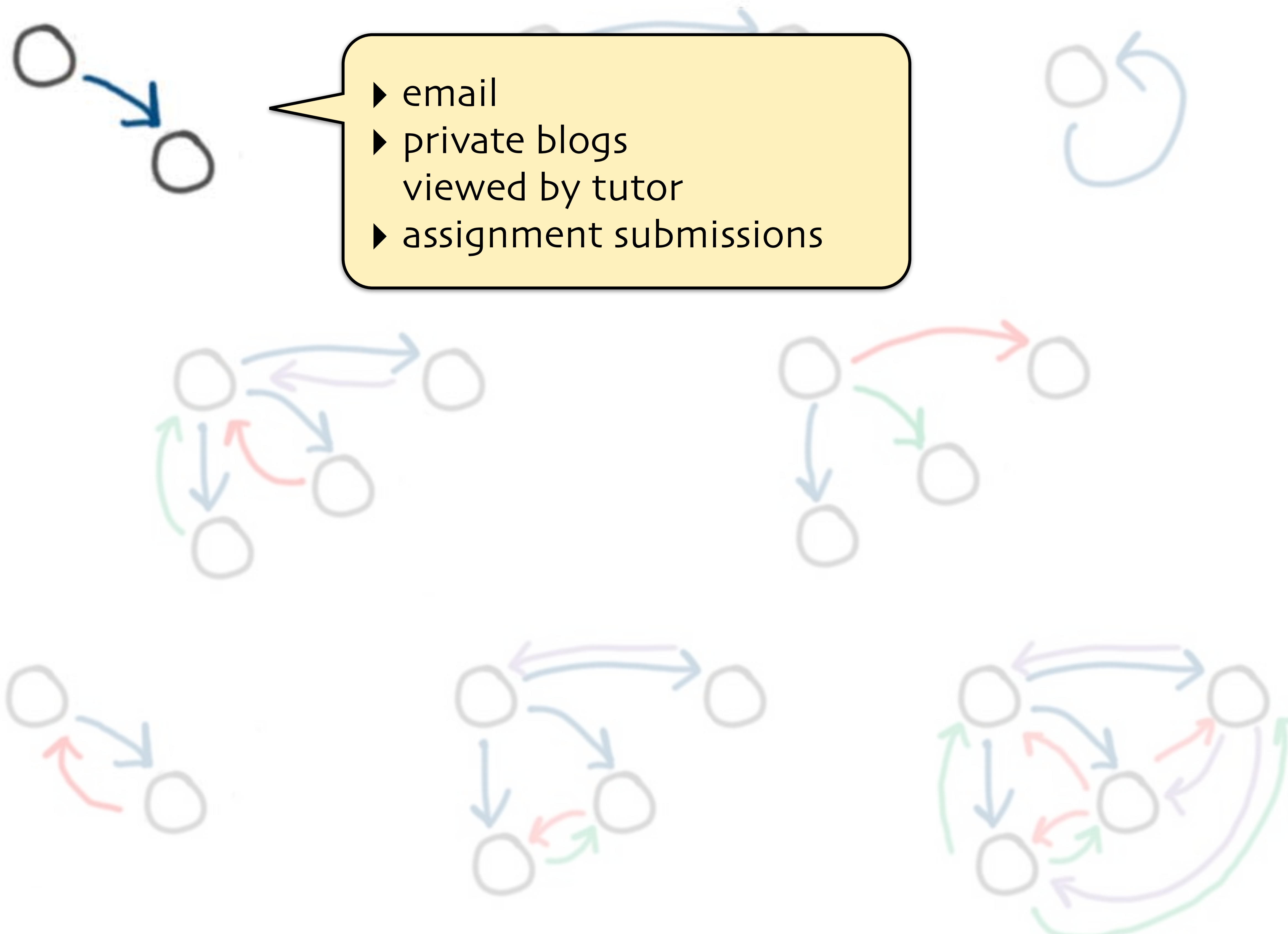
Tool	Veterinary (U-PG)	Education (PG)	SPS (U-PG)	Maths (UG)	Business (U-PG)	Geoscience (U-PG)	LLC (UG)	Biology (UG)	Medicine (PG)	Law (U-PG)	ECA (U-PG)
Physical tools	UG		UG	UG	PG	UG	UG	UG	PG	PG	U-PG
Clickers	UG		UG	UG		UG		UG			
VLE	PG	PG	U-PG	UG	U-PG	U-PG	UG	UG			U-PG
Blogging	PG	PG	UG			U-PG	UG				U-PG
Twitter	PG	PG	UG	UG	PG	PG		PG	PG	U-PG	U-PG
Facebook	PG	PG	UG			U-PG	UG	UG		UG	U-PG
LinkedIn					PG	PG					PG
Skype	PG	PG			Pre-entry						
Googledocs/ hangout/grp	PG	PG			PG	PG	UG				U-PG
Second life	PG	PG									
Pinterest/ wallwisher	PG		UG					UG			U-PG
Wikis	PG	PG		UG				UG			
Online tests	U-PG			UG						PG	
Own software					U-PG	PG	UG	UG	PG		U-PG

Classifying Interactions

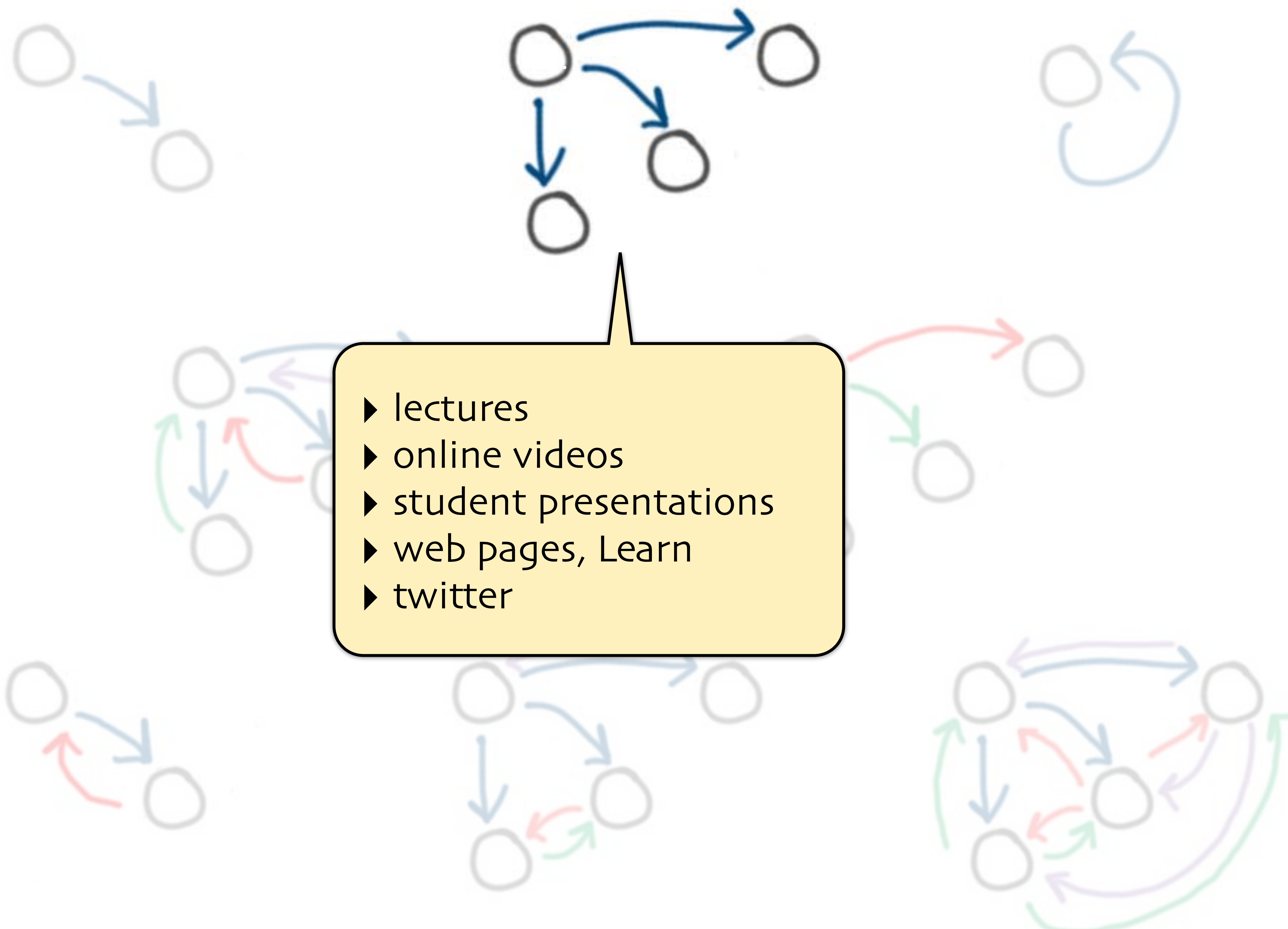
We attempted a very simple classification the interactions described in the interviews

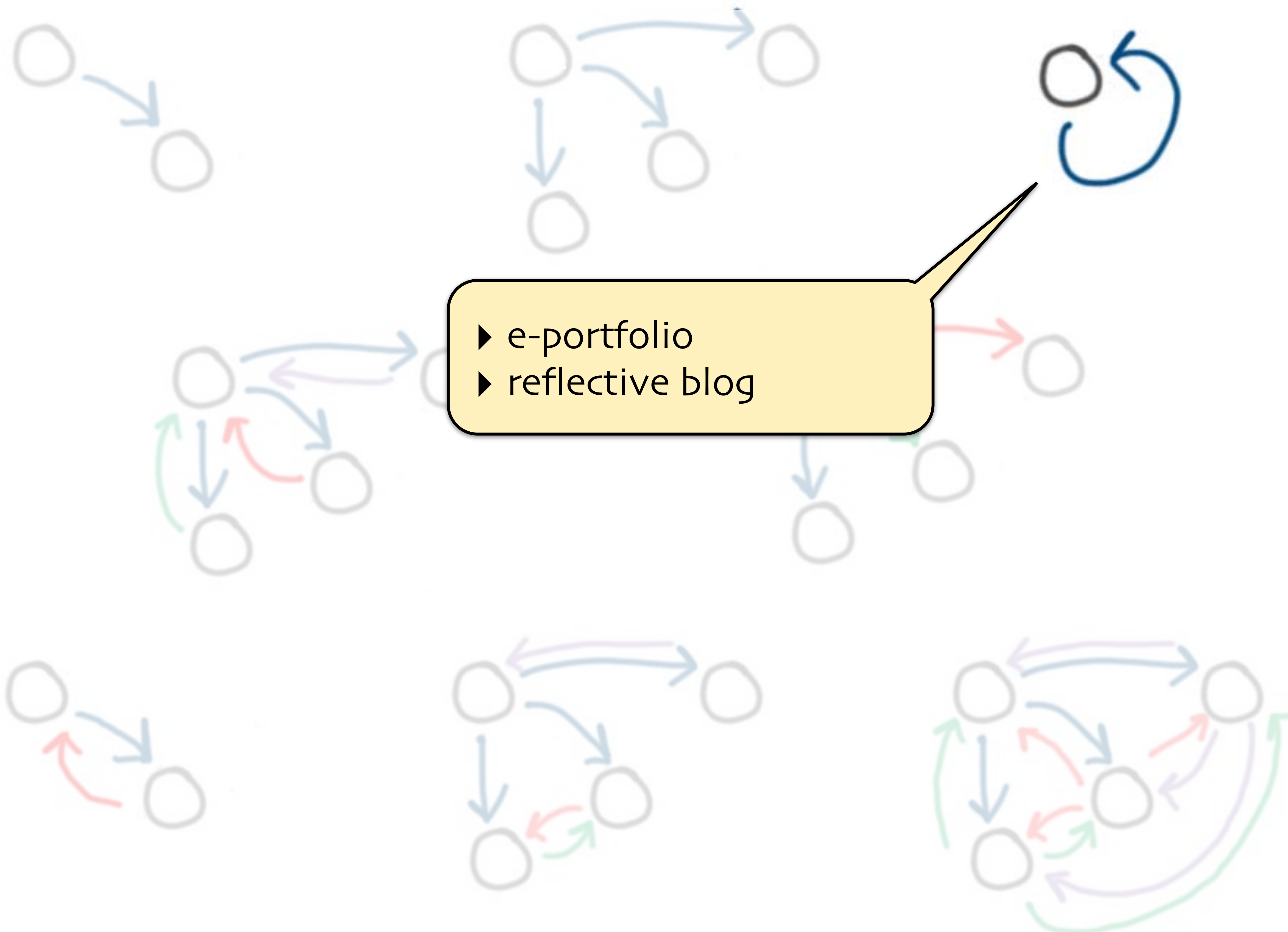
- who is communicating with who, in what order?
- no analysis of message content

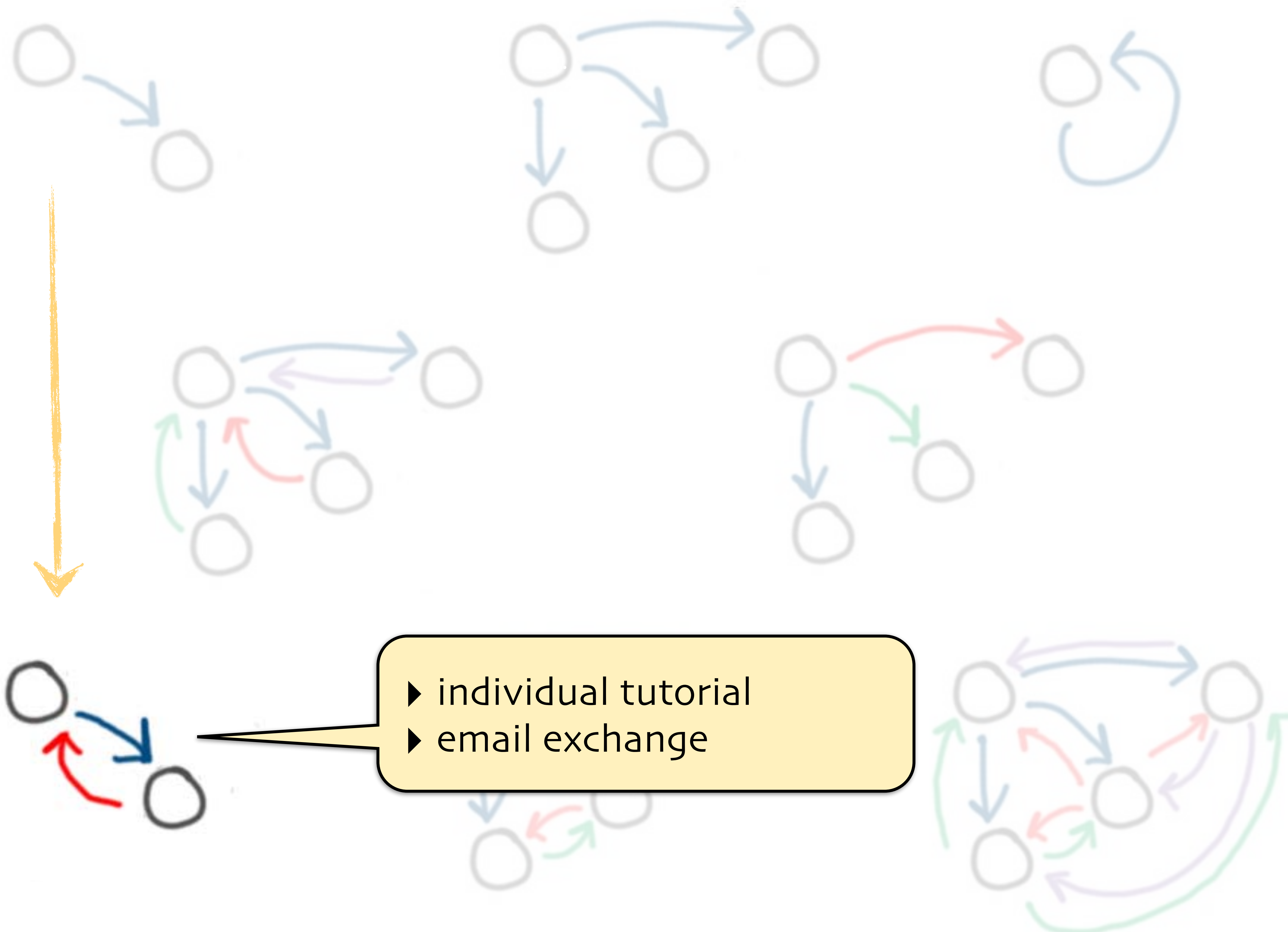


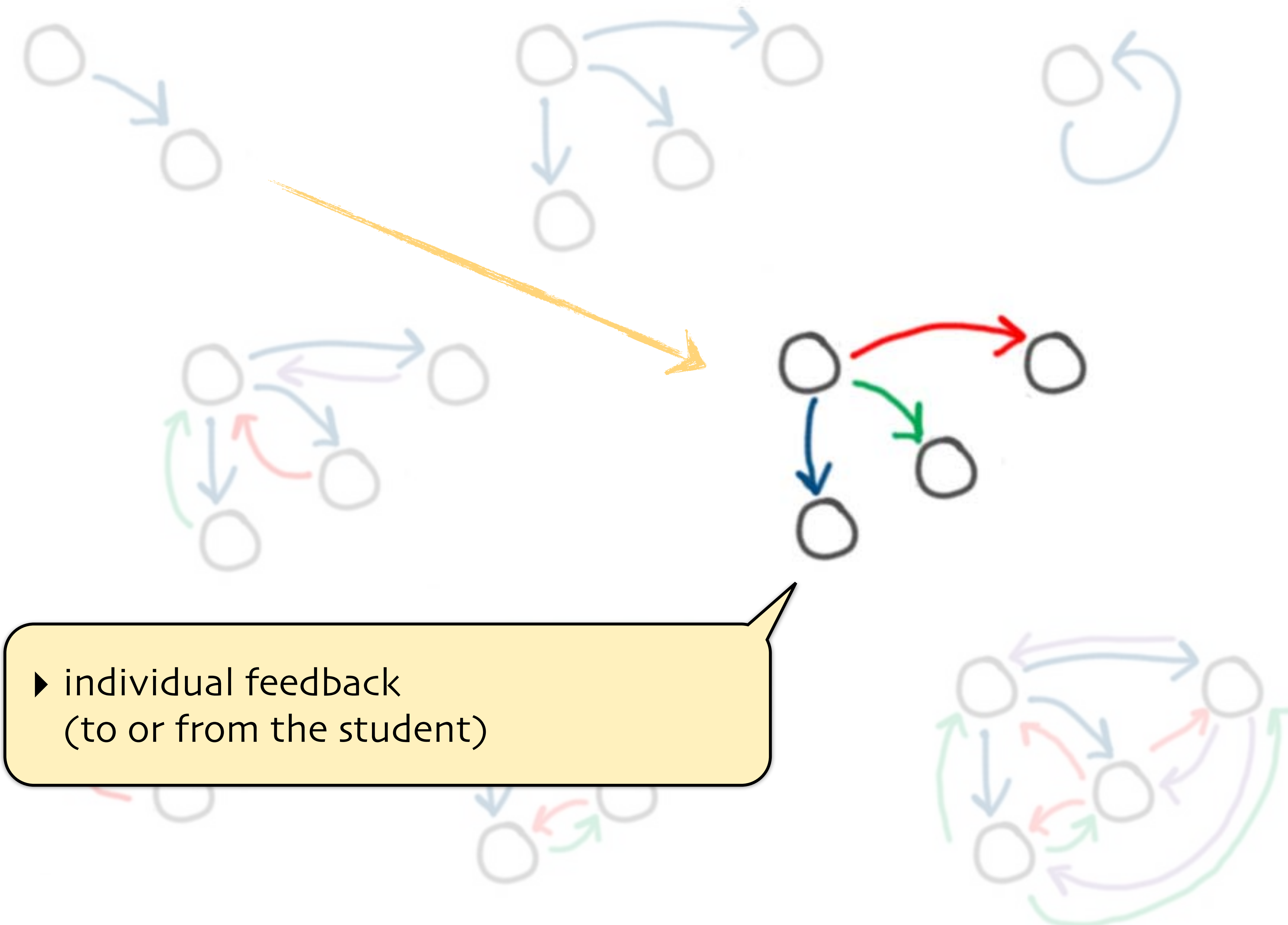


- email
- private blogs viewed by tutor
- assignment submissions

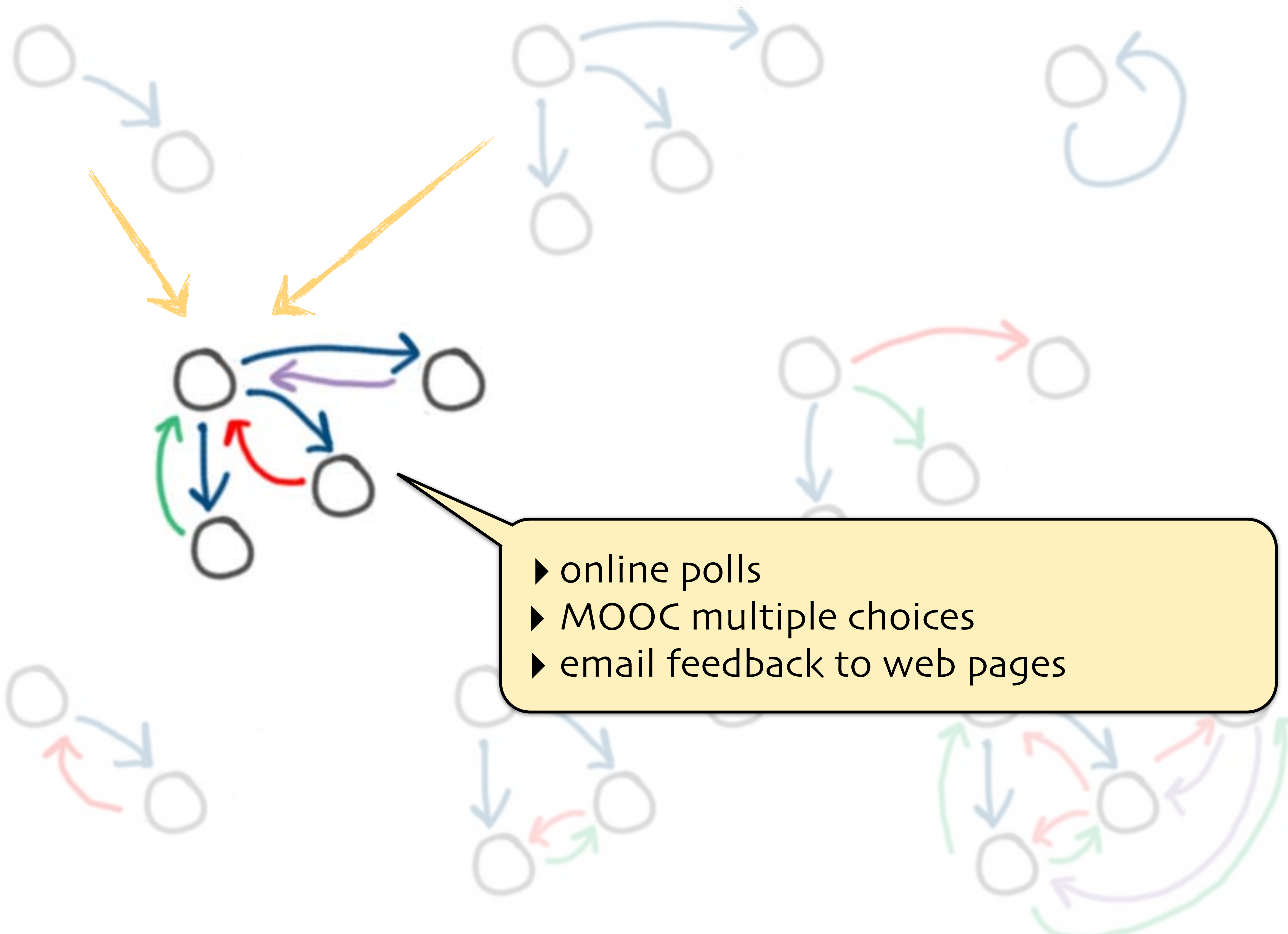

lectures
online videos
student presentations
web pages, Learn
twitter


e-portfolio
reflective blog

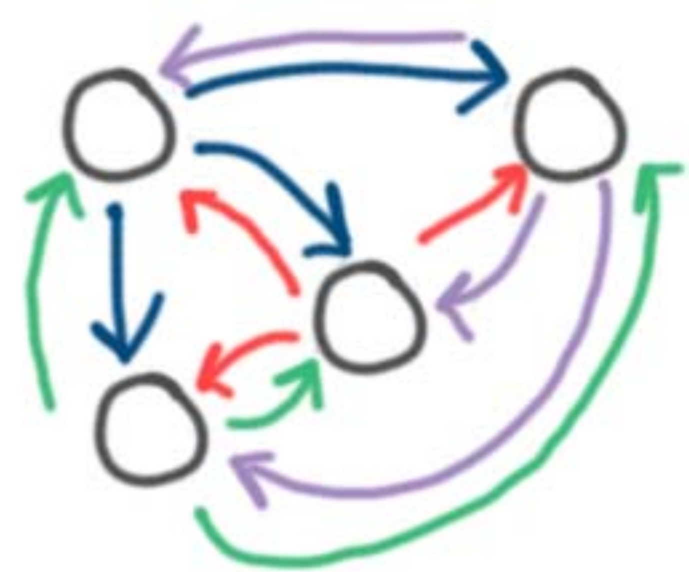

individual tutorial
email exchange



- individual feedback
  (to or from the student)


online polls
MOOC multiple choices
email feedback to web pages

- face-to-face group discussion
- skype, second life
- collaborate
- clickers
- twitter



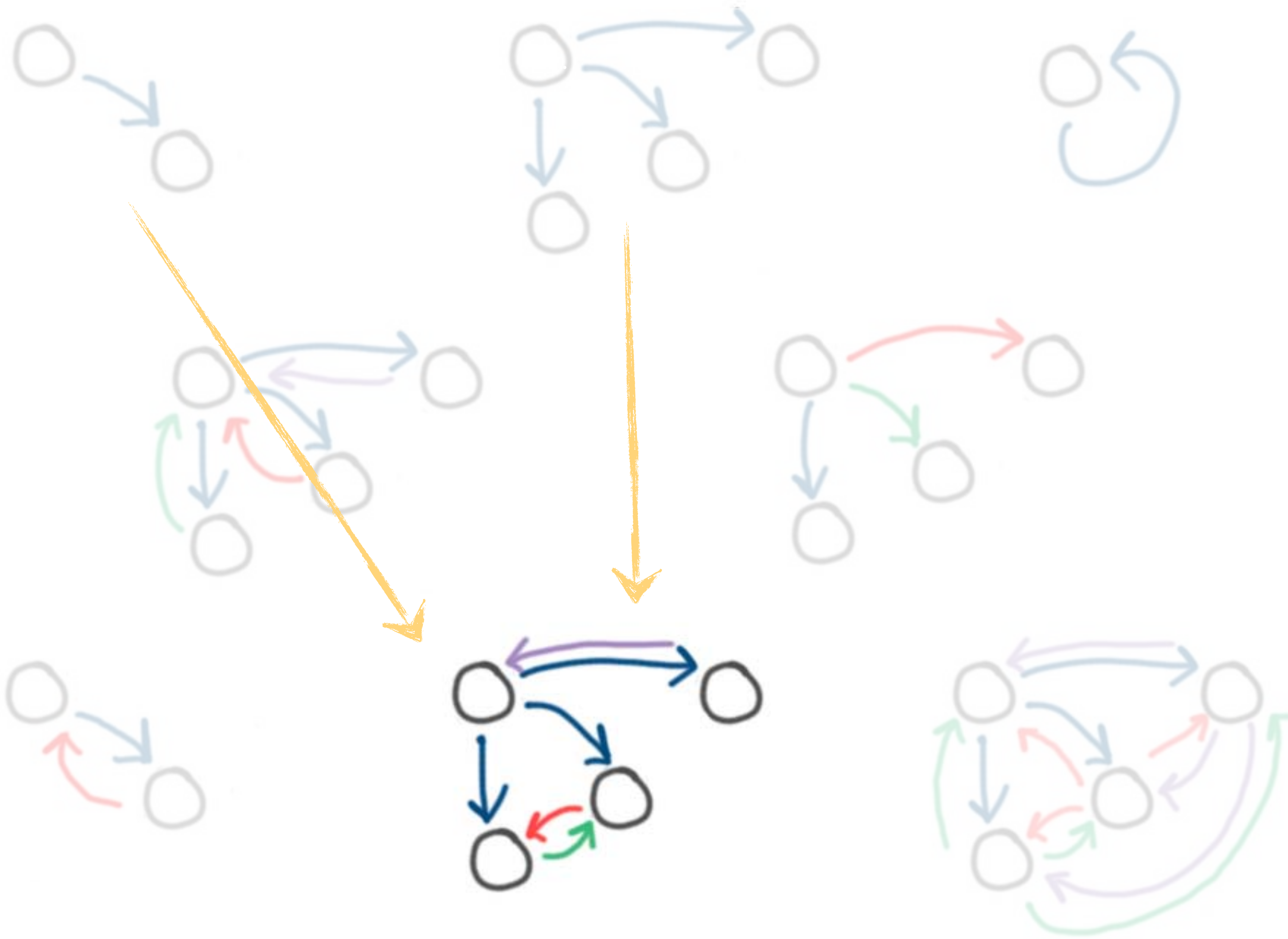
Compound Interactions

There were quite a few cases of more complex procedures

- These are usually sequential compositions of individual interactions

For example …

- A group of students collaborate to create (closed) Wiki pages
- The Wiki pages are then opened up to a wider student group
- The other students comment on the Wiki pages
- The original students revise their pages
- The Wiki is presented for marking
- The staff return marks and comments



Modelling and Equivalence

How can we represent interactions so that we can reason about them?

- How do we represent the sequences of actions?
- How much is the message content significant, compared to the sequencing of the individual actions ?

When are two interactions "the same" ?

- Tools supporting "the same" kind of interaction should be suitable for similar purposes
- Are there multiple notions of "equivalence"?

Reactive Systems

Reactive systems …

- Have “state”
- React to stimuli from their environment
  - e.g. by changing their state
- Influence the environment

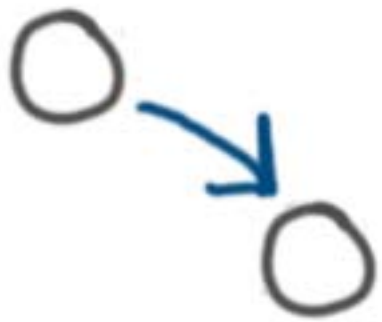
Process Algebras …

- Are prototype specification languages for reactive systems
- These allow us to write down descriptions of interactions and reason about them

CCS (calculus of communicating systems)

- From the work of Robin Milner (Edinburgh) , around 1980
- A process is a "black box" with inputs and outputs
- Communication is an exchange of information between a "matching" input and output
- Following a communication, a process evolves into a different process
- For example: `P' = a.P`
  - **`P`** is a process which can accept the message **`a`**
  - After it has accepted **`a`**, it evolves to a new process **`P'`**
  - **`P'`** is (potentially) different from **`P`**
    for example, it may no longer be able to accept **`a`**
- **0** is the "null" process (stopped - end of interaction)

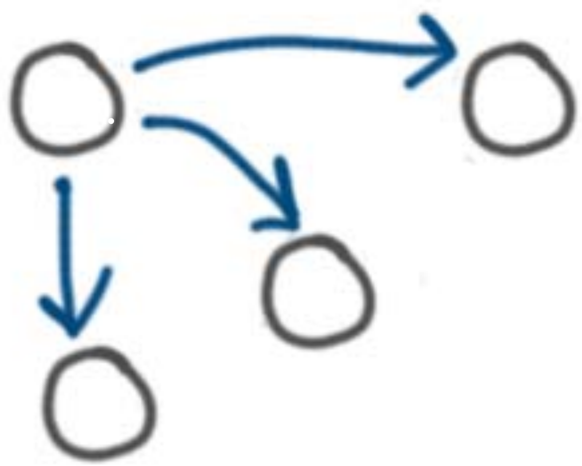
CCS Example (1)



```
Student = assignment . 0
Lecturer = assignment . 0
```

- **assignment** is an "output"
  - this should be an "overbar", but my slides don't support it!
- **assignment** is a matching "input"
- The student stops after submitting the assignment
- The lecturer stops after receiving the assignment

CCS Example (2)

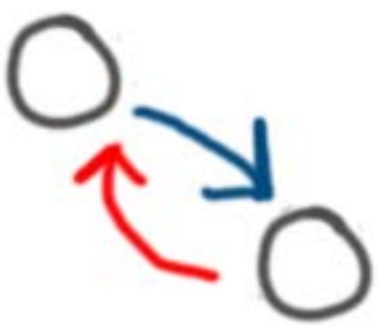


```
Video = show . Video
Student1 = show . 0
Student2 = show . 0
...
```

- After showing, the video returns to the same process as it started with (recursion) an "output"
  - this is sequential here, not simultaneous
- Each student watches it only once and then stops
- The order is indeterminate

CCS Example (3)

```
Demonstrator = question . answer . Demonstrator
Student1 = question . answer . Student1
Student2 = question . answer . Student2
```



- After accepting a question, the demonstrator must respond with an answer before returning to the initial state
- Each student may keep asking questions
  - but they must wait for an answer before asking the next one

CCS Example (4)

```
Demonstrator = q(X) . a(X) . Demonstrator
Student1 = q(X) . a(X) . Student1
Student2 = q(X) . a(X) . Student2
```

- The communications usually involve some kind of information
- We need to represent message content
- For example ..
  - If the student asks a question (X) ..
  - He/she would like to receive an answer to the same question (X)
    Not a completely different question!

CCS Example (5)

```
demonstrator =
   question . (
      answer . demonstrator          (a)
      +
      demonstrator                   (b)
   )
```

- The **+** symbol represents a choice of actions
- This unreliable demonstrator may choose to answer the question (a)
- Or to ignore it and return to waiting for the next question! (b)
- Note that in both cases, the question must be received first

CCS Example (6)

```
Video = show . Video
Demonstrator = q(x) . a(x) . Demonstrator
Student1 = 0 + (( q(x).a(x) + show ) . Student1)
Student2 = 0 + (( q(x).a(x) + show ) . Student2)
Class = Video | Demonstrator | Student1 | Student2
```

- The | symbol indicates a composition of processes …
- The class contains a video and a demonstrator and two students
- The video can be watched repeatedly
- The demonstrator continually responds to questions
- Each student can either give up (**0**)
  - ask a question (and continue after the answer)
  - watch the video (and continue)

CCS Example (7)

```
OpenWiki = ( view(x) . OpenWiki )
         + ( close . ClosedWiki )

ClosedWiki = ( update(x) . ClosedWiki )
           + ( open . OpenWiki )

Lecturer = ( open + close ) . Lecturer

Group = update(x) . Group

Class = view(x) . Class
```

Internal Reasoning

The process calculus models only the "externally visible" interactions

- It does not model the internal decision process of any of the agents
- For example: we have no knowledge of when, or why a student may choose to watch a video, rather than ask a question
- If we are interested only (for example) in deciding whether two tools offer a similar pattern of interaction, then this is not usually significant
- The Lightweight Communication Calculus is an executable language based on CSS which allows us to specify the internal processes, as well as the interactions
  - This is less useful for equivalence checking (for example)
  - But it could be used, for example, to create simulations

LCC

```
a(buyer, B) ::
 ask(X) => a(shopkeeper, S) then
 price(X,P) <= a(shopkeeper, S) then
 buy(X,P) => a(shopkeeper, S)
             ← afford(X, P) then
 sold(X,P) <= a(shopkeeper, S)


a(shopkeeper, S) ::
  ask(X) <= a(buyer, B) then
  price(X, P) => a(buyer, B)
               ← in_stock(X, P)then
  buy(X,P) <= a(buyer, B) then
  sold(X, P) => a(buyer, B)
```

Equivalence

CCS allows us to demonstrate equivalence (or not) of two different interaction models

- CCS has a notion of process equivalence called "Bisimulation"
- Informally: the two processes are capable of following the same sequences of actions
- The "names" of the processes and messages are not significant, so this equivalence is based on the abstract pattern of the interactions
- There are some technicalities involving non-termination

The "Edinburgh Concurrency Workbench"

- is an automated tool which can check the equivalence of two processes
- Also, check various properties and run simulations

A Useful Equivalence?

We have not created sufficiently realistic models to be able to judge whether automated equivalence checking may be useful in practice

- How significant are the roles?
  - Does a tool which supports an interaction between the teacher and student also support the same interaction when the roles are reversed?
- Which actions are significant?
- How significant is the message content? Can we classify this?
- Could we engineer the models to expose the learning outcomes in a way which would be significant?

Modelling issues

- CCS does not support "broadcast"
- Some situations are not very natural to model

Is This A Useful Perspective?

There were very few cases where someone articulated a clear vision of an interaction which they explicitly wanted to initiate

- This makes it difficult to evaluate how useful this perspective is in designing interactions to meet a particular objective

But …

- Feedback suggests that this can be a helpful way of thinking about tool use
- Other tools which perform a similar interaction may be useful alternatives

Is it worth a deeper analysis ?

- I think so …

Non-functional Aspects

Synchronous?

- Does everyone need to be present at the same time?

Persistent?

- Do the contents remain visible indefinitely? (snapchat)

Anonymous?

- Is the poster anonymous ?

Fluent?

- Is there a significant latency?

Other Issues

Time & Effort

- Is it worth the time to investigate/learn/develop?
  for both staff and students?
- Learning multiple, constantly changing tools is not efficient
  tools can change quickly, requiring significant effort to keep up

Cultural or personal attitudes/preferences

- Some people have a natural tendency to share things (or not)

Privacy, Anonymity & Data Protection …

Internal vs External Systems …

Privacy & Anonymity

Students prefer to keep separate personal & work spaces

- eg. on Facebook
- This may lead to “exclusion” and other issues

Anonymity is an important consideration

- Can encourage people to participate (Peerwise? Wordpress aliases?)
- But can also be abused (Twitter?)

Accidental bleed between public & private spaces

- Lack of clarity about (eg.) staff membership of Facebook groups
- Postings on private Wordpress site then discussed in public Facebook

Tools are often deployed without a very explicit consideration of these issues

- Google hangouts posting discussions to uTube

Internal vs External Systems

Internal systems are good ...

- Access is restricted and students (and staff!) are not so exposed
- They provide data protection, and protection of ideas (copyright)
- We have some control over the availability and stability

Internal systems are not so good ...

- The privacy is unclear because staff have access and control
- Access is unavailable after students graduate
- It may not be easy to provide access for (eg.) external examiners, or job interviewers
- The need for stability and the lack of effort means that services usually lag behind those available externally

Final Thoughts ...

The project state ...

- Interviews are still being coded - lots of interesting data here
- But no further explicit work planned on the interactions

What we would do with more time/resources ...

- Attempt to model some realistic examples more fully
  - Including the types of messages
- Experiment with (automated) equivalence checking
- Look more at related fields, such as the use of process calculi for modelling business processes (s_BPM)
  - And process calculi supporting broadcast

Is this interesting ?

- (How) does it relate to "group knowledge" ?

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