

participative systems



© Paul Pangaro 2000. All Rights Reserved.

outline

- i. present a hypothesis
- ii. sketch a framework
- iii. propose a research direction

i. present a hypothesis

'participants'

- act on their own
- behave in complex ways that make sense to us
- interact with us directly
- work with us in achieving our goals
- modify their own goals
- partner with us in the creation new goals
- collaborate with us on the design of new partners



hypothesis

interaction framework

to understand existing interactions with participants, and to propose new and more interesting ones, we need a framework to characterize degrees of:

- autonomy
- complexity
- interactivity
- collaboration
- goal-setting

hypothesis

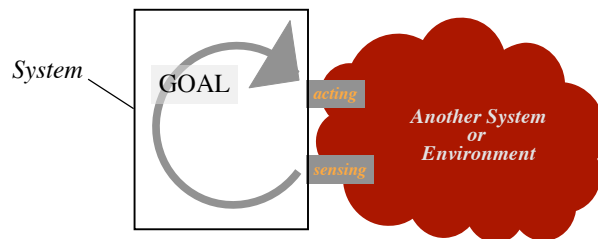
II. sketch a framework

- defining single-loop and double-loop
- characterizing “participative systems”
- composing systems of users and artifacts
- increasing system variety

categorizing systems — single-loop system

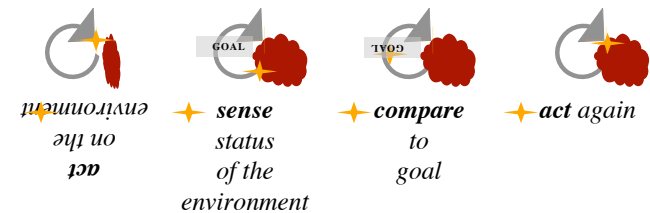
after C Argyris 1992

can detect and react / has goals that are static
thermostat senses temperature below 70°f
setpoint and turns on heat



framework

single-loop cycle

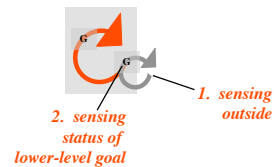


framework

categorizing systems — double-loop system

after C Argyris 1992

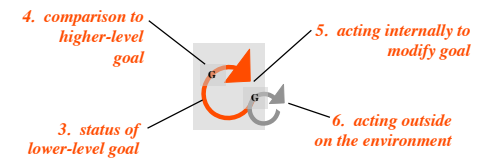
can detect and react on multiple levels
 system can sense from outside itself
 system can also sense the status of its lower-level goal
 goal: is it achieved, how closely, for how long...



framework

categorizing systems — double-loop system

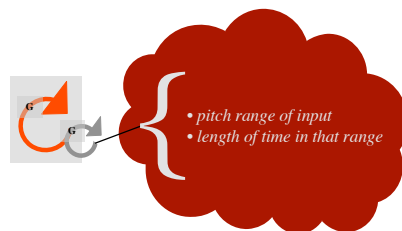
has goals that are dynamic and changeable
 system compares status of lower-level goal to higher-level
 higher-level goal may take action to modify lower-level goal
 this new goal causes actions to be taken outside



framework

categorizing systems — double-loop system

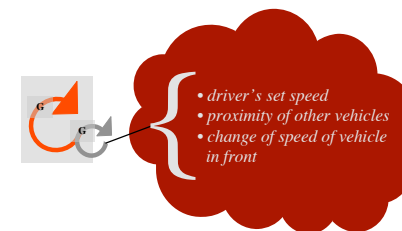
Pask's Musicolour
 avoids boredom [second-order goal]
 by varying mapping of sound to light [first-order goal]
 in response to changing inputs from musician



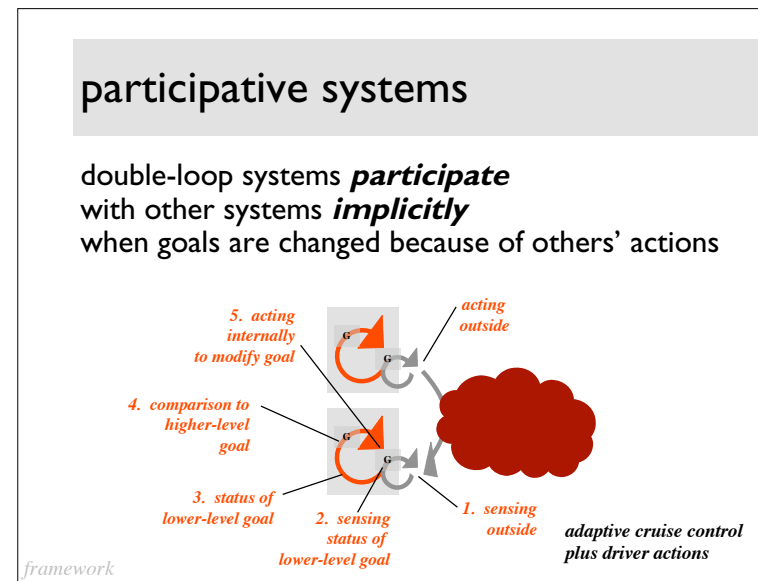
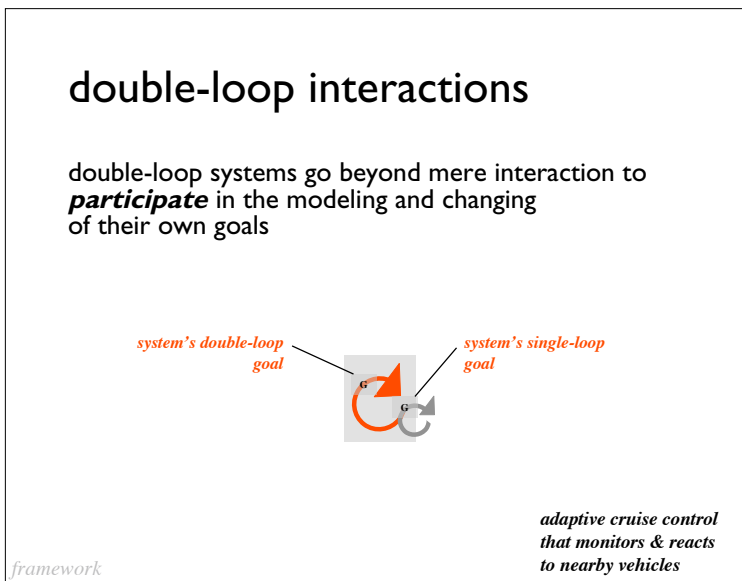
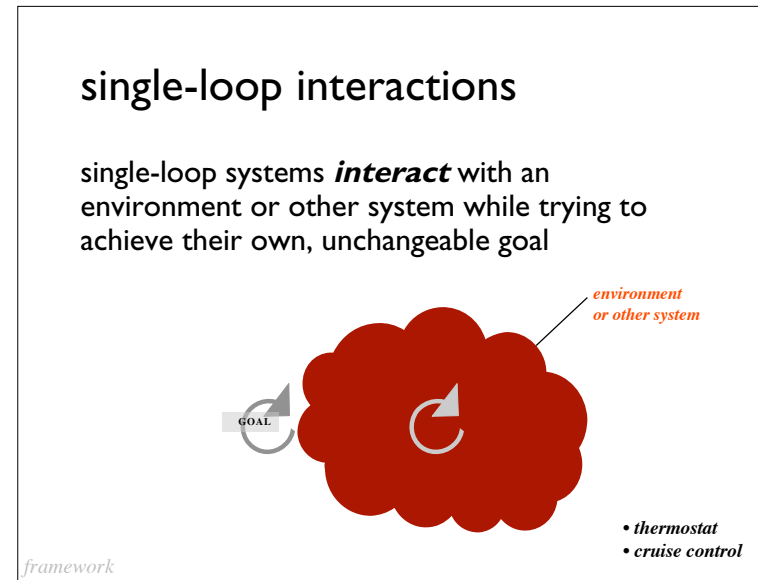
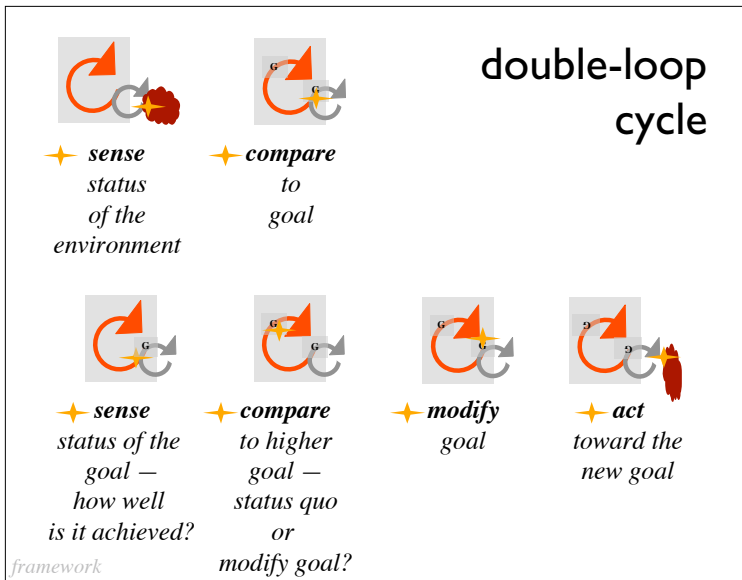
framework

categorizing systems — double-loop system

adaptive cruise control
 avoids collisions with vehicles [second-order goal]
 by varying Set cruising speed [first-order goal]
 in response to changing speed of vehicles in front

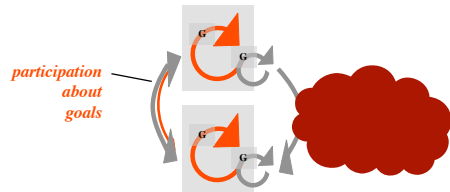


framework



participative systems

double-loop systems may **participate explicitly** with other double-loop systems in goal-setting



framework

participative systems — definition

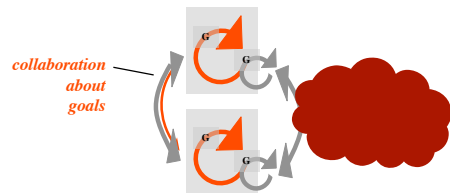
modify themselves as a result of interactions
participate in changing their goals
influence other double-loop systems to test and modify their goals
participate in the creation of new possibilities

only double-loop systems are participative

framework

participative systems — collaboration

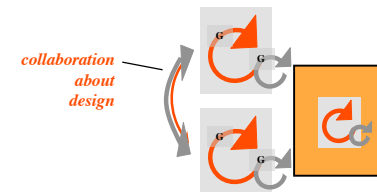
when double-loop systems interact with other double-loop systems for the **same** goals, they **collaborate** with each other



framework

participative Systems — design

when double-loop systems collaborate to create new systems, they engage in design



framework

composing a system — human user



a human User may behave as a single- or double-loop system

framework

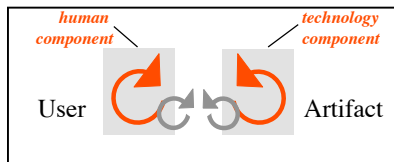
composing a system — technological artifact



an Artifact may be a single- or double-loop system

framework

composing systems — humans and technology



User may be single- or double-loop sub-system
Artifact may be single- or double-loop sub-system

framework

variation 1

User and Artifact are each single-loop

User and Artifact
act and sense
pursue a fixed goal
do not change the goals of the other



framework

variation 2

only user is double-loop

User

modifies own goals
can delegate to the artifact to achieve own [user's] goals
guides the whole



Artifact

acts and senses according to a fixed goal

framework

variation 3

only Artifact is double-loop

User

acts and senses according to a fixed goal

Artifact

modifies own goals
can delegate to the user to achieve its [artifact's] goals
guides the whole



framework

variation 4

User and Artifact each double-loop

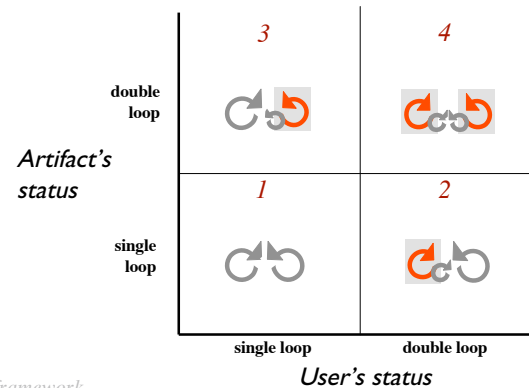
User and Artifact

contain models of their goals
vary their goals
delegate to the other
may influence the goals of the other



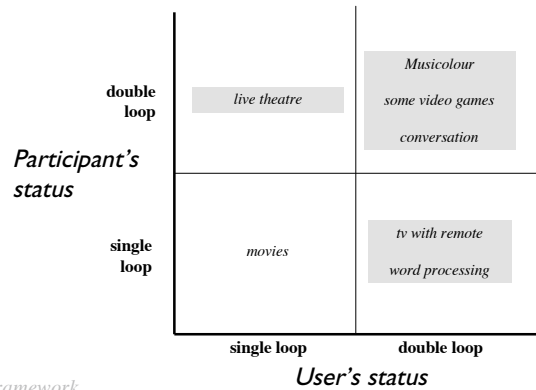
framework

space of participative systems

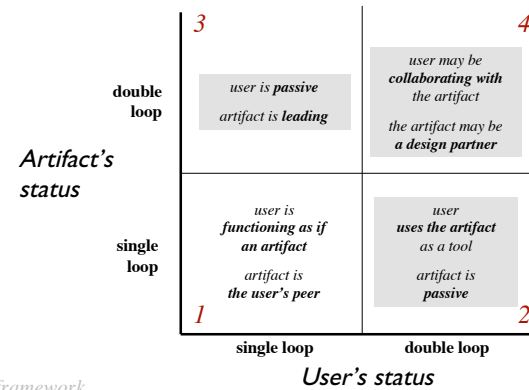


framework

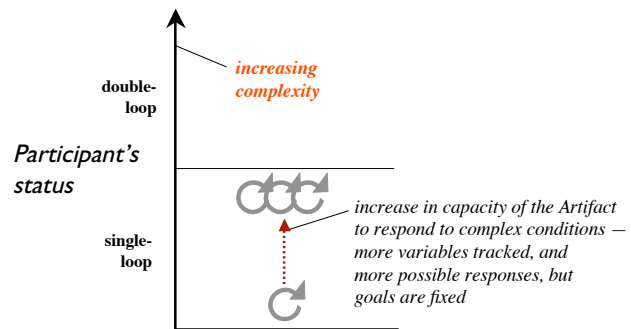
system variations — interactive media



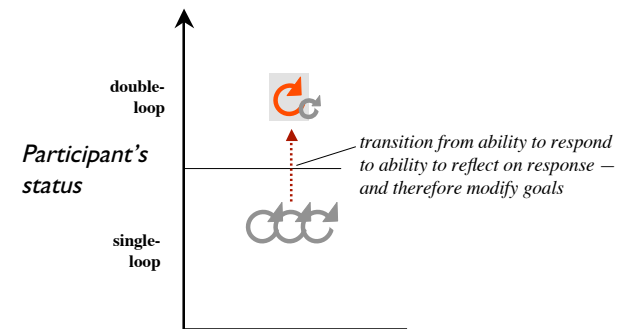
system variations — summary



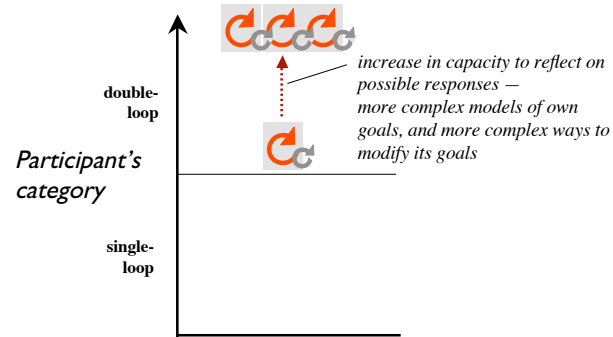
increasing system variety — single-loop



increasing system variety — transition to double loop



increasing system variety — double-loop

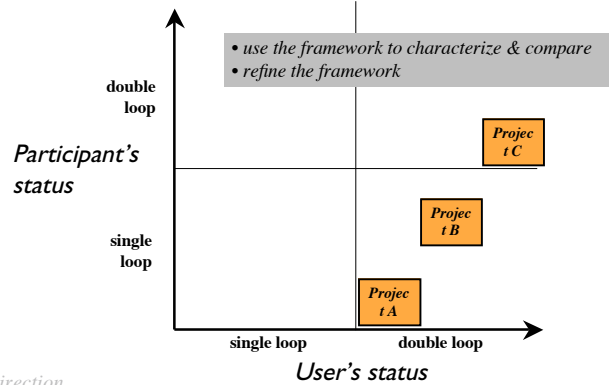


framework

III. research direction

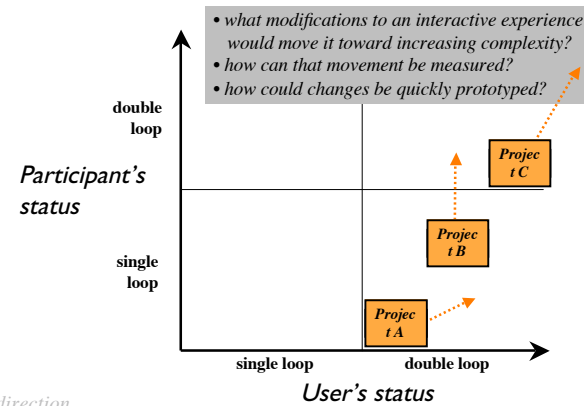
- categorize current research
- propose research metrics
- design demo architecture
- formulate initial questions

categorize interactive systems



direction

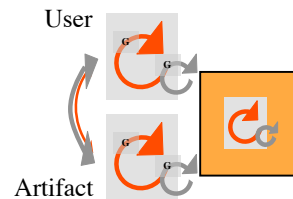
propose interactivity metrics



direction

collaboration architecture — User+Artifact does design

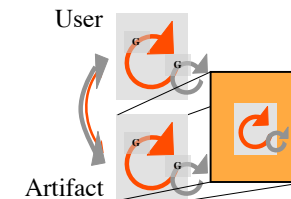
Users and Artifacts can collaborate on the construction of new demos



direction

designing new systems

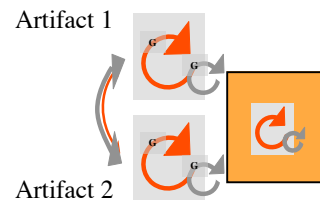
new demo under design may be the next-generation Artifact



direction

Artifact+Artifact does design

it should be possible to create collaborating artifacts that construct new systems



direction

two broad application domains

participative systems in environmental controls

- monitoring and improving quality of air and water
- control and coordination of audio and video information sources, including radio, telephone, voicemail, video, broadcast media

participative systems in user experience design

- monitoring and improving the quality of our daily use of software
- control and coordination of digital information sources, including email and web

direction

initial questions — environmental controls

what environmental sensors are currently available?

- focus on air, water, sound

- include a wide range of sensor types

- consider needs for accuracy, bandwidth, low power

what control systems effect reduced costs?

- energy management

- healthcare management

what control systems improve human comfort?

- hvac, toxins, ...

direction

initial questions — user experience design

how does this framework apply to pure software systems?

- software monitors can maintain overall system health of networks and distributed software applications

- autonomous software agents can forage the internet to find information and potential relationships

- bug wizards can detect, diagnose, and correct user errors and system bugs

direction

initial questions — how are goals to be represented?

requirements

- single-loop systems must be able to test a goal against sensor data

- double-loop systems must be able to modify its single-loop goal(s)

range of representations should be explored

- symbolic data structures...

- configurations of a neural net...

- genetic algorithms...

direction

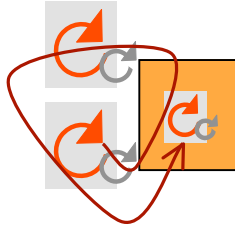
summary goals for participative systems

encompass complexity, collaboration, and goal-directed systems in a single framework

provide a framework to characterize, compare, and extend any given product or service

propose a means to construct collaborative design partners

participative design



participative design

