formal futures

ubiquity and physicality

changing nature of the interface

• ubiquitous computing
  computers everywhere!

• many simple systems
  + complex interactions

• sounds like a job for ....
  formalism
an example …

- understanding the tangible
- the physical world
  - we live in it
  - we are good at it!
  - we understand it
- properties of physicality
  - directness of effect – push and it moves
  - locality of effect – here and now
  - visibility of state – small number of relevant parameters

study the old to design the new

- look at ordinary consumer devices
  - washing machine, light switch, personal stereo
- why?
  - we are used to using them ourselves
  - they have been ‘tested’ by the marketplace
  - they embody the experience of designers

work with Masitah Ghazali & DEPtH project
fluidity

• ‘naturalness’ of device–logical mapping

half empty?

• not the first ...
  – Norman – DOET/POET
  – Thimbleby – FSM for video, microwave

• often used as HCI strawman
  – emphasise for design flaws

• we are looking for the good lessons
  – how mundane devices exploit physicality
models of AR & tangiblity

- Ullmer and Ishii – MCRpd
  - architectural interaction model

- Benford et al. – sensible/sensable/desirable
  - exploring design space

- Koleva et al. – TUI framework
  - 'coherence' between the physical and digital

multiple feedback loops

The GUI fallacy ... semantic feedback is NOT enough
model physical device states

- the device ‘unplugged’

model logical system

- two states of the system
physical-logical mapping

exposed state

mapping 1-1

particularly easy to understand and use but not always 1-1
bounce-back button

- mapping is on events not states

in detail: initial pressure on exposed state switch

shorthand
time-dependent devices

N.B. continued pressure during interaction

minidisk

minidisk knob

track selected

'virtual' time event added
controlled state

(1) system state visible through control
(2) system and user have similar effects

compliant interaction

(1) system state visible through control
(2) system and user have similar effects
is it enough?

• need to represent rich physical interaction

• decorated STNs – go some way
  ... but still simplistic

• need to model pressure/force
  status–event analysis ... naturally!

physigrams in action ... 

• three physical devices
• the same logical system

area for display
but emulated on PC screen

knob  dial  touch pad
obvious differences

less obvious

knob has end stop
dial rotates freely
... and subtle

- bounce-back resistance on knob
- felt transitions but no resistance on dial
- continuous with no felt transitions on touch pad

designers like it pretty!
now do it yourself ...