Human–Computer Interaction:
as it was, as it is, and as it may be
Connected, but Under Control?
Big, but Brainy?

Alan Dix
InfoLab21, Lancaster University, UK
www.hcibook.com/alan
www.alanxiv.com/blog

today I am not talking about ...
(but may have mentioned earlier!)

• situated displays, eCampus,
  small device – large display interactions
• fun and games, artistic performance,
  slow time
• physicality and design, creativity and bad ideas
  + modelling dreams and regret!!

‘my stuff bit’, but lots of other people

Athens:  Akrivis, Costas, Giorgos, Yannis, +++
Lancaster: Azrina, Devina, Nazihah, Stavros, +++
 Madrid:  Estefanía, Miguel, Allesio
Rome:  Antonella, Tiziana, +++

plus the old Qtive team

some numbers

back of the envelope ... the Dix number

how much memory for full AV record of your life?
  — assume ISO quality (100bytes/sec)
  — 30 million seconds / year => 300 Gbytes/year
  — one hard disk x number of years
  — but Moore’s Law -> size reduces each year
  — max is after 2 years
  — never need more than one big disk

baby born today ...
  — the life of man is 3 score and ten = 70 years
  — 21 terabytes ... but with Moore’s Law ...
  — memory the size of a grain of dust
      ... from dust we came ...

more back of the envelope

The Brain
  — number of neurons ~ 10 billion
  — synapses per neuron ~ 10 thousand
  — information capacity

• number neurons x synapses/neuron = 100 bits
• 40 bits = address of neuron (34 bits) + weight (6 bits)
• total = 500 terabytes or 1/2 petabyte

The Web
  — web archive project 100 terabytes compressed
  — or Google 10 billion pages x 50K per page
      = 500 terabytes
and more ...

The Brain
- total number synapses = 100 trillion (10¹²)
- firing rate = 100 Hz
- computational capacity = 10 peta-nuops / second
- nuop = neural operation - one weighted synaptic firing

The Web
- say 100 million PCs
- assume 1 GHz PC can emulate 100 million nuop / sec
- computational capacity = 10 peta-nuops / second

so what?

- global computing approximating raw power of single human brain
- does not mean artificial humans!
  but does make you think
- we live in interesting times
  an age pregnant for "intelligent" things
- but maybe not as we know it
  ... AI = Alien Intelligence

onCue origins

- dot.com company aQtive
  with Russell Beale, Andy Wood, and others
- venture capital funding from 3i
  ... BEFORE dot.com explosion
- onCue principal product
  - over 600,000 copies distributed
  - 100bs of registered copies
- needed second round funding ...
  ... just AFTER dot.com collapse :-(

onCue in action

user selects text

slowly icons fade in
kinds of data

- short text
- single word
- names
- post codes
- numbers
- custom
- tables

issues ...

appropriate intelligence

- often simple heuristics
- combined with the right interaction

rules of standard AI interfaces

1. it should be right as often as possible
2. when it is right it should be good

rules of appropriate intelligence

1. it should be right as often as possible
2. when it is right it should be good
3. when it isn’t right ...
   it shouldn’t mess you up

Hit or a Miss?

× paper clip
  - can be good when it works
  - but interrupts you if it is wrong

✓ Excel ‘∑’ button
  - guesses range to add up
  - very simple rules
  - if it is wrong ...
    simply select what you would have anyway
onCue appropriate?

1. it should be right as often as possible
   - uses simple heuristics:
     e.g. words with capitals = name/title
2. when it is right it should be good
   - suggests useful web/desktop resources
3. when it isn’t right it shouldn’t mess you up
   - slow fade-in means doesn’t Interrupt

related systems ‘data detectors’

- late 1990s
  - Intel selection recognition agent
  - Apple Data Detectors (Bonnie Nardi)
  - CyberDesk (Andy Wood led to onCue)
- recently
  - Microsoft SmartTags
  - Google extensions
  - Citrine – clipboard converter
  - CREQ system (Faaberg, 2006)
- way back
  - Microcosm (Hypertext external linkage)

using intelligence

... and on the web

SnipIt

SnipIt origins

- MSc project 2002 (Jason Marshall)
- studying bookmarking
  - focus was organisation
- exploratory study
  - found users wanted to bookmark sections
- so one evening Alan has a quick hack
  ... and about once or twice a year since
- now being used for other projects
- live system ... try it out

SnipIt

- users select in web page and press "SnipIt" bookmarklet
- SnipIt pops up page with suggested things to do with the snip (and saves it for later, like bookmark)
SnipIt

architecture
• server-side 'intelligence'
• recognisers + services again
• different kinds of recogniser chaining:
  – from semantics to wider representation
    e.g. postcode suggests look for address
  – from semantic to semantic
    e.g. domain name in URL
  – from semantic to inner representation
    e.g. from Amazon author URL to author name

issues ...

provenance
when you have a recognised term:
• where did it come from
  – text char pos 53-67
  – transformed from Amazon book URL
• how confident are you
  – 99% certain Abraham Lincoln is a person
• how important
  – mother-in-law’s birthday

using intelligence
the bigger picture ...

the ecology of the web
linking it together?
Semantic Web answer – providers add semantics
onCue & SnipIt – use intelligence add at point of use
• onCue & SnipIt (data detectors)
  – semantics for source of interaction
• text mining (crawlers)
  – semantics for target of interaction
• other parts of the ecology ...

folksonomy mining

folksonomies (tags)
  ... emergent human vocabulary
  but no semantics ☺
mine structure using co-occurrence
generates ‘similar to’ and ‘sub-type’

structure on the desktop
personal ontologies

user’s own connections and relationships
egocentric & ideocentric classes

hand-produced or mined
(e.g. Gnowsis)

spreading activation over ontology

context in forms

from use to data

using interaction to generate semantics
• selection:
  – user selects data and uses it in semantic field
• confirmation
  – if user uses inferred data assume correct
• web forms
  – type annotation from use

entry of first field sets context for rest of form

but what is the relationship?
maybe semantic markup on form
  – good SemWeb style ... but rare
  ... or more inference ...
match terms in form to ontology  
look for ‘least cost paths’  
• number of relationships traversed, fan-out

Dr. A. Kofala-N., K. Legg, A. Colenst, T. Sparrer, K. Lippert,  
of End-User Information Management.  