St Andrews, Nov. 2008

Human–Computer Interaction:
as it was, as it is, and as it may be

Connected, but Under Control?
Big, but Brainy?

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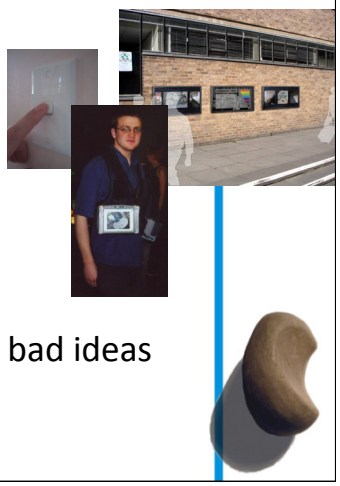
today I am not talking about …
(but may have mentioned earlier!)

- 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!!



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‘my stuff bit’, but lots of other people

Athens: Akrivi, Costas, Giorgos, Yannis, +++

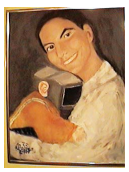
Lancaster: Azrina, Devina, Nazihah, Stavros, +++

Madrid: Estefania, Miguel, Allesio

Rome: Antonella, Tiziana, +++

plus the old aQtive team

, 2008



some numbers

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back of the envelope … the Dix number

how much memory for full AV record of your life?

- assume ISDN quality (10Kbytes/sec)
- 30 million seconds / year => 300 Gbytes/year
- one hard disk x number of years
- but Moores 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 tera bytes … but with Moores Law …
- memory the size of a grain of dust

… from dust we came …

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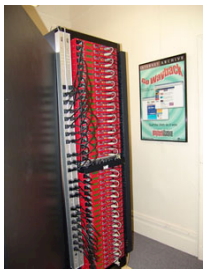
more back of the envelope



The Brain

- number of neurons ~ 10 billion
- synapses per neuron ~ 10 thousand
- information capacity
  - number neurons x synapses/neuron x 40 bits
  - 40bits = 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

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and more …

The Brain

- total number synapses = 100 trillion (10^{14})
- 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

?

News Flash Japan 2011
10 petaflop super computer

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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

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using intelligence

on the desktop

onCue

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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
  - 1000s of registered copies
- needed second round funding …

  … just AFTER dot.com collapse :-(

aQtive

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onCue

- intelligent ‘context sensitive’ toolbar
- sits at side of the screen
- watches clipboard for cut/copy
- suggests useful things to do with copied date

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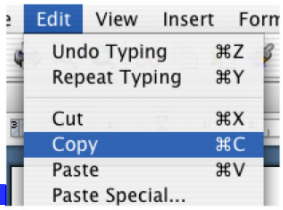
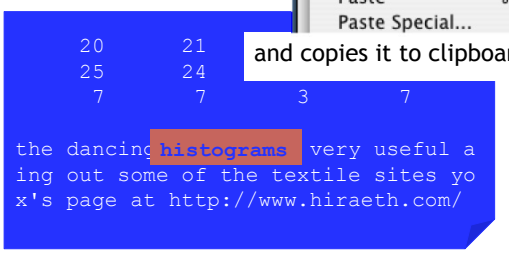
onCue in action

user selects text



and copies it to clipboard



slowly icons fade in

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kinds of data

short text	–	search engines
single word	–	thesaurus, spell check
names	–	directory services
post codes	–	maps, local info
numbers	–	SumIt! (add them up)
custom	–	order #, cust ref ...
tables	–	...

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issues ...

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appropriate intelligence

- often simple heuristics
- combined with the right interaction

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rules of standard AI interfaces

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

good for demos
look how clever it is!

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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

} what makes a system really work!

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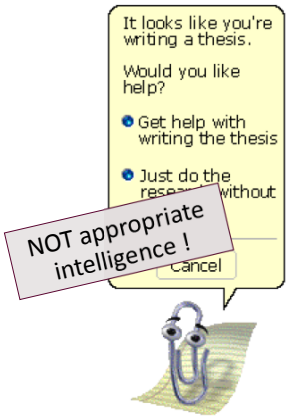
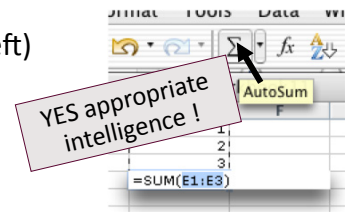
Hit or a Miss?



✘ 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 (contiguous numbers above/to left)
- if it is wrong ... simply select what you would have anyway



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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

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architecture

- high level
  - recognisers & services
- low level
  - Qbit components
  - based on status–event analysis

theoretical framework bridging human activity to low-level implementation

events	–	happen at single moment e.g. button click, lightening
status	–	can always be sampled e.g. screen, temperature

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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
  - CREO system (Faaberg, 2006)
- way back
  - Microcosm (Hypertext external linkage)

syntactic / regexp

'semantic' / lookup

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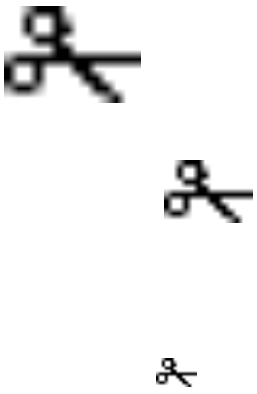
using intelligence



... and on the web

Snip!t

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Snip!t 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

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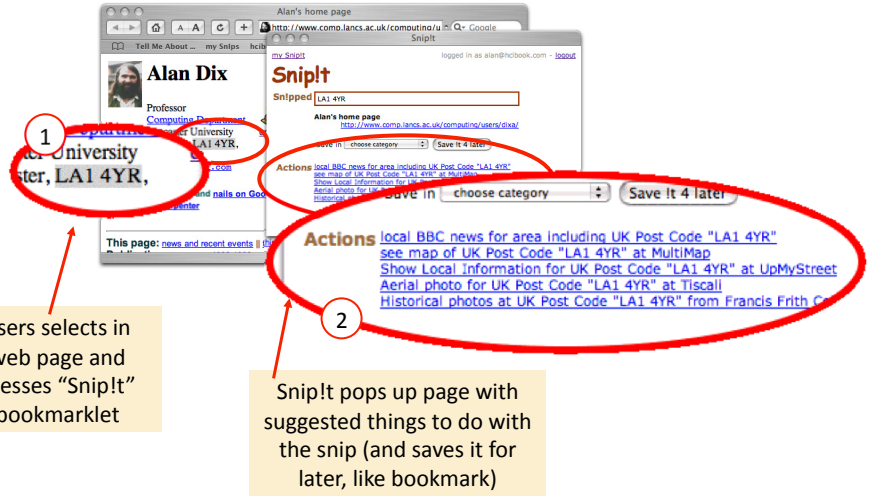
Snip!t



users selects in web page and presses "Snip!t" bookmarklet

Snip!t pops up page with suggested things to do with the snip (and saves it for later, like bookmark)

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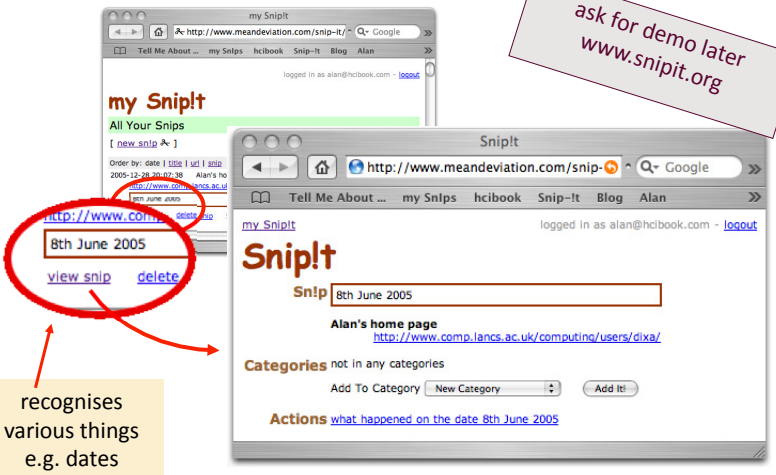
Snip!t



ask for demo later
www.snipit.org

recognises
various things
e.g. dates

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issues ...

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architecture

representation vs. semantics very important

- 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

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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

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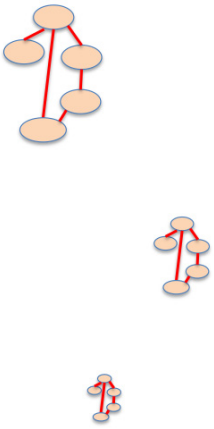
using intelligence



the bigger picture ...

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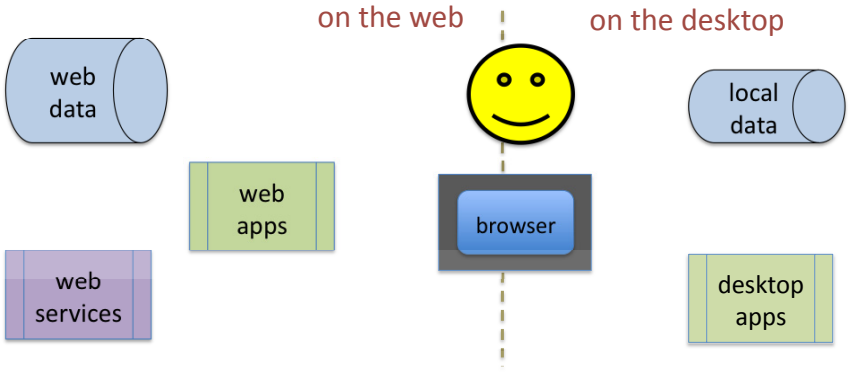
the ecology of the web



linking it together?

- Semantic Web answer – providers add semantics
- onCue & Snip!t – use intelligence add at point of use

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- onCue & Snip!t (data detectors)
  - semantics for **source** of interaction
- text mining (crawlers)
  - semantics for **target** of interaction
- other parts of the ecology ...

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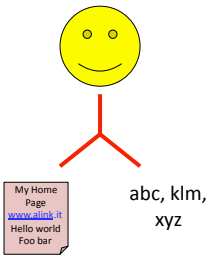
folksonomy mining

folksonomies (tags)

... emergent human vocabulary



but no semantics ☹

mine structure using co-occurrence

generates 'similar to' and 'sub-type'

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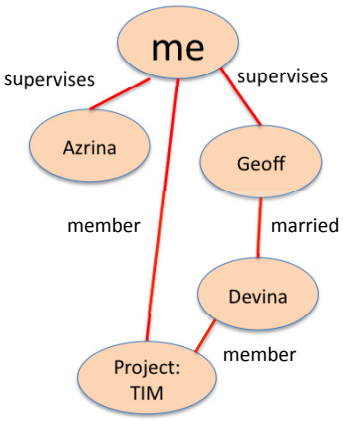
structure on the desktop
personal ontologies

user's own connections
and relationships

egocentric & ideocentrc classes

hand-produced or mined

(e.g. Gnowsis)



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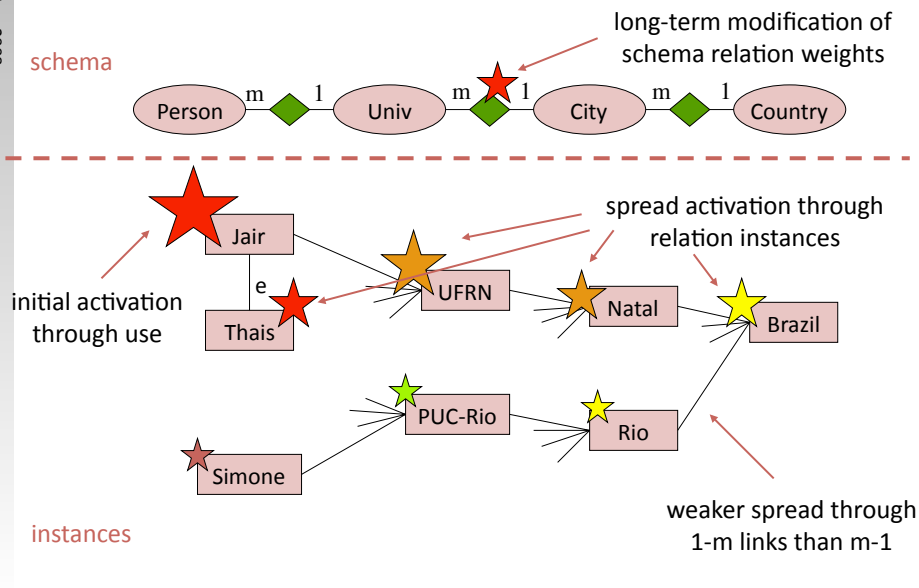
spreading activation over ontology



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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

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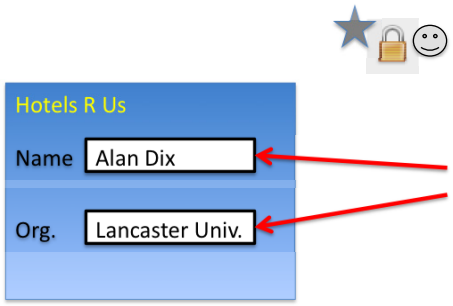
context in forms



but what is the relationship?

maybe semantic markup on form

- good SemWeb style ... but rare

... or more inference ...

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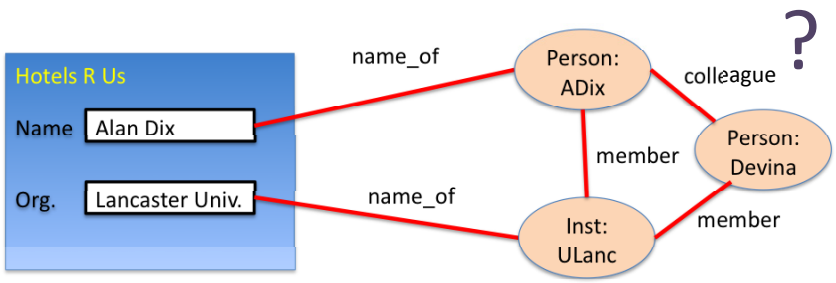
context in forms - inference



match terms in form to ontology

look for 'least cost paths'

- number of relationships traversed, fan-out

Dix, A., Katifori, A., Poggi, A., Catarci, T., Ioannidis, Y., Lepouras, G., Mora, M. (2007). From Information to Interaction: in Pursuit of Task-centred Information Management. http://www.hcibook.com/alan/papers/DELOS-TIM2-2007/

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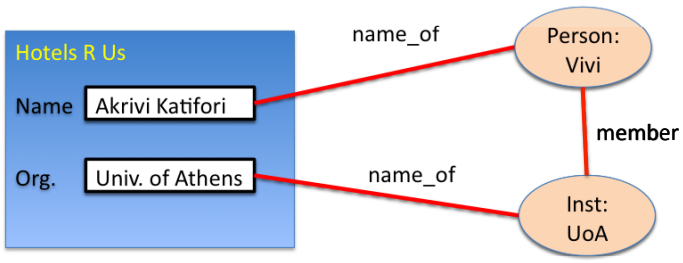
context in forms - inference

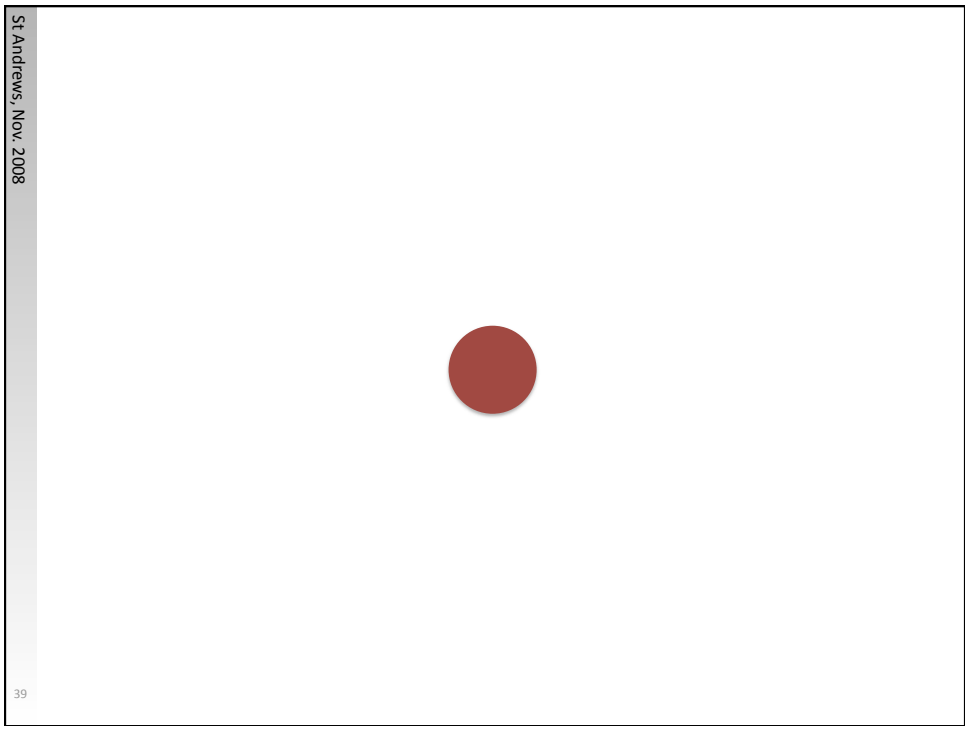


match terms in form to ontology

look for 'least cost paths'

- number of relationships traversed, fan-out

later suggest based on rules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