Distributed Interaction

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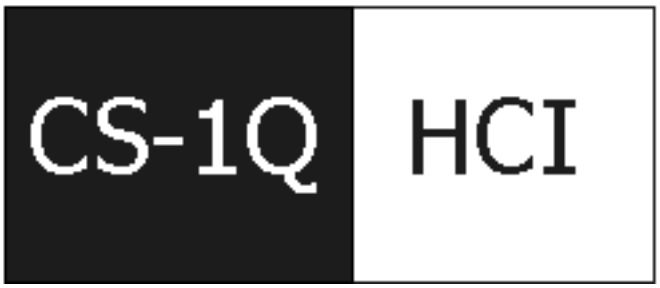


Distributed Interaction

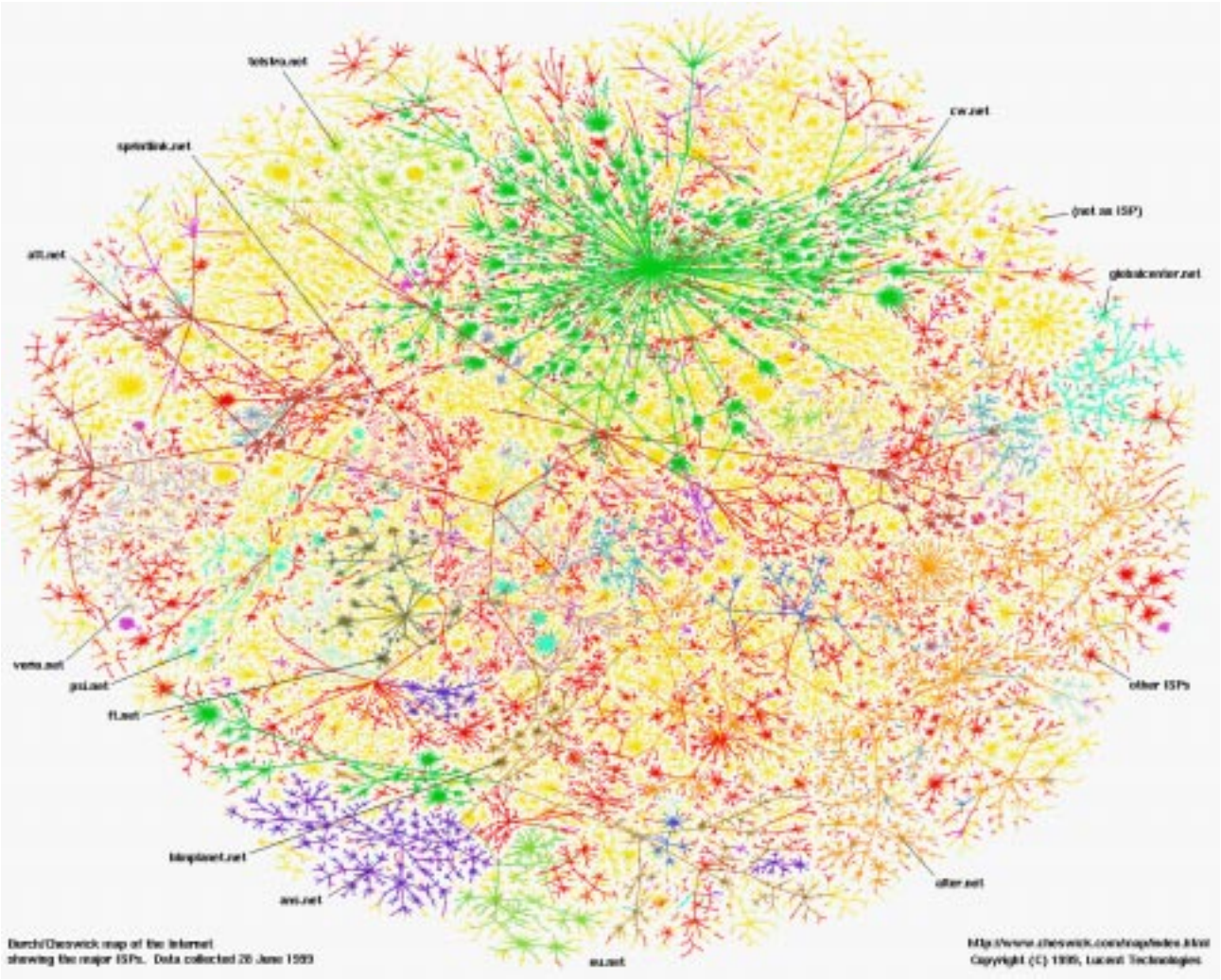
- Infrastructure issues:

- Internet protocols, the Web and beyond.

- Usability issues:

- browsing and task directed search;
- information saturation and redundancy;
- delays, unpredictability and security.

Distributed Interaction



Acknowledgement: http://www.cs.bell-labs.com/who/ches/map/gallery/isp-ss.gif

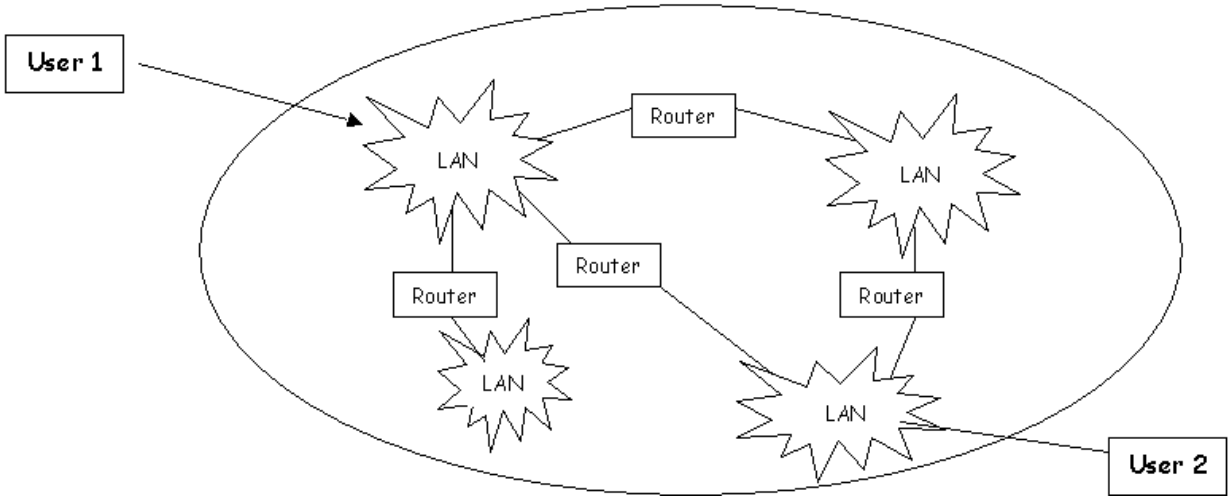
- The Internet:

- 1971 23 hosts; 1980 100 hosts; 1990 1,000,000...

Infrastructure Issues

- What do we need to connect machines:

- an addressing scheme ('where are you out there?');
- transfer protocols ('how much info can I pass you?').



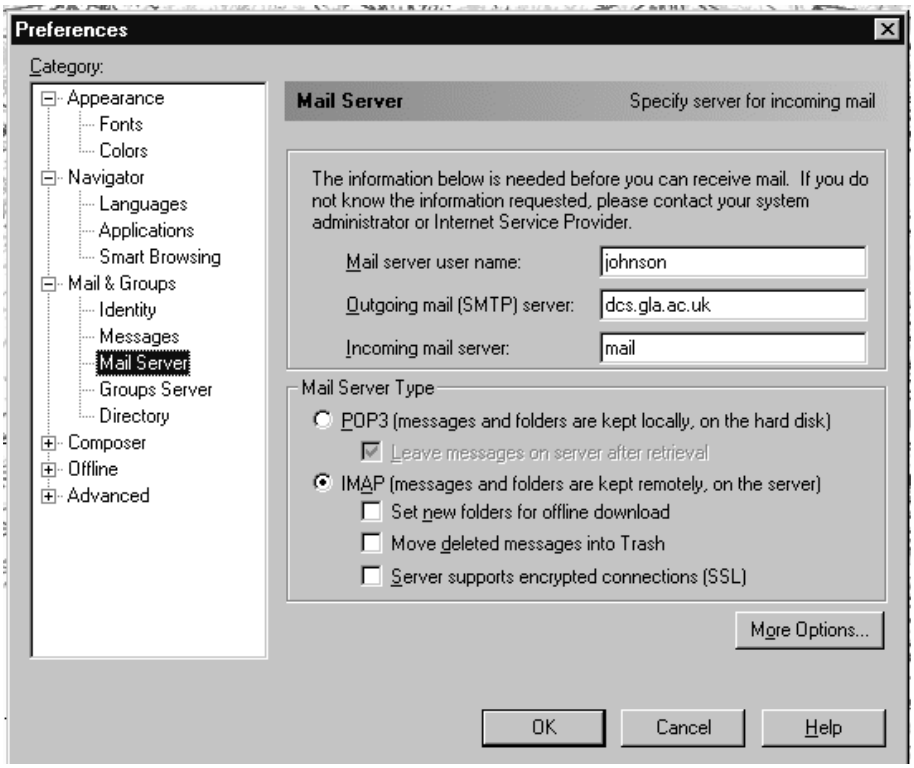
- Internet Protocol underlies it all:

- IP address of sender and recipient plus information;
- routers read the address of packets and forward them on.

Infrastructure Issues

- On top of IP we can build:

- Transmission Control Protocol - reliable connections;
- User Datagram Protocol - unreliable messages.



- On top of TCP/IP we can build:

- ftp - file transfer protocol;
- SMTP - mail transfer protocol;
- NNTP - net news transfer protocol;
- http - hypertext transfer protocol.

Infrastructure Issues

- The Web:

- CERN and Tim Berners-Lee (among others);
- 1993 Nat. Centre for Supercomputer Applications' Mosaic;
- Netscape commercial successor then Microsoft IE.

- Remembers:

- Web is not only form of hypertext system;
- Web is not the same as the Internet...

- Many other ideas and models:

- Ted Nelson's Xanadu transclusion ideas;
- 'The Grid', E-Science - lots of hype...

Usability Issues: Accessibility

- So what does distribution buy users?

- Can access remote resources:

- computational resources;
- information resources;
- human resources (next lecture).

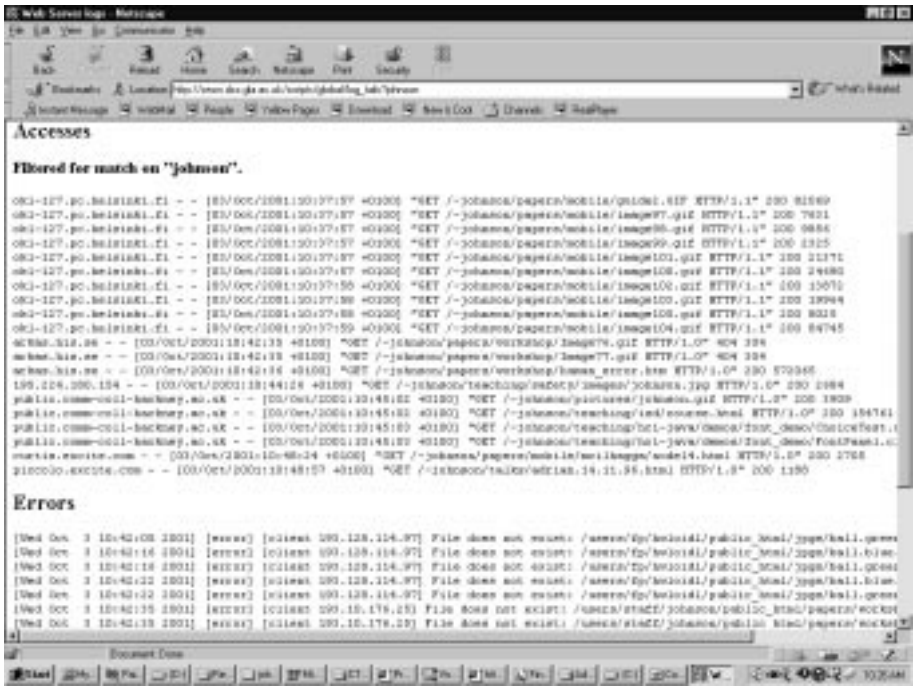
- Two principle modes of activity:

- browsing, undirected, ad hoc and opportunistic;
- direct search, clear task, often time limited.

Usability Issues: Browsing

- As designers, can you attract user?

- avoid scrolling and gratuitous animation;
- banner advertising can be off-putting;
- high download latencies (see later).

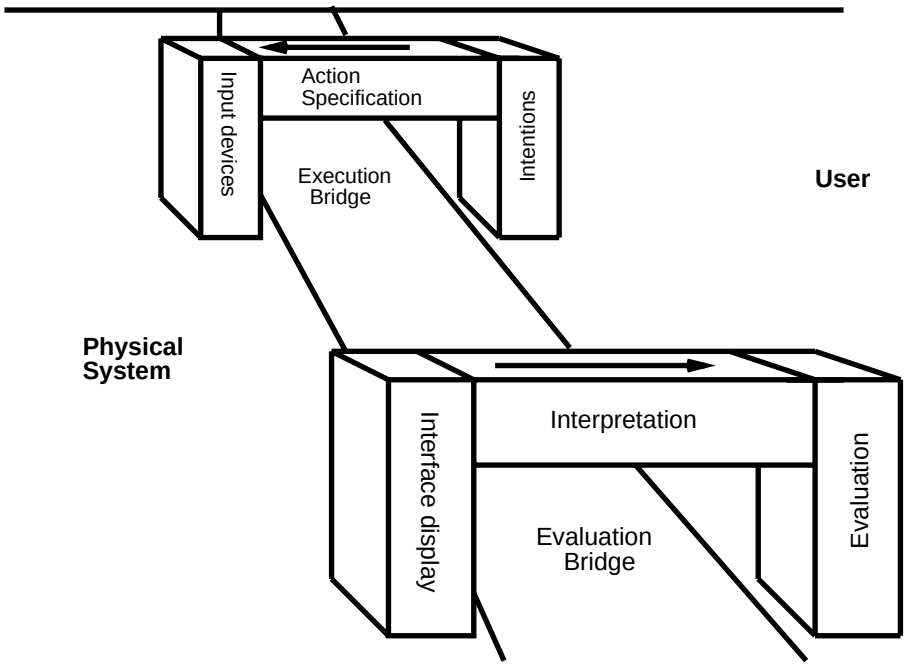


- Dwell time is a key issue:

- examine server logs for abandoned requests;
- may need remote usability testing.

Usability Issues: Directed Search

- Task directed interaction.



- Information retrieval:

1. Form intention to find information;
2. Translate intention into query language;
3. Evaluate results of search request;
4. If not found, reform intention or query...

Usability Issues: Information Saturation

- May get a huge number of hits;

- few of them may actually be relevant to your task.

- Search on DVD gives 6 million+ hits.

Usability Issues: Information Saturation

- Precision:

$$\frac{number\ of\ relevant\ hits}{total\ number\ of\ documents\ returned}$$

- Recall:

$$\frac{number\ of\ relevant\ hits}{total\ number\ of\ relevant\ documents\ in\ collection}$$

- Relevance feedback:

- user indicates which 'hits' are relevant;
- system uses this to improve next search.

- Remember also the problem of search IN a page.

Usability Issues: Redundancy

- Multiple sources of information:

- if one server fails then there are others;
- camera bought in Glasgow but drivers in Singapore.

- Increase in global competition:

- B2B (business to business) transactions;
- if your site fails I can find another.

- Usability is suddenly very important.

- 2 click techniques (eg Amazon).

Usability Issues: Delays

- Distributed systems speed interaction:

– cacheing holds information close to point of use;

– mirror sites replicate a server close to user.

- So where does a web page come from?

- Always try to minimise file sizes.

- Avoid gratuitous graphics and animations.

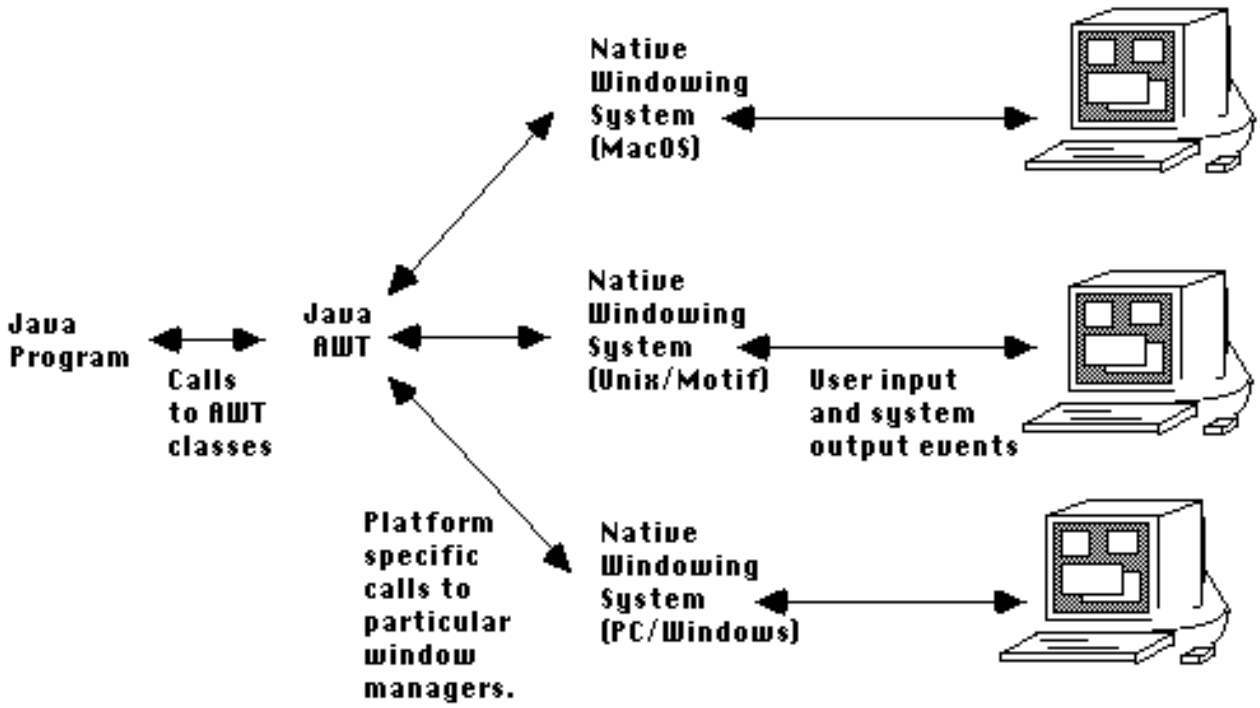
- Give users warning about 'expensive' resources.

- Myth of the Infinitely Fast Machine.

Usability Issues: Portability and Java

- Portability:

- don't just move data between machines;
- also move code and applications.

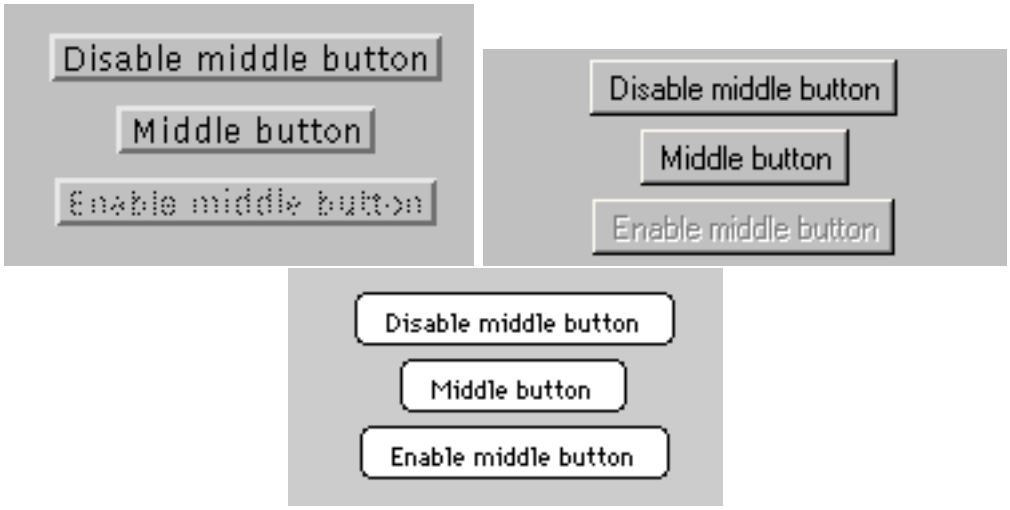


- Local execution of remote code:

- Java bytecode downloaed from web;
- Java virtual machine executes on client;
- security issues??

Usability Issues: Portability and Java

- AWT makes interface look like host machine.



- Swing makes interface look same on all machines.

Usability Issues: Unpredictability

- Summary:

- don't know where your information is coming from;
- don't know where code is being executed.

- Loading on remote servers varies:

- with time of the day (US daylight hours);
- with process profile (lots of computations?);
- with mirror/cacheing support.

- Web performance is very unpredictable.

Usability Issues: Unpredictability

- Solutions to unpredictability.

- Give users an idea of the possible delay:

- indicate file sizes for remote resources.

- Indicate quality of the resource:

- thumb-nail images of videos show production qualities.

- Alternatively, make all delays predictable:

- technically not easy to do but some suggest adding delays;
- everything would take 5 minutes...
- users would develop *coping strategies*;
- slightly wacky - not sure...

Usability Issues: Security

- Users often don't know about this.

- Openly share passwords.

- Use the same password everywhere 8(

- Social issues - do you trust the web?

Final Caveats

- US census 1990:

- total population 230,445,777;
- 198,600,798 only speak English;
- 31,844,979 primarily non-English speaking.

Very Well	Well	Not Well	Not at All
17,862,477	7,310,301	4,826,958	1,845,243

Table 1: 1990 US Census Data for Self-Reported Ability in English

- US census 2000:

- 54,000,000 (51%) of households had 1 or more computers;
- this was an increase of +42% from 1998.

- US census 2000:

- 45,000,000 (42%) use Internet at home;
- it was 26% in 1998 and 18% in 1997.

- Don't get carried away by growth of Internet!

Summary

- Infrastructure issues:

- Internet protocols, the Web and beyond.

- Usability issues.

- Accessibility.

- Browsing and task directed search.

- Information saturation and redundancy.

- Portability, Java and RMI.

- Delays, unpredictability and security.

Further Reading

- A lot of detailed material to cover.

- Shneiderman on:

- response time - pp. 351-366;
- the web - pp. 551-579.