World: "Hello"

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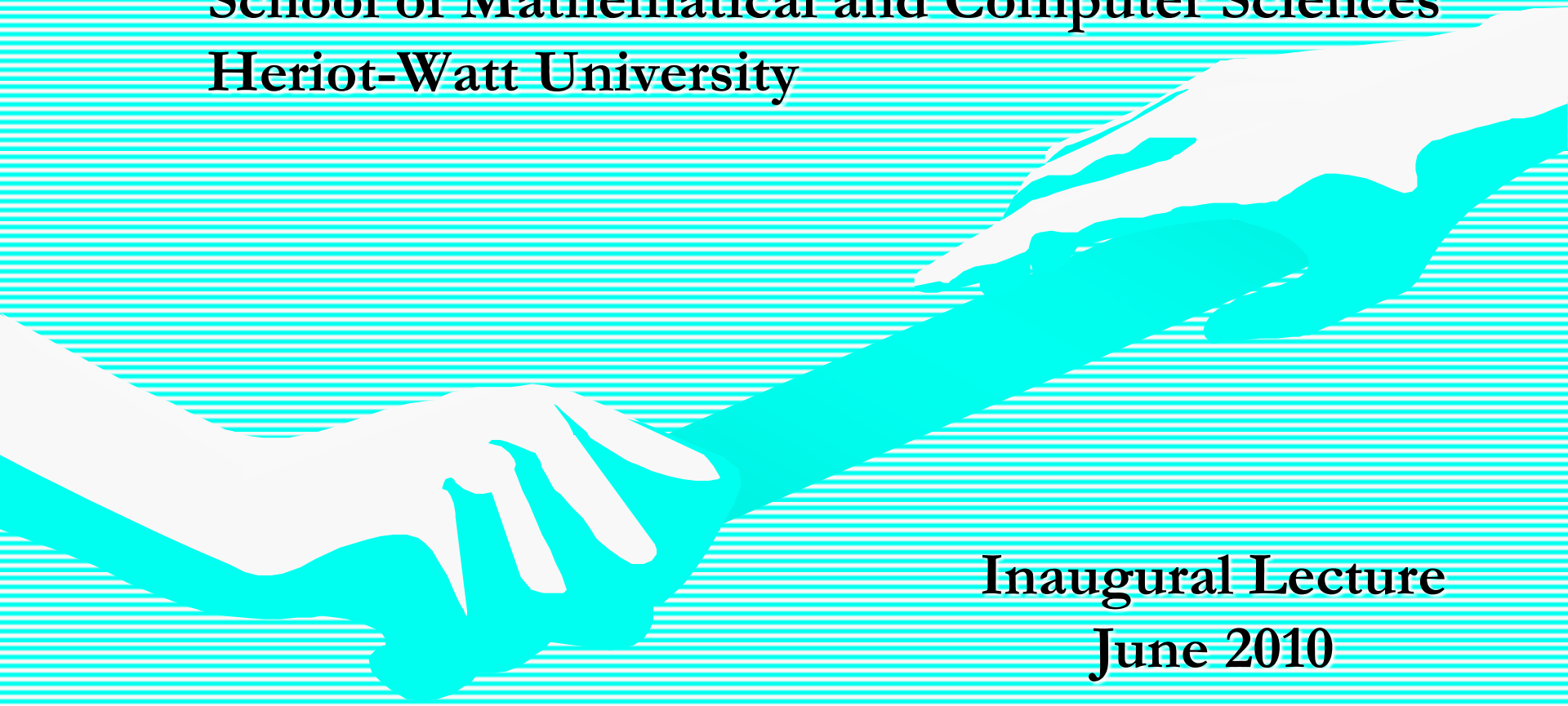


Inaugural Lecture
June 2010

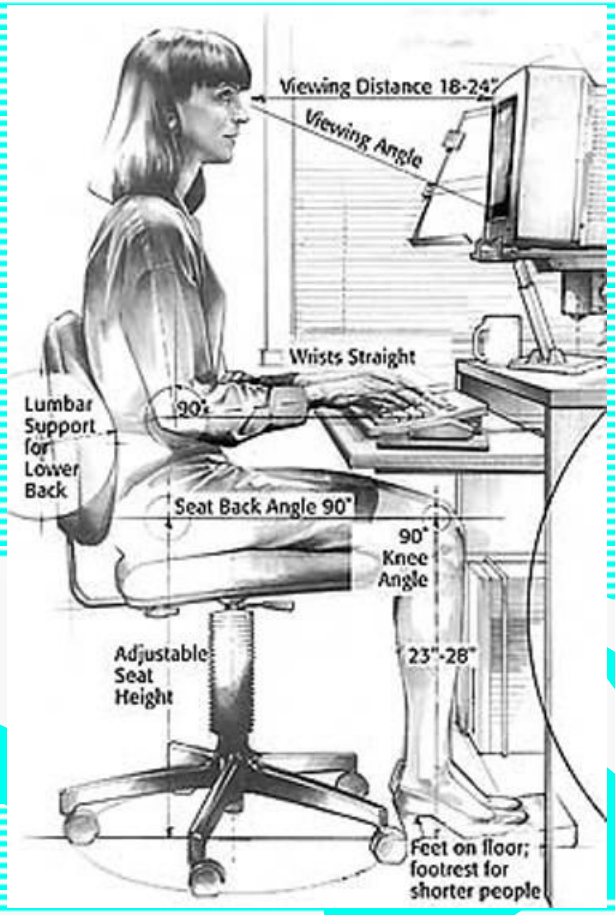
Agenda

- A bit about me and my past
- Machine learning
- Life's so complicated nowadays
- Pervasive computing
- Personalisation, privacy and trust
- *e*Life
- Where next?

Eclectic Research Interests

- Computational Neuroscience
- Computer Aided Archaeology
- Computer Based Ophthalmic Diagnosis
- Fractal Music Composition
- Knowledge Based Design
- Robotics
- Machine Learning
- Pervasive Computing
- *e*Life

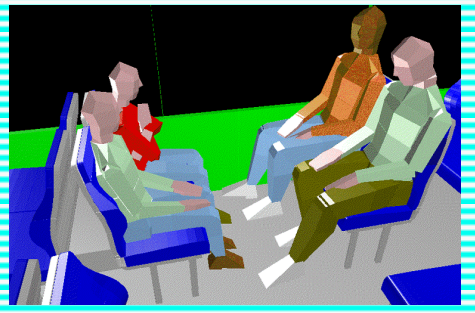
Ergonomics



- SAMMIE

Images from
SAMMIE CAD Ltd

- Then (30 years ago) and Now



Machine Learning

- **Biologically inspired approaches –**

- **Artificial Immune Systems**
  - Adil Ibrahim
- **Artificial Neural Networks**
  - Lawrence Thirkell, Alex Iversen, Saira Butt, Dave Edwards, Sarah Gallacher
- **Evolutionary Computing**
  - Dave Edwards, Steve Gill
- **Swarm Intelligence**
  - Mohd Mohammad

A Beaver

Kingdom: Animalia

Phylum: Chordata

Class: Mammalia

Order: Rodentia

Family: Castoridae

Genus: Castor

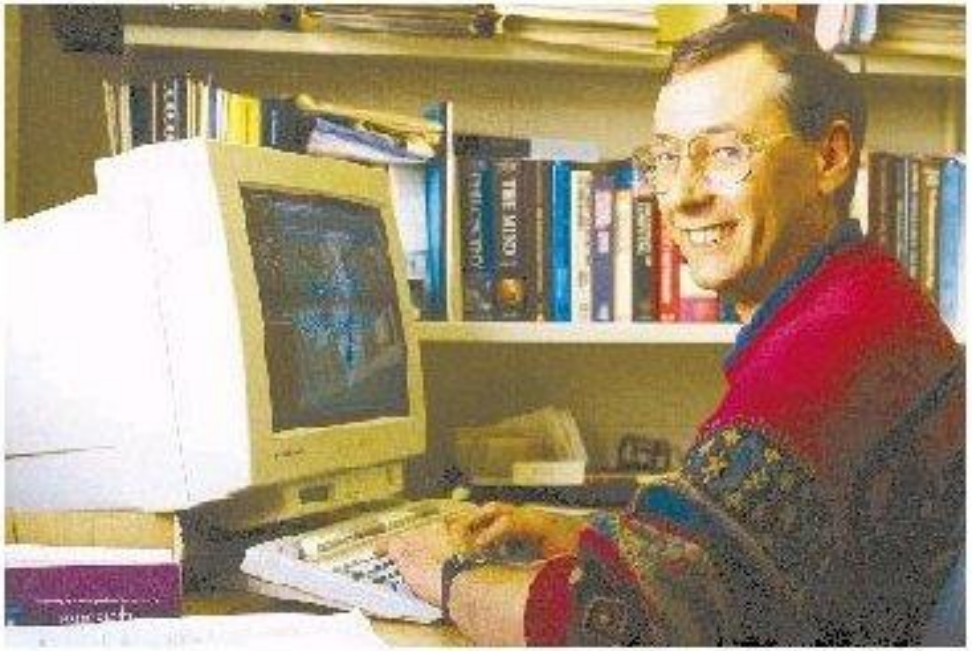
Species: *C. canadensis*

Linnaeus, 1758

Wikipedia, 2010

What a "Web Wizard" looked like in 1997 ☺

Nick puts 'News' on internet

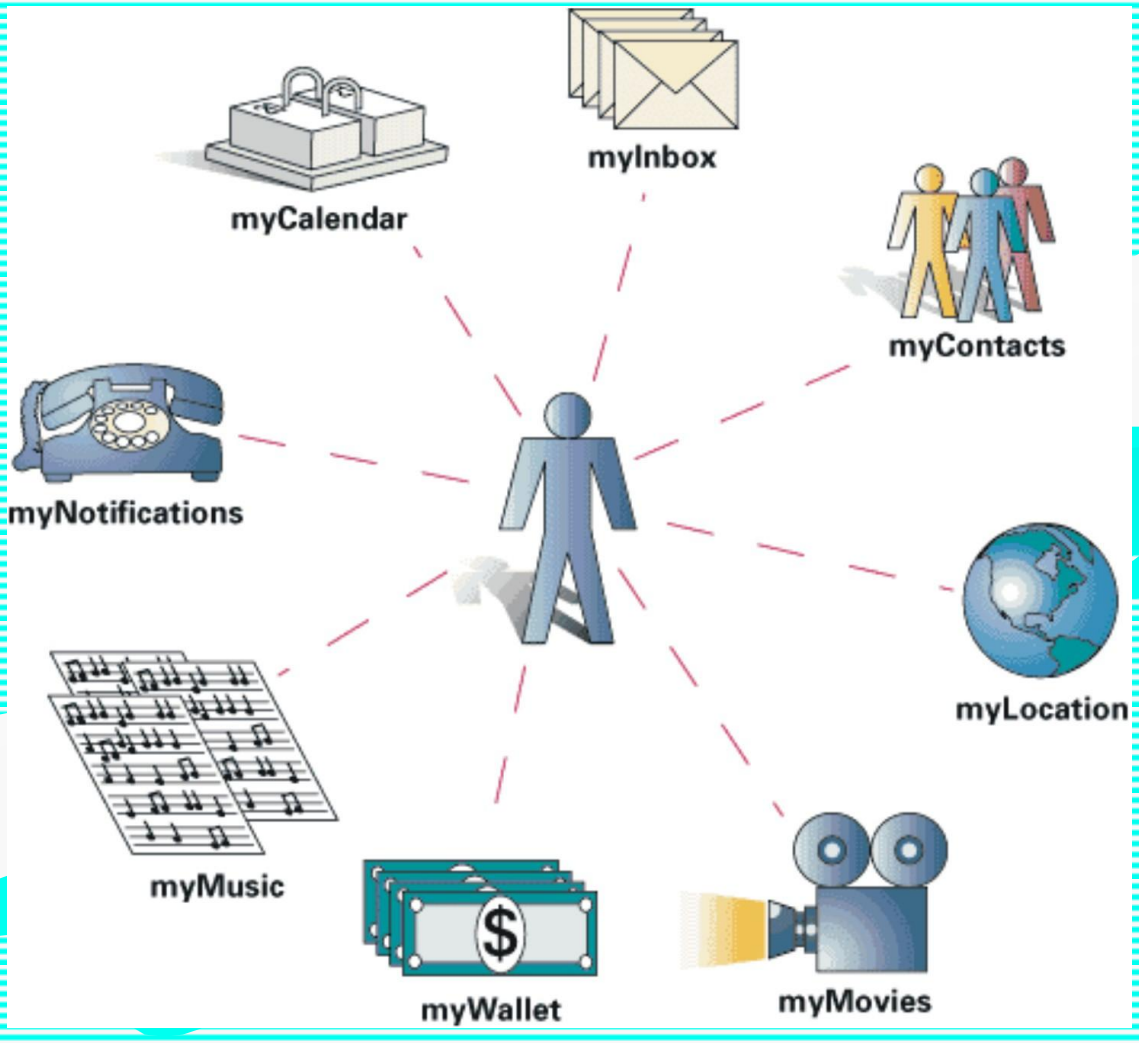


A web wizard at work: Nick Taylor updates his "unofficial" Midlothian home page

Following the publication of the Council's Business Directory in print and on the internet, Midlothian is now hooked up to the World Wide Web in more ways than one.

Local computer whiz Nick Taylor has designed his own 'unofficial' website to display information and advice on the area. But what prompted a man from Dorset to put Midlothian on the net?

myWorld


myCalendar
myInbox
myContacts
myNotifications
myLocation
myMusic
myWallet
myMovies

More Beavers

Plug and Play

- Think about all those wires behind your TV
  - Are your devices really connected in the most optimal fashion?
  - HD leads, SCART leads, Component leads, etc.
  - How many remote controls do you have?
- Wouldn't it be nice if each new TV, Freeview box, Satellite box, DVD Player, Games Console we bought automatically configured itself to communicate optimally with the rest when we first turned it on?
- Why do we have all the wires still?

Mobile Computing

Smartphones

- Landline services available in the 1890s
  - UK, France, Hungary, USA
- Provided by Electrophone in London
  - Included live opera, music from the theatre and news services
- BBC News - The 19th Century iPhone
- Not mobile or interactive of course
- A century later things became very different

Even More Beavers

Pervasive/Ubiquitous/Mobile

- DAIDALOS
  - Personalised Mobile Services (video)
- PERSIST
  - Personal Smart Spaces
- SOCIETIES
  - Community Smart Spaces

myPervasiveWorld

Personalisation

- A truly pervasive world could be a nightmare if it behaves the same way for everybody
  - We need to develop new ways of personalising pervasive systems to meet people's needs via adaptation and automatic behaviours
- A truly pervasive world could be unusable if it takes a lot of time and effort for an individual to personalise it to their own needs
  - We need to be able to learn, not be told, what a person's preferences are by watching what they do and the context in which they do these things
  - Sarah Gallacher's doctoral research is addressing this

Usability versus Security

- An age-old dilemma

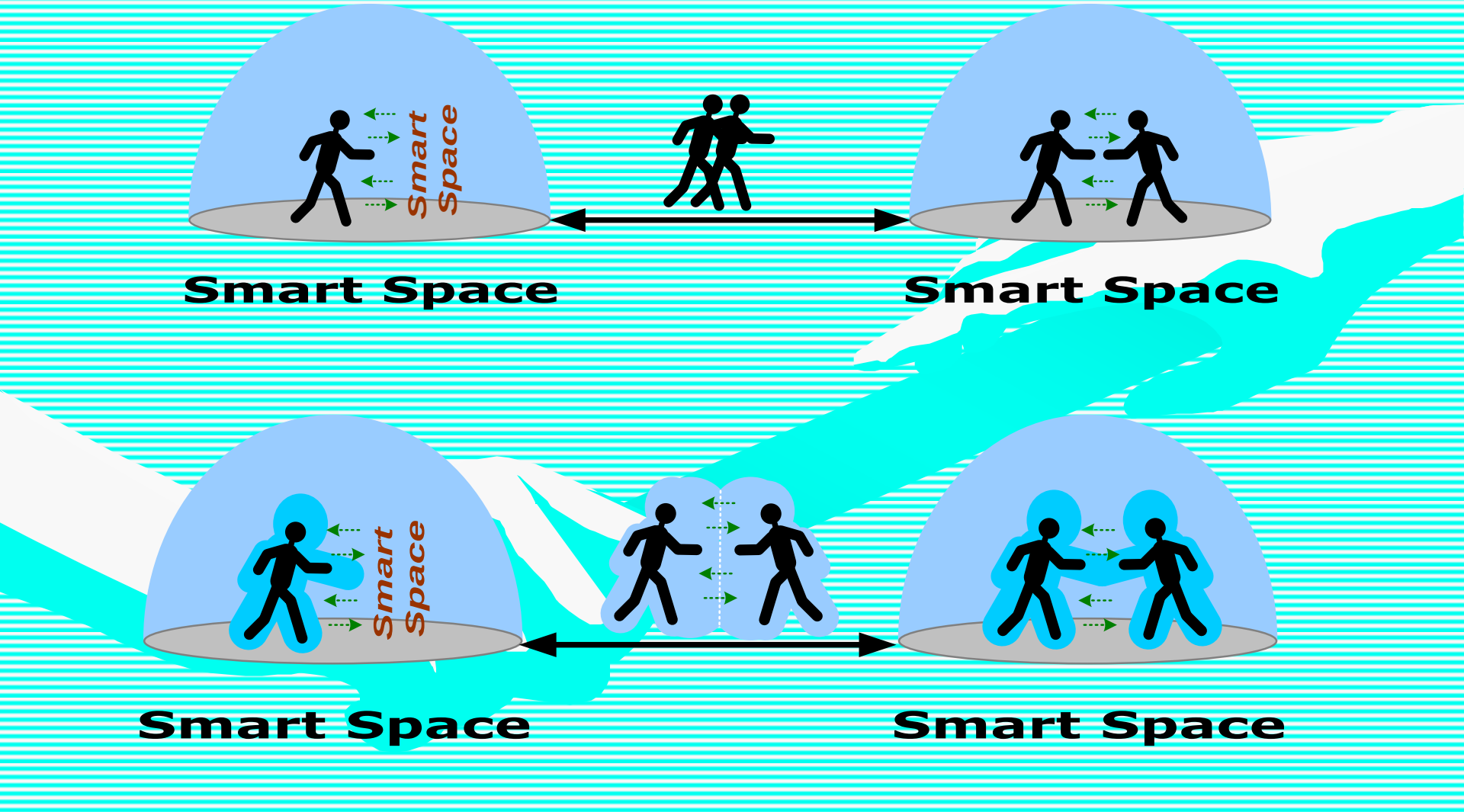
Personalisation versus Privacy

- The new face of that old dilemma –
- The more personal I want a system to be the more information I need to tell it about me
- Our personal details and preferences can be very private and sensitive information
- Eliza Papadopoulou's doctoral research is addressing this potential conflict

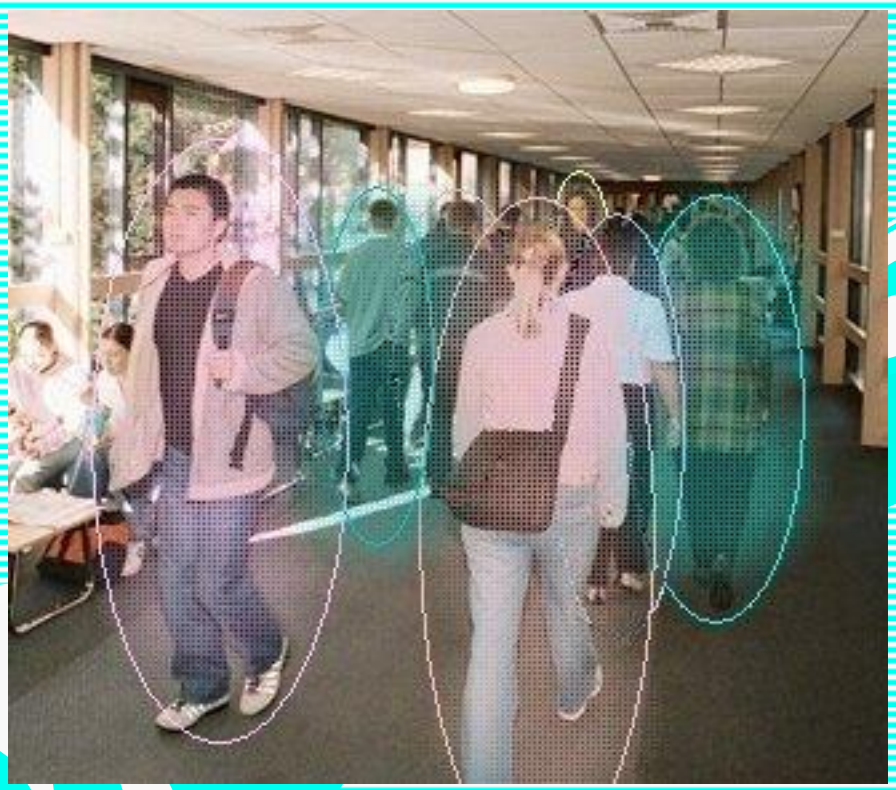
Privacy Preferences & Negotiation

- Is there a way to resolve this conflict?
- Can this information disclosure be negotiated on a case-by-case basis?
  - I'd like to be able to tell my bank my account details but not my Facebook friends
  - I'd like to tell some of my friends things I wouldn't tell others
- We can use personalisation to solve the problem with preferences describing our privacy policies

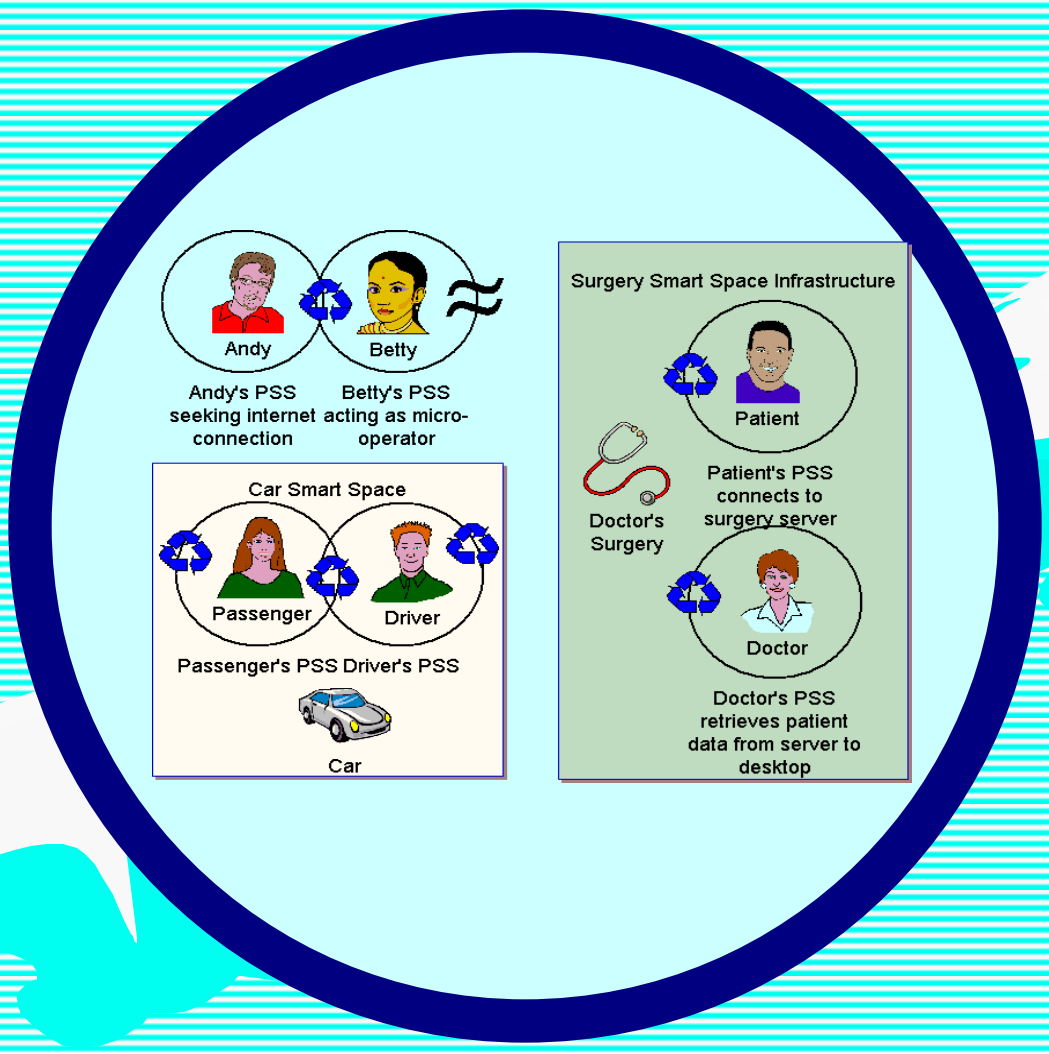
myPersonalSmartSpace



myPersonalSmartSpace



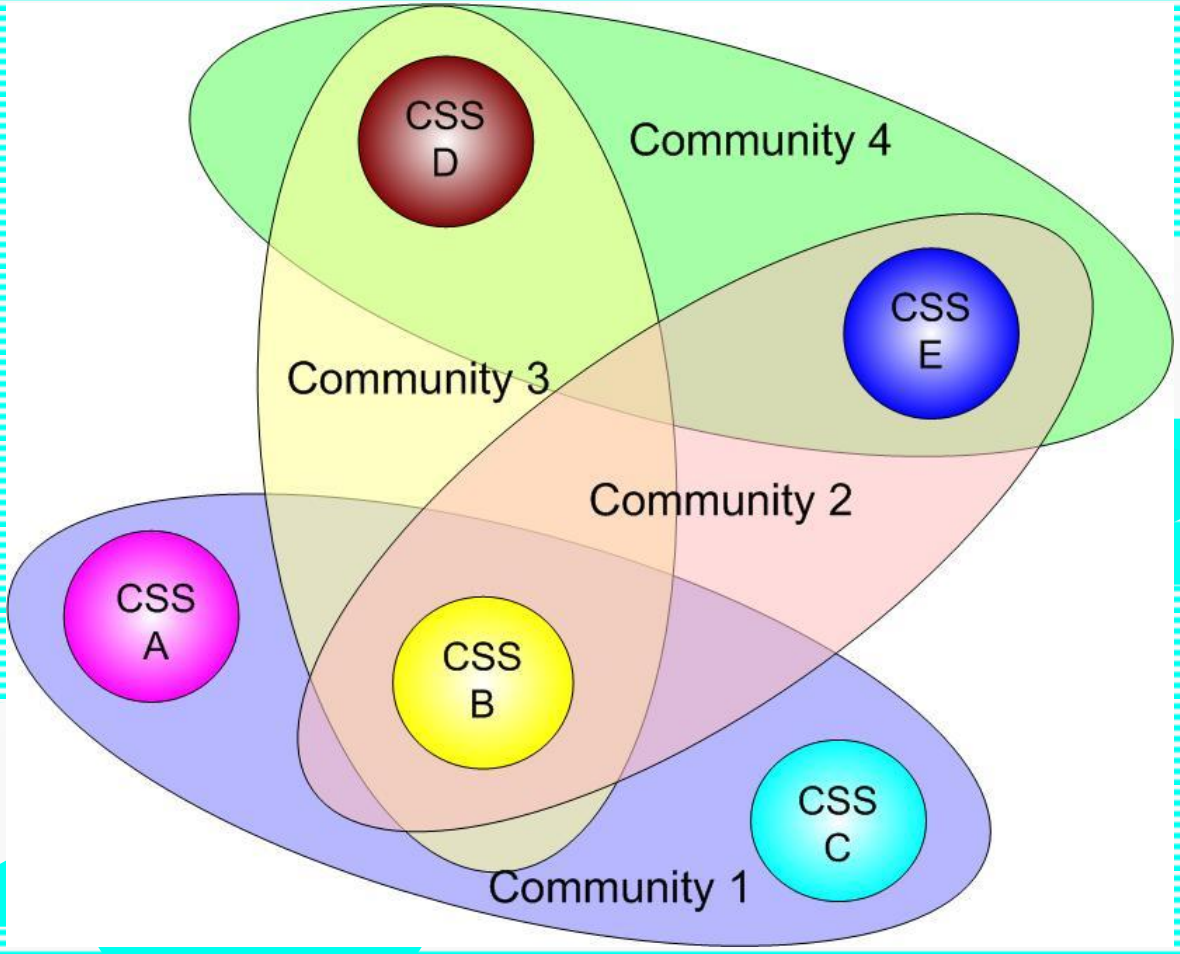
myPersonalSmartSpace



Trust

- "6 degrees of separation"
- Downside –
  - We are only 6 steps away from all the bad stuff
- Upside –
  - We can discover who/what to trust from a small number of trusted parties who trust other parties, etc.
- Reputation will become a very important characteristic in the future

myCommunitySmartSpace



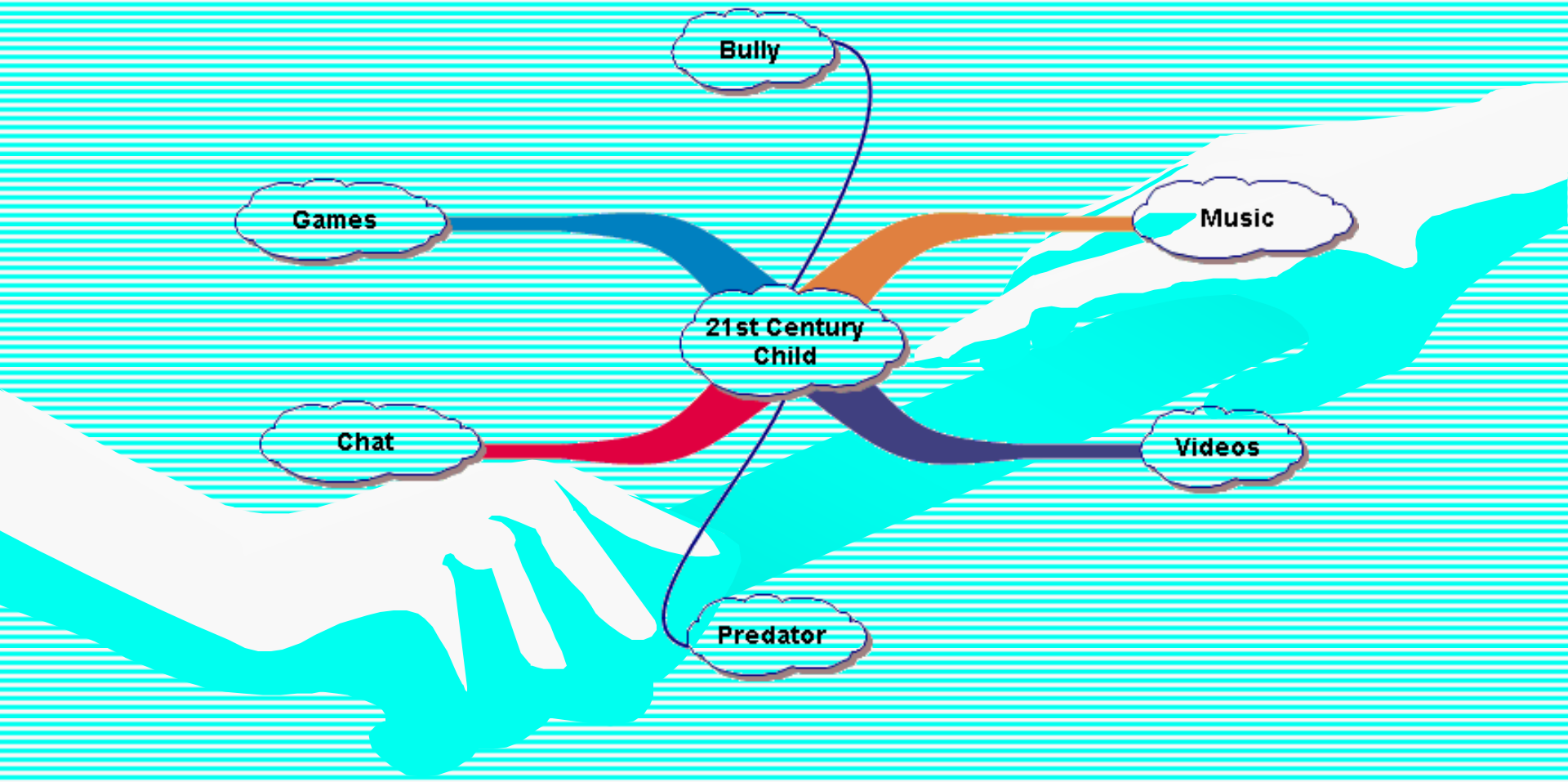
*e*Life

- How computer technology affects the way people behave and the kind of societies which might emerge as we adapt to technological advances
- Student projects –
  - Electronic Voting Systems, *e*Democracy, Spam and Direct Marketing, *e*Shopping and High Street Stores, eBay and the Supplier Society, Real-World Value of Virtual Objects, Virtual Currencies in Online Games, Accessibility and the WWW, Impact of Future HCI Technologies on People with Disabilities, Computer Mediated Communication, Chat Room Behaviour and Psychology, Information Disclosure on Social Networking Sites, Home Working, Surveillance and Privacy, Information Security and Data Losses

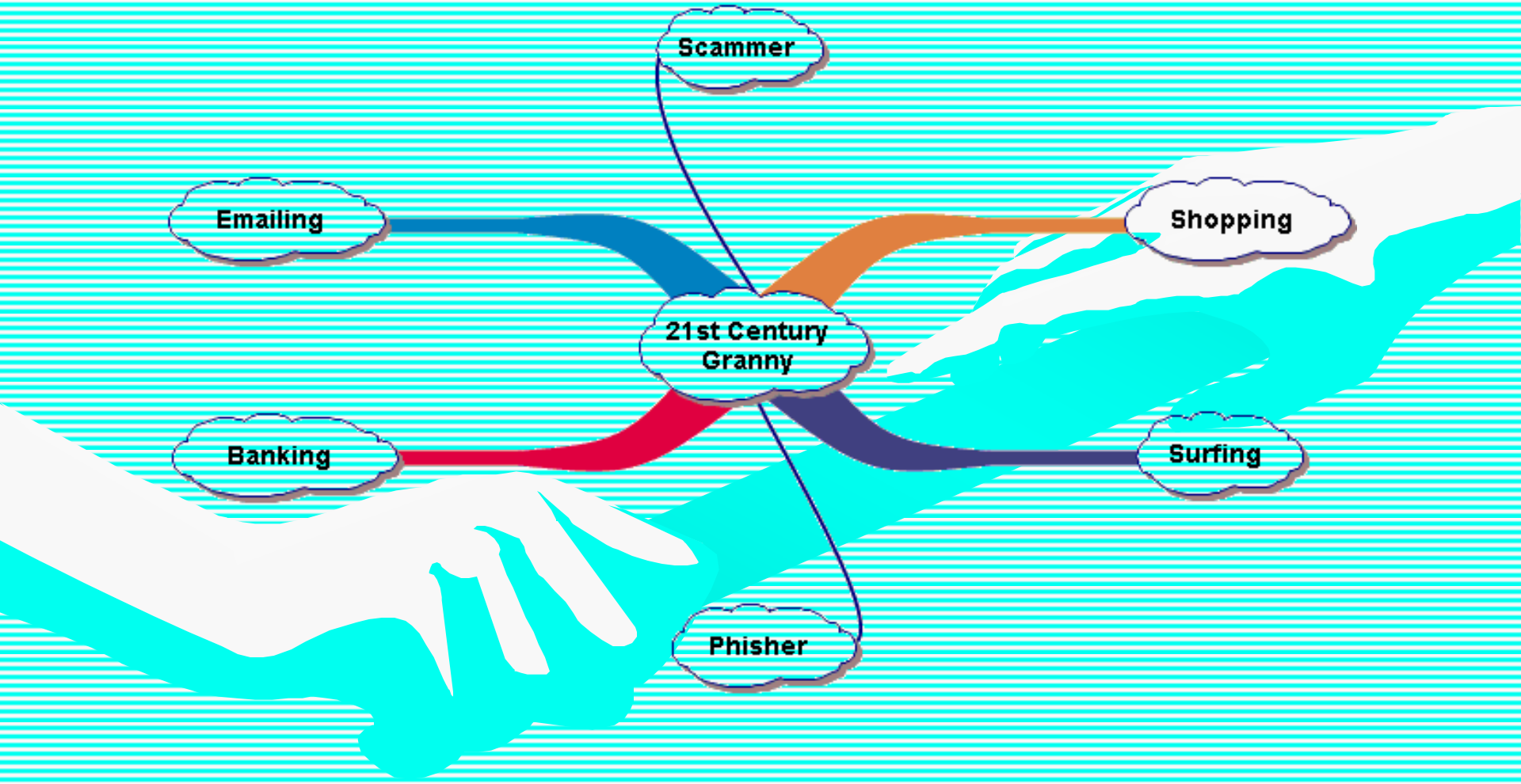
Personal *e*Space

- An analogue of the psychological "personal space" which can be used to keep people at bay in cyberspace
- A mechanism through which all of our activities are mediated and which allows us to use our own common sense in determining who and what to trust
- A paradigm which can be manifested via the personal/community smart space in pervasive environments but also the Internet at large

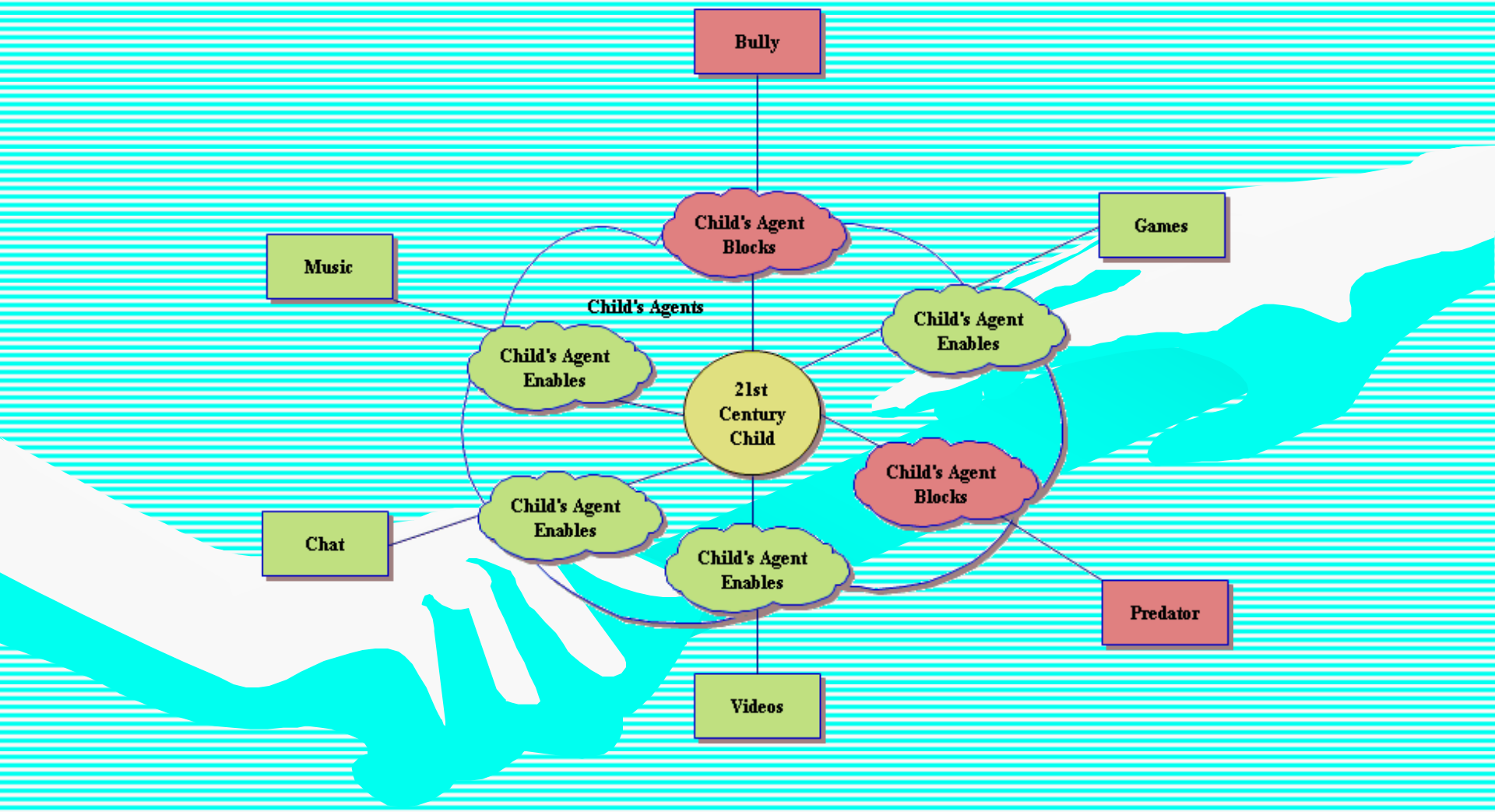
Vulnerable People - Young



Vulnerable People - Old



The *e*Spaced 21st Century Child



Where Next?

- The future is a big place …

- PUMA Lab involved in
  - SOCIETIES – "Pervasive meets Social"
  - Future Internet Assembly – Smart Infrastructures
  - FET Flagship - The Social Computer
  - Converge Challenge – Smart Shopping Malls
  - RCIF – Pervasive Interaction Testbed

Where Next?

- Related research at Heriot-Watt
  - Machine Learning (learning more about what we want in even cleverer ways) – Intelligent Systems Lab
  - System Architectures/Implementations (reliability and robustness) – Dependable Systems Group
  - Multimodal Dialogue (no need for handheld devices) – Advanced Interaction Lab
  - Affective Computing (our emotional state gives context) and Narrative (our lives are stories) – Digital Story Lab
  - Robotic Companions (part of our future smart worlds) – VIS&GE + Robotics Lab

Thank you