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The OATS Project

Simon Judge MEng

Contents

- About the project:
  - [[Consortium, Motivation]]
- Context:
  - [[Electronic Assistive Technology]]
  - [[Open Source]]
  - [[Other EAT Issues]]
- Assistive Technology Software
  - [[Existing Software]]
- oatsoft.org
  - [[Developing an OATS community]]
  - [[OATS Examples]]
- Future Plans and Direction
  - [[Sustainability, opportunities]]

Introduction to the Project

The OATS consortium

Me

OATS motivation and goals

The OATS Consortium

ACE Centre Advisory Trust:

Andrew Lysley, Jason Walsh, Stephen Druce, David Colven

Access to Communication and Technology (ACT), Birmingham:

Simon Judge

University of Dundee, Dept of Computing:

Andy Judson

The OATS Consortium

Swedish Institute for Special Needs Education

Specialpedagogiska Instituet, Sweden:

Eive Landin

DART Kommunikations- och dataresurscenter för funktionshindrade

DART, Sweden:

Mats Lundälv, Bengt Farre

www.oatsoft.org/Info/Project/OatsConsortium/

The OATS Consortium

Open Source Volunteers:

Steve Lee

Mark Landeryou

...and many others...

My role

- Clinical Scientist
- Within specialist NHS Electronic Assistive Technology (EAT) team in the UK
- Clinical role: wide range of client contact (any age, any condition)
- Assess for and provide wide range of EAT
- A unique insight into man-machine interaction and the use of AT devices

ACT

- Regional specialist service
- Multi-Disciplinary team
  - Speech and Language Therapists
  - Occupational Therapists
  - Clinical Scientists
  - Medical Technical Officers
  - Administration
- One of the biggest EAT teams in the UK

Project Motivation

Duplication

Usability

Flexibility

Resources

Feedback

Assistive Technology Software

Adaptations

Standards

Innovation

Research

Mainstream

Project Motivation

Duplication

Usability

Flexibility

Resources

Feedback

Assistive Technology Software

- Technology transfer from research projects?
- Clear goals for research?

Adaptations

Standards

Innovation

Research

Mainstream

Project Motivation

Duplication

Usability

Flexibility

Resources

Feedback

Assistive Technology Software

- Diverse clients require customised software

Adaptations

Standards

Innovation

Research

Mainstream

Project Motivation

Duplication

Usability

Flexibility

Resources

Feedback

Assistive Technology Software

- Are there any AT standards?
- Are relevant standards from other fields applied?

Adaptations

Standards

Innovation

Research

Mainstream

Project Motivation

Duplication

Usability

Flexibility

Resources

Feedback

Assistive Technology Software

- Are resources portable across systems?
- Are they tied to the software?
- Central store?

Adaptations

Standards

Innovation

Research

Mainstream

Project Motivation

Duplication

Usability

Flexibility

Resources

Feedback

Assistive Technology Software

- How close are user & developer?
- Are bugs quickly fixed?
- Is software stable?

Adaptations

Standards

Innovation

Research

Mainstream

Project Rationale

- Open Source offers a potential solution to some or all of these issues
- The Open Source ethos matches the Assistive Technology ethos
- Users need a better service
- This is the future of software (anyway)

Project Goals

- To date there has been no concerted effort to promote and develop Open Source within Assistive Technology
  - The OATS project was set up to investigate the need and viability of this
- Deliverable – OATSOFT.org website
  - Resource for users to find software
  - Somewhere for the OATS community to live…
- Evaluation project ~ 1 year – completed in June 2006

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Context

Open Source
Assistive Technology Definitions
Users and Characteristics
Day-to-Day EAT
Trends and Future Directions

What is Open Source Software?

- **Software**
  - Works like any computer software
  - Could be written for any operating system
  - Well established, over a wide range of applications – from operating systems to mind mapping (e.g. Linux, Apache, OpenOffice, FreeMind, Gimp, …)
- **Open**
  - Source code freely available
  - Anyone can change and/or share the software freely
  - End-users have the right to modify and redistribute the software

Open Source Development Model

- The secret volunteer army: Open source software is often developed by 'volunteers'
- Coders enjoy coding on interesting projects!
- Often companies (e.g. Sun, IBM) contribute coders to projects – mutual interest
- Some sectors are dominated by Open Source – most of the internet is built on it
- Universities frequently open source projects

Open Source Differences

- Fundamentally different way of doing things
- Allows innovation, a closer 'relationship' to the user
- Allows standardisation to develop – since the fundamentals are published and open.
- Growing movement:
  - considered by some to be the future of software (e.g. IBM, Sun, governments…)
  - growing in some sectors – e.g. education (SchoolForge), libraries

Assistive Technology

"Assistive Technology (AT) is any product or service designed to enable independence for disabled and older people."

King's Fund Consultation (14th March 2001)

Electronic Assistive Technology (EAT)

- No clear definition of Electronic Assistive Technology (EAT). To derive a definition:

"Electronic systems designed to enable independence for disabled and older people"

The EAT Spectrum

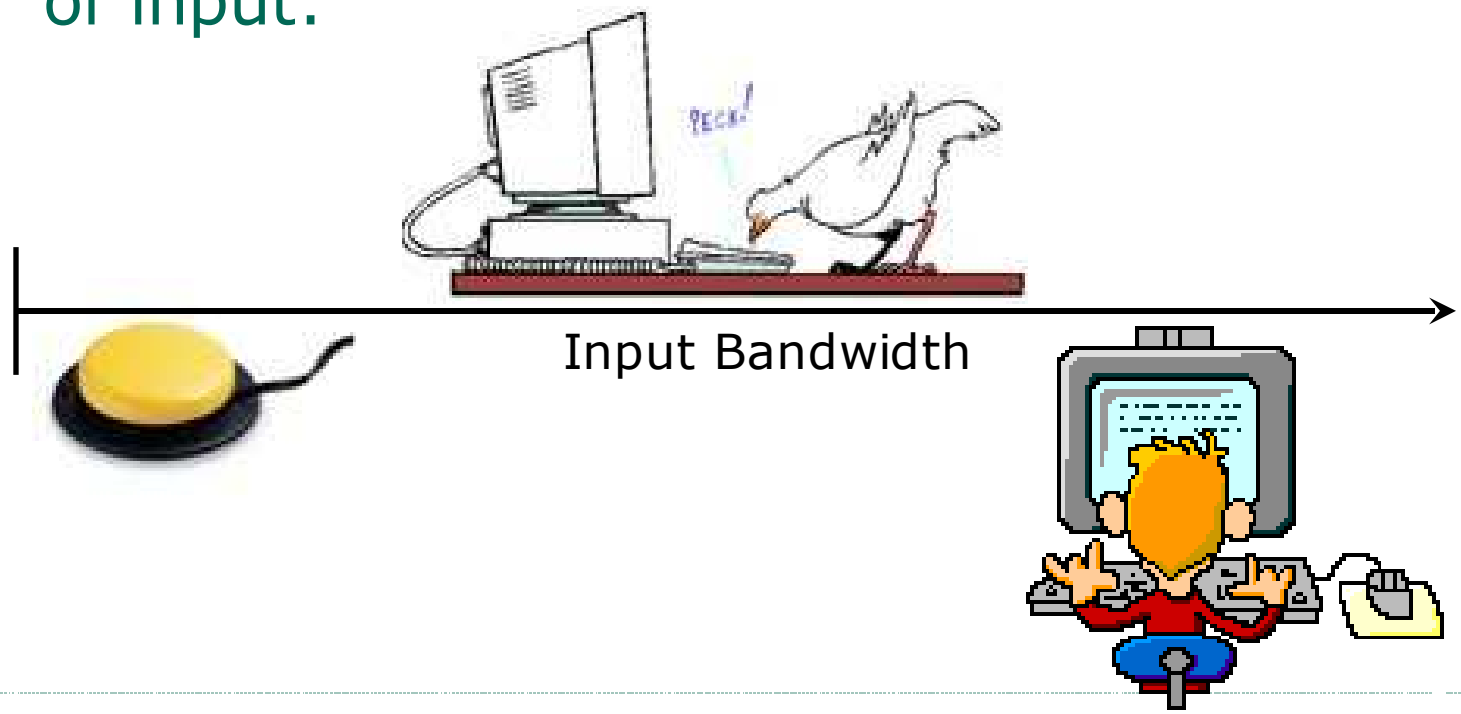
- These are very medical definitions
- In its broadest sense EAT is relevant to all of us
- EAT is one end of the 'Usability' spectrum
- There should be cross over with 'Mainstream'
  - E.g. symbian phone OS voice feature
  - Voicing of MP3 player controls
  - Disambiguation

Using EAT

- People with many different conditions that make use of EAT: e.g:
  - Motor Neurone Disease
  - Multiple Sclerosis
  - Cerebral palsy
  - Muscular Distrophy…
- Mobility impairments, communication problems, learning difficulties, cognitive problems, sensory impairments
  - all impact on control of technology

Mobility problems

For example, consider access for someone with mobility impairments… There is a spectrum of input:



Communication Problems

- Consider people who have not learnt to read – possibly due to physical and/or communication difficulties
  - Symbols can support or replace their receptive and/or expressive language

Communication Problems

- Consider people who can not talk or have difficulties talking
  - Alternative methods of communication are needed for them to express themselves

Learning and Cognitive Difficulties

- Consider someone who has difficulty understanding information presented to them
  - Clearly presented information may make it more accessible
  - Symbols or graphics may support their reading
- Consider someone who has problems with memory
  - Technology can help to record and recall information

Sensory Impairments

- Consider someone with a visual impairment
  - Alternative methods of presenting information can support access e.g screen readers, Braille readers
- Consider someone who is deaf-blind
  - The Kinaesthetic channel is the only method of reception or expression

Day to Day EAT

- Electronic Assistive Technology aims to overcome some of these problems.
- EAT devices fall into a number of categories, including:
  - Alternative and Augmentative Communication
  - Environmental Control
  - Computer Access

Alternative and Augmentative Communication (AAC)

- Allows someone who can not speak or has communication problems to communicate
- A range of solutions:
  - Paper based
  - Dedicated devices
  - PC based software
- Voice Output Communication Aids are devices which provide a voice output
  - can be a synthesised or recorded voice

Environmental Control

- Allows a user to control equipment around them
- E.g.
  - Phone
  - Lights
  - Pager and other attention calling
  - TV, etc…
- Generally custom dedicated units

Computer Access

- Allows people who struggle with conventional interfaces to fully control the PC
- Includes:
  - specialised peripherals (input or output)
  - software based solutions

Trends in EAT

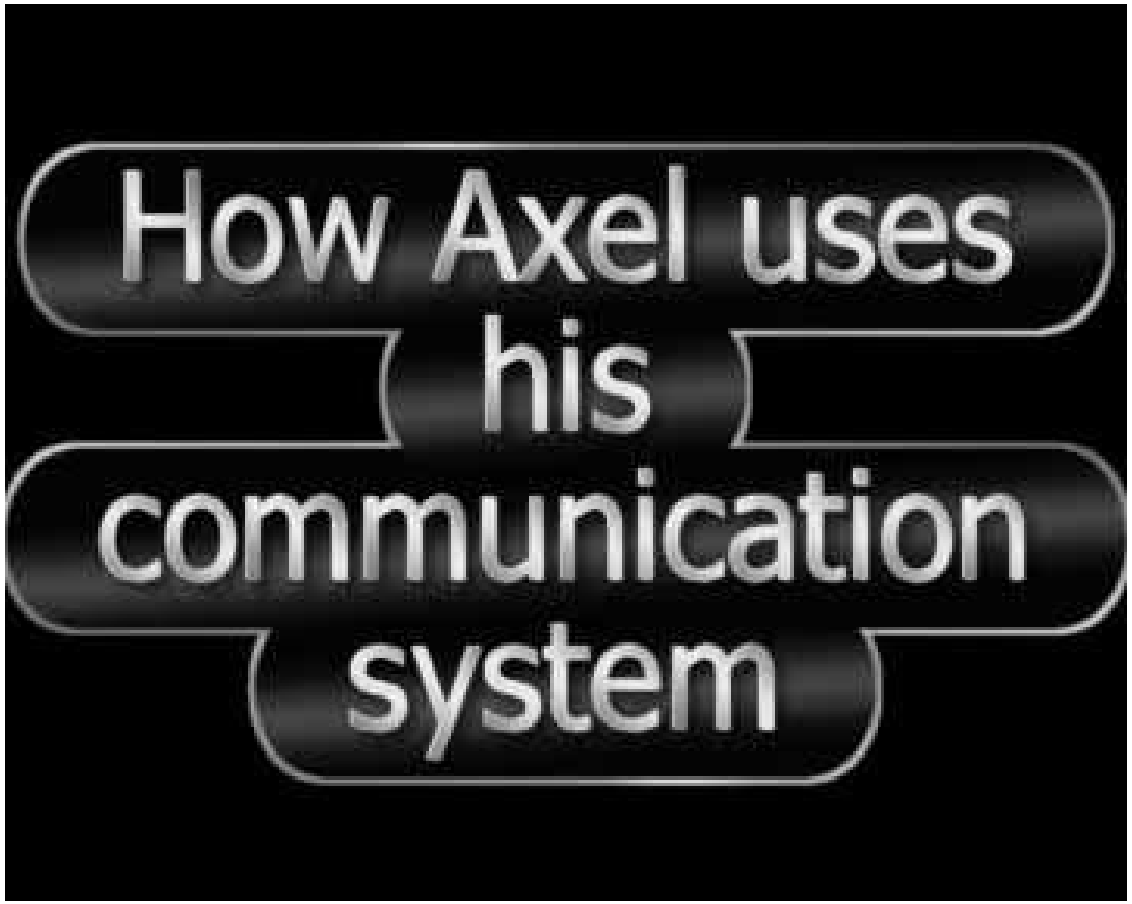
- Most original EAT devices were 'dedicated'
- More modern devices are still dedicated, but increasingly based on an operating system
- Now, many devices are based on an operating system and also expose the operating system to the user
- Difference in AAC/EC – EC has more dedicated devices (potential for risk situations)

Consumer electronics

- Smaller-faster-better approach to consumer electronics – spin off is devices that are appropriate for EAT.
  - Modularisation, ruggedisation, miniaturisation, increased battery life etc…
- Same characteristics that provides potential for personal User Interfaces
- Consider pocket PCs, or tablets (and compare to 5 years ago)
- Danger that accessibility is not considered

Case Studies :: Axel

Case Studies :: Axel



Case Studies :: Axel

Case Studies :: Brenda

Case Studies :: Brenda

Health Warning!

- EAT offers great potential for many people but:
  - Each person **is** different and the **environment** and **motivation** is almost always the most important factor
  - EAT is not the holy grail – lots of other things are often more important
  - Technology take-up is not necessarily related to need.
    - E.g. gerontology research: wealth is relevant, age is not.

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EAT Software

Structure of Software
EAT software examples

Structure of EAT Software

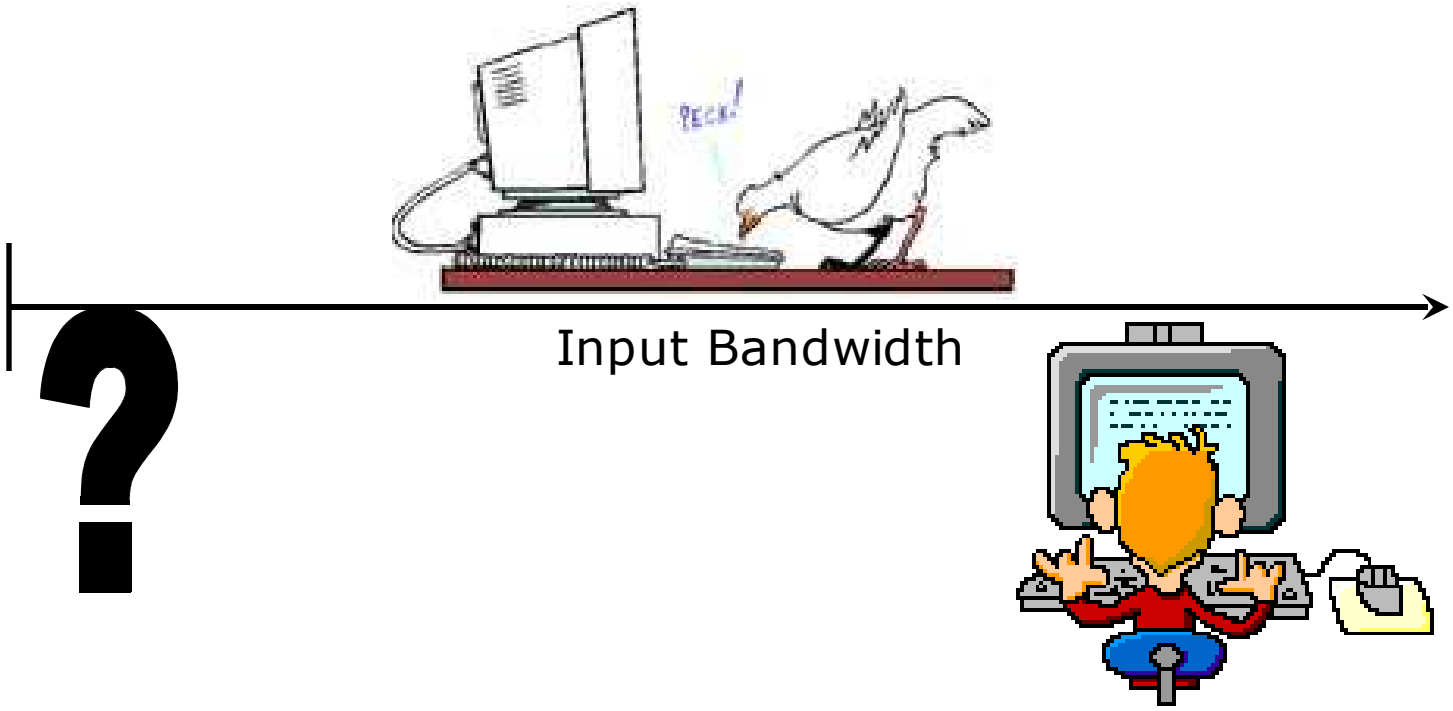
In an engineering sense:

- Input
- Processing
- Output

Input

- Restricted mobility implies restricted input 'bandwidth'
- Equipment can improve access (e.g. alternative keyboards/mice)
- Software can also allow access at the very lowest level of bandwidth
- How? Switching…

Input Bandwidth

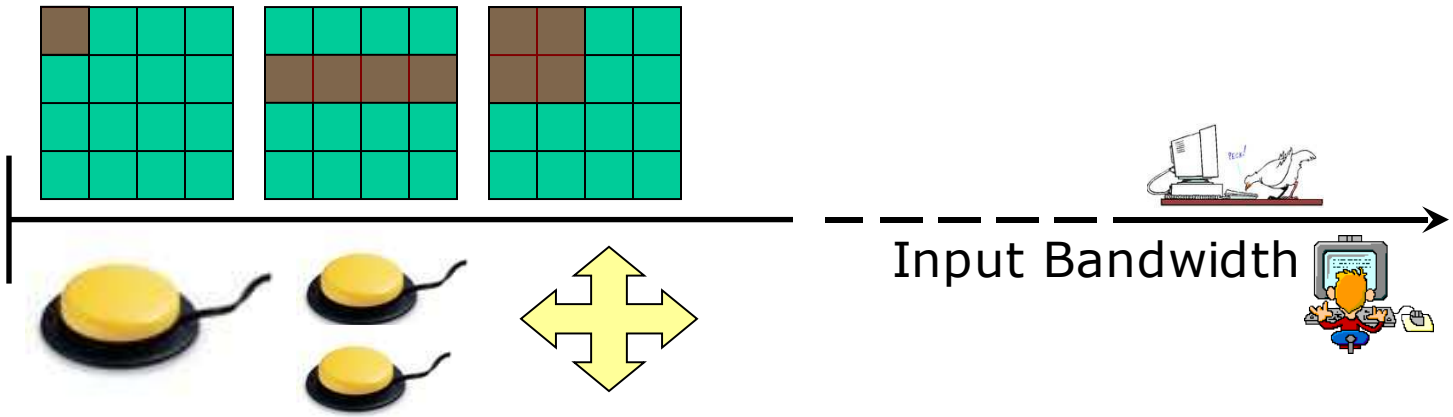


Input: Switching

- At the lower end of bandwidth we only have 1 bit of information… how do we use this usefully?
- Introduce time

DEMO

Input Bandwidth - Switching



Processing

- With a low-bandwidth 'signal' you need to make it work hard.
- Techniques and methods to improve output speed by processing.
  - Prediction
  - Disambiguation

Output

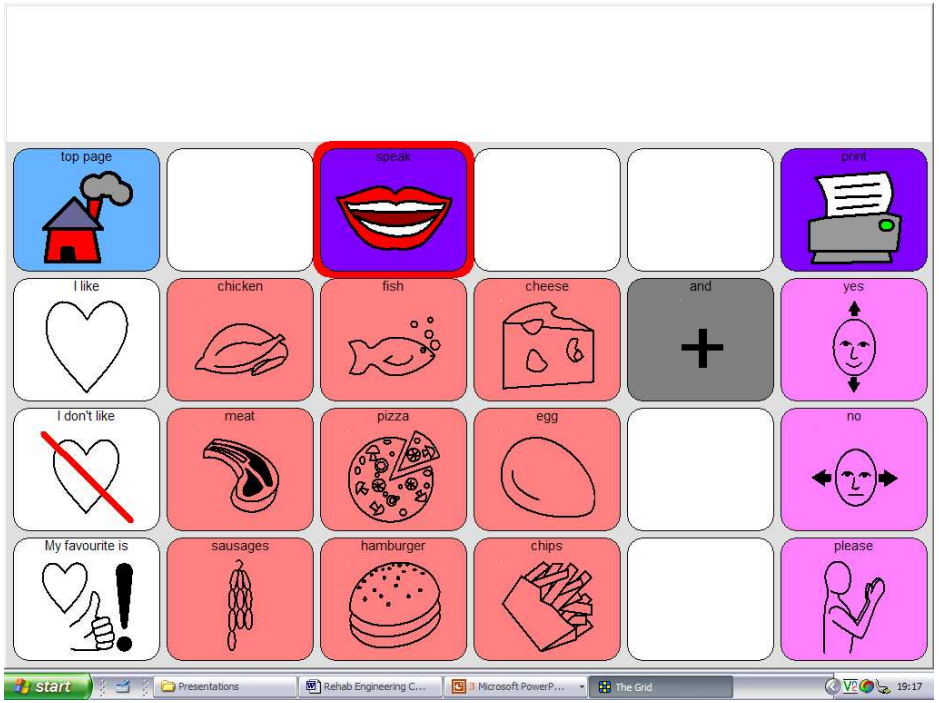
- Make the information do something useful
  - Talk
  - Type
  - Text/Email
  - Control Environment
  - Move mouse
  - …

Examples – AT Software

- Text based communication

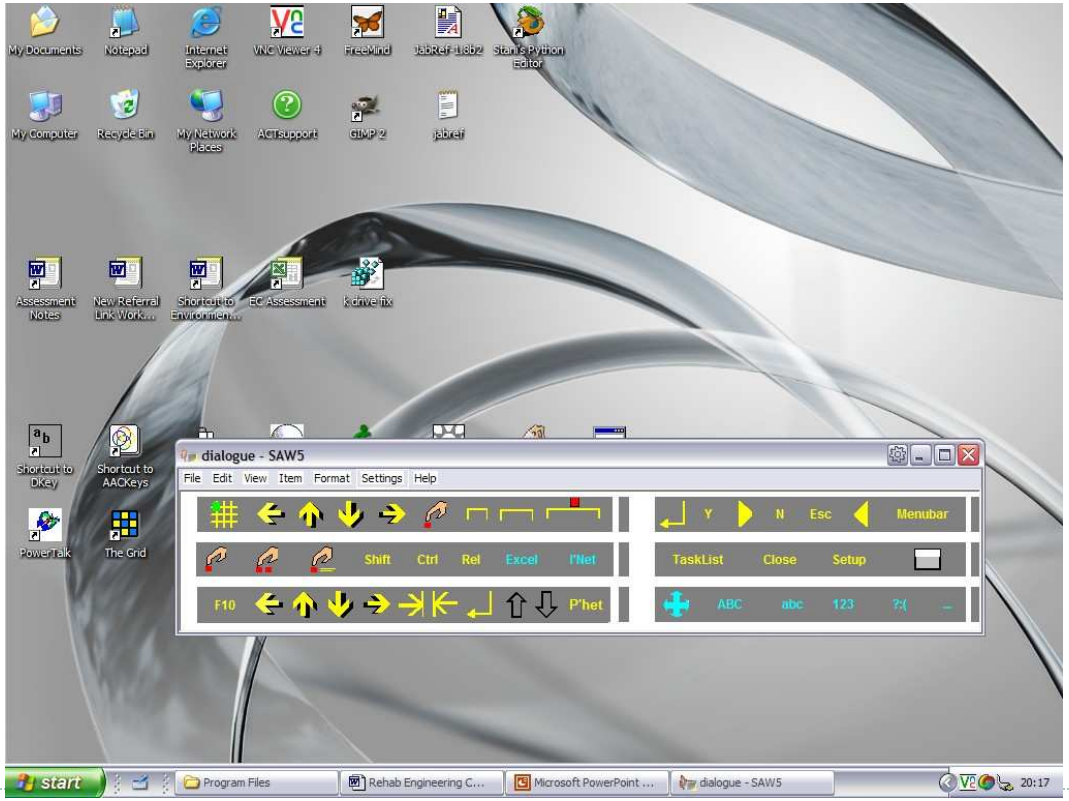
Examples – AT Software

- Symbol based communication



Examples – AT Software

- Computer control



Mainstream AT software

- Some software could be considered to be 'mainstream' AT software – software that is applicable to people with disabilities but developed for other reasons… e.g:
  - Voice Recognition (Dragon, ViaVoice)
  - Quikwriting and other PDA input methods
  - Disambiguation (mobile phone prediction)
  - Magnification tools? (almost)

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Other EAT issues

EAT Context
Computer Accessibility
Usability and HCI

EAT Context

- EAT is, or should be, related to:
  - Accessibility (e.g. W3C WAI etc)
  - Usability
  - Human Computer Interaction
    - Cognitive Science, Psychology, Human Factors etc.
- And may sometimes be called or related to:
  - Biomedical Engineering

Computer Accessibility

As well as specific EAT software there are a range of things that happen in mainstream software and operating systems:

- Operating system accessibility
- Program specific accessibility
- Content accessibility

Operating System Accessibility

- Control characteristics of the input and display
- How the operating system 'exposes' controls is important
- Some operating systems are better at this than others and may have additional accessibility tools
- Windows have now integrated their accessibility model with UI automation

Windows Accessibility

- Mouse settings
  - Speed, cursor, click speed …
- Keyboard settings
  - Repeat rate, repeat delay, …
- Visual settings
  - Size, font, colours, contrast, screen size…
- Accessibility tools
  - Mouse keys, narrator, magnifier, sound sentry…

Software Accessibility

- Software needs to take on the characteristics set at the OS level (e.g. appearance etc)
- Needs to provide multi-modal input where possible (e.g. keyboard shortcuts)
- Usability and Accessibility are particularly vague at this level

Software Accessibility Example

- Firefox
  - Tabbed browsing
  - Search in page on typing
  - Tabbed links
  - Good use of style sheets
- All these features make for good usability
- They also make for good accessibility

Content Accessibility

- Some (most?) software also has 'content'
- This also needs to be accessible, for example:
  - Accessible to someone with a learning difficulty
  - Accessible to non-english speakers
  - Accessible to people with visual impairements

Web Accessibility

- An interesting example of content accessibility issues.
- Content is provided by many different people (through websites).
- Content is coded into html or other
- How do you ensure accessibility? You don't!
- Standards and techniques to aid accessibility.

Web Accessibility – Concept Coding

- Example of an (AT) standard that could improve accessibility (using mainstream technology)
- Proposed that symbols are coded according to their concept
- Conceptual tree provided by word-net
- Allows 'translation' between symbol sets
- Allows display of symbols from text
- Problems with licensing!

Usability & Accessibility

Usability: "The effectiveness, efficiency and satisfaction with which specified users achieved specified goals in particular environments"

ISO 9241

Accessibility: "Usability of a product, service, environment or facility by people with the widest range of capabilities"

ISO 16071

‘The Design of Everyday Things’:

Design should:

- Make it easy to determine what actions are possible at any moment (make use of **constraints**)
- Make things visible, including the conceptual model of the system, the alternative actions, and the results of the actions
- Make it easy to evaluate the current state of the system
- Follow natural mappings between the intentions and the required actions; between actions and the resulting effect; and between the information that is visible and the interpretation of the system state.

‘The Design of Everyday things’ , Don Norman, 1988

HCI

- Assistive Technology is not formally or informally related to Human Computer Interaction field
- Many models, theories and techniques that could be applied across the fields
- E.g. Model Human Processor and other GOMS models
- Fitts law, Power law of practice…

Divergent Fields?

- Usability, Accessibility and HCI:
  - Not formally, or informally related to Assistive Technology (yet)
  - Assistive Technology software can be notoriously un-usable!
  - Can FLOSS encourage this cross-over?

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The OATS website

User Groups
Design Considerations
Implementation
Website Walkthrough

OATS :: Users

- Simple portal for finding and downloading software
- Unique opportunity to contribute directly to development of software
- Opportunity to comment/vote on AT software

OATS :: Developers

- Exciting and interesting projects
- Unique client contact
- Context of other projects
- Access to information on Assistive Technology
- Excellent open source tools

OATS :: Professionals

- AT professionals have a unique insight into user's needs and have lots of ideas.
- Researchers research into relevant areas to AT (but maybe not called 'AT').
  - OATS offers the opportunity to connect the two.
- Allows customisation to meet individual client's needs

OATSOFT.org :: Considerations

- Catering for some very different groups of users – end users, developers and professionals
  - 'Partition' site
  - Same core data, presented differently
  - Different additional data/resources as appropriate
- Accessibility obviously important
  - WAI compliance
  - Icons
  - Simple navigation and download

OATSOFT.org :: Considerations

- Community development
  - Encourage users to feedback
  - Encourage professionals to input knowledge
  - Encourage developers to contribute code!
- Sustainability
  - Allow anyone to contribute software listings
  - Allow anyone to create content

OATSOFT.org :: Implementation

- Content Management System - PLONE
  - Open Source (obviously!)
  - Good Accessibility 'out of the box'
  - Support for multiple languages
- OATS team developed site
  - Custom library component
  - Based on existing library component
  - Site can be entirely and flexibly customised using the PLONE framework

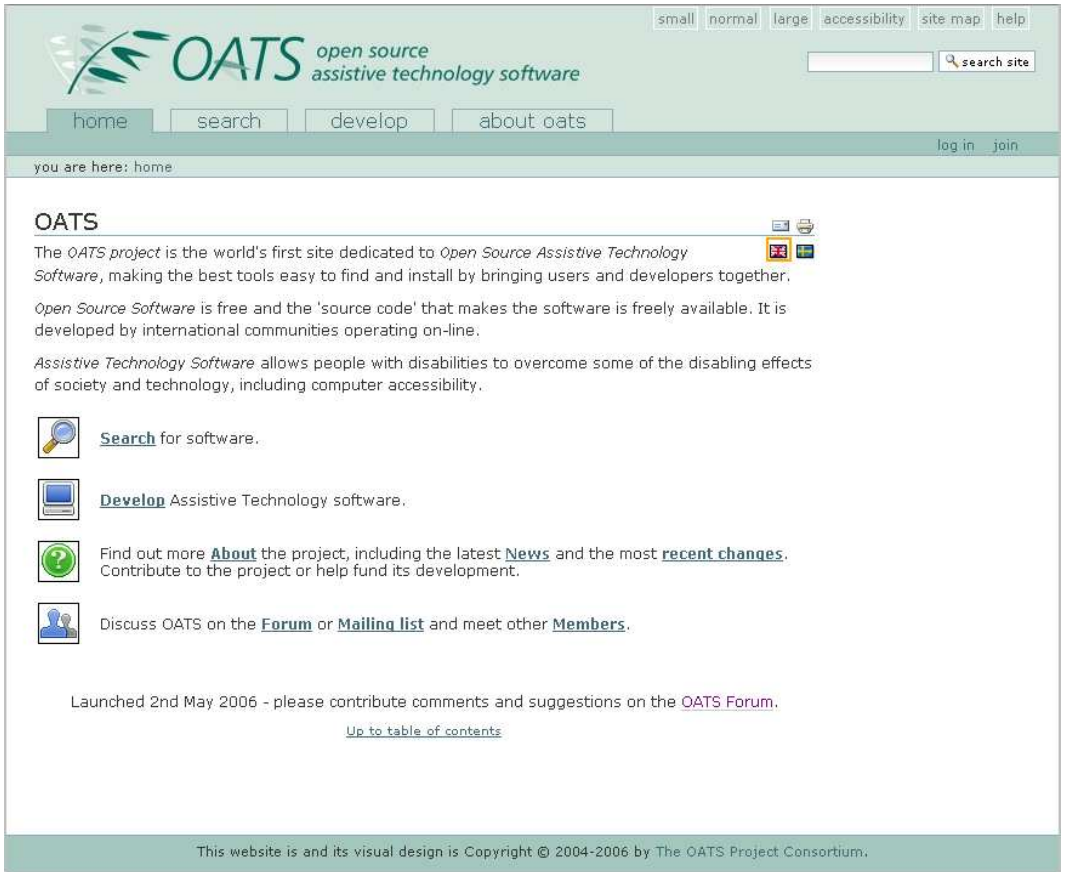
OATSOFT.org

- Two parts
  - Repository (Library): help users find software easily
  - Forge (Dating agency): tools for developing open source software

The only website dedicated to Open Source Assistive Technology software

OATSOFT.org

- Launched in April 2006



OATSOFT.org :: Library

- Easy search
- Browse by type
- Browse by need
- Advanced search

Includes free software as well as open source

OATSOFT.org :: Search Results

- Simple Summary
- Download Link (3 clicks to here)
- More Info…

OATSOFT.org :: Project Listing

- 'Amazonesqe'
- Full project info
- Further resources
- Download link
- Access to previous download versions

OATSOFT.org :: Features

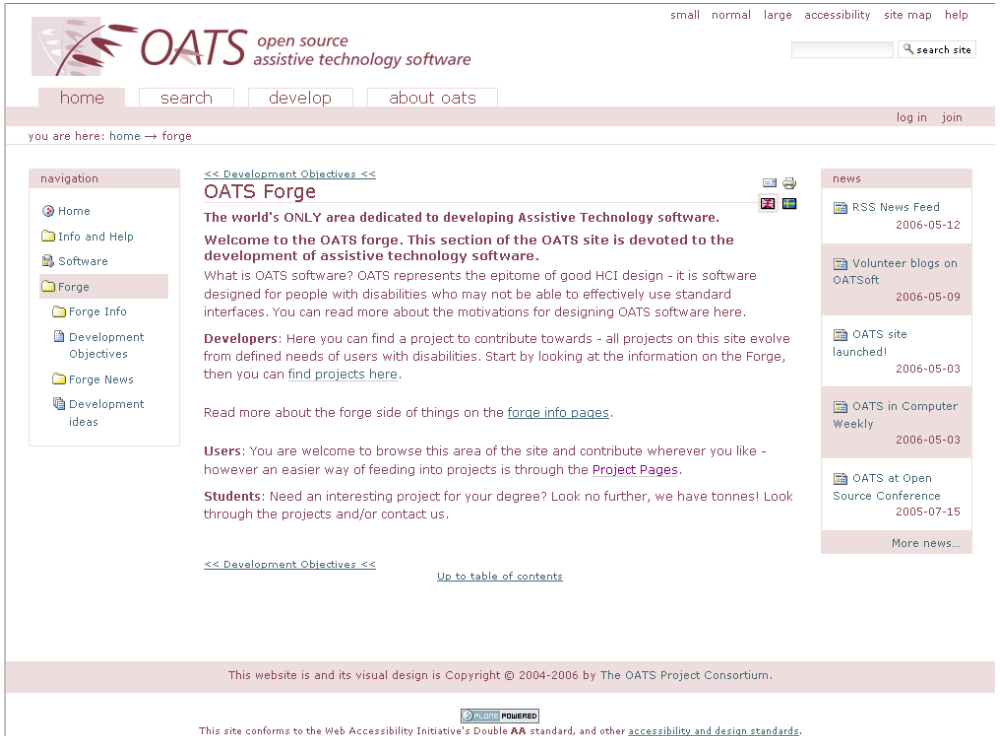
- Community development

Discuss OATS on the Forum or Mailing list and meet other Members.

- Content development
  - contribute feature requests,
  - discuss on noticeboards, report bugs,
  - vote for software…
  - Anyone can add/suggest projects
  - Developers can maintain their own project areas
- Internationalisation

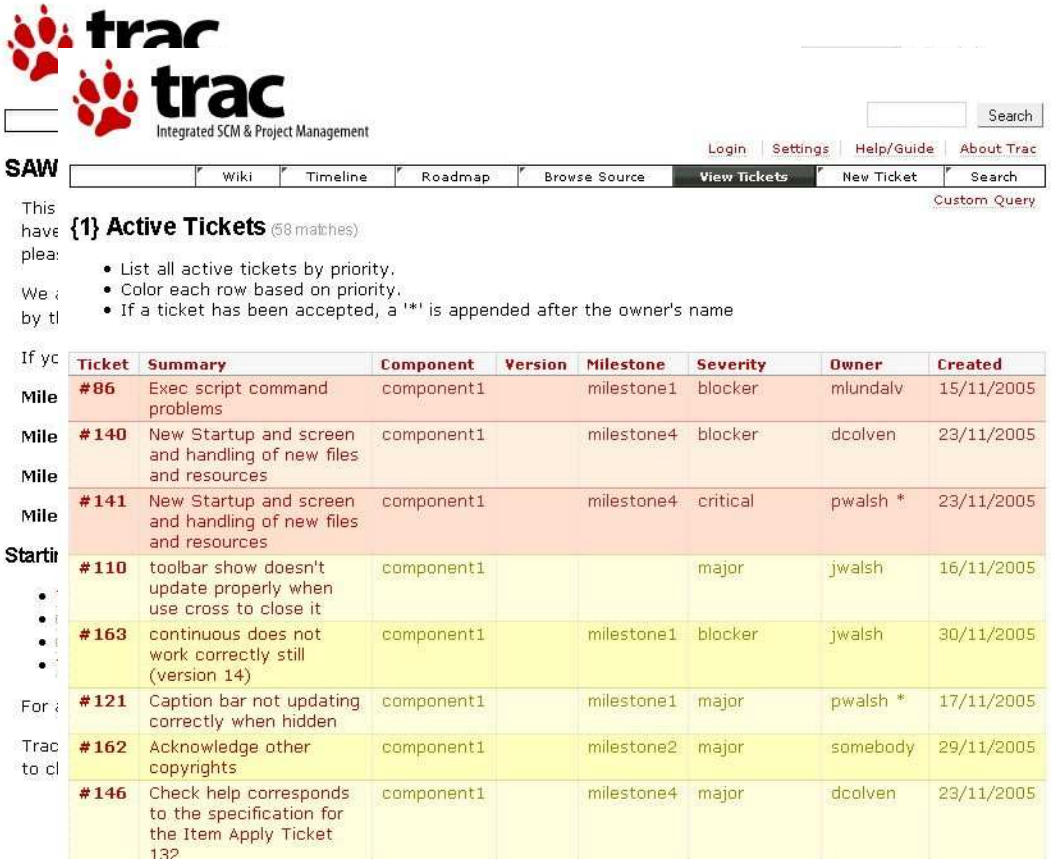
OATSOFT.org :: Forge

- Project Listings
- Info on AT
- Access to lots of Open Source tools…



OATSOFT.org :: Forge Tools

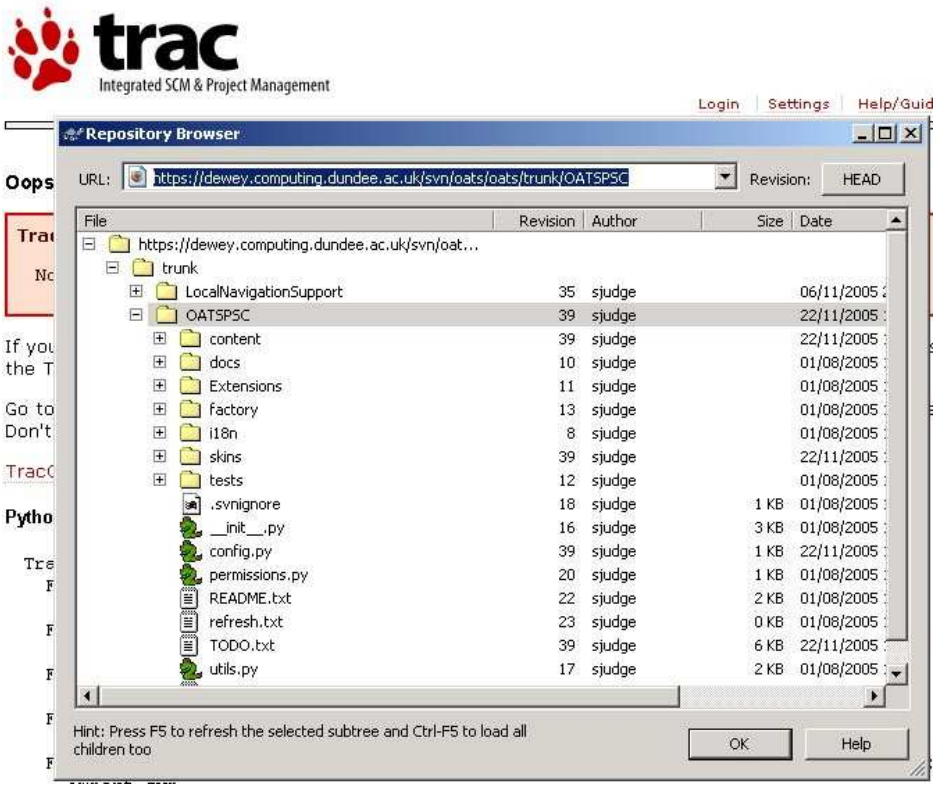
- Trac: Project management



Ticket	Summary	Component	Version	Milestone	Severity	Owner	Created
#86	Exec script command problems	component1		milestone1	blocker	mlundalv	15/11/2005
#140	New Startup and screen and handling of new files and resources	component1		milestone4	blocker	dcolven	23/11/2005
#141	New Startup and screen and handling of new files and resources	component1		milestone4	critical	pwalsh *	23/11/2005
#110	toolbar show doesn't update properly when use cross to close it	component1			major	jwalsh	16/11/2005
#163	continuous does not work correctly still (version 14)	component1		milestone1	blocker	jwalsh	30/11/2005
#121	Caption bar not updating correctly when hidden	component1		milestone1	major	pwalsh *	17/11/2005
#162	Acknowledge other copyrights	component1		milestone2	major	somebody	29/11/2005
#146	Check help corresponds to the specification for the Item Apply Ticket 132	component1		milestone4	major	dcolven	23/11/2005

OATSOFT.org :: Forge Tools

- Subversion: Code Management (Code Versioning System)



OATS examples

- On Screen Keyboards
- Screen Readers
- Resources, e.g:
  - Symbol Libraries
  - Gridsets
  - Dictionaries
- Cause/effect programs
- Macro software (e.g. remapping)
- Prediction software

… Innovative and user led software….

OATS example: DASHER

- Innovative on-screen-keyboard
- Designed by Cambridge university (Inference group)
- Originated from information theory – considering the best way to enter information into a palmtop with gesture
- Potentially very quick and efficient input method given ability to make 2D gestures
- Good example of innovation from associated field

[[DEMO]]

OATS example: SAW

- Switch Access to Windows
- Flexible on-screen keyboard
- Designed by ACE centre and made open source
- Can be expanded to provide universal switch access
- Provided as modules for other software?

[[DEMO]]

OATS example: PowerTalk

- Designed for a user with problems speaking, working for Ford UK
- Wanted to be able to make his presentations using a synthesised voice
- VI community also found useful for making presentations (to give voice feedback of where they are in the presentation)

[[DEMO]]

OATS example: DKey

- Disambiguation was originally an Alternative and Augmentative Communication concept
- Users who have restricted input ability but can use more than 1 or 2 switches have limited options
- Dkey designed to be used with a keypad keyboard…

[[DEMO]]

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OATS Project Future

Current Status
Future Direction
Challenges

Current Status

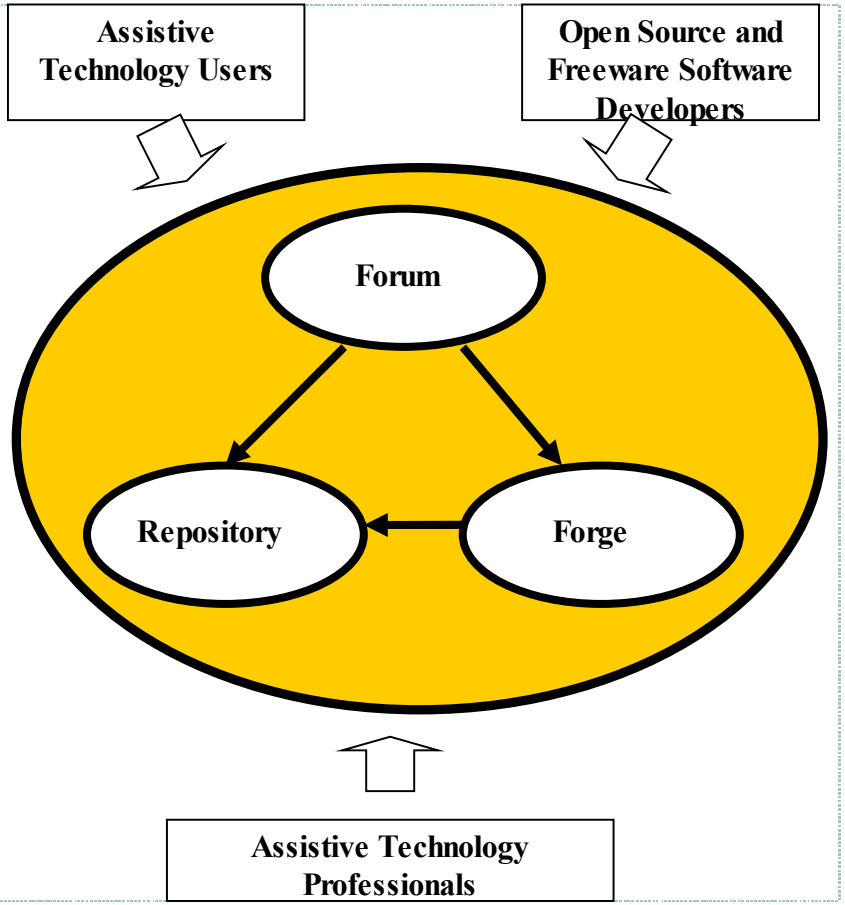
- Reached the end of the pilot year (project report on website)
- Much interest and publicity (continuing)
- Set up OATS Steering Board to oversee project
- SIT have secured time to manage the site and content
- Secured server hosting and management

Future Direction

- Objectives:
  - Encourage the community
  - Develop Content
  - Develop the Scope
  - Champion the FORGE
  - Further develop the site

Future :: Community

- Communication
  - RSS Syndication
  - Mailing lists
  - Bulletin boards



Future :: Content

- Software listings:
  - encourage developers to maintain their own listings
  - ensure up-to-date listings
  - reviews and comments
- Other content :
  - articles etc. about Assistive Technology
  - collate relevant external content / links

Future :: Forge

- Clearly present the challenges
- Explain Assistive Technology and user's needs
- Put Assistive Technology in context
- Make it easy to contribute at any level

Contributing to OATS

- We need:
  - Keen users
  - 'Exemplar' Programmers
  - Open Source Advocates
  - Steering Board Members
  - Content contributions (software, articles, links etc)
  - Any input! Contact us

Summary

- Open Source software (FLOSS): source code is openly published
- Assistive Technology Software allows people access and control of technology
- The FLOSS Development model is well suited to the Assistive Technology field
- OATSOFT.org
  - Library of existing software for users
  - A conduit for user's and professional's ideas
  - Place for developers to hang out
- Get Involved!

References / Contacts

Website, Resources, References, RSS feed, project report:

www.oatsoft.org

Citations of papers:

citeulike.org/user/simonjudge/tag/floss

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