

# Advances in Electronic Assistive Technology

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Chailey Heritage Clinical Services

South Downs Health   
NHS Trust

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# Background

**Chailey Heritage Clinical Services**

**NHS service**

**1000 clients per year**

**Client group : Children and young adults with complex physical disability**



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# The different parts of our service

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- Children's head injury service
- Rehabilitation engineering
- Clinics and assessments
  - Clinical Support to Pupils
  - Switch Access
  - Activities of Daily Living
  - Posture Clinic .....
- Respite care
- Integrated nursery



# Multi-disciplinary assessment

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- Paediatrician
- Speech and language therapist
- Physiotherapist
- Occupational therapist
- Clinical/Rehabilitation Engineers



# Complex ?

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- Aged 14
- Athetoid Cerebral Palsy
- Gastrostomy fed
- No verbal communication
- Assistance for all ADL

# Environmental Control Systems

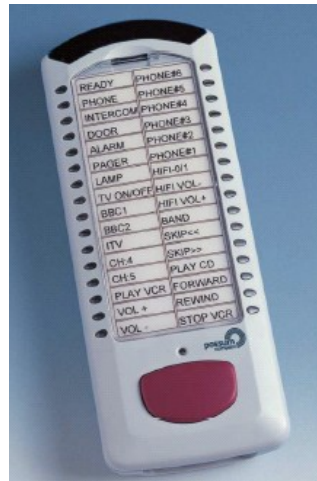
Allows control of the home environment using a single switch



## Function:

Occupation	(tv, hifi, computer, reading)
Security	(alarm, door release)
Comm'n	(VOCA, telephone, intercom)
Comfort	(heating, lighting, fan, curtains)

# Environmental Control



# Powered Mobility



<http://www.bugzi.org.uk>



- Various access methods ( joystick or switches 1-5)
- Can control seating position

# Computer Access

- To enable a user to access a computer and all the facilities that this activity can offer, to their maximum potential.

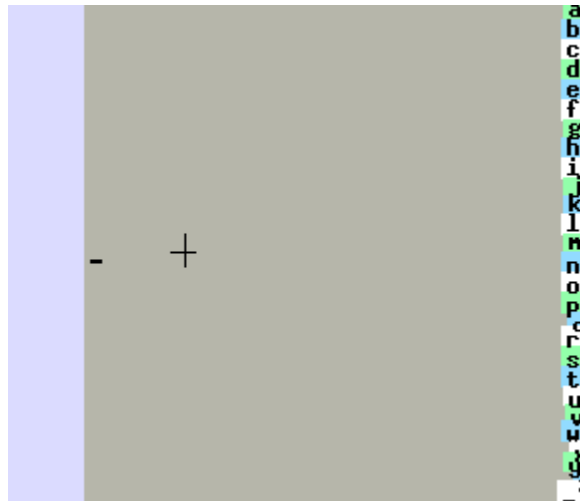




# Computer access

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- Dasher software



<http://www.inference.phy.cam.ac.uk/dasher/DasherSummary2.html>



# Where to learn about ....

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- Conferences meetings:
  - PMG Conference [www.pmguk.co.uk](http://www.pmguk.co.uk)
  - RAATE conference [www.RAATE.org.uk](http://www.RAATE.org.uk)
  - Communication matters  
[www.communicationmatters.org.uk](http://www.communicationmatters.org.uk)
  - FAST website [www.FASTuk.org](http://www.FASTuk.org)



# Current equipment

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- EAT currently used
  - Powered mobility spectra plus
  - WiseDX integrated control system
  - Dynavox
  - Environmental control accessed via WiseDX



# Access ?

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- One and a half switch user
- Main switch on left hand side
- Mode change on right



# How do we get from a to b...

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How can someone with such limited voluntary movement gain control over this wide range of equipment?

# Integrated EAT



Devices increasingly have more than one function:

- Communication aids incorporate IR input/output for ECS
- ECS incorporate communication functions  
Computer access can be enabled via the device
- Wheelchair controllers can incorporate ECS



# Access ?

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- A common area for many different types of AT.
- Can affect the use and disuse of equipment
- Often after-thought once sorted out the “real problem” which type of chair, ECS, communication aid etc
- Problem for users with complex needs promoted by fragmented services



# Switch Interfaces

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- Method of access
  - Fastest
  - Energy Efficient
  - Reliable/Consistent



# Assessment

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- Multidisciplinary task
- therapists
- engineers
- medics
- .....

# Impact of Seating





## Priorities - Posture switch access

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- looking for posture which promotes:
  - reliable voluntary movement to activate a switch
    - **consistency wrt switch position**
  - optimise cognitive alertness
    - **reclining**
    - **head position**
  - comfortable working position without fatigue
    - **trunk and pelvis stability**
    - **shoulder and arm movement**

# Options



[www.cogain.org](http://www.cogain.org)

From [www.qedltd.co.uk](http://www.qedltd.co.uk)

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# Different Activities

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- ..require different skills and hence some access methods are more appropriate than others.
- *E.g driving a car vs. operate a computer.*
- Always looking for fastest, most efficient and reliable method of access for the user



# Control Characteristics

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- |   |   |
|---|---|
| <ul style="list-style-type: none"><li>■ <b>Comm/ECS/Comp</b></li><li>■ large selection set</li><li>■ selected or not</li><li>■ static situation</li><li>■ Speed and accuracy are important</li><li>■ Feedback</li></ul> | <ul style="list-style-type: none"><li>■ <b>Powered Mobility</b></li><li>■ small selection set</li><li>■ continuous input</li><li>■ dynamic situation</li><li>■ Slow or inaccurate movement dangerous</li><li>■ Feedback</li></ul> |
|---|---|

From Nisbet 1996

# Integrated Access Systems



[www.wisedx.com](http://www.wisedx.com)

User access more than one piece of equipment  
using a single access method



[www.quintet.ie](http://www.quintet.ie)



# Integrated Access Method

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- Single reliable access site
- Optimum access method is the same for each assistive device
- Client/family's preference
- Changes in living environment that may require more assistive technology
- Progressive conditions that may result in limited access



# Discrete Access Method

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- Performance trade-offs with integrated controls
- Client/ family's preference
- Physical /visual/ perceptual or cognitive limitations preclude integration
- External factors e.g. cost, technical limitations



# Issues with Integration

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- One fail - all fail
- Service fragmentation - maintenance & ownership issues
- Cost....reducing
- Technophobia
- Extracting individual items for use in alternative environments..e.g manual chair
- ...but enables true independence in activities



# Summary

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- Integrated EAT and access requires teams working together
- Issues over funding and responsibility for maintenance



# Evidence-base

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- Provides children with
  - Increased confidence,
  - control,
  - independence and
  - interaction with friends



# Bibliography/References

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- **Cook A.M., Hussey S.M., (2001)**  
**Assistive Technology - Principles and Practice, Mosby Inc, St Louis.**
- **Switches** Call Centre, Edinburgh ([www.callcentre.ed.ac.uk](http://www.callcentre.ed.ac.uk))
- Guerette P et al (1992) Rehabilitation R&D Progress Reports 93
- Guerette P et al (1994) Assistive Technology 6 67-76
- Nisbet P (1996) Medical Engineering & Physics 18 193-202
- Hawley M et al (1992) Biomedical Engineering 14 193-19
- Nisbet (1996) Clinical Rehabilitation 18 (3) 193-202 7
- [Angelo-J](#) (2000) J-Rehabil-Res-Dev Sep-Oct; 37(5):



# Info about equipment

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- <http://www.rslsteeper.com/>
- [www.possum.co.uk](http://www.possum.co.uk)
- [http://www.dlf.org.uk/factsheets/pdf/Choosing\\_a\\_powered\\_wheelchair.pdf](http://www.dlf.org.uk/factsheets/pdf/Choosing_a_powered_wheelchair.pdf)
- <http://www.communicationmatters.org.uk/>
- [www.ace-centre.org.uk/](http://www.ace-centre.org.uk/) -
- [www.abilitynet.org.uk](http://www.abilitynet.org.uk)
- [www.inclusive.co.uk](http://www.inclusive.co.uk)
- [www.qedltd.com](http://www.qedltd.com)