


Designing for older people with HADRIAN

The Science of Age-Supportive Built Environments Seminar:
towards solutions

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Age Supportive = Inclusive

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Inclusive Design

- ▶ The social, ethical, legislative, and business cases for designing products, environments, and services to be accessible and inclusive are clear
- ▶ However, despite this many products are designed without due care and attention to the needs of all users
- ▶ Whilst practitioners (designers, ergonomists, transport system or urban environment planners etc.) are largely 'on board' more support is required.

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Supporting Inclusive Design

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 - ▶ Empathy.

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 - ▶ data tends to be 'patchy' and rarely in sufficient detail to enable design professionals to make more informed decisions
 - ▶ existing data tools are not in a format or language that designers can access, relate to, and apply easily.

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 - ▶ Accessing the right people (for transport design, those who are most excluded are likely to be trapped at home)
 - ▶ Often reserved for requirements gathering, or validation, not during design.

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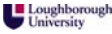
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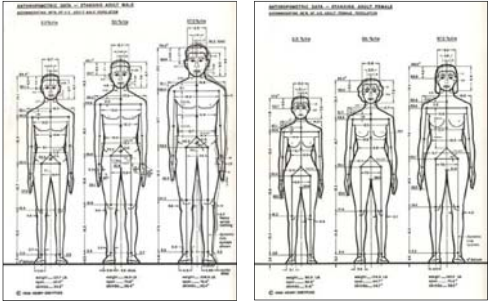
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 - ▶ Multivariate accommodation and other such issues are not easily supported.

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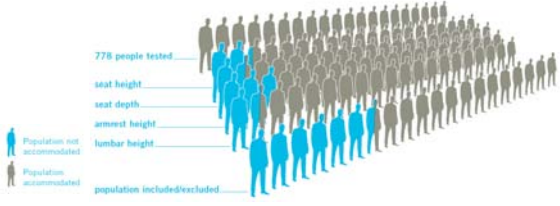
Univariate Data




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Multivariate Accommodation

from www.hermanmiller.co.uk



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Meet Rob



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Rob has 102 friends



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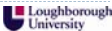
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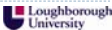
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 - ▶ Design for All, part of EQUAL (Extending QUALity Life)
 - ▶ To develop a design tool to support the multivariate estimation of percentage accommodated

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 - ▶ To develop a design tool to support the multivariate estimation of percentage accommodated
 - ▶ AUNT-SUE (Accessibility and User Needs in Transport for Sustainable Urban Environments)
 - ▶ Developing sustainable policy and practice to deliver inclusive design in transport.

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HADRIAN

- ▶ Rob and his friends form a virtual user group

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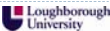
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- ▶ Rob and his friends form a virtual user group
- ▶ Age range 18 – 89 yrs (46 people over 60)


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HADRIAN

- ▶ Rob and his friends form a virtual user group
- ▶ Age range 18 – 89 yrs (46 people over 60)
- ▶ 59 people have some sort of impairment: limb loss, cerebral palsy, epilepsy, head injuries, non specific knee problems, multiple sclerosis, arthritis, vision and hearing impairments, heart problems, paraplegia, Parkinson's disease, stroke, and dyslexia etc.


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HADRIAN as database

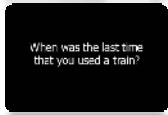



Name: Rob
Subject Number: 78
Gender: Male
Age: 43
Category: Wheelchair user
Occupation: Shop manager
Impairment: Paraplegia

Kitchen task video



Interview video

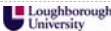




Rail

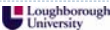
Other data

- Anthropometry
- Reach range
- In the home
- Out & About
- CAD DATA

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Data in the database

- ▶ 28 anthropometric body measures
- ▶ 18 joint angle ranges of motion
- ▶ 1 coordinate based reach envelope
- ▶ 3D Whole body scan
- ▶ Task capability: a range of pick & place kitchen based tasks, a range of seating scenarios, public transport ingress and egress
- ▶ Additional capability: Grip strength, dexterity, vision, bending, twisting
- ▶ Transport use history, likes, dislikes etc.
- ▶ Background information: photograph, age, nationality, occupation / work history, handedness, disability.

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Data can be explored

Disability and Demographics

For people interested in the effects of disabilities on public transport use

Modes of transport used and not used

For people interested in the design details that stop or hinder the use of public transport by disabled people

Anthropometry & Range of Motion

For people interested in size variability and the ability of disabled users to reach control interaction points

In the Home

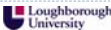
For people interested in the ability of the sample to perform activities of daily living

Behaviour & Emotion

For people interested in emotional aspects of transport use

Out & About

For people interested in the effects of disabilities on peoples ability to navigate the urban environment

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Data in the database

- ▶ Exploring the data provides:

Data in the database

- ▶ Exploring the data provides
 - ▶ Empathy with the end user

Data in the database

- ▶ Exploring the data provides
 - ▶ Empathy with the end user
 - ▶ Support for design decision making.

Exploiting the data in HADRIAN

- ▶ Exploiting the data was also a focus of research

HADRIAN and SAMMIE

- ▶ Expertise in digital human modelling.



Automated Task Analysis in HADRIAN

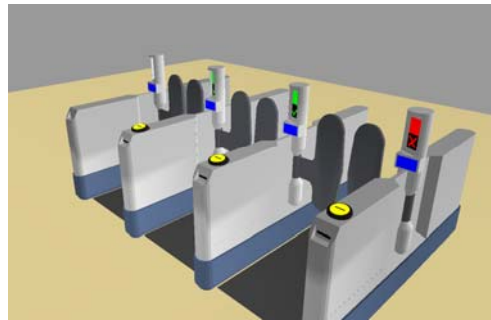
- ▶ The 103 HADRIAN people can be used to evaluate a computer model (CAD) of a design during early design development

Automated Task Analysis in HADRIAN

- ▶ The 103 HADRIAN people can be used to evaluate a computer model (CAD) of a design during early design development
- ▶ The user of HADRIAN defines a task that describes how to use the design.

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Computer Model to Evaluate



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Task Description: Is this Aisle Open?



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Task Description: Insert Ticket



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Task Description: Retrieve Ticket



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Task Description: Move Through Barrier



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A Measure of Inclusiveness



- ▶ Participant 77 failed to complete the task
- ▶ Failure occurred on task element 4: move through barrier
- ▶ Issue: wheelchair wider than width of barrier



- ▶ Participant 83 failed to complete the task
- ▶ Failure occurred on task element 3: retrieve ticket
- ▶ Issue: arthritis prevents arm being raised sufficiently to reach



- ▶ Participant 71 failed to complete the task
- ▶ Failure occurred on task element 2: insert ticket
- ▶ Issue: right arm mobility severely impaired, design is exclusively right handed

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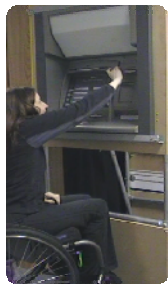
Validation of the Prototype Tool

- ▶ Evaluation of an ATM
 - ▶ Real product and 10 real people
- ▶ SAMMIE evaluation of a CAD model by an experienced ergonomist
- ▶ HADRIAN evaluation of a CAD model by a designer with a small amount of training in the system.



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Validation of the Prototype Tool



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Validation of the Prototype Tool

- ▶ Evaluation of the DLR station at Greenwich
 - ▶ Various accessibility issues explored including the ticket machine, access to the platform, access to the train
- ▶ Done with real people and with HADRIAN



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Validation of the Prototype Tool



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Summary

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- ▶ HADRIAN has been developed to provide support and address some of these issues
- ▶ The ability to assess the physical accessibility and accommodation of a design concept during the early stages of design is a real step forward.

Other Work

- ▶ Accessibility in Online Journey Planning

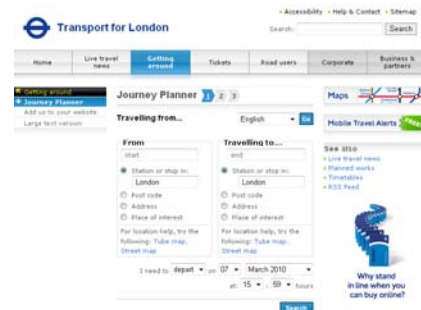
Other Work

- ▶ Accessibility in Online Journey Planning
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- ▶ Develop an accessible version of TfL's Journey Planner

Journey Planner



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Other Work

- ▶ Accessibility in Online Journey Planning
 - ▶ Research funded by Transport for London
 - ▶ Develop an accessible version of TfL's Journey Planner
- ▶ A direct outcome of the AUNT-SUE work that has the potential to have a significant impact.

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Thank you

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