

Extending the Reach of the Medical Care Environment:

early user focused design concepts using the Orient 2

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Edinburgh University
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Overview

- To design wearable healthcare prototypes for three user groups
 - frail elderly
 - young children
 - respiration

Deliverables

- Devices (in the region of 45 pieces)
- Range of packaging concepts
- Moulds and samples

Rationale

- using existing packaging to carry out initial user feedback sessions in collaboration with consultants
- some scope for design of trial, though most likely to use well tried and tested system with medics experienced in enrolment and permissions
- technical reliance and acceptance levels
- create a new iteration with generic basis across the three user groups
 - with interchangeable user specific details, eg strap for home/medical environments/colourways
- feedback to be gained in group sessions where possible, outside the home; drop in centres a possibility
 - across Lothians

Design constraints

- cleanable
- waterproof
- resistant to medical cleaning agents
- resistance to stress cracks
- anti bacterial
- clip mechanism (no Velcro)
- compliance
- ROHS
- EU directives and standards
- wearable over a significant length of time
- formally acceptable in context
- ergonomic
- breathable

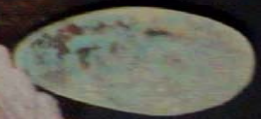
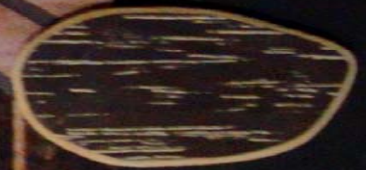
Waterproof mechanisms



Waterproof mechanisms



Visual research - landscape



Visual research - orthopaedic

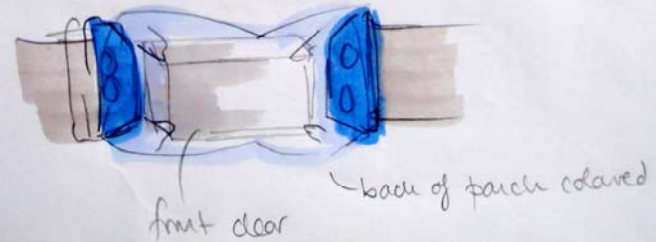
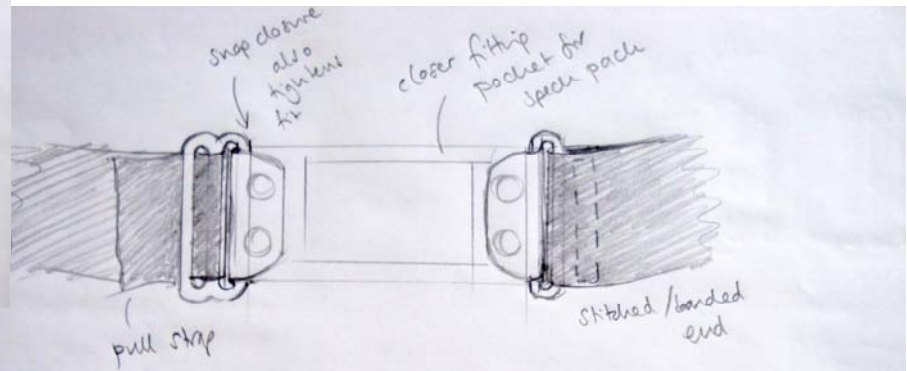
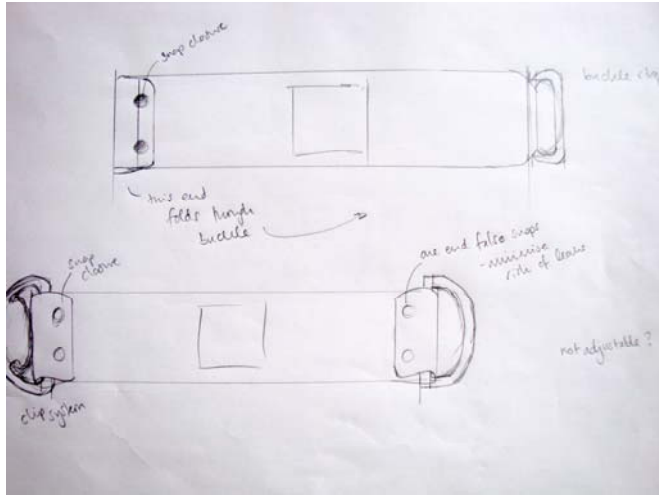


Provides immobilization for weak or injured wrists. Durable canvas brace with soft lining and removable stay. Self adjusting two-cluster lacing attached to hook 'n loop straps ensures a proper fit along the entire length of the brace.

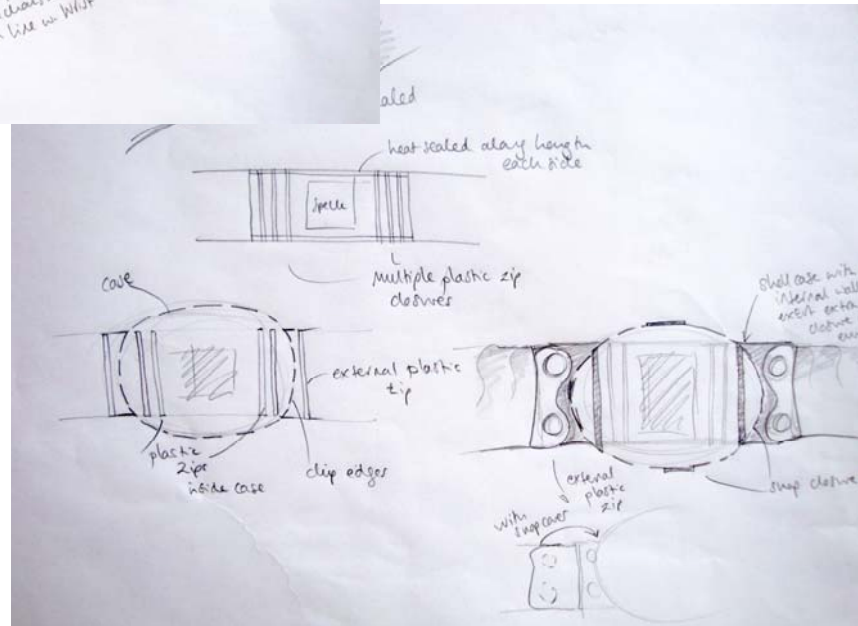
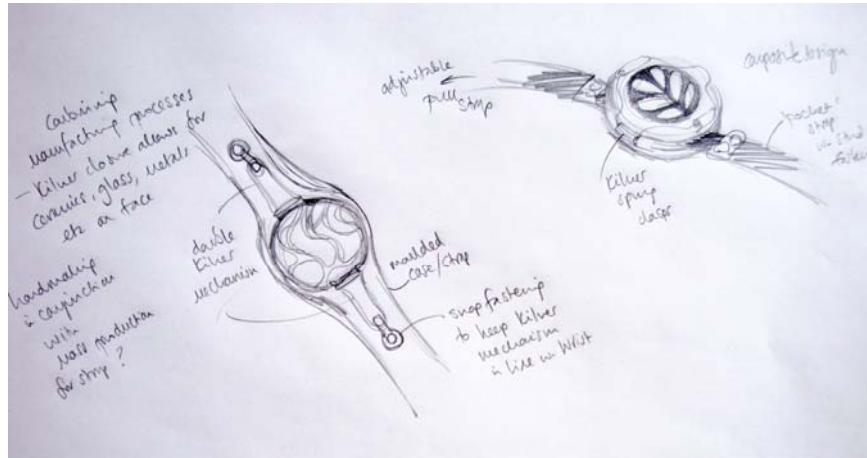
Ankle supports – elastic
Is there a material that is elastic as well as compliant for hospital use and underwater use?



Design proposals I



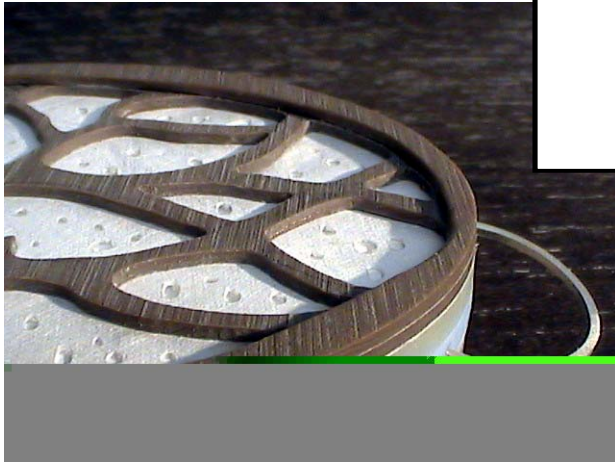
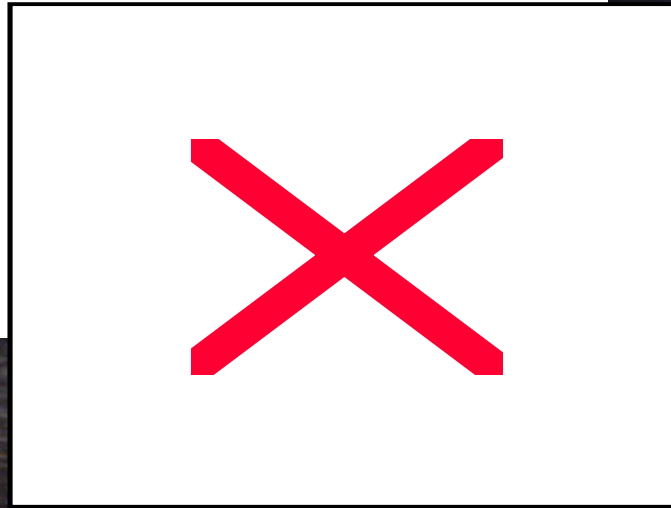
Design proposals II



Material selection

material	pros	cons	cost	FDA approved?	common uses
polyurethane	Bioccompatible, flexible, high abrasion resistance	Synthesized from toxic chemicals, thermosetting Pus cannot be recycled	2.15 – 6.01 \$/kg		Medical devices, implants, wound dressing, bedclothes; fabric coatings for inflatables
polyethylene	Easy to process, low dielectric loss, extremely non-toxic	Not UV resistant, cannot be printed on	4 \$/kg	yes	Milk bottles, toys, oil containers, artificial joints
PTFE	pore size can be controlled to reject bacteria as well as water, low dielectric loss, high resistance to chemicals	Once mixed with other materials to make fabric cannot be recycled	15.90 \$/kg	yes	GoreTex, Kevlar, Teflon
ABS/SAN	High impact resistance, take colour well, resistant to chemicals	Acrylonitrile monomer very poisonous	2.80 \$/kg	yes	Telephones, lego, toys, medical instruments
PVC	Can be coated to give anti microbial characteristics, flexible; good resistance to gases & acids	Environmentally dubious; not breathable, not resistant to some solvents	1.20 \$/kg	yes	Pipes, dolls, medical tubes, artificial leather, car upholstery, vinyl records
DuPont 20 Series (polyethylene resins)	Flexible, resistant to stress cracking, good thread tolerance		?	yes	Pharmaceutical & cosmetic containers

Prototyping & beyond



HCI

- observations for wearability Oct 08
- user centered design
- design for healthcare
- arts in healthcare
- specific user groups

<i>issue</i>	<i>resolution</i>
Helper needed to put on straps	Use pull strap design
Personal effects need to be removed to minimize interference	
Aggravating selection of different sized straps	Colour code straps by body area
Calibration depends on magnetic north	Supply a compass – perhaps in mat, below?
Stance calibration requires visual feedback	Create a pre marked mat
Jumping not well represented	



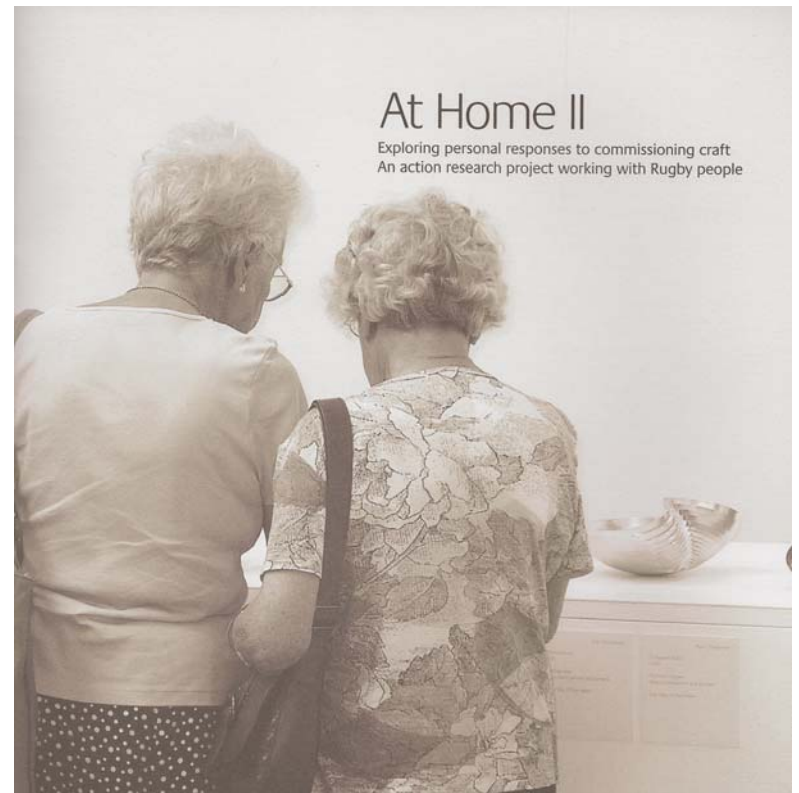
Early observations

<i>issue</i>	<i>resolution</i>	<i>reflection</i>	<i>HCI</i>
Helper needed to put on straps	Use pull strap design		Test designs with user groups; distributed user
Personal effects need to be removed to minimize interference		A problem for long term personal use, but may be OK in context of a surgery or examination room	Longitudinal testing; contextual observations
Aggravating selection of different sized straps	Colour code straps by body area	May still need to be user specific	Ergonomics, aesthetic potential
Calibration depends on magnetic north	Supply a compass – perhaps in mat, below?	Performative and time consuming – may be OK if directed by a helper or as part of an acceptable ritual	Design rituals of use – scenarios; distributed user
Stance calibration requires visual feedback	Create a pre marked mat	As above	Design rituals of use - scenarios
Jumping not well represented			

Early observations

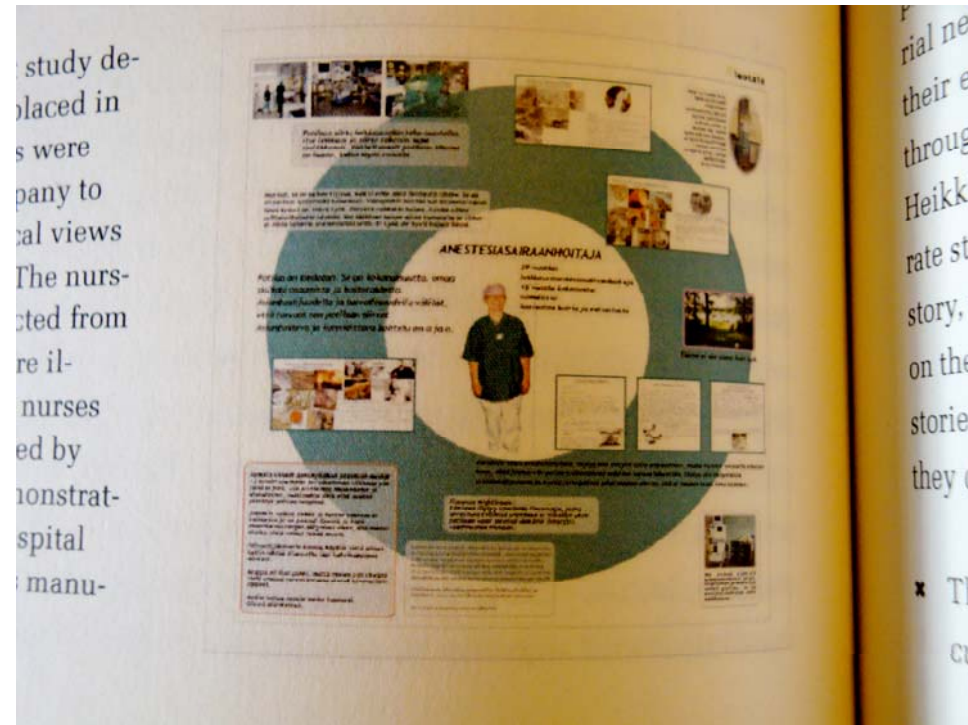
Next user centered steps

- Identify design stakeholders
 - the design team
 - the user(s)
- Identify questions
- Co-design process
- Introduce prototypes



Towards a distributed user

- The patient
 - the consultant
 - care environment
 - family
 - visiting carers
 - social centers
 - friends, colleagues
 - pets
 - things



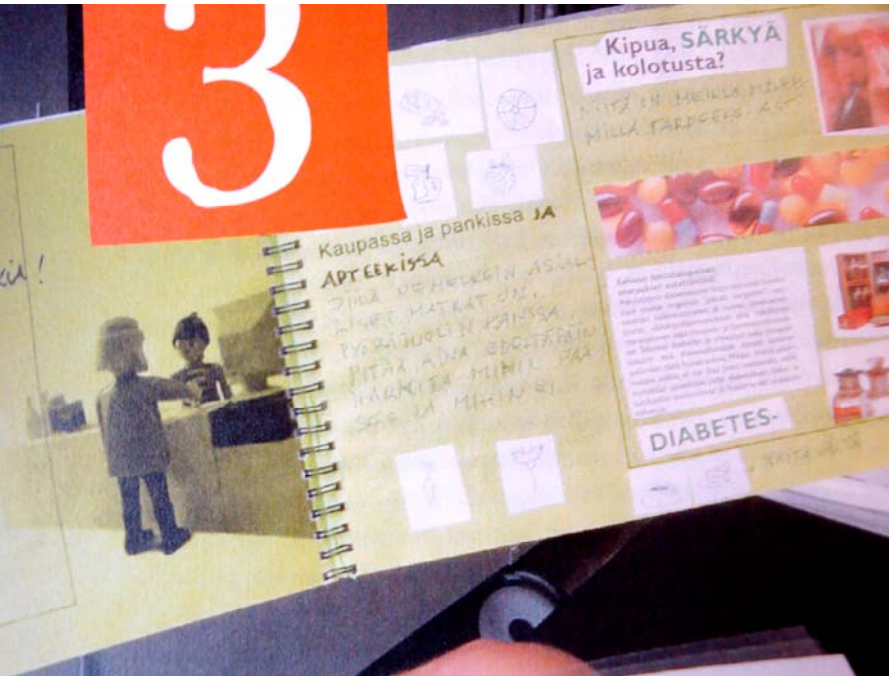
Identify questions

- Well being
 - rituals of interaction
 - the body and self respect
 - (un)enjoyable aspects of care
 - networks of care
 - fears and dreams
- The everyday
 - accomplishments & chores
 - looking forward to



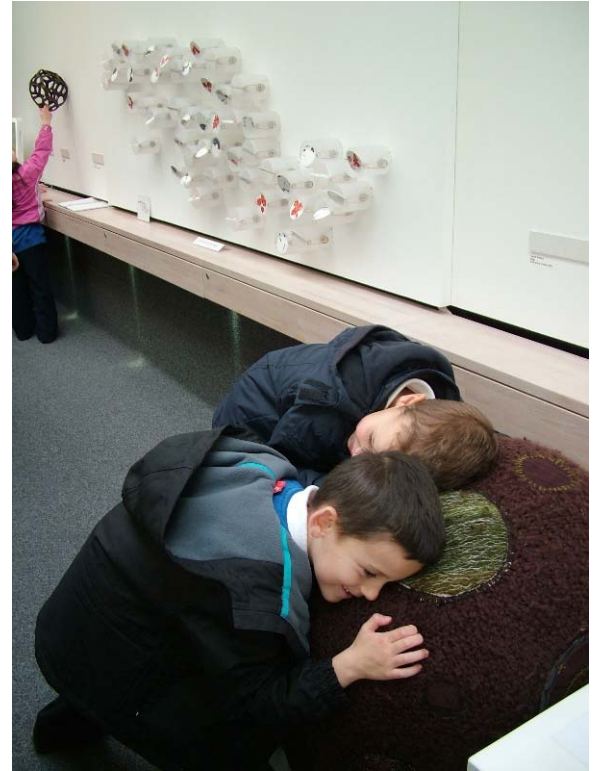
Tämä on noloa,
tätä häpeän...

Plan methods



Images from Mattelmäki, T. (2006). Design Probes. University of Art and Design Helsinki, Helsinki,.

- Design probes (eg Mattelmäki 2006)
 - creates dialogue & empathic understanding
 - challenges easy stereotypes
 - drawn out process requiring high levels of engagement from all involved
 - experimental method giving unfocused feedback
 - Ethnographic observation
 - well documented approach
 - connection between descriptions and design unclear
 - observer affects the subject at hand
 - Actor Network Theory
 - not a method as such
 - a way of organising descriptions of relationships
 - can take account of the effect of the observer
 - can take account of temporal as well as spatial relationships



tansleyshakeshaft

:: craft & interaction design ::::::::::::::::::::

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