

Usability and Industrial Design for a user-centred programmable thermostat

Presented by:

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Scottish Usability Professional's Association



Who are User Vision?

- Edinburgh-based Usability Consultancy
- Usability Services to Products, Web sites and Software
 - Consultancy
 - Audits / evaluations
 - Training
 - Usability Testing
- Clients include: Dell, DTI, Intelligent Finance, BBC, Scottish Enterprise, Royal Bank of Scotland, HSBC, Leeds City Council, Honeywell



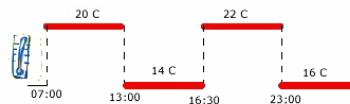
Outline

- **The usability & business challenge**
- Usability & Industrial Design Activities
- Results



Honeywell's business requirement

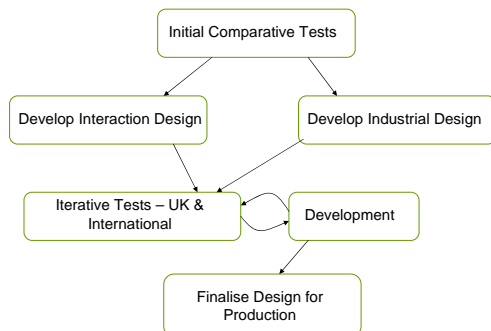
- New programmable thermostat design



- Usability & appearance of thermostat important for
 - End user - Styling important
 - Installers (part of value chain)
- Desire to capture lessons from existing design
- Support multi-lingual market in Europe



Our approach



Models in initial comparative test



Honeywell CM20



Touchscreen



Soft Keys prototype



Theben



Initial testing

- **Goal:** identify features to incorporate
 - ◆ Design & position of buttons and other controls
 - ◆ Clarity of terminology and iconography
 - ◆ Screen layout of information e.g. temperature, time, date.
 - ◆ Interactions & visual cues e.g. screen feedback, icons
- **Subjects:** 7 Installers, 7 Domestic users
- Each test one-on-one, lasting 2 hours in total
 - ◆ Pre task interview
 - ◆ Testing pre-agreed tasks on all 4 – reviewing & changing factory setting, copying settings for a day, manual setting, changing time
 - ◆ Post task interview & questionnaire
- Test metrics captured
 - ◆ Success rate
 - ◆ Perceived difficulty
 - ◆ Use of instructions (an option)
 - ◆ Qualitative comments, types of errors
 - ◆ All tests video recorded

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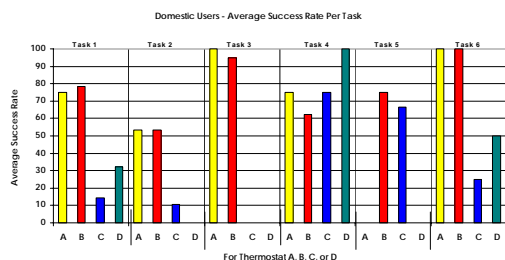
Initial Round – Comparative testing



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Results

Lots of data captured, analysed in Honeywell 6-Sigma Quality Control. Presented graphically for quantitative tasks



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Key findings & questions

- Confirmation button added confidence, feedback
- Need to distinguish current & target temperature
- Clear labelling of the functions on casing / screen
- Allowing easy movement between viewing and editing the settings of a programme
- Key questions
 - ◆ How move between different time intervals?
 - ◆ How much info to fit on LCD screen – line of text?
 - ◆ What makes an attractive industrial design

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Industrial design goals and constraints

- Retain footprint and architecture of CM20
- Minimum possible depth from wall
- Two versions (basic & advanced) sharing same parts
- Improve user interface experience
- Develop contemporary brand identity
- Build on 'wave' of previous designs (if appropriate)

- Multiple design concepts were generated
- 2D sketches, 3D sketch models & 3D CAD
- 5 concepts proposed, 3 taken to user trials
- 3 concepts each chosen from Shore and Italian firm

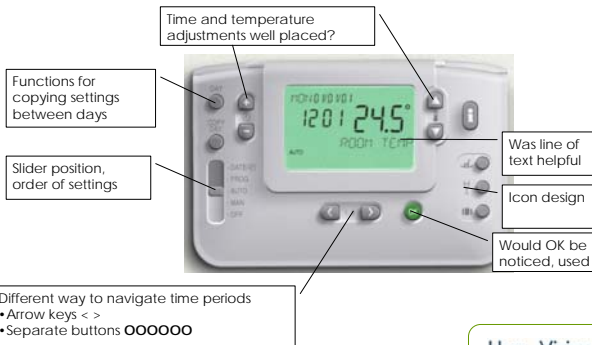
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Development & round two tests

- Software prototype for exploring interactions & display options including confirmation button
- Extensive internal and external reviews to refine
- Prototype tested with target users
 - ◆ Industrial design drawings, models provided
 - ◆ First in UK, iterative refinements, then Spain & Belgium
 - ◆ Similar metrics as previous test, but qualitative discussion, ratings & rankings to explore the design issues

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Questions addressed in testing



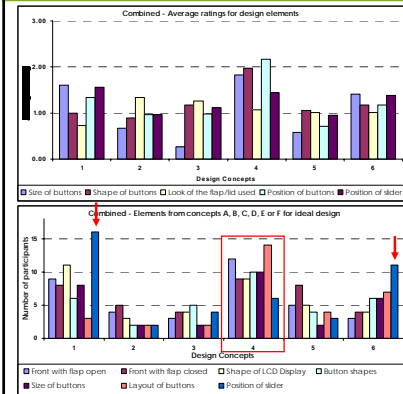
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Round two tests – UK, Spain & Belgium



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Design Review interface elements



Features were rated individually for each design

Subjects asked to create their 'ideal design' from parts of each

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Findings

- Significant improvements on task success rate and satisfaction from initial tests
- Clear evidence of where some changes still had to be made
- Clear basis of data to refine & reposition design elements

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The end result



- 2 different concepts manufactured to target alternate sales channels (both from Shore Design)
- Optimum integration of button/screen layout, styling and modular flexibility

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