Towards Smart Hospitals

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Human-Computer Interaction

23 Academics
50+ PhD students
$5 million annual staff costs

Computing
Psychology
Design

Mission:
Create the next generation of Interactive Technologies
Brief history of computing

1960’s

1980’s

2000’s
3 “Waves” of computing

<table>
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<th>1960’s</th>
<th>1980’s</th>
<th>2000’s</th>
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<td>Capabilities</td>
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<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
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<tr>
<td>Size</td>
<td><img src="image4.png" alt="Image" /></td>
<td><img src="image5.png" alt="Image" /></td>
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<td>Usage</td>
<td><img src="image7.png" alt="Image" /></td>
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<td>2020’s</td>
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<td><img src="image12.png" alt="Image" /></td>
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INTERNET of THINGS
Universities: Technology Push

Consumer needs

Industry: Technology Pull
Current AI spring
Making technology “Smart”

Data/Sensors ("Cheap")

Calculate metrics

Ground truth: Behaviour, needs, ethnography ("Valuable")

Calculate metrics

Establish correlations
Describe behaviour
Sources
Social Media
Phones/gadgets
Smart city
Smart building

Methods
Smartphone sensing
Crowdsourcing
In-the-wild methods

Insights
Happiness
Personality
Habits
Exposure
Smart Hospital Living Lab

Northern Health
Royal Children’s
Royal Melbourne

University of Melbourne
Computing
Population Health

Department of Health and Human Services
Government of Victoria
Smart Hospital Living Lab

Improve hospital operations

Safety: reduce errors
Efficiency: generate insights
**Smart pill box**
Identify pills using chemical signatures

- Images of pill boxes and chemical analysis graphs.
- Diagram showing absorbance and wavelength data.
- Text indicating the use of chemical signatures for pill identification.
IV line monitoring
Continuous identification of liquids/concentrations in IV line
Operating theatre tracking
Track patients/staff in & out of operating theatres
Dendrogram of ward

cluster.all[2:length(cluster.all)]
agnes(*, "ward")
Hand washing detection
Detect (and quantify) hand washing in the hospital
How to handrub?
WITH ALCOHOL-BASED FORMULATION

1a. Apply a palmful of the product in a cupped hand and cover all surfaces.
1b. Rub hands palm to palm.
2. Rub hands palm to palm.
3. Right palm over left dorsum with interlaced fingers and vice versa.
4. Palm to palm with fingers interlaced.
5. Backs of fingers to opposing palms with fingers interlocked.
6. Rotational rubbing of left thumb clasped in right palm and vice versa.
7. Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa.

20-30 sec

How to handwash?
WITH SOAP AND WATER

0. Wet hands with water.
1. Apply enough soap to cover all hand surfaces.
2. Wet hands with water.
3. Apply enough soap to cover all hand surfaces.
4. Dry thoroughly with a single use towel.
5. Use towel to turn off faucet.
6. Rinse hands with water.

40-60 sec

...once dry, your hands are safe.
...and your hands are safe.

WHO acknowledges the Hôpitaux Universitaires de Genève (HUG), in particular the members of the Infection Control Programme, for their active participation in developing this material.

October 2006, version 1.
Predict ED arrivals
Predict people arriving to the Emergency Department
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<th>Explore</th>
<th>Prototype</th>
<th>Evaluate</th>
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- Co-create: Initial concept generation and co-creation with stakeholders.
- Explore: Detailed research and exploration of ideas.
- Prototype: Development of working models or prototypes.
- Evaluate: Testing and refinement of prototypes.
- Publish: Dissemination of results and findings.
- Funding: Acquisition of financial resources.
- Trials: Clinical testing and trials.

The images represent different stages of the research and development process.
Living Lab: Continuous Innovation

Co-create → Prototype → Analyse → Trial → Co-create
Outcomes and benefits

- Improved operations
- Generalisable solutions
- Pathway to funding
- Establish critical mass
- Innovation beyond hospitals
The end

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