



# Mapping the way forward

*“It’s impractical to change architectural features of existing buildings and we can’t improve every individual’s sense of direction”*

Hospitals are complex built environments and at the best of times can be confusing to visitors unfamiliar with their complexities, so Bournemouth University and Poole Hospital set out to innovate the science of signage.

Healthcare settings such as hospitals can be difficult places to navigate around, with many departments and countless corridors. Wayfinding is especially demanding for the numerous visitors they receive each day, many of whom are distressed, unwell, or never have set foot in the hospital before. Poole Hospital NHS

Foundation Trust took the step of bringing some cutting edge research to bear on this issue through a partnership with psychology researchers at Bournemouth University. By figuring out how people actually use maps and signage, the psychologists are beginning to make it easier for everyone to find their way

through the hospital labyrinth.

## Lost in transition?

Hospitals are packed with staff, patients and visitors all year round, 24 hours a day. For example, thousands of people attend Poole Hospital each year, many for the first time. As with any complex built environment, Poole Hospital can be confusing to visitors unfamiliar with its complexities. Most of us are only too well aware of the frustration and confusion brought on by trying to follow maps in an unfamiliar place, often needing to ask for directions, and getting even more frustrated along the way. But if you happen to be running late for an important medical appointment or trying to see a seriously unwell relative, this kind of confusion is certainly not what



you need: it adds unnecessary stress to what is already a very stressful day.

Visitors' difficulties may also impact on the productivity of busy hospital staff, dealing with missed appointments and a backlog of late arrivals. The hospital wayfinding issue was highlighted recently with the revelation that both patients and staff reported getting lost at University Hospital of North Staffordshire. Chief Executive Julia Bridgewater assured a concerned councillor that they were aware of the problem and would be improving signage. This exemplifies the problem, but finding a viable solution is not an easy matter—if it was simple, there would be no problem.

### The journey begins

For a long time, Poole Hospital has had a problem with wayfinding. The site is unusual, an elongated, narrow site built on a steep hill, with entrances at multiple levels, and a multi-storey car-park some

distance further downhill from the main buildings, but linked by a lengthy corridor, accessible only at one level. People were confused by this but fortunately a team of psychologists at Bournemouth University was close at hand to provide advice.

The BU Wayfinding Research Group is led by Dr Jan Wiener, a man with encyclopaedic knowledge of the kind of problem Poole was facing, and experience of successful changes in similarly complex environments such as Frankfurt Airport, a major European air hub. Dr Wiener comments, "Although high-tech gadgets like satnavs and smart phones make long-distance journeys much easier, we still rely on printed maps and signage to find our way through everyday locations like department stores and office complexes."

It turns out that psychologists like Dr Wiener have a major interest in the

mental processes that underlie the people's ability to find their way through this kind of complex environment. Three factors affect how easy it is to learn the layout of a new building: the structure itself, the learner, and wayfinding aids such as maps and signs. Dr Wiener adds, "It's impractical to change architectural features of existing buildings (although new buildings are another matter) and we can't improve every individual's sense of direction. What we can do is design maps that are really user-friendly, based on good understanding how people typically use them. We may think that maps are basically all the same and nothing can be done to improve them, but this is far from true."

### Mapping map use

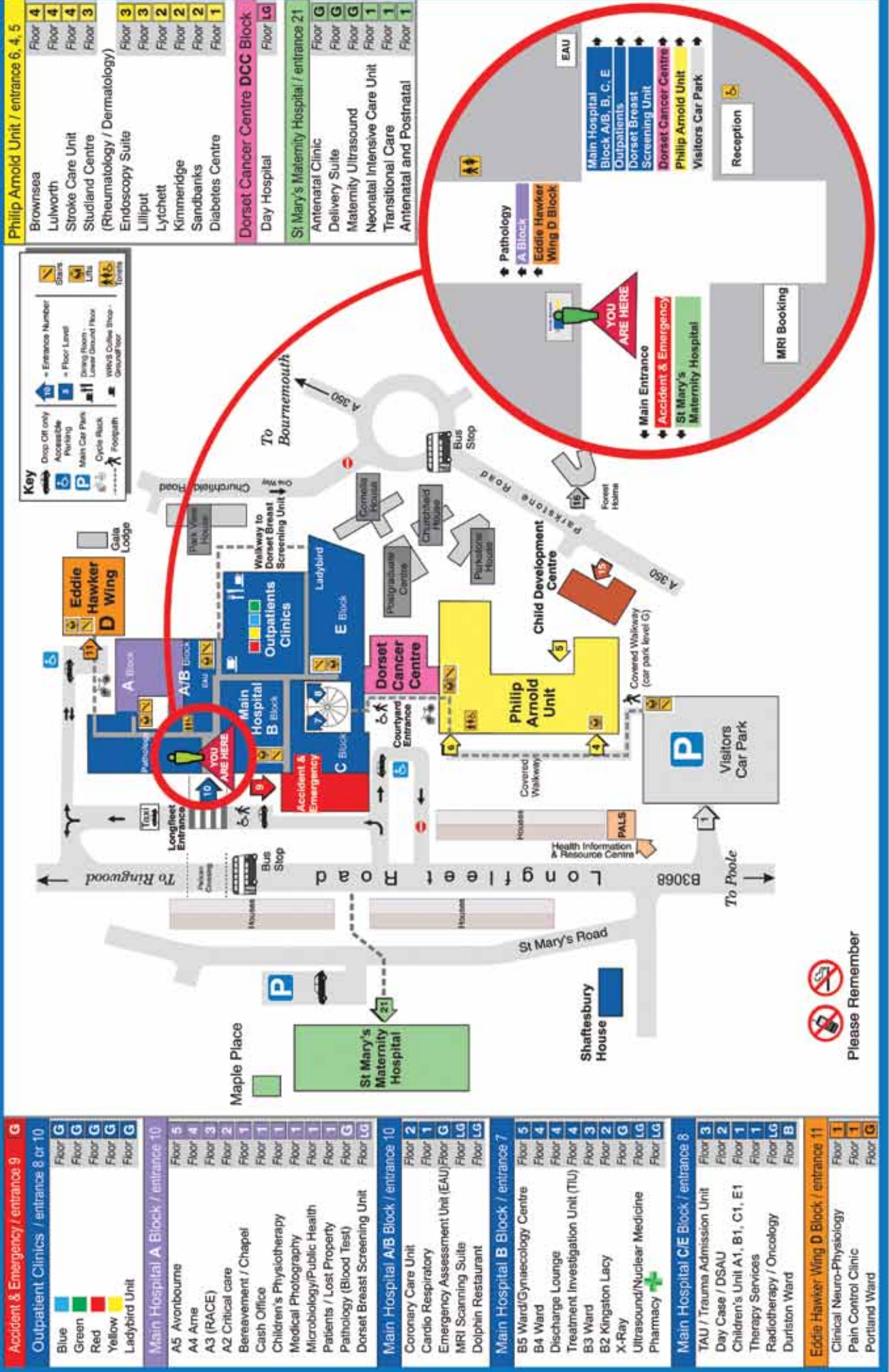
When Poole Hospital commissioned Dr Wiener's team to help improve visitor wayfinding, their first step was to analyse

*"There will always be a large number of people wandering around the hospital, getting lost and irritated"*



# Poole Hospital

**Poole Hospital**  
NHS Foundation Trust



**Accident & Emergency / entrance 9** | **G**

**Outpatient Clinics / entrance 8 or 10**

|               |         |
|---------------|---------|
| Blue          | Floor G |
| Green         | Floor G |
| Red           | Floor G |
| Yellow        | Floor G |
| Ladybird Unit | Floor G |

**Main Hospital A Block / entrance 10**

|                              |          |
|------------------------------|----------|
| A5 Avonbourne                | Floor 5  |
| A4 Arnie                     | Floor 4  |
| A3 (RACE)                    | Floor 3  |
| A2 Critical care             | Floor 2  |
| Bereavement / Chapel         | Floor 1  |
| Cash Office                  | Floor 1  |
| Children's Physiotherapy     | Floor 1  |
| Medical Microbiology         | Floor 1  |
| Public Health                | Floor 1  |
| Patients / Lost Property     | Floor 1  |
| Pathology (Blood Test)       | Floor G  |
| Dorset Breast Screening Unit | Floor LG |

**Main Hospital A/B Block / entrance 10**

|                                 |          |
|---------------------------------|----------|
| Coronary Care Unit              | Floor 2  |
| Cardio Respiratory              | Floor 1  |
| Emergency Assessment Unit (EAU) | Floor G  |
| MRI Scanning Suite              | Floor LG |
| Dolphin Restaurant              | Floor LG |

**Main Hospital B Block / entrance 7**

|                                      |          |
|--------------------------------------|----------|
| B5 Ward/Gynaecology Centre           | Floor 5  |
| B4 Ward                              | Floor 4  |
| Discharge Lounge                     | Floor 4  |
| Treatment Investigation Unit (TIU)   | Floor 4  |
| B3 Ward                              | Floor 3  |
| B2 Kingston Lacy                     | Floor 2  |
| X-Ray                                | Floor G  |
| Ultrasound/Nuclear Medicine Pharmacy | Floor LG |
|                                      | Floor LG |

**Main Hospital C/E Block / entrance 8**

|                                |          |
|--------------------------------|----------|
| TAU / Trauma Admission Unit    | Floor 3  |
| Day Case / DSAU                | Floor 2  |
| Children's Unit A1, B1, C1, E1 | Floor 1  |
| Therapy Services               | Floor 1  |
| Radiotherapy / Oncology        | Floor LG |
| Durleston Ward                 | Floor B  |

**Eddie Hawker Wing D Block / entrance 11**

|                           |         |
|---------------------------|---------|
| Clinical Neuro-Physiology | Floor 1 |
| Pain Control Clinic       | Floor 1 |
| Portland Ward             | Floor G |

**Philip Arnold Unit / entrance 6, 4, 5**

|                              |         |
|------------------------------|---------|
| Brownsea                     | Floor 4 |
| Lulworth                     | Floor 4 |
| Stroke Care Unit             | Floor 4 |
| Studiand Centre              | Floor 3 |
| (Rheumatology / Dermatology) |         |
| Endoscopy Suite              | Floor 3 |
| Lilliput                     | Floor 3 |
| Lytchett                     | Floor 2 |
| Kimmeridge                   | Floor 2 |
| Sandbanks                    | Floor 2 |
| Diabetes Centre              | Floor 1 |

**Dorset Cancer Centre DCC Block**

|              |          |
|--------------|----------|
| Day Hospital | Floor LG |
|--------------|----------|

**St Mary's Maternity Hospital / entrance 21**

|                              |         |
|------------------------------|---------|
| Antenatal Clinic             | Floor G |
| Delivery Suite               | Floor G |
| Maternity Ultrasound         | Floor G |
| Neonatal Intensive Care Unit | Floor 1 |
| Transitional Care            | Floor 1 |
| Antenatal and Postnatal      | Floor 1 |

Please Remember

the existing maps. Although these were accurate and seemed perfectly acceptable, they hid some psychological design flaws that the team felt would limit their usability. Hana Kmecova, a researcher in the team, tested this by asking ordinary visitors to use the existing maps to find correct routes to various locations within the hospital, starting from the main entrance area. The results were startling: nearly half of people tested couldn't do it. "What this means", commented Dr Wiener, "is that there will always be a large number of people wandering around the hospital, getting lost and irritated, and needing to ask staff for help." These findings gave the team the opportunity to create new and better maps.

### Finding a way forward

Building on theories and research evidence from psychology, architecture, and building design, the BU team changed several aspects of the original maps. Usually when we are making a decision, we want as much information as possible, but in map design less is more. A less overwhelming and better structured map is easier to work with. To achieve this, the team refined the information in the legends (captions) and chunked it together, to make it more concise and easier to process. Next, they changed map alignment so that the buildings pictured on the maps were always orientated in the same direction that the person was facing. This means people do not need to rotate the map in their mind, struggling to align the direction they are facing with the orientation of the map. Finally, they added a You-Are-Here symbol, with a close up view of immediate vicinity. This instantly helps people to determine where they are standing and what is nearby—these are potent directional cues. These changes may seem subtle, but the effects were massive.

### A step change

When Dr Wiener's team carried out the same route planning studies with the new maps, there was a staggering improvement in wayfinding. Suddenly, 98% of people could plan correct routes to a chosen destination; an almost two-fold increase in accuracy. Furthermore, visitors were able to decide on their routes more quickly with the

new maps, in fact they were 37% faster. These results translate into fewer lost people and a reduction in unnecessary stress, making for far less frustration all round. In fact, the people who took part in the research also commented that they liked the newly-designed maps, found them easy to read, more helpful, and they were more confident with their route planning.

Wiener concludes, "What seem like slight changes to the existing maps can have a dramatic impact on people's ability to navigate around a space like a hospital" but, he adds, "Only if the maps are based on a scientific analysis of the wayfinding process. Good psychological theory, linked to well-designed research, leads the way to better maps."

### Many more paths to follow

Dr Wiener expects this cornerstone research project may lead to further key developments. The Wayfinding Research Group at Bournemouth University is continuing its successful collaboration with Poole Hospital and, with Professor Siné McDougall—another senior researcher in the group—they are now working on a redesign of the wayfinding signage system.

Signage is another area where psychological research can be brought to bear very effectively. For example, the team can use their knowledge of information-processing theory, drawn from cognitive psychology, to optimise the content and layout of signs, and then test the new signs by carrying out more field-based research. In fact, the Bournemouth team can wheel out some state-of-the-art equipment for this purpose. They use eye-tracking systems that employ tiny, wearable cameras which can record exactly where people are looking as they try to find their way through a series of hospital corridors, marked with information-giving signs. This information can then be linked to the accuracy and speed of their decision-making.

The team can even use virtual reality software to simulate this task in a laboratory setting, evaluating a series of different sign layouts before settling on one to test in the real hospital setting. In the laboratory, they can also manipulate factors that may affect wayfinding, such as time pressure or fatigue, to see how their signs hold up under this kind of

tough testing.

The principles of new map design and signage can be applied not only to NHS hospitals, but to a multitude of complex building types. The approach can produce a range of potential benefits in addition to increasing punctuality of visitors, for example speeding up evacuation in the event of a fire, or guiding visitors through an exhibition hall.

This project demonstrates how advantageous it can be for research institutes to work in partnership with external organisations such as hospital trusts or building designers. Partnerships of this sort can tackle issues that will improve facilities for the general population, applying research knowledge to a useful end.

At the same time, partnerships can further pure science by uncovering new difficulties in practical settings. These can then be understood and corrected by developing novel concepts and carrying out careful laboratory research to test their usefulness. For example, it may be that the improvement in wayfinding resulting from the new maps is less marked in older people, suggesting that ageing affects specific mental abilities in previously unexpected ways.

In fact, Dr Wiener's laboratory research has already shown that this is the case. He is currently working on how to construct dementia-friendly care home and hospital environments for people with early indications of the problem. It is ironic that the elderly are particularly prone to difficulties in finding their way in new environments, given that their age and health status often means that they can no longer manage to live in the home environments with which they are familiar. Dr Wiener comments, "Good laboratory research can quickly improve our understanding of how dementia affects wayfinding. Once we understand the principles, it will be that much easier to build and test effective applications."

There is no doubt that the Bournemouth Wayfinding Research Group will have plenty to keep their research projects on track for many years to come.

**Wayfinding Research Group website:**  
[www.spatial-cognition.org](http://www.spatial-cognition.org)

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