



WHAT WORKERS WANT

How can employers find out how their staff is really feeling without direct and intrusive means? The BOP Project is an attempt to find out

NOW



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MEETING ROOM - NOW (THU 15 FEB 2007 14:23)

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ROOM TODAY



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MEETING ROOM - TODAY (THU 15 FEB 2007)

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WEEK



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DESIGN LAB STUDIO - THIS WEEK (12-18 FEB 2007)

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Below: Ticker Tape that would scroll across employees' screens displaying environmental conditions in the workplace

■ Low-level moaning is an accepted part of life in most offices. Water-cooler moments turn into extended bitching sessions as the huddled workers vent their respective spleens on whatever happens to be vexing them today: they're overworked; they're underworked; the office is too hot; the office is freezing; their boss is a twerp; their boss thinks they're all twerps.

Which is all fine, up to a point. We all need something to talk about. But sometimes this semi-hidden background griping can get out of hand, and a build-up of negativity can become a huge obstacle to productivity and, ultimately, the success of the enterprise.

Perhaps there is a way of monitoring both the workplace and the workers, so that any serious causes for complaint – whether in the physical environment or in the personnel structures – could be properly dealt with and addressed before it's too late?

This was the starting point of BOP – Making Sense of Space, a two-year collaborative project drawing on the knowledge of

designers, "futurists" and computer experts that reached its conclusion at the end of 2006. BOP (essentially a failed acronym for Building Awareness for Enhanced Workplace Performance) sought to use the principles of "pervasive computing", using wireless sensors in the workplace to provide data on a wide range of "observables" such as temperature, light, activity and – perhaps most significantly – workers' feelings.

As Tricia Austin of Central Saint Martins College of Art & Design explains, the important thing was to create a feedback loop, so that the users could both give and receive information about the workplace: "If the worker is pissed off, something needs to be done. If, for example, the window by their desk is bust, it's not enough that they report it; they need to know what's going to be done about it. There needs to be a loop of information."

On the internet, the principle of instant user feedback reigns supreme; a film comes out and within hours it is voted upon by millions of moviegoers worldwide. Blogs give everyone

the opportunity to react publicly to serious news stories and celebrity tittle-tattle – ratings are everywhere. BOP wanted to capture some of this spirit but make it relevant to the office experience. "We wanted to find out how you enable what happens on the internet to move into the physical space of the workplace," says Austin.

Prototypes of the BOP system were set up at Central Saint Martins Innovation Centre and at the HQ of engineering company Arup, both of them in London.

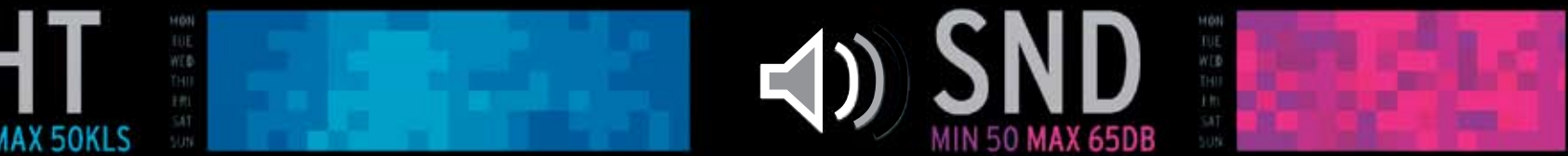
The nuts and bolts of BOP were the wireless sensors themselves, a combination of existing commercially available models and so-called "Beasties", which were designed and built specifically for the project by a team at Imperial College headed by Dr Julie McCann. The Beasties were designed to be robust and adaptable, so that they could be easily plugged in by hand where they were needed – "almost Lego-like", according to McCann. They were programmed using the Tesseract software system, which was also developed by Imperial. [4]



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Used in their basic form, the wireless sensors could record a whole range of environmental information, which was then fed back to a central database. As well as temperature and light levels, movement in particular rooms could also be detected. BT worked with Imperial to create a "feature map", which employed artificial intelligence to interpret the data and provide a picture of what was going in individual rooms so that it was possible to tell, for example, how often a particular meeting room was being used or what time the cleaners arrived.

Gonzalo Garcia-Perate, of London-based interaction design consultancy Artificial Tourism, designed a ticker-tape style visualisation of some of this data. "A ticker is not an unusual sight in a financial institution, and live news broadcasts are also present in many work environments," he says. "This allowed us to use a familiar language in an unusual context, bringing the subject of the experiment closer to the inhabitants of the space." The ticker tape worked in tandem with a data sonification installation designed by Stuart Jones of Central Saint Martins (see box overleaf).

The other, perhaps more interesting strand of the project - to record workers' moods

and feelings - presented a challenge for Tobi Schneider of London design consultancy Maoworks. He and his team had to come up with a range of interactive devices that provided an elegant and reasonably non-intrusive way for users to express themselves. There were three prototypes in the first trial: the Personal EnergyMeter, the RealFeel Meter and the TeamFlag.

The Personal EnergyMeter adapted a light therapy lamp of the kind used by people suffering from SAD (seasonal affective disorder). The users were briefed to use the lamp to reflect their perception of their own energy levels, so that if the users felt full of beans the lamp would be turned up, but if they were flagging it would be turned down. These variations were recorded by the sensor and sent to the central database.

The RealFeel meter allowed users to compare their own perceptions of the temperature of the office, by the movement of a dial, with the actual temperature of the office as measured by a thermometer. Again, the data would be recorded and forwarded to the

database. With climate change and all that it entails, the issue of workplace temperature control will become increasingly significant, believes Duncan Wilson of Arup, another partner in the project. "In offices you've always had the problem of some people complaining about being cold and in the past the solution was often just to

hand out electric fan heaters. But as energy use regulations start to come in more and more things like personal heaters won't be allowed. What you need to do is help people understand why the environment is kept the temperature it is." The hope is that the sort of feedback provided by the RealFeel meter might provide a more rounded, accurate view of what the actual temperatures are in different parts of the building, such as near large windows or atriums.

With the TeamFlag, the project starts to move into the territory of behavioural psychology. The idea is that in an open-plan office a TeamFlag would be attached to each person's workstation: if a person wants to indicate that he or she is available to talk



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Above: Personal EnergyMeter - the light can be brightened or lowered by the employee to indicate high or low energy levels

Right: Weigh Your Opinion, inviting employees to give their opinions about certain issues by placing small weights onto the scales



something through or respond to a query, the flag is raised; if the person in question is in the middle of something that requires maximum concentration and could do without being drawn into a discussion about work matters or last night's Ugly Betty, the flag is lowered. And the flag's status is recorded on the database. Wilson believes that the TeamFlag concept worked up to a point but was ultimately not "robust". "People wanted to know whether it was the 'right' thing to have the flag up or down – they wanted to be seen to be doing the right thing." When concerns like this start to creep in, the feedback provided by such a device begins to lose its value.

By the time of the final version of the pilot run at the Innovation Centre, two more feedback prototypes had been developed: Vote With Your Feet and Weigh Your Opinion. Both these relied on users responding to a series of questions relating to their workplace, such as "Do you feel motivated?" In the first, users literally voted with their feet by electing to tread on one side of a floor mat marked with "yes" on one side and "no" on the other. In

the second, a set of weighing scales invited you to place a small weight, representing your response to a series of questions posed on a noticeboard during the day. If you wanted, you could personalise your weight with your business card – or you could choose to remain anonymous. The results from the floor mats and the weighing scales are then fed through to the database.

What is striking about all these feedback devices is their physicality: the project may be trying to reflect some of the democratising principles of the internet age but none of the devices are screen-based. This is deliberate. "It contextualises the feedback," says Austin. "The user is not just sitting in front of his or her workstation tapping on a keyboard but is expressing an opinion while moving around the office."

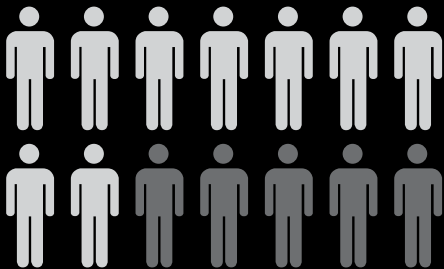
Those behind the BOP project are understandably keen to stress that they are not backing a Big Brother approach to workplace management, where the drones are spied on by an Orwellian network of pervasive computing sensors. Where potentially compromising opinions were expressed, they could be done so anonymously. Austin believes that as long as workers feel included in the

information loop, they will be more likely to share their opinions in the first place.

Austin admits that the partners in the trial (she prefers not to use the term "guinea pigs") – design research staff at the Innovation Centre and future-contemplating Arup apparatchiks – might have had more empathy with the project than your average call centre or insurance company employee, for whom the idea of all-pervasive computing keeping tabs on their feelings could well seem rather sinister. After all, most of their telephone conversations are already being recorded "for training purposes".

According to Allan Parsons of AP Futures, another partner in the project, the Big Brother problem should not be underestimated. Perhaps before designers and managers take the idea of wireless sensors in the workplace much further, they need to decide what they will do with all the information that is collected, he says. "They need to ask themselves why they would need that data. What is the purpose of all this information-gathering?"

Of course, if they really wanted to know what everyone was thinking they could always wire that water cooler for sound. ☒



Above right: Vote With Your Feet, in which employees can express their opinions physically

Below: TeamFlags, which are raised if the employee is available to talk



THE SOUND OF DATA

Data sonification is the use of sound to signify the state of something. Examples are the Geiger counter or auditory displays connected to patient-monitoring medical equipment. As part of the BOP project, Stuart Jones of Central Saint Martins explored ways of sonically representing the environmental and occupancy data collected by the wireless sensors dotted around the Innovation Centre. He used eight loudspeakers to create a 360° array of sound to work in conjunction with the data visualisation ticker tape, the sound being directly generated from the data streams.

"We are much better at handling, and keeping discrete, multiple strands of information with our hearing than with our sight," says Jones. "We can listen to the totality and understand it, or we can focus on a single strand (someone talking to us), or several unrelated (someone talking, the traffic behind us, music coming out of a shop door to our left) or related (the parts in a fugue). We are good at doing this, which makes sound a very suitable medium for relaying simultaneous strands of information to be immediately comprehended, something that remains a problem in the field of data visualisation."

