MULTIPLE INFORMATION FAILURE: A CASE OF DIFFERENT INVESTMENTS IN FORM AND CONTENT IN GRAPHIC DESIGN

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ABSTRACT

This paper considers a sequence of failures in the design of information. It focuses on the Safe and Sustainable Indoor Cleaning study (SASI Clean), a 2007 government-funded study into cleaning practices in Australian childcare centers. Empowerment through participation was integral to the study, childcare workers being seen as collaborators in the investigation, not mere research subjects or informants. They worked with scientists and designers to investigate the nature of childcare as a specific context for cleaning and information delivery and to identify creative responses to its challenges. In respect of design, however, other project dynamics clashed with the frame-changing nature of participatory design. Ultimately, key project stakeholders preferred a failed model of communication, focused on the information to be transmitted over design prototypes oriented to the perspectives and situation of childcare workers, revealing skepticism to claims to knowledge to be both a compelling reason for the use of participatory design and a basic obstacle to the valuing of its results. To explore the complex human and organizational issues associated with the project, the paper uses a case study approach.

INTRODUCTION

It's hard to know when designed communications fail. Effectiveness in graphic design is rarely the subject of objective investigation. Information delivery also spans both the form and content of communications, either of which can fail to resonate with audiences; designers often have little influence over content, when others may feel a strong sense of ownership. In this paper, we discuss the mixed success of a program of participatory design carried out as part of the Safe and Sustainable Indoor Cleaning study (SASI Clean). The study took place in 2007 and investigated resistance to low-chemical cleaning in childcare centers in the Australian state of Victoria. The inclusion of designers in the initiative responded to the failure of existing information to influence childcare centers to adopt low-chemical cleaning. We chose a participatory approach to design for its capacity to focus on the needs and perspectives of childcare workers, but decision-making in participatory design is less clearly defined than in client-focused projects. The vignettes we present suggest that even when all parties to a venture believe they are aiming for the same goals, stakeholders outside the design process can privilege information content over specifically targeted forms of information delivery, highlighting the problem of differential investments in knowledge and information, raising the question of how inclusive participatory design should be.

That many of Victoria's early childhood centers use harsh detergents, disinfectants and surface sprays indicates that information on low-chemical cleaning has had little traction in the sector despite seemingly clear guidelines on its use. The National Health and Medical Research Council publication *Staying Healthy in Childcare* is the sector's primary source of information on cleaning and hygiene, being recommended by the National Childcare Accreditation Council, the Australian Governments' childcare accreditation agency. The document is freely available over the Internet. Its approach to communication embodies functionalism, using factual explanation and standard publication design to present the facts on cleaning and infection control.

Staying Healthy in Childcare recommends diluted detergent for cleaning surfaces outside food preparation areas. It explains that, "Washing germs down the drain is better than trying to kill germs with disinfectant ... Most germs do not survive for long on clean surfaces when exposed to air and light. Even in hospitals, the emphasis is on the use of detergent and effective cleaning and drying procedures rather than disinfectant."[1] The publication stresses that to kill germs a disinfectant needs to be the right one, applied to a cleaned surface at the right strength and left for at least ten minutes. Even then, not all germs are eliminated, fewer than 100 germ particles are enough to spread infection.

Staying Healthy in Childcare uses the weight of science to press home its message on protecting against invisible germs. Bruno Latour argues that modern science has socialized the natural world's nonhuman elements, bringing them into new relationships with people.[2] It was science that identified the presence and risk of germs; cleaning products are an example of Latour's argument that science and technology create hybrids of the human and non-human that permeate society.[3] Latour also sees the pragmatics and processes of scientific knowledge dividing the material and human realms into two distinct and increasingly distant zones.[4] The development of the chemicals that comprise cleaning products and the attribution of their uses, benefits and effects is the subject of complex historical processes within the institutions of science, technology and government. Individual pieces of scientific knowledge also conflict with each other. Branches of science and technology have created cleaning compounds and driven their application, while others reveal their risks. Driving the SASI Clean initiative was the prospect that enabling childcare workers to negotiate competing information about cleaning could achieve significant reductions in environmental toxins, packaging waste, embodied energy and sodium in waste-water, within approximately 2,700 childcare centers in Victoria. Each childcare facility also sits at the hub of a broad social network, suggesting the potential to spread low-chemical cleaning further into society through the development of effective behavior change communications.

Contributing to the SASI Clean study were a variety of people and organizations, recognizing that the strategies for promoting low-chemical cleaning were unlikely to come from a single source of knowledge or support. An independent, sustainable cleaning consultant and accredited trainer established and managed the initiative. Microbiologists compared the effect of cleaning products on germs. Environmental scientists researched the active ingredients and health and environmental effects of cleaning products.

Funding for the study came from the Victorian Government. Officials from Sustainability Victoria, the state government's environmental sustainability agency, sat on the study's steering committee, as did others from the National Childcare Accreditation Council and Community Childcare Victoria to ensure project proposals fitted policy directions in that sector. We were recruited to explore the failure of existing information and develop alternative approaches. However, it was envisaged that the primary knowledge about how to change attitudes to cleaning would come from childcare workers. Key aspects of the study were developed in collaboration with staff from four Melbourne childcare centers, building on their needs and perceptions. The microbial testing, for example, compared the efficacy of low-chemical cleaning with current cleaning products on actual surfaces in the centers, the workers seeing *in situ* tests as the most convincing.

PARTICIPATORY DESIGN AS AUDIENCE RESEARCH AND A PHILOSOPHY OF DESIGN PRACTICE

The anticipated goal of the SASI Clean initiative was the development of a social marketing program built around the accreditation of individual childcare facilities as SASI Clean centers. According to Andreasen's classic definition, social marketing is "the application of commercial marketing technologies to the analysis, planning, execution and evaluation of programs designed to influence the voluntary behaviour of target audiences in order to improve their personal welfare and that of their society."[5] There is a clear connection between this definition and Jorge Frascara's representation of graphic design as the creation of visual objects or messages for specific audiences with the aim of eliciting an action or reaction.[6] An issue in both fields, however, is recourse to audience research and the nature of methods used. Bruce Hanington contests the relevance of conventional market research to design in providing limited insight and sitting outside the design process.[7] He nominates two preferable, emerging sets of user research methods, both human-focused and design-centric; those adapted from the social sciences where members of the design team or people themselves investigate the design task in its everyday setting; and innovative, participatory methods that allow people to directly contribute their knowledge and ideas to the design process in ways that are integral to design.[8]

[1] National Health and Medical Research Council. 2005. *Staying healthy in childcare preventing infectious diseases in childcare*. 4th Edition. Canberra: Australian Government and National Health and Medical Research Council, 35. http://www.nhmrc.gov.au/publications/synopses/ch43syn.htm. Accessed 4 February 2007.

[2] Latour, B. 1999. *Pandora's hope*. Cambridge. MA: Harvard University Press, 194.

[3] Latour, B. 1991. *We have never been modern*. Cambridge, MA: Harvard University Press.

[4] Freed, M. 2005. Latour, Lyotard, and the problematics of legitimation. *Journal of Theoretical Humanities*, 10.3, 99-114.

[5] Andreasen, A.R. 1995. *Marketing social change*. San Francisco, CA: Jossey-Bass, 7.

[6] Frascara, J. 2004. *Communication design: Principles, methods and practice*. New York, NY: Allworth Press, 54.

[7] Hanington, B. 2003. Methods in the making: A perspective on the state of human research in design. *Design Issues*, 19.4, 13-18.

[8] Hanington, Methods in the making, 17-18.

It is increasingly understood that how people use things transcends basic function, indicating what they mean to them; providing an insight into the narrative of their lives.[9] The design team spent time in the four facilities observing cleaning and talking to childcare workers about their everyday experiences. In each center, printed and hand-written information on themes including occupational health and safety, children's health and self-esteem, nutrition, recycling and workplace events and procedures covered the walls, exemplifying the art critic Leo Steinberg's idea of the "receptor surface"; any hard surface where information is "received, printed, impressed—whether coherently or in confusion"[10] *(See figure 1).* Steinberg represents such surfaces as analogous to human subjectivity in an era of mass consumption and media, their complexity evoking both the fragmentation and capacity for depth in the human mind. The walls of the centers in the SASI Clean study suggested childcare workers' obligatory mindfulness of many important things, but also the competition for their attention. To better understand their situation and perspectives on cleaning and develop relevant designed responses we organized a sequence of three participatory workshops of three hours each with a group of fifteen volunteer childcare workers. These were spaced three and six weeks apart, with the design team undertaking significant design work around the workshops to prepare for each one and to document and develop ideas coming out of them.

Participatory design has varied philosophical and disciplinary roots, including the Scandinavian tradition of workplace democracy and the computer industry's efforts to better match software products to people's needs and abilities by including everyday users in product development and testing.[11] Today, in fields such as architecture, human-computer interaction, information design, product design and urban design and planning it is increasingly common for the recipients of design to contribute to the design process. There is a thread of graphic design writing—both scholarly and industry-focused—that questions the viability of client and designer-driven communications, but including audience members in graphic design is still at an experimental stage. When we embarked on the SASI Clean study there were few scholarly accounts of its real-world application.[12] In the field of public health, Strickler and Neafsey reported on a project in user-centered design in which designers and social scientists collaborated to develop animated interactive software to prevent drug interactions in older adults, but audience members were not included.[13]

Co-design principles conflict with graphic designers' traditional perception of their enterprise. Drucker and McVarishs' 2009 history of graphic design chronicles designers' assumptions about visual communication and the socio-cultural conditions that have shaped

[9] Busch, A. 2004. *The uncommon life of common objects: Essays on design and the everyday*. New York, NY: Metropolis Books.

[10] Steinberg, L. 1972. *Other criteria*. In *Other criteria: Confrontations with twentieth-century art*. Chicago, IL: University of Chicago Press, 84.

[11] Sanoff, H. 2005. Community participation in riverfront development. *CoDesign*, 1.1, 61-78.

[12] See Forlizzi, J. and C. Lebbon. 2002. From formalism to social significance in communication design. *Design Issues*, 18.4, 3-13. Nini investigates three participatory design methods in a student project for a cookbook for disabled people, but the students involved did not have enough data to be adequately informed about end-users. See Nini, P.J. 2005. Sharpening one's axe: Making a case for a comprehensive approach to research in the graphic design process. *Research Journal of the Australian Graphic Design Association*, 1.2, 1-10.

[13] Strickler, Z. and P. Neafsey. 2002. Preventing drug interactions in older adults: A collaborative study. In Frascara, J., editor. *Design and the social sciences: Making connections*. London, UK: Taylor and Francis, 102-124.

[14] Drucker, J. and E. McVarish. 2009. *Graphic design: A critical history*. Upper Saddle River, NJ: Pearson Prentice Hall. xxii.

[15] Ilyin, N. 1997. Fabulous us: Speaking the language of exclusion. In Bierut, M., W. Drenttel, S. Heller and D. Holland, editors. *Looking Closer 2: Critical writings on graphic design*. New York, NY: Allworth Press. 37.

[16] See Glaser, M. 1997. Design and business: The war is over. In Bierut, M., W. Drenttel, S. Heller and D. Holland, editors. *Looking Closer 2: Critical writings on graphic design*. New York, NY: Allworth Press. 183.

[17] Drucker and McVarish, *Graphic design*, 337-338.

Figure 1
Interior of one of the four centers in the SASI Clean study demonstrating information disposition. Photograph: the authors.

graphic design's aesthetic constructs, production methods and professional discourses and institutions.[14] Key among these, they argue, is the desire for freedom in self-expression, a product of graphic design's long association with art and artists. Alternatively, the privileging of professional expertise in modernity has seen graphic designers' specialist creative skills promoted as the basis for expert solutions to communication problems. For Ilyin, graphic designers' self-representation as artists and experts is a game of exclusion that sees designers playing with the formal languages of graphic design and looking down on clients and audiences.[15] Elsewhere, success in graphic design is linked to its capacity to support commercial profit.[16] In Drucker and McVarishs' study, any challenges to the graphic designer's perceived autonomy and expertise are recent; the end of the era of mass media and consumption, the dissemination of graphic design capacity through computer software and the rise of information and communication technologies seeing everyday people emerge as active shapers of products and services and as cultural producers in their own right are examples. Such changes, they argue, require graphic designers to better understand the "conditions of use" rather than just design "effective or aesthetic displays of useful information."[17]

The emergence of user-centered perspectives in graphic design also builds on theoretical debates that highlight the historically and socially constructed frameworks and reading practices that influence people's response to text and image, suggesting the presence of complex, two-way interactions between people, designed communications and the communication context.[18] The work of the Italian sociologist Alberto Melucci supports this shift. Melucci argues that individuation, self-determination and associated capacities for learning and action are integral to the operation of today's complex, media-saturated societies, which he describes as "networks of high-density information," characterized by manifold, disconnected social realities and diffuse sources of authority.[19] For Melucci, this complexity creates contradiction, indicating a "need for greater integration and intensification of control" as reflected in the proliferation of social institutions seeking to penetrate and control aspects of human life.[20] But today's complex societies exceed direct control. To maintain momentum, they require individuals and groups to operate as "terminals capable of self-regulation ... producing, collecting, decoding and exchanging information."[21] To balance control with scope for individuation, Melucci argues societies must shift their "emphasis from the content to the code of social life, from behaviour to the pre-conditions of action."[22] For Melucci, offering individuals the opportunities to communicate, negotiate, produce meanings and make decisions affords them—and society as a whole—a chance to fulfil their potential.

Melucci's arguments suggest that practices like low-chemical cleaning will only become part of peoples' everyday knowledge where externally determined processes support individuals and communities to arrive at their own understanding of and commitment to changed values.[23] Participation in decision-making is one way to mobilize peoples' autonomy, reasoning skill, capacity for conviction and critical practical insight into their own needs and circumstances to precipitate desired social outcomes. Decision-making processes also operate on a symbolic level, indicating values of empowerment and disempowerment; participatory decision-making suggesting a dynamic and inter-individual process of forming commitment to action.[24]

CHILDCARE AS A CONTEXT FOR INFORMATION DELIVERY

Working conditions in the Australian childcare industry raise evident issues of authority, autonomy and subjection that potentially affect receptivity to information. Childcare workers are subject to a raft of externally determined standards imposed through centralized structures and delivered through standardized information forms,

[18] See, for example, Tyler, A.C. 1992. Shaping belief: The role of audience in visual communication. *Design Issues,* 9.1, 21-29.

[19] Melucci, A. 1989. *Nomads of the present: Social movements and individual needs in contemporary society.* London, UK: Hutchinson Radius, 45.

[20] Melucci, *Nomads of the present*, 45.

[21] Melucci, *Nomads of the present,* 45.

[22] Melucci, *Nomads of the present,* 45.

[23] Buechler, S. 2000. *Social movements in advanced capitalism: The political economy and cultural construction of social activism.* New York, NY: Oxford University Press, 148-149.

[24] Melucci, *Nomads of the present*, 163-179.

although they still exercise some control over their labor. Many centers have high staff absenteeism and turnover with the sector loosing significant numbers of workers each year. Lyons shows childcare workers feel conflicted about their employment, deriving high satisfaction from certain aspects of the experience of caring for children, but feeling frustrated over their working conditions.[25] These include lower wages for qualified staff than unskilled workers in many other fields; the difficult, labor-intensive nature of childcare work, which is characterized by high levels of stress and responsibility; limited career paths and low social status; and strong expectations of quality from governments, parents and society.

Australia's Childcare Quality Assurance Process makes workers feel they have inadequate influence over decision-making in their workplace, accreditation entrenching norms and rules so that practices go largely unchallenged.[26] Sims's research into the experience of junior workers in the for-profit segment of the Australian childcare industry depicts cleaning as a lowly, relentless task, one worker commenting:

> *Mainly my responsibilities were to clean, but that's not what I was told at the interview. I was told I would be an assistant for the children ... I was cleaning up lunch, doing the dishes and floors; the whole centre was mopped after lunch, it was all vinyl, it was a pretty big job; then all the bathrooms had to be cleaned which was my job ... After afternoon tea, I would clean up again, as usual do the dishes, tidy everything up ... from 4-6 I was cleaning the centre, doing all the floors, all the vacuuming, toilets, basins.*[27]

This account suggests the difficulty in linking cleaning in childcare to positive change. Arguments for participatory design posit that an investment in process develops shared perceptions between designers and audience members concerning the field of possibilities and constraints in which design will operate, and the objectives to be pursued and ways for achieving them.[28] Acknowledging the capacity of childcare workers to advocate and innovate on their own behalf, the design phase of the SASI Clean study worked directly with childcare workers to develop design responses to the communication task based on their circumstances, self-understanding and potential points of resistance.

[25] Lyons, M. 1997. Work rewards, job satisfaction and accreditation in long day care. *Australian Journal of Early Childhood*, 22.3, 40-44.

[26] Jackson, E. 1996. Work conditions in long day care in the era of accreditation. *Australian Journal of Early Childhood*, 21.2, 17-20; Lyons, Work rewards, job satisfaction and accreditation in long day care, 40-44.

[27] Sims, M. 2002. Junior pay, senior responsibilities: The experiences of junior childcare workers. *Australian Journal of Early Childhood*, 27.3, 7.

[28] See Gronbaek, K., J. Grundin, S. Bodker and L. Bannon. 1993. Achieving cooperative system design: Shifting from a product to a process focus. In Schuler D. and A. Namioka, editors. *Participatory Design: Principles and practices.* Mahwah, NJ: Lawrence Erlbaum Associates, 92; also Grudin, J. 1993. Obstacles to participatory design in large product development organizations, 99-122; Spinuzzi, C. 2005. The methodology of participatory design. *Technical Communication*, 52.2, 164.

THE ISSUE OF CO-DESIGN METHODS

In 1998, Kensing and Blomberg represented participatory design as a "maturing area of research" dominated by three main issues: the politics of design, the character of participation and the nature of methods and tools for carrying out design projects.[29] For Sanders, graphic design today is unquestionably about people designing together, the main challenge for graphic designers being the development of innovative tools to enable people to articulate "those ideas and feelings that are often so difficult to express in words."[30] Ehn uses Ludwig Wittgenstein's idea of language games to approach the issue of methods.[31] Wittgenstein stressed the imperfection of communication systems, challenging the idea that lay participants must fully articulate their needs and desires. For Ehn, design tools such as ideation exercises, visualization methods and prototypes are all representations that enable participants in design to see new dimensions in existing circumstances and practices, how participants' knowledge and creative ideas are applied to design being more important than any single method.

Dodd[32] argues that the nature of the design task indicates methods. We used philosophical perspectives intrinsic to the global SASI Clean study to determine the character of the workshops. A guide was Heron's idea of "cooperative inquiry," which stresses the importance of the inter-subjective exchange of critical knowledge between expert and lay participants in a project and the intent and quality of interaction, Heron explains:

> *In meeting people, there is the possibility of reciprocal participative knowing, and unless this is truly mutual, we don't properly know each other. The reality of the other is found in the fullness of our open relationship ... when we each engage in our mutual participation. Hence the importance of cooperative enquiry with other persons involving dialogue, parity and reciprocity in all its phases.*[33]

To enable the childcare workers' knowledge of the context for information delivery to merge with the design team's knowledge of visual communication and design production we strove to replace the usual subject-object relationship of designing *for* an audience with the subject-subject relationship of designing *with* members of that audience.[34]

[29] Kensing, F. and J. Blomberg. 1998. Participatory design: Issues and concerns. *Computer Supported Cooperative Work*, 7, 167-185.

[30] Sanders, E. 2002. From user-centered to participatory design approaches. In Frascara, J., editor. *Design and the social sciences: Making connections*. London, UK: Taylor and Francis, 7.

[31] Ehn, P. 1993. Scandinavian design: On participation and skill. In D. Schuler and A. Namioka, editors. *Participatory design: Principles and practices*. Mahwah, NJ: Lawrence Erlbaum Associates, 41-78.

[32] Dodd, K. 2001. Research and design success. *Design Management Journal*, 12.3, 58-84.

[33] Heron, J. 1996. *Cooperative Inquiry: Research into the human condition*. London, UK: Sage, 11.

[34] Spinuzzi, The methodology of participatory design, 163-174.

[35] Ehn, Scandinavian design, 41-78.

The design workshops included short information sessions that explained various techniques for idea generation and design refinement, including brainstorming, "what if" exercises, SWOT analysis, values analysis and mood boards; the premise being that the main problem with graphic design methods is the absence of audience participation in their use. Time was set aside to discuss cleaning routines, the childcare workers having been shown SASI cleaning practices. Recognizing that locations are never neutral, we carefully considered where to hold the workshops. We thought to conduct them in one of the childcare centers to emphasise the communication context. We decided to hold them in a design studio to minimize the perception of designers as external problem solvers. Here, the arrangement of desks, the priority given to technology, the profusion of source books, magazines, font samples, color swatches, the mock-ups and other, seemingly random clippings pinned on walls evoked the nature of graphic design, potentially demystifying its practice for the childcare workers in much the same way as the walls of the childcare centers spoke to us of their daily experience.

Following Ehn's observation that both ethics and aesthetics are important in participatory design, we chose attractive but inexpensive materials and low-technology processes to encourage participants to engage with the design exercises, which we pitched between work and fun[35] *(see figure 2)*. The workshops used a rapid sequence of activities to generate as many ideas as possible and then develop the best, the childcare workers adapting quickly to design in being articulate, imaginative, responsive to the ideas of others, accustomed to shifting quickly between activities and comfortable with the use of cut paper, colored markers, sketching, found materials and collage. The iterative nature of design was stressed throughout so that the childcare workers appreciated that any design ideas we developed further between workshops could be changed. Alternatively, the design team's work following the first and second workshops, which spanned the research and idea generation phases of design and was vital to producing design prototypes for assessment and selection in workshop three. The childcare workers were somewhat reluctant to make design decisions that might appear to reject others' ideas.

Figure 2
Design activity from workshop one in the SASI Clean study. Photograph: the authors.

BARRIERS TO THE ADOPTION OF SAFE AND SUSTAINABLE CLEANING IN CHILDCARE

The global SASI Clean study identified four main hurdles tothe adoption of safe and sustainable cleaning in childcare, each contradicting the notion that information alone is enough to influence people's attitudes and behavior. There was a "strong belief that ... disinfectants and/or antibacterial agents will achieve cleaner nappy change tables and hands." There was "a much higher level of concern about the risk to health from the spread of germs, than the risk to health from the methods used to kill them." Indeed, many childcare workers felt that the stronger the cleaning chemicals, the "safer and cleaner" an indoor environment would be. There was a perception that "green" cleaning products are "less effective and more time consuming." Finally, those who suspected the safety of disinfectants had typically begun to use vinegar and essential oils to clean, disinfect and freshen air, perceiving these to be effective, natural products.[36]

The design workshops found additional factors at play. These included uncertainty over which cleaning methods were approved by the national accreditation scheme for early childhood services; concern over not meeting the standards of the Childcare Quality Assurance Process; staff wanting to do the best for the children in their care while needing to be seen to be doing so in the eyes of

parents; a sense that parents expect disinfectants to be used; general information overload in childcare, workers feeling overwhelmed with expert recommendations on how to do most aspects of their job; centers' lack of time to reflect on work practices; difficulty controlling the products used by afterhours contract cleaners; the need to buy cleaning products in bulk to contain costs; little discussion of cleaning practices in childcare training; and the routine nature of cleaning in childcare, which is so constant that how it is done is easily overlooked.

Of course, any piece of information is not received in a vacuum.[37] Each competes with an ever-expanding corpus of contradictory information on standard and green cleaning, cleaning products and infection control, issued from sources ranging from the evidence-based and informative, the commercially motivated and promotional, and the opinionated, uniformed and misleading. For the childcare workers, the language and concepts of advertising were influential here, especially advertising's focus on 99% effective disinfectants and products that make cleaning effortless. The workshops also identified the labelling of cleaning products as a problem. The small point size and cramped layout of labels on commercial cleaning products were too hard to read when caring for children, one worker explaining how this had led to serious mistakes in the dilution of cleaning fluids. *(see figure 3).* Alternatively, improvised labels lacked impact and durability *(figures 4 and 5).*

[36] Gardner, B. 2008. SASI Clean Study Report. Available at http://www.sasiclean.com.au/project_results.html. Accessed 3 March 2008.

[37] Margolin, V. 1997. Getting to know the user. *Design Studies*, 18.3, 227-36.

Figure 3
Commercial cleaning products in one of the four centers in the SASI Clean study. Photograph: the authors.

Figure 4
Improvised sign in one of the four centers in the SASI Clean study. Photograph: the authors.

Figure 5
Improvised labels in one of the four centers in the SASI Clean study. Photograph: the authors.

[38] Tuuli, M.M. and S. Rowlinson. 2009. Empowerment in project teams: A multilevel examination of the job performance implications. *Construction Management and Economics*, 27.5, 474.

Social cognitive theory argues that the interaction between people's perception of empowerment and the context for empowerment strongly influences outcomes.[38] We saw the participatory workshops as producing authentic knowledge and design prototypes that responded directly to the childcare workers' needs, perspectives and situation. The character of inter-subjective exchanges in the workshops was a strong indicator of our success here. When discussions explored the effects of cleaning chemicals, the responsibility workers felt for the children in their care and issues of accreditation, the atmosphere in the workshops became charged. Alternatively, the affective ties that developed between the workers and designers sustained collaboration over the three workshops. Friendliness, frequent humorous exchanges and general openness between childcare workers and designers, as well as growing understanding of each others' skills and experience marked the positive group dynamic that developed during the main business of design and informal conversations in breaks.

Three main understandings emerged from the workshops to shape design recommendations. The first was that the childcare workers disliked the childish imagery often used in information directed at them, which they felt placed them on the same level as the children they cared for rather than addressing them as adults and professionals. They suggested asking children from each center to make drawings about cleaning as a visual resource for design, children's art being an important part of their day. From these drawings, the workshops developed four icons to identify information impact on health, environment, water use and explanations of cleaning products and processes, believing these to be respectful to and engaging for all members of a center community, children, parents and staff *(figure 6)*. The icons' perceived role was to enhance awareness of the key aspects of the information to be delivered and provide a basis for a SASI Clean identity system *(figure 7)*.

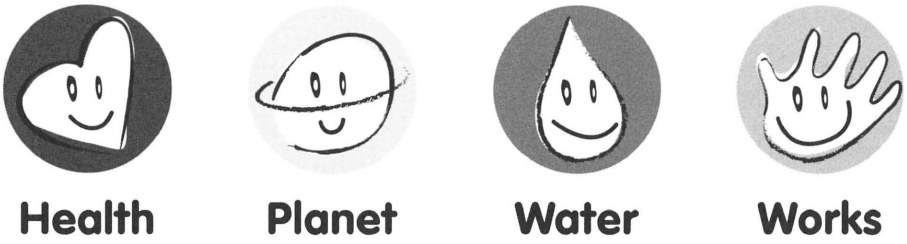

Figure 6
Prototype designs for SASI Clean icons. Copyright: the authors.

Figure 7
Prototype design for a SASI Clean manual. Copyright: the authors.

The second important idea was that information on low-chemical cleaning needed to be configured for a range of tasks and delivery points. A single manual was too detailed for use in the children's rooms by busy staff, but one comprehensive, updatable manual was needed in the director's office to refresh knowledge, explain policy and procedures at accreditation time, and as a reference in selecting cleaning products. Digital technology would be useful to update information, but was not applicable where workers were caring for children. Posters could reinforce a center's commitment to low chemical cleaning, declaring this to parents and at accreditation time, but information on cleaning procedures had to be linked to cleaning tools and products.

The childcare workers also felt that once a facility became an endorsed SASI Clean center and its workers were trained in low-chemical cleaning, permanent staff would not need to consult cleaning information daily. However, cleaning routines could lapse when relieving staff substituted for absent workers, as happened regularly. Relievers needed orientation just as children were arriving at the start of the day, explaining a center's ways of doing things often became a rushed, incomplete process. A shortage of casuals meant that centers had difficulty attracting relieving staff. The workshops recommended that a set of SASI Clean cards be developed to give to relievers to hang from their belt or put in a pocket. These would support the low-chemical cleaning initiative and address the common problem of relieving staff feeling uncomfortable about not knowing what to do, a number of workshop participants having experienced this when they worked as relievers. The customizable cards could include other information about a center, being something casual workers could take away with them, creating a connection with a center that might encourage them to work there more regularly, simultaneously addressing several problems for center staff.

The third innovation to emerge from the design workshops was the potential for dialogue and group activity to encourage commitment to low-chemical cleaning. In exchanging anecdotes, information and opinions during the workshops, the childcare workers became noticeably more positive about the value of low-chemical cleaning, increasing the design team's interest in the information to be communicated. The group decided to design the majority of information materials as digital templates *(figure 8)*. Specific center staff would attend a SASI Clean training program, returning to their centers as cleaning ambassadors with a kit of customizable information materials that staff could use to formulate their own steps for cleaning instead of having these dictated, allowing the innovation on low chemical cleaning to take on individual forms as it spread. We addressed the failure of existing improvized labels by proposing laminated swing tags for bottles of cleaning solution, laminating and color printing being inexpensive technologies found in most childcare centers. There was discussion about whether tags would get in the way during cleaning, but it was felt this would mean they were noticed, while blurred, peeling paper labels were easily overlooked.

Figure 8
Prototype for customizable labels. Copyright: the authors.

THE FORM/CONTENT DIVIDE: STAKEHOLDER RESISTANCE TO THE DESIGN RECOMMENDATIONS

Graphic design is currently challenged to accommodate the broad restructuring of societies around differentiation, diversification and distributed systems, each placing greater emphasis on the human dimension in communication. It is thus not surprising that Carroll describes participatory design as a "major, orienting position in contemporary debates about design methods."[39] In the SASI Clean study, harnessing the capacities of critical reflection and decision-making that characterize the psychological makeup of the modern, autonomous individual seemed crucial when the aim of communication was to influence people to change their attitudes and actions. Otherwise, tasks in the study were divided according to participants' professional expertise, the steering committee meetings providing the common space in which the different disciplines working on the study brokered a collective response to its goals. Nevertheless, the steering committee reflected the centralized, bureaucratic structure of the childcare sector. Childcare workers were not included, although their input into the scientific testing and design created the sense that their views were present.

Ultimately, however, the challenge of engaging with the otherness of other knowledge systems became a barrier to the acceptance of the design recommendations. Members of the steering committee resisted the need to diversify information delivery, preferring a standard manual to be provided for each center setting out the facts about cleaning and standardized wall charts for individual rooms to fix cleaning procedures. The idea to target information to relieving staff was the least accepted proposal, although it was the core issue for the childcare workers. For the childcare workers participating in the design workshops, the fact that outside people could come in and do whatever they liked affected everything in their workplace, encapsulating their feelings of lack of control at work and the hidden emotional dimensions in information delivery. Yet including childcare workers in the design process did not eliminate the question of who decides which, if any, design ideas would be acted on. Bravo arguing that in participatory processes there is "a big difference between making suggestions and making decisions ... between having the right to participate and having power."[40]

Heartened by our sense of the success of the participatory workshops, we had not predicted this response from other project stakeholders. We now recognize that when the views and needs of people are given primary importance in design, organizing bodies, project funders and managers can become distanced from design

[39] Carroll, J.M. 2006. Dimensions of participation in Simons design. *Design Issues*, 22.2, 3-18.

[40] Bravo, E. 1993. The hazards of leaving out the users. In Schuler, D. and A. Namioka, editors. *Participatory design: Principles and practices.* Mahwah, NJ: Lawrence Erlbaum Associates, 5.

proposals. Owens, for example, has studied decision-making in seemingly non-hierarchical design teams.[41] He shows that high status individuals have the biggest impact on which designs are produced, not the identification of specific design goals, middle- and low-status contributors have little influence over design. Lacking direct insight into the practical and emotional parameters of the childcare workers' experience, the other stakeholders' limited enthusiasm for the design recommendations risked the success of a future SASI Clean accreditation scheme. Indeed, Lockwood, Bachman, Oldach and Rutter highlight the vital link between people's involvement in design and their ownership of design outcomes through the example of a project where visual displays were designed to save time and enhance the selling process for retail staff. The views of the overworked sales staff were not sought during design and in many instances they didn't even bother to unpack the merchandising displays once delivered.[42] Lockwood and his co-authors argue that how and when people become involved in the design process is as important as the design solution, motivated stakeholders being essential to successful design implementation.[43]

In the SASI Clean study, broad stakeholder involvement in design would have been difficult, the various experts being busy with other facets of the study and their other work. However, the devaluing of the results of a rigorous program of participatory design left us wondering whether childcare workers' participation in the study was mere lip service. Commitment to participatory processes is questioned in other social spheres, suggesting their use is not always to improve outcomes for people, Barnes, Newman and Sullivan report that often "Participants in NGOs, community groups and social movements find themselves invited or encouraged to take part in state-sponsored participation initiatives which aim for consensus building and seek to minimize protest."[44]

Expert stakeholders in the SASI Clean study maintained an allegiance to the content of information on cleaning and infection control. For example, they saw scientific data produced during the study on the efficacy of dilute detergent by comparison to the potential risks of stronger cleaning products as compelling reason for workers to adopt low-chemical cleaning. Yet the characteristics of scientific propositions are defined by the parameters and legitimation methods of disciplinary knowledge. For Jean-François Lyotard the increasing complexity of standards of scientific proof has seen scientific knowledge conflict with the nature of "traditional knowledge or knowledge based on revelation," placing it outside most people's experience.[45] Arguably, the form of information is an issue in influencing cleaning practices in childcare, advertising strategies for

[41] This research is cited in Walton, T. 2000. Design management as a business and academic discipline. *Design Management Journal*, 11.4, 7.

[42] Lockwood, T., T. Bachman, M. Oldach and B. Rutter. 2001. Perspectives on communicating the value of design. *Design Management Journal*, 12.3, 76-83.

[43] Lockwood *et al*, Perspectives on communicating the value of design, 78.

[44] Barnes, M., J. Newman and H. Sullivan. 2006. Discursive arenas: Deliberation and the constitution of identity in public participation at a local level. *Social Movement Studies*, 5.3, 193.

[45] Lyotard, J-F. 1984. *The postmodern condition: A report on knowledge*. G. Bennington and B. Massumi, translators. Minneapolis, MN: University of Minnesota Press, 44.

[46] Gilbert, G.N., and M. Mulkay. 1984. *Opening Pandora's box: A sociological analysis of scientists' discourse*. Cambridge, UK: Cambridge University Press, 40.

the promotion of high-chemical cleaning products is more effective than the factual approach of Australia's National Health and Medical Research Council in promoting low-chemical cleaning. However, the design workshops also found both advertising and science conflicted with the received wisdom of older childcare workers, who reported that in the past it was always believed that fresh air and "elbow grease" solved the problems of dirt and germs.

The SASI Clean study showed poor information design created doubt over the efficacy of low-chemical cleaning in the scientific testing. Childcare workers saw great variance in test results for bacterial loads for surfaces cleaned with existing products in Room 2 and those treated with low-chemical cleaning methods, when in fact the difference was infinitesimal *(figure 9)*. Here, the scientists and designers held conflicting perspectives on the nature and purpose of information and visualization, the scientists' preference for an "empiricist repertoire" in the representation of test results arguably building on a sense that childcare workers, as passive semiotic recipients, would be unlikely to dispute science facts.[46] For us, the needs and preferences of childcare workers defined the form and role of information, ensuring that information would be acted on.

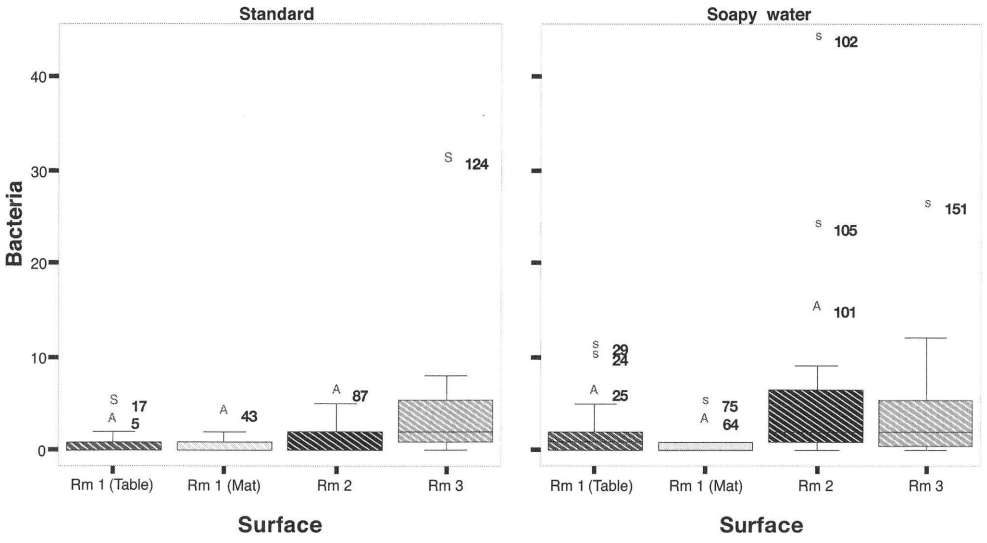

Figure 9
Bacterial load for Total Plate Count Agar for Centre 1. Louise Dunn and Enzo Palombo, Faculty of Life and Social Sciences, Swinburne University of Technology. Reproduced with permission.

Frascara argues that knowledge of graphic design will only emerge from "the recording of design practice as systematic case studies," though he adds that substantive reflection on methods already in use in graphic design will not arise until designers address their "fear that sharing will 'give away' some perceived competitive edge."[47] The implications of reporting design failures are undoubtedly an additional hurdle to building knowledge in design in this respect. Our mistake in the SASI Clean study was to assume that a public project would inherently favor participatory design; the commitment to socially beneficial outcomes and the absence of the profit-motive naturally would prefer innovative design proposals supported by rigorous audience research.

Pervasive representations of design highlight its social value. Nelson and Stolterman describe design as a form of thought and action that precipitates change, while Cross represents design as a particular set of cognitive processes dedicated to formulating, structuring and solving problems.[48] Frascara describes future graphic designers as advisors, coordinators or guides, who will support users and decision-makers to achieve what is required through their original analysis, creativity, realism and experience in working with people.[49] For Spinuzzi, the broad adoption of participatory design will enable designers to understand the tacit and often overlooked ways in which people conduct and understand everyday activities.[50] Strickler and Neafsey contend there is great scope for designers and design researchers to contribute to audience research in public health communication, given the mounting prominence of visual media and technology.[51]

For us, the use of participatory design in the SASI Clean study modelled a socially engaged form of design practice that responded to the complexity of information delivery by engaging the specificity and diversity of the communication task. But the culmination of the design process coincided with major difficulties in other aspects of the study. Identifying the active ingredients of cleaning products and their confirmed health and environmental effects had become an endless task, complicated by a range of legal issues. Despite information resistance being an important driver for the study, the design recommendations and the considered, people-focused methods used to arrive at them struggled to command attention with the deadline for final project reporting looming. The design prototypes have not been as rigorously trialed as we had hoped. Certain elements of the design proposals and other design work we completed for the study were incorporated by the project manager into a set of SASI Clean

[47] Frascara, *Communication design*, 60.

[48] Nelson, H.G., and E. Stolterman. 2003. *The design way: Intentional change in an unpredictable world: foundations and fundamentals of design competence*. Englewood Cliff, NJs: Educational Technology Publications; Cross, N. 2006. *Designerly ways of knowing*. London, UK: Springer-Verlag.

[49] Frascara, *Communication design*, 8.

[50] Spinuzzi, The methodology of participatory design, 163-174.

[51] Strickler and Neafsey. Preventing drug interactions in older adults, 102-124.

[52] Available at http://www.sasiclean.com.au/pdfs/SASIclean_Guidelines_Protect_ Health_Mar.08_Brief.pdf. Accessed December 9, 2008.

[53] Bayazit, N. 2004. Investigating Design: A review of forty years of design research. *Design Issues*, 20.1, 22.

guides available over the Internet, our icons being used along with generic clip art to embellish information dense pages[52] *(figure 10)*. This outcome suggests that graphic design is often perceived as the decoration of information, not a process integral to determining its conceptual and strategic forms.

In the SASI Clean study, we were confident in our ability to deliver effective, informed designs based on the centrality of the childcare workers to the design process. We neglected the relationship of other study stakeholders to design. Rittel and Webber's 1973 treatise on the cascading nature of design problems describes a chain of questions that can't be defined until their solutions are found, each solution creating new questions to be addressed.[53] In the SASI Clean study, the delivery of the design recommendations revealed the problem of how to communicate the results of participation to other study stakeholders so they would find them compelling. This was a failure based on our assumption that other stakeholders would not question our expertise in design, or the authenticity and importance of the childcare workers' views and situation. Indeed, Owens argues that an emerging task for the designer researcher is to develop strategies to manage perceived differences in status between the various participants and stakeholders in projects, a view our experience in the SASI Clean study confirms.

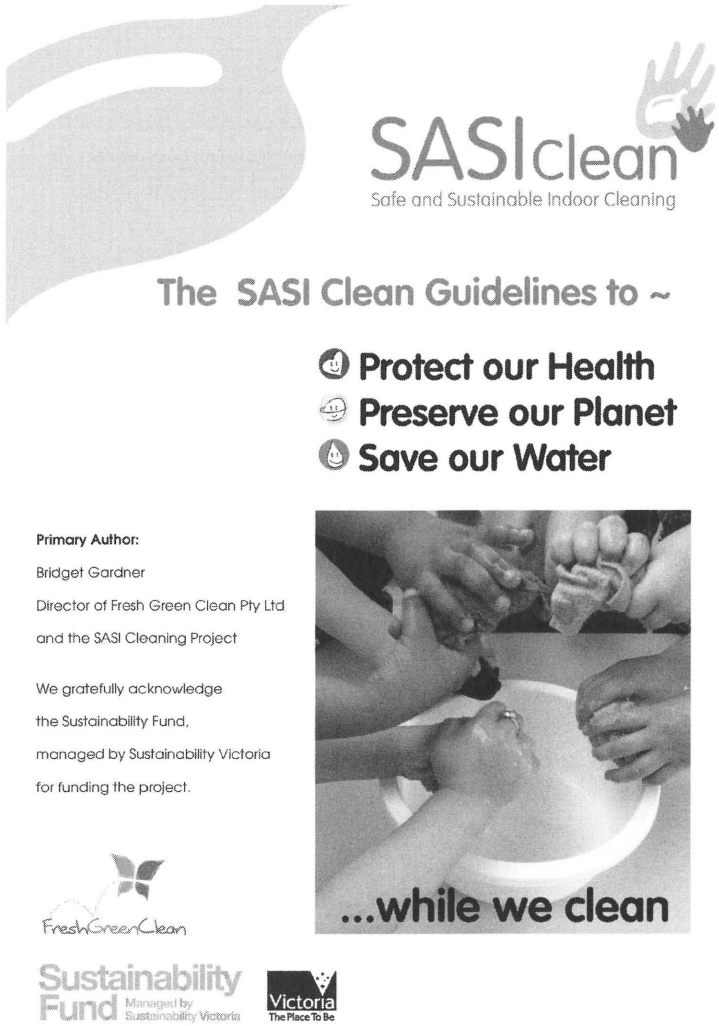

Figure 10
Improvised use of design materials.
http://www.sasiclean.com.au/pdfs/SASIclean_Guidelines_Protect_Health_Mar.08_Brief.pdf.
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