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Published in:
Proceedings of International Conference on Engineering Design, ICED'09

Publication date:
2009

Document Version
Publisher's PDF, also known as Version of record

INTERNATIONAL CONFERENCE ON ENGINEERING DESIGN, ICED'09
24 - 27 AUGUST 2009, STANFORD UNIVERSITY, STANFORD, CA, USA

THE CHALLENGES FACING ETHNOGRAPHIC DESIGN RESEARCH: A PROPOSED METHODOLOGICAL SOLUTION

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ABSTRACT
Central to improving and maintaining high levels of performance in emerging ethnographic design research is a fundamental requirement to address some of the problems associated with the subject. In particular seven core issues are identified and include the complexity of test development, variability of methods, resource intensiveness, subjectivity, comparability, common metrics and industrial acceptance. To address these problems this paper describes a structured methodological approach in which three main areas are proposed, the modularisation of the research process, the standardisation of the dataset and the stratification of the research context. The paper then examines the fundamental requirements of this scheme and how these relate to a Design Observatory approach. Following this, the proposed solution is related back to the initial problem set and potential issues are discussed. Finally the paper concludes with a possible scheme for the implementation process required for such a solution and the roles to be played by a Design Observatory approach.

Keywords: Design process, experimental methodology, performance, methodological problems

1 INTRODUCTION
Over the past decade there has been a proliferation of design research experimentation and methodological approaches ranging from tools and technologies studies [1] to experience based work [2]. These range from qualitative industrial based reflective research to quantitative laboratory based experiments. This variety of methodologies has presented a number of problems not only within the design research community but also the wider engineering fields. Not least of these problems are the perceived value of lab based experiments within industry and the associated successful application of some of the research approaches and ideas. There have been determined efforts to define the elements that are necessary in engineering design research with the publication of the work of Chakrabarti and Blessing [3]. The work dealt with in this paper addresses the next level of detail, particularly for more controlled work such as that carried out in labs or observatories.

This paper discusses a possible solution path to some of the problems identified using a methodological framework approach. The salient points are outlined and their potential impact examined critically. The paper then shows how the framework could be deployed in conjunction with a Design Observatory [4], new technologies such as interactive environments [5] and high definition video [6] and other innovative technology [7].

2 THE CHALLENGES FACING ETHNOGRAPHIC DESIGN RESEARCH
Design related research has produced a great number of innovations in terms of working practice, tools and technologies since its inception in its modern form. These include the deployment of CAD systems, tools such as DFA [8], QFD [9] and TRIZ [10], the Function-Behaviour-Structure framework [11] and many other user interfaces [12][13]. Further to these general approaches and practices a wide range of divergent tools have been developed and tested for niche or industrial applications. Coupled with this practical and experimental development has been the introduction to the field of many aspects of the social, psychological and management sciences. These include emotions studies, neuropsychology and cognitive psychology [14][15] and have generated a scope of potential activity

unrivalled in ethnographic design research. With this range and variety have come a number of problems and issues that threaten to limit the potential and prospective impact of much of the research being conducted.

Considering the field from the perspective of an experimental researcher wishing to produce data by monitoring and examining designer's activities, thought processes and actions, a number of core issues have been identified. These can be seen most clearly in the deployment of design tools of which there are many. It is widely acknowledged [16][17] that these tools are often implemented and used in a suboptimal manner with no clear consensus as to an optimal solution or procedure.

Based on a review of the existing literature, particularly [1][3][18] several of the key problems have been identified. It is these problems in combination that create the challenges of undertaking ethnographic design research. They tend to hinder the communication, generation and reuse of data in research and also negatively affect the applicability, uptake and perceived value of the research in industry. Figure 1 shows the seven identified problems and their relationships to each other. Each is now discussed with a combination of emerging approaches for design observation.

Figure 1. The Seven Problems Identified in Ethnographic Design Research (EDR)

2.1 Ethnographic Design Research

Seven divisions have been established which must be considered for the successful implementation of EDR (Sections 2.1.1 – 2.1.7, Figure 1). Theses aspects are interrelated and must be considered collectively. Through the evaluation of the interrelationships, these aspects fall into three main categories denoted by the linking arrows in Figure 1. The three strongly related areas are: facilities and culture (*A*), relationships and trends (*B*), context in industry and academia (*C*). They can also be seen to relate to Figure 2 in that *A* is equivalent to Facilities/Technologies, *B* to capture and analysis (the identification of relationships and trends) and *C* to methodology (the control and understanding of context). Each area *A*, *B* and *C* consists of several strongly linked problems/considerations:

- *A*: Complexity is self-evidently linked to resources; longer, larger and richer experiments/studies require more resources in terms of both time and material. It is arguable that the inverse is also true when larger facilities or the requirement for lab/industrial comparisons drive the need for greater complexity in experimentation.
- *B*: Context, both cultural and experimental, is closely related to the way in which research is carried out and understood and hence linked to subjectivity.

- *C*: Consistent metrics are a prerequisite for the development of clear measures and quantifiable results. These in turn allow variability to be controlled and understood and also help reduce variation in methodology, technology, process and results. Metrics and variables also link to comparability, which is fundamentally based on consistency and the understanding of variables.

2.1.1 Complexity of Test Development
The development of new test procedures is often prohibitively complex and time consuming [18]. This requirement for a lengthy, highly refined development process often leads to difficulties in communication, divergence of standard techniques and a limited number of tests that can be carried out. Not only do these problems affect academic research but also inhibit the implementation of the design research in industry where there are frequently very limited resources available. In general the level of complexity at all stages is high due to the lack of any framework around which unique elements could be added. This level of complexity limits the number of tests that can be carried out leading to hypotheses being constructed based on what are relatively small datasets.

2.1.2 Variability of Methods
There are a wide variety of methods and technologies used for data collection and analysis. These range from interview techniques [1] to protocol [19] or video analysis [20]. Indeed there is often a large variation in the implementation of techniques with no accepted standard for controlling variables within an experiment. These factors combine to make the cross referencing of research carried out in different locations and the reuse of data outside of an individual research group extremely difficult. The lack of clear baseline standards also hinders attempts to draw comparisons between industry and academia due to the lack of large coherent datasets against which sound comparison can be made.

2.1.3 Resource Intensive
The nature of design research dictates that it is resource hungry. This is especially true in the analysis phase where potentially hours of video must be reviewed/assessed. This can be coupled with a requirement for specific infrastructure and facilities [21]. The requirement for time investment often makes industrial studies impractical and difficult to justify. The slow speed of response also limits the effectiveness of any interactive studies making the process unfeasible for industrial purposes where direct intervention and rapid evolution are often required. There are some approaches to help the capture and analysis such as AMI [22], Quindi [23] and others [24]. These processes are still largely manual however and often the automated features are inferior or subordinate to a human analyst.

2.1.4 Subjectivity and Culture
Due to the social and behavioural aspects of design, cultural viewpoint and subjectivity are areas that are extremely difficult to control or understand in the context of its affect on research [25]. With a lack of standardised approaches and experiments it is enormously difficult to draw comparisons between different cultures. This is compounded by the lack of large datasets, making it hard to vindicate core results against competing hypotheses based on a variety of different cultural settings. This lack of a broader understanding of experimental results makes it difficult to say categorically what, if any, the optimal solution or solutions are and to clearly define local and global truths.

2.1.5 Inter Test Comparability
The factors previously identified combine to generally make inter-test and inter-institution comparability relatively poor. There is a lack of a benchmark tests or framework against which experiments can be normalized or compared respectively. This lack of comparability makes the development of large data sets very difficult and hinders industrial uptake. It is hard to unambiguously show that one set of results is superior to competing sets or that any one test shows some form of universal truth. Comparing the different approaches used in two separate tests both studying the same area [2] [20] gives an example of this problem.

2.1.6 Common Metrics
There is lack of clear common standards for metrics, test validation and procedures [18]. These make the development of new tests difficult; each experiment must define its own standards. This limits the communicability of test methods due to the different approaches. The lack of clear metrics also

compounds the problem of industrial acceptance as without agreed performance measures it is difficult to accurately compare the value of new techniques assessed using different criteria.

2.1.7 Context and Industrial Acceptance

The lack of a clear contextual framework in the experimental corpus in terms of culture, method, structure and data capture make building a complementary interlinked database of research difficult. Without this rich depth of data it is argued that assessing the merit of work in different situations from those explicitly studied becomes exponentially more difficult. This is one of the issues that makes industrial acceptance and application difficult [1] where the argument of inapplicability of lab based research is commonly used. Without a coordinated and linked body of work where trends can be seen and quantified between a number of situations this argument will remain a powerful negative force. Creating the means to meaningfully translate academic lab based research to an industrial context can be seen as one of the major issues facing design research today.

2.2 New approaches

New technology in the form of the Design Observatory [4] in combination with methods for intelligent data capture [21] and analysis techniques seek to resolve some of these issues, however these alone do not offer a complete solution. A third aspect must be understood in conjunction with these areas, namely that of the methodological framework used in the research.

It may be that many of the aforementioned problems can be seen to stem from the lack of a clear and consistent framework in which experiments can be placed. Without a clear, concise and widely accepted methodology; repeatability, comparability, complexity and development time will continue to be problems. The introduction of a methodological reference frame in conjunction with new technologies and techniques could facilitate an attempt to answer the issues surrounding ethnographic design research. Figure 2 shows a visualization of the different proposed elements that would constitute a framework with an indication of how they interlink. These links can be seen as the intersections between the major elements.

The intersections: capability, control and theory show the resultant factors that are affected by changes to any of the major elements. They form the core of any change in the performance of design research. It should be noted however that for positive change to be affected each of these three must be equally supported and act in a complementary manner.

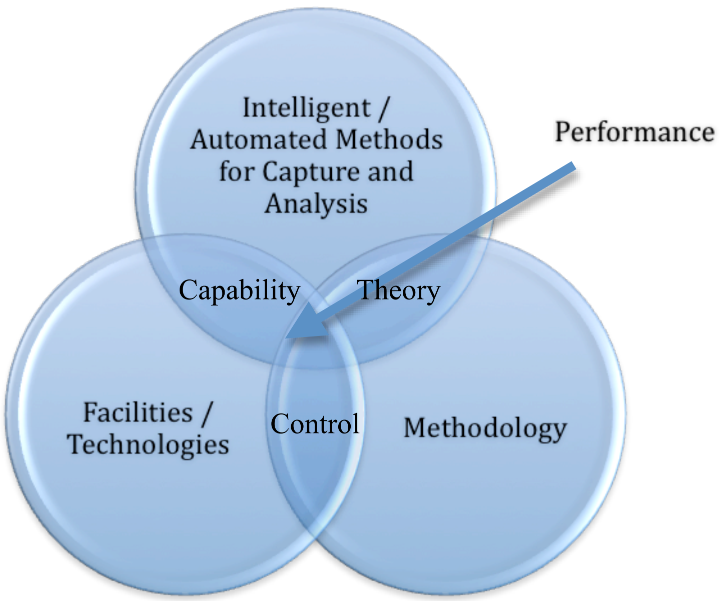

Figure 2. The Three Part Research Model

3 THE METHODOLOGICAL SOLUTION

From Figure 2 it can be seen that the methodology is an important part of any solution. This section focuses on a methodological approach and does not consider the other areas seen in Figure 2 as these are being considered elsewhere [4][6][21] and are introduced in Section 4. The aim would be to offer a framework around which a research question could be constructed rapidly and in a repeatable manner. A standardised framework would allow industry and academia to quickly develop test sequences, more efficiently organize and retrieve data and make better use of a scientific database approach to experimental results and so on. Using some form of modular procedure would give researchers the ability to concentrate on the detail and production of experiments rather than the currently time consuming need to develop a new research protocol for each test individually. Realizing a modular solution would also allow industry to implement a research based strategy over their existing operating protocols with the minimum investment and would give a foundation for comparability between academic and industrial research. Creating a large scale pool of linked experiments would allow meaningful comparisons to be made between lab based and industrial tests, different cultures and facilities as well as many other key areas.

3.1 The Three Pillars of the Methodology

There are three core streams that are included within the proposed methodology; these allow the researcher to address the different problems described in Section 2.1. Each stream looks at one area of the whole while complementing the others to build an interlinked protocol covering the whole gamut of the research area. The different streams form a framework around which research can be moulded with the aim of achieving significant improvement without incurring significant extra work or complexity and with no dilution of the original research goals.
The three streams are listed below and examined in further detail in the following sections

1. **Modularisation** of the research process
2. **Standardisation** of the data set
3. **Stratification** of the research context

The following sections outline the basic requirements and form of the three streams and examines how each stands both individually and in conjunction with the other two. The introduction and practical application of the streams is then considered in Section 4. Here the application of the proposed methodology is considered in relation to a Design Observatory approach and the potential advantages of such a partnership are examined.

3.1.1 Stream 1: Modularity

It would be useful if the experimental process could be broken down into several elemental stages each of which conformed to a basic set of rules or conventions. Currently in academia and especially in industry each test sequence looks at and uses these stages in a unique way that is often not fully documented. These factors combined with the varying perspectives of different cultures and institutions make the reuse of data and the extension of historical experiments very difficult. Each research group tends to independently develop procedures, which are often limited by the scope and depth of the research base as well as their experience. This lack of conformity in recorded data also makes experimental reuse or reanalysis almost impossible and prohibits any attempt at constructing large multinational data sets without major investment and effort.

Using a standardised “modular” system or approach each element of the experimental process could be categorized and documented in detail in a common form. Each module would be represented by a basic formulaic system that would be used to define such things as minimum test equipment and requirements. These modules would set universal base standards for defining and carrying out any test sequence. By defining the modular makeup of an experiment rapid and effective reuse could be encouraged and larger data sets constructed by combining multiple experiments sharing the same modular makeup. Using this system any unique research goals or factors in a test would be maintained whist being complemented by a higher level framework, capturing the context and structure of the experiment within the larger community.

Supplementing existing data capture with defined common data, based on the modules used, would allow future use of results while introducing minimal amounts of extra work for the researcher. Clearly not every area of future use can be anticipated; however by applying a standard for each module a data rich methodology would be formed. In terms of experimental validation and standard data capture a modularised common test format would allow certain base hypotheses to achieve much larger data sets from extended communities in industry as well as academia. Setting a standard modular system for tests gives a more complete contextual dataset, capturing such things as the study / participant type, cultural background etc. enhancing the value of any future use and giving a richer picture of the research to a wider audience. The core points of modularisation are forming a universal framework from which a common reference point can be formed and allowing any researcher to quickly assemble and compare test sequences using their modular makeup. It is interesting to reflect that in Engineering Design texts (and practice) modularisation is widely cited as one of the key factors in improving speed to market, reliability and enabling global development [26][27][28]. It thus seems logical to explore whether it can be applied in a research context. This modular structure would be at a higher level than that of a specific experimental methodology and would be used in a concurrent manner, forming a structure against which experiments could be framed.

Table 1 shows an example of how a simple modular system as suggested by the first stream could be envisaged. Obviously this would require a detailed development process not covered here to produce a working system able to effectively cover the range of the design research field. The modular system can be envisaged as a step by step process that examines each stage of an experimental methodology. The columns in Table 1 represent these stages. Each column is broken down into the areas that must be considered/recorded at each stage. Some of these form simple choices such as video or questionnaire based work etc while others require the recording of such things as experimental context or comparison to standards. Thus each stage of an experimental procedure is clearly defined and has an attendant set of requirements that must be fulfilled.

Table 1. An example of a simple modular breakdown

<table>
<tr><th>Development</th><th>Test Type</th><th>Research Focus</th><th>Facilities</th><th>Data Collection</th><th>Analysis</th><th>Output</th></tr>
<tr><td>Aims</td><td rowspan="3">Video
Survey
Interview
Novice
Expert
Etc.</td><td rowspan="3">Environment
Management
Teams
Technology
Tools
Etc.</td><td>Common core equipment</td><td>Common core capture</td><td>Common procedure for core data</td><td>Common core data</td></tr>
<tr><td>Metrics</td><td>Specialist equipment</td><td>Specialist capture</td><td>Specialist areas defined</td><td>Test parameters</td></tr>
<tr><td>Wider Context</td><td>Industry / Academic</td><td>Basic standards for capture</td><td>Data set defined and quantified</td><td>Test metrics and context</td></tr>
</table>

3.1.2 Stream 2: Standardised data capture

In conjunction with the modular breakdown of the experimental procedure it is proposed that a standard data set be devised for each experiment type as defined in conjunction with the modular system in Section 3.2. This would be defined at the module stage with each module selection contributing to the form of the standard capture, thus experiments constructed of the same modules would share certain data. This dependency on the module selection allows a degree of flexibility in the standard dataset. This flexibility is critical to the successful implementation of any approach as it allows common data to be recorded in a complementary manner with the existing test recording methods thus introducing little extra work for a large potential benefit. The recording of standard data would not however be limited to the active experiment itself and would also cover such basics as cultural, systematic and analytical specifics in order to form an in-depth contextual background for each experiment. Context is an increasingly important issue [29] recording this extra information does however trade-off with extra work and investment required by the research community. Thus it is critical that this approach is used in conjunction with a modularised methodology to ensure that the level of data capture and complexity is appropriately shaped for each test to complement the existing capture methods.

The data capture standards for each module would be developed such that they offered the maximum information for the minimum level of disruption. Each area would be assessed in conjunction with the facilities and modular makeup of the experiment to ensure that certain core areas were always addressed thus building an interwoven experimental database. Using this system, areas could be more easily identified where work was sparse and would also allow people to clearly understand how their work linked with other areas and build on these relationships. The core elements to be addressed using standardised data capture are the formation of a cross-referenced body of work where a benchmark reference frame can be easily established and compared; and the establishment of a flexible system complementary to the modularised methodology which supplements existing data capture methods.

3.1.3 Stream 3: Stratification of Facilities

The stratification of facilities is closely related to the modularisation of the experimental procedure and would be directly affected by the needs of any data capture standards. By detailing the facilities used for each test in conjunction with the modularised system and the standardised dataset a variable map would be developed. This would detail the facility and environmental variables that each test was subject to, thereby allowing the experimental data to be distributed between a series of facility bands. These bands would split facilities based on the level of control and data recording available and would form a scale against which facilities of different basic types could be compared. Conceptually this scale would range from fully lab based experiments such as the Design Observatory to industrial experiments where access to people and information can be highly restricted. By stratifying the level of facilities the whole range of ethnographic design research can be measured in a coherently scaled space where each test can be considered individually and also compared to the whole. The stratification of facility would also offer a scale about which a research database could be constructed allowing for the effective construction of benchmarks linking the different levels within the space. This paper does not propose specific bands as representing the whole range in a meaningful way goes beyond the scope of this paper and requires significant research and development in its own right.

The levels would be split based on the amount and type of data capture available and the degree of control of variability in the experiment. Stratifying the facilities in this manner allows a degree of flexibility to be maintained within the range. This allows researchers freedom to conduct experiments as they see fit whilst critically, also offering a contextual reference for outside observers.

The level of variability control is a critical factor within this rating system. Taking this into account allows several of the major problems identified in Section 2.1, for example subjectivity, inter test comparability and context, to be tackled much more effectively than in the current environment where variability is often not fully considered and difficult to describe completely in a standard way. Rating the facilities in this way creates not only a tool for assessing the variables present within a test sequence but also a measure of how they are controlled and what equipment/resources were necessary for their control. The core aims of producing a banded scale against which experimental facilities and variability can be rated is to produce a scale against which all experiments, no mater how disparate, can be ranked and offer a standardised means of comparison between experiments carried out using different facilities.

4 A DESIGN OBSERVATORY APPROACH

The three streams outlined in Section 3 can be seen as part of a wider strategy (Figure 2) to help solve the issues identified in section 2.1. To implement these streams in practice there is a requirement to be able to explore and develop the framework and also produce a baseline against which further work can be compared. Key to these requirements is the use of a controlled environment where the maximum amount of data can be recorded, forming a best case scenario for development and testing. This could be considered to be one possible scenario for the embodiment of the intersection of facilities and capture/analysis methods in Figure 2. This section does not consider the other possible approaches as this is beyond the scope and available length of this paper. With some of these aims in mind a number of researchers and institutions have adopted a Design Observatory or design laboratory approach [4][21], notably LTU [6], Stanford [30] and Grenoble [31]. The high level of scientific control and repeatability offered by having a standard benchmark environment is a key step in the development of any standard methodological frame work. Using an observatory in this manner delivers the highest level of control over the potential experimental variables though it is impossible to eliminate these entirely due to the human centred aspect of the research In addition to these human centric factors there may also be an innate artificiality associated with undertaking design in such an environment. Developing this benchmark facility in conjunction with a methodological framework could lead to a core data set for all subsequent work being established. The use of core data to structure a reference frame against which experiments can be added and compared forms the first step in the development of a truly scientific data repository offering valid comparison of experimental data across the whole range of research undertaken.

The development of a flexible modular research framework and of standardised data capture methods demands a great deal of development and testing. The technological challenges of this development would require a flexible environment with the ability to be rapidly changed and examined such that the whole scope of design research could be considered in a meaningful time frame. To this end the use of an extended and intelligent design environment [21] in conjunction with a Design Observatory would be critical in the development and implementation of a methodological framework. The Design Observatory [4] approach currently under development will offer a state of the art facility with the potential to enable the rapid deployment of multiple tests within a controlled environment.

Figure 3 shows how a Design Observatory approach could be used in two mutually supporting ways and how these relate to the issues previously discussed. Using the observatory to rapidly and repeatably develop a benchmarking system for the whole range of module combinations allows a database to be created where clear relationships and trends can be explored. Particularly important for the proposed methodology (Section 3) is understanding the relationships between different facilities and cultures, the context surrounding industrial and academic environments and the construction of meaningful comparisons between these areas. Combining the two aspects of Design Observatory operation allow the creation of a rigorously linked and comparable database of research that can be grown in a transparent and controlled way. The three central boxes shown in Figure 3 form the core aspects of ethnographic design research as identified in Section 2.1 and Figure 1.

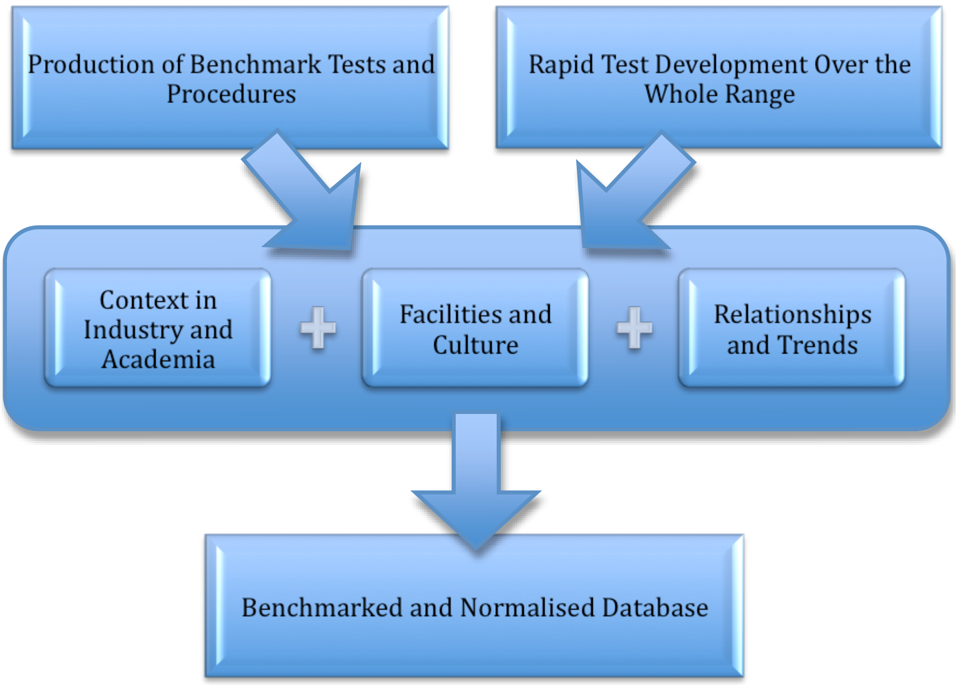

Figure 3. The Creation of a Research Database

5 DISCUSSION

This section contextualises or relates the proposed methodological approach (Section 3) to the fundamental issues outlined in Section 2.1 and the three elements of a solution identified in Sections 3.1.1, 3.1.2 and 3.1.3.

There are some difficulties associated with the proposed solution. The primary concern would be that of reducing to a minimum the amount of extra work generated as a result of applying this method. This has been tackled by making the process a concurrent system (Section 3.1.1) that would entail little more than ensuring certain core subjects are considered during the development process and noting these down in a uniform manner. Making the work complementary to the existing test procedures in this way ensures flexibility and freedom are maintained while still offering a meaningful framework for reuse.

The secondary concern would be the ongoing requirement to maintain consistency within the framework and its application, as this is core to its success. However, any successful system would have to be rigorously developed and tested such that it was robust enough to meet these criteria in the long-term. This requirement for structural durability would demand an investment in development work and a staggered introduction to ensure acceptance and compatibility with the whole range of ethnographic design research. Many of these problems could be addressed through the flexible use of what can be thought of as the Design Observatory method, it also offers a rigours development test for the intelligent design environment.

The following sections re-analyse the seven problems highlighted in Section 2.1 with respect to the proposed approach. Each section aims to highlight the solution path made possible by the implementation of the methodology proposed in Sections 3 and 4.

5.1 Complexity of Test Development

- The introduction of some form of standard framework reduces the complexity of the development process as experimental structures can be built around the existing standards thus removing the base level of work and offering a guided approach to follow.
- The use of a modularised system also allows a researcher to clearly and rapidly assess and understand the requirements of a range of different approaches and test styles.
- A secondary advantage of the modular system would be the ability for a proposed methodology to be quickly researched from existing tests using the modular form and thus the potential pros, cons and requirements to be identified earlier in the process.

5.2 Variability of Methods

- Methodological variability would be fundamentally reduced by the introduction of a standard framework about which new tests are built.
- The use of a standard data set would encourage similar approaches to be followed and allow researchers to rapidly assess the level of divergence of any test from the baseline.
- Producing a standard dataset for each test allows variability to be quantified by comparing the standard data from one test to that of a benchmark or simply the average of the corpus in that specific test configuration.
- The recording of a rich contextual background of each test and rating it against the facilities and modular scales, tests could be rapidly and quantifiably compared and reused with a greater degree of repeatability.

5.3 Resource Intensive

- The use of a linked research database, test benchmarking and Design Observatory techniques could be used to reduce the time required for test sequences and also make the selection of optimal test sequences easier.
- The ability to build on and compare a large corpus of standardised work would reduce the number of experiments required and in certain cases the range of results needing to be examined, using the corpus to guide your selection depending on the research goals.

5.4 Subjectivity and Culture

- The standardisation of methodology, facility and basic data capture allows a large database to be constructed within a quantifiably scaled space. This space would then allow comparisons, trends and correlations to be clearly defined and understood.
- The understanding of correlations and trends would not eliminate the cultural and subjective factors within ethnographic design research but would allow them to be qualified, quantified and normalised.
- The combining of this scaled space with a benchmark test system would give two normalising baselines for each test forming a meaningful measure for comparison.

5.5 Inter Test Comparability

- The implementation of a modularised framework and standardised data capture together with benchmarking and Design Observatory experimentation offer a scale against which all tests can be measured and normalised.
- This system would offer the flexible needed to account for a wide range of variability in the test facilities and participants and offer insight into many areas such as novice/expert that are currently difficult to quantify with small datasets.
- The use of a scaled data repository allows tests to be compared in a repeatable and standard manner where the measures are clearly documented and understood. It is interesting to note that the sharing of test data and reanalysis it is quite common in other disciplines [32][33].

5.6 Common Metrics

- Clearly by providing a methodological framework and standards for data capture and recording of context a common scale is introduced.
- This standard subsequently addresses many of the problems identified such as difficulty in communication of test information and the lack of common metrics for performance and comparison.

5.7 Context and Industrial Acceptance

- The modularised methodology and standard data capture form a framework in which a richer contextual picture can be defined.
- The ability to understand and quantify contextual differences as well as generate a large data repository with clear structure would allow a greater understanding of the relationship between lab based and industrial type research. Through this understanding and accumulation of standardised research, trends and correlations can be drawn. Thus using these correlations, academic work can be related to and substantiated against industrial studies and practice.
- Using the data backed correlative approach; academic work can be meaningfully translated into an industrial context with confidence both quantifiable and logical.
- The ability to understand and scale the whole corpus of research is the key to gaining industrial acceptance and to fully understanding the relationships between the different aspects of ethnographic design research. In addition it may be that industrial participants could be used to inform and develop new methods in an environment that is separated from the pressures of the workplace.

6 CONCLUDING REMARKS

This paper discusses the problems associated with ethnographic design research. In particular, the limits of current approaches are evaluated and include industrial uptake, research sharing and the creation of large databases. In addition to these limitations, seven fundamental issues are elicited, namely: complexity of test development, variability of methods, resource intensiveness, subjectivity, comparability, common metrics and industrial acceptance. In order to address the limits and overcome these challenges a methodological framework is proposed with the aim of contributing to the solution of the problems facing ethnographic design research today. The approach is split into three complimentary streams, the modularisation of the research process, the standardisation of the dataset and the stratification of the research context. Using these three streams a reference frame is constructed in which all experiments can be placed. Framing experiments in this space exposes relationships and trends while requiring little extra work on the part of the researcher. Solving the identified problems in this way also offers the ability to reduce the amount of time taken to carry out research and develop a large scale repository of data against which comparisons can be made. Using these techniques in conjunction with a Design Observatory approach would allow not only a core dataset to be developed but also the rapid and rigours production of benchmark tests which would then be re-introduced into the modular system.

This additional level of data capture and method would incur a certain amount of extra work but by making this a concurrent process that merely supplements existing methods and systems, this overhead could be limited while offering significant advantages across the field. A secondary difficulty would be gaining acceptance and maintaining consistency within the framework itself. Finally, the further work required to produce, test and deploy this methodology is extensive, requiring a thorough examination of several aspects of ethnographic design research. However the deployment of such a shared approach in a finished form would offer great rewards to the research community.

ACKNOWLADGEMENTS

The work reported in this paper is part of a PhD sponsored by the EPSRC Innovative Manufacturing Research Centre at the University of Bath (grant reference GR/R67507/0).

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