

A CASE STUDY IN USING MACROERGONOMICS AS A FRAMEWORK FOR BUSINESS TRANSFORMATION

Faith McCreary
Intel Corporation
Beaverton, OR 97006 USA

Kunjan Raval
Intel Corporation
Beaverton, OR 97006 USA

Meghan Fallenstein
Intel Corporation
Beaverton, OR 97006 USA

This paper presents the results of a case study of an approach for simultaneously investigating an organization's user experience and driving user-centric change within the larger organization. Called Model Workplace, it is a collaborative, macroergonomics-based approach that leverages the business expertise native to an organization with that of user research consultants to gather diagnostic information at all levels of the user experience for informed organizational decision-making. This innovative approach is as much about changing an organization so that it can make more effective use of the research data, as it is about gathering the data needed for effective change. Our findings suggest that this approach can be used by other organizations to drive customer-focused change throughout their business plans and processes.

INTRODUCTION

Organizations are constantly looking for new ways to more rapidly respond to changing user needs, enhance their customer focus, and improve customer loyalty. In order to drive and sustain meaningful user-centric innovation, they often invest heavily in research aimed at deepening their understanding of the needs and experiences of their users. However, many organizations find transforming this deeper understanding of user needs into new business directions that yield significant improvements a daunting task. They often find that even after they obtain such data, internal paradigms must be changed before they can efficiently use the data to drive changes in the user experience.

A transformation from a technology-oriented business to a customer-focused one is often needed for organizations to fully reap the benefits of their investment in user research over the long term. Organizations frequently find accomplishing this kind of large-scale organizational change both challenging and time-consuming. Further, waiting until the organization has the research in hand to begin this change may mean that by the time the organization has transformed to the extent needed to reap the competitive advantage afforded by the research, the opportunity has passed.

Organizations need a way to systematically gather user data while simultaneously shifting to a more user-centric orientation. Model Workplace is one such approach that does just that. It is a macroergonomics-based approach to holistically assessing how well a particular "technology" fits its users and their work environment in relationship to an organization's business priorities. "Technology" is used here in its broadest sense --- it could be a suite of tools, an enterprise system, a training system, a physical environment, or even an organizational structure. The approach engages the organization in the diagnosis and solution finding process, thereby simultaneously helping to bring about an

organizational paradigm shift so the organization can more effectively use the end results.

Over the past five years, the Model Workplace approach has been utilized successfully to trigger user-centric innovation and transform a diverse handful of businesses within a much larger company including internal services and a worldwide channel co-marketing program. Organizations that have experienced a Model Workplace have reported a variety of benefits including a more competitive user experience, increased market share, user-centric cultural shifts, consensus and relationship building within the organization, validation of business process changes, and decreased resistance to change.

This paper focuses on how the Model Workplace approach was used most recently by a large software division with several hundred employees inside a much larger company as a framework for systematically evaluating their customer experience and as an impetus for change within their larger business. The case study presented here will detail how the Model Workplace approach was implemented within the division, the lessons learned from this Model Workplace, and implications of this work for other organizations.

A FRAMEWORK FOR CHANGE

Model Workplace provides a collaborative framework for investigating an organization's user experience. Macroergonomics provides the underlying theoretical model for analyzing the user experience at both the micro and macro levels. In keeping with macroergonomic theory, a Model Workplace intervention can be expected to result in both a significant improvement to the user experience and in cultural shift within the larger organization in terms of behavior and core values (Hendrick, 1995; Kleiner, 2004).

A Collaborative Experience

At the heart of any successful Model Workplace is a successful collaboration between the individuals in the organization and multi-disciplinary consultants who specialize in large-scale cooperative user experience research. Model Workplace brings key players in the business together with the consultants to form a team that is responsible for engaging the larger organization and critical stakeholders in joint research activities over the course of a Model Workplace. This pairing immerses the consultants in the organizational culture; their every interaction becomes an intervention with the potential to change the mindset of an organizational member.

This collaborative team leverages business expertise native to an organization, helps organizational players better understand how each contributes to the overall user experience, provides a vehicle for transferring knowledge between team members, and improves the quality of results. As in previous research, this collaboration is also critical to shifting the organizational mindset and increasing commitment to proposed solutions (Beer et al., 1990; Imada, 2002; Kleiner, 1996). It also helps the business overcome many of the common obstacles that often prevent organizations from fully reaping the benefits of innovations, including

- *Cultural* barriers (for instance, “not invented here” syndrome),
- *Management* resistance (for instance, insufficient buy-in to implement proposed solutions),
- *Knowledge* hurdles (for instance, lack of skills needed to convert research into actionable plans),
- *Communication* barriers (for instance, research results not linked effectively to business goals), and
- *Planning* challenges (for instance, research not done at time organization has ability to act on it).

The collaboration starts from the beginning. Before formally embarking on a Model Workplace, key players from both sides work together to determine if a Model Workplace is a good “fit” for the organization. Team members meet individually with key people throughout the organizations to assess (1) the openness and willingness of key stakeholders to commit time and expertise to the effort, (2) the availability of actual users to participate in research activities, and (3) whether the system is of sufficient complexity and importance to warrant investment in a Model Workplace effort.

Besides helping team members to better understand the challenges facing the organization, it helps the key players on both sides assess their ability to work together and facilitate the change process within the organization. It also helps them determine the likely scope and nature of Model Workplace activities. Although the individuals who initially advocate a Model Workplace often have strong beliefs about what the problems are, neither side really understands the problem well enough to jump straight into solution space. Rather a Model Workplace helps the organization to explore

and ultimately specify the diagnostic activities that eventually lead to tangible improvements.

In keeping with Kleiner’s (2004) contention that macroergonomists are suited to the role of “change master”, a macroergonomist serves as the Model Workplace facilitator for the joint team. The facilitator takes on many of the responsibilities which have been attributed to the “change master” (Kleiner, 2004; Sink and Morris, 1995) including

- *Collaborator*, who partners with other team members and the larger organization. Like the “change master”, the facilitator must be careful not to dominate the team (Sink and Morris, 1995) and instead must rely on influence to accomplish goals.
- *Expert*, who is often called on to share her expertise in user experience research, organizational change, and macroergonomics with the organization.
- *Inquirer*, who helps the team and larger organization constructively investigate user-related issues facing the business.
- *Data Gatherer*, who guides research strategy and the distilling of user data into actionable information for the business.
- *Structure Provider*, who sets Model Workplace processes, coordinates activities, and adjusts the Model Workplace to fit the organizational context.
- *Challenger*, who constructively questions decisions of organizational members or the larger business.
- *Educator*, who often trains organizational members on user research techniques in order to prepare them to participate in research activities.

A facilitator is also an *innovator*, who introduces new ideas to the organization. Most importantly, the facilitator is able to accurately assess the rhythm of an organization and adjust the tempo of a Model Workplace to match it. For a facilitator, expertise is less critical than the ability to successfully draw organizational members into the process.

A Theoretical Framework

Macroergonomics is a critical component that guides research and team practices. It defines the research framework used to evaluate the user experience, as well as how this approach should be applied in a particular organization. It is also the impetus for participating organizations to consider the fit between their business practices and user needs.

Macroergonomic principles mean that Model Workplace practitioners must gather data about the user’s environment, technology, social setting, and organization. This breakdown is especially appropriate for examining the user experience, as success requires the business to understand how their “technology” impacts other elements of the user’s world. Similarly, designing solutions without considering these different elements in both the user and client worlds will result in a sub-optimal solution. As these elements vary from one Model Workplace to another, no one single method of change or user-centered design is expected to be sufficient.

Thus, when determining the specific strategy for implementing a Model Workplace within an organization, the practitioner must consider how the business environment, technology, and organizational dynamics may impact the efficacy of this approach and customize the Model Workplace strategy for the current organizational setting.

Macroergonomics also stresses the need for alignment between “macro” and “micro” elements of a system, therefore both must be part of any user research and resulting organizational action plans. During a Model Workplace, emphasis is on gathering diagnostic information at all levels of the user experience, from overall functioning to individual elements. Focus is also on collecting the user data needed to fuel and sustain meaningful business change with variance analysis often playing a key role in identifying critical data.

GROWING LARGE-SCALE CHANGE IN THE DIVISION

The Model Workplace approach was used most recently by a large software division with several hundred employees inside a much larger company as a framework for systematically evaluating their user experience and as an impetus for change within their larger business. The division had recently committed to aggressive business goals and had

had a history of rapid growth, but was at the time wrestling with flattening sales.

Division leadership recognized that they needed to rethink business direction and better understand user needs in order to support their ambitious growth plans. To that end, they were already engaging in user surveys. While this work provided intriguing clues into flattening sales, it offered little actionable data that could yield specific product improvements. Also working against leadership efforts was the extent to which the division was fragmented in product silos.

At the same time, a new employee in the division began advocating Model Workplace as a possible approach for discovering user drivers for recent business events. The employee had seen the approach used successfully elsewhere in the company and rapidly convinced key managers of the value of the Model Workplace approach. These early believers then partnered with Model Workplace consultants to jointly determine that the division was a good candidate for this approach and to get senior management buy-in for the effort.

In keeping with previous Model Workplaces, the entire process took almost a year to complete. This process was comprised of five stages:

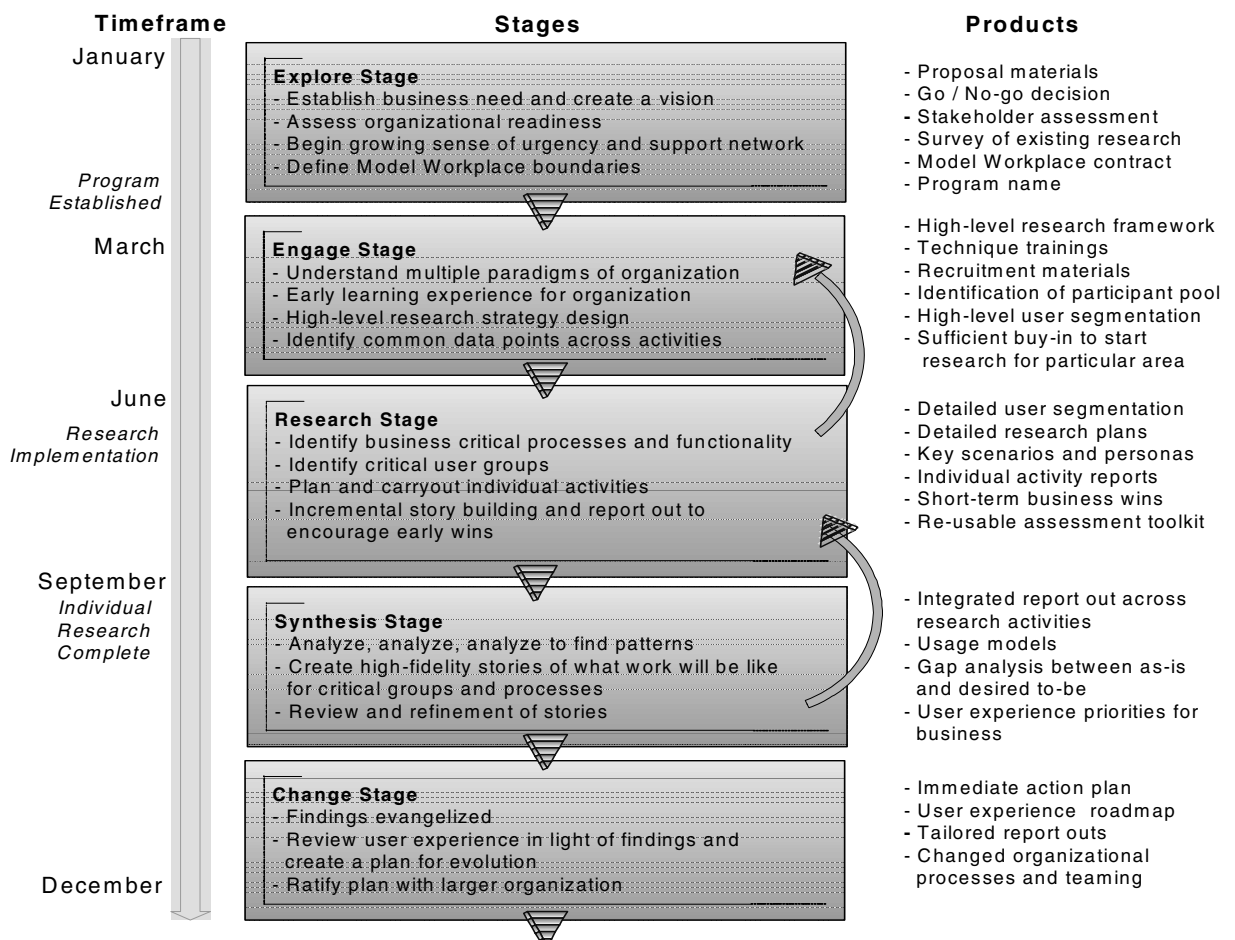


Figure 1. Timeline for division's Model Workplace

Stage 1: *Explore* whether Model Workplace was the right solution for the division.

Stage 2: *Engage* with the large organization to better understand the multiple perspectives that drove the business and to grow support.

Stage 3: *Research* how well the existing “technology” fits users and their larger work context.

Stage 4: *Synthesis* and analysis of the research data to find patterns of use and develop high-fidelity usage stories.

Stage 5: *Change* where research data is transformed into an organizational action plan for improving the user experience.

Figure 1 summarizes the division’s journey from first contact with the Model Workplace consultants to the start of institutionalizing the resulting changes within the organization.

A Closer Look at the Journey

Even after agreement was reached about the suitability of Model Workplace for the division, much had to be accomplished before the division was ready to move forward. As with all aspects of Model Workplace, this work was accomplished collaboratively. Underlying this collaboration was the assumption that division members know more about their business than the consultants, and their participation was a must for Model Workplace success. As ultimately the division owns their user experience and is responsible for implementing any solutions, the consultants must focus on passing on their diagnostic and problem-solving skills to division members as well as facilitating the solution process for any lasting change is to result from this partnership.

The division’s ownership of the Model Workplace process was bolstered by a Model Workplace contract being developed early in the process which detailed the responsibilities of the consultants, the division’s program manager for the effort, the joint team, the larger division, and senior management. To further encourage ownership, the division “named the change” (Nevis et al., 1996), resulting in what started out as a Model Workplace becoming the Customer Experience Research Program.

Getting the larger division to the point where members would willingly commit resources to the effort took many weeks and required much patience on the part of early advocates of the effort. The focus was on creating a virus for change by leveraging potential change champions within the organization who had a passion to assist in improving the division’s user experience but no outlet for their desires. These individuals became the catalyst for changing the larger division and helped role model change throughout the organization.

A key element of this strategy was creating a sense of urgency among division members; the division’s aggressive business goals helped greatly, but still required extensive communication by team members to grow this sense of urgency at all levels of the organization. As part of this

process, the team surveyed the existing user experience data and included that information also in their formal and informal communications with organizational members.

The team’s mission was further aided by providing the division with an early learning experience. The division was allowed to tackle a task that the consultants did not expect them to accomplish, but the division was confident that they could accomplish based on their understanding of users. Their subsequent failure left them more open to the possibility of the need for change and allowed the team to more easily grow a sense of urgency in the larger organization.

To further lay the groundwork for change, the consultants concentrated on preparing division members to take an active part in the coming research by training them on various user-centered skills, such as interviewing and usability testing. To ensure the consultants were equally prepared, individuals in the division trained the consultants on their products and business processes.

Care was taken to use influence, not coercion, to shift the organizational mindset. Although management commitment is critical as people are seldom willing to invest time and effort in a project that does not have management backing, using management to force the change seldom results in lasting change or significant change (Nevin et al., 1996). Emphasis was on extrinsic rewards (for instance, thank you notes to division participants and their managers) and other forms of positive reinforcement. Additionally, to reduce resistance and increase participation, the consultants were also particularly vigilant to the perception and reality of wasting people’s time.

The team also worked hard to grow trust within the larger organization in order to not drive resistance underground. They uncovered multiple organizational paradigms that defined the business reality for the user experience. By examining differences in these paradigms, they gained powerful clues about division functioning.

Slowly as the consultants and division members worked together, a new shared paradigm of the user experience began to emerge. Only then, could actual research begin. A further hurdle had to be cleared before a specific research activity could begin; namely, the buy-in of key organizational players for that segment of the process. Different product teams became ready at different time, which helped pace the work.

The research activities focused on pulling together different user experience elements (e.g., business process, products, collateral and training materials) into simulated but unscripted segments of the user work process. Research activities included interviews, usability studies, surveys, ethnography, and industrial-strength qualitative analysis. Examples of the data gathered included demographic, ease-of-use, user satisfaction, observations, and user benchmark data. In all, over 1200 users participated in this research.

As with other aspects of a Model Workplace, research activities were accomplished thru collaboration. Together, team members from the division and the consultant team jointly worked to identify key information based on business goals, joint design of research methods, joint implementation of research activities, and joint analysis of results. For instance, division members helped develop detailed interview

scripts focused on learning how experienced customers used their products and later went onto help interview users.

Next the collaboration's focus shifted to creating high-fidelity snapshots of the user experience in accessible story form and identifying opportunities for improving the experience. The story was evangelized throughout the organization, with multiple presentations of the information customized for specific audiences. Emphasis was on reviewing the existing system in light of findings, and facilitates development of concrete action plans for evolution of these items based on business priorities.

From the start, this work had an impact on the division. For example as part of this effort,

- Usability tests identified a number of barriers to developers evaluating the division's products. As a result, the division early on made some fairly simple changes to their evaluation process and the rate of customer product evaluations rose 40% or more for nearly all products in the very next month.
- Multiple research activities identified the interface of one particular product line as a poor fit with customer patterns of use. As a result, the product line is completely redesigning the interface from scratch.
- Much of the cross-functional team infrastructure that was developed during the Model Workplace helped breakdown silos and evolved into a standing body for driving the user experience based on business priorities at the organizational level.
- The original Model Workplace was transitioned into a \$1.8 million, two year user experience research program that continues today.

Even now, many months after the Model Workplace, division changes continue to occur. A usability architect position has been created, and the division is establishing usability engineering milestones as part of their standard lifecycle.

The user experience has become a new focus area for the division and shifted the division from a technology-centric to a customer-centric organization. It has changed the way the division develops new products, with user-centered activities integrated throughout product and collateral lifecycles.

DISCUSSION

A systematic evaluation of any user experience requires identifying and understanding the many elements of the user experience and their inter-relationships. The Model Workplace approach provides a method for examining the user experience and for balancing the sometimes disparate needs of organizational stakeholders. The division successfully used this approach to evaluate their user experience and as an impetus for change within their larger organization. The division now has a holistic and detailed view of who their users are, what matters to them, and what specific improvements will have the most impact their user experience. The results reinforced some of the things the division already knew about their users, but provided even

greater surprises for their business. In a year, Model Workplace shifted the division's technology focus to a customer-centric one, and as a by-product, changed how the division structures its business.

Although this paper has focused primarily on the application of this approach to one division, the approach has previously been successful in other organizations. This approach may be used to help organizations (1) trigger internal paradigm shifts based on how well their "technology" fits their customers, or (2) better deal with imposed paradigm shifts by assessing how well the new "technology" fits and helping the organization improve the fit.

This approach is most suitable for settings where (1) the "fit" between users and technology plays a critical role in overall business success, (2) the system involves multiple application or functionality interactions, (3) opportunities exist to make improvements based on results, (4) need to assess if technology is meeting strategic objectives, or (5) high fidelity user evaluations are required to assess strengths and weaknesses of new business processes.

REFERENCES

- Beer, M., Eisenstat, R., and Spector, B. (1990). Why Change Programs Don't Produce Change. *Harvard Business Review*, pp.156-166.
- Hendrick, H. (1995). Future Directions in Macroergonomics. *Ergonomics*, 38, 1617-1624.
- Imada, A. (2002). A macroergonomic approach to reducing work-related injuries. In H. Hendrick and B. Kleiner (eds.), *Macroergonomics: Theory, methods, and applications*. NJ: Lawrence Erlbaum.
- Kleiner, B. (1996). Macroergonomic lessons learned from large scale change efforts in industry, government, and academia. In O. Brown, Jr. and H. W. Hendrick and (Ed.), *Human Factors in Organization Design and Management*. North-Holland, Amsterdam.
- Kleiner, B. (2004). Macroergonomics as a Large Work-System Transformation Technology. *Human Factors and Ergonomics in Manufacturing*, 14(2), 99-115.
- Nevin, E., Lancourt, J., and Vassallo, H. (1996). *Intentional Revolutions: A Seven-Point Strategy for Transforming Organizations*. San Francisco, CA: Jossey-Bass.
- Sink, D. and Morris, W. (1995). *By What Method*. Norcross, GA: Industrial Engineering and Management Press.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the many individuals who worked to make this effort a success. The authors are especially grateful to Chuck Piper, Jim Prelack, Connie Woodworth, Al Vannoy, Luke McDonald, and Mark Rose. Special thanks also to Allyn MacInnes for her insight.