

# Negotiating Absent Practices and Dormant Features: Discourse as a Means of Shaping the Implementation of a Global Enterprise System to Meet Local Work Culture

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## ABSTRACT

The introduction of a new enterprise system to an organization often necessitates the accommodation of standardized practices, which may be in conflict with local users' practices and their work culture. We explore such a conflict in an India-based multinational organization using an eight-month interpretive case study. Based on grounded analysis, we present a narrative account of how consultants, on contract for managing the deployment and making necessary adjustments, used discourse as a means of shaping user understanding about the features and practices embedded in the underlying system, which were not initially realized through the interface. Sustained user resistance to this shaping led to a negotiated compromise and adaptation of the system to incorporate local work culture. Our findings allow us to explore the under-theorized role of discursive power within an implementer-user-technology trio, and illustrate the feedback utility of user resistance in developing culturally-inclusive designs.

## Author Keywords

HCI; affordance; appropriation, culture; discursive; Enterprise system; HCI4D; critical design; cross-cultural design; workplace studies; CSCW.

## ACM Classification Keywords

H.5.m. Information interfaces and presentation: User Interfaces—Theory and methods.

## INTRODUCTION

Technology appropriation has been a major focus of CSCW studies and Information System studies for decades [32, 36]. It is the process through which technology is evaluated by people over time and adopted, adapted and incorporated

into their work practices [8, 9]. Adoption involves a decision to use a technology to support one's practices. Adaptation is the process of modifying either users' needs and their existing practices to suit the artifact (i.e., user adaptation) or conversely, the artifact to suit users' needs and their existing practices (i.e., artifact adaptation), or both (i.e., mutual adaptation), entailing artifact redesign. Thus, appropriation seems to complete the design of technology through use – a point that warrants more attention [8, 9, 36]. Scholars across fields have investigated appropriation during software implementation calling for the acknowledgment of post-implementation modification to software and work practices of user organizations as part of appropriation for which businesses should plan and budget [25, 33, 58]. Rather than interpreting such mutual adaptation as a design failure, it may better be interpreted as productive steps toward creating a 'working system' [57]. After all, the alternative is non-use of technology [40].

As we shift to supporting the mutual adaptation process within software projects, we must study how users as a collective, rather than individual [53], come to appropriate the software and what modifications to the artifact are required as part of that appropriation [19, 32, 36, 50, 51, 57]. We focus on the first issue by presenting detailed evidence of a collective cognitive shift in how users thought about a standardized software package embedded with quite a different approach to work than the users had been accustomed to. We examine how system implementers, called "consultants", discursively shape users' collective understanding of software functionality and the underlying changes to local work practices that would accompany the implementation of a ubiquitous IT, an Enterprise System (ES).

Recent CSCW studies consider ES as an information infrastructure – a standardized integrated system that needs embedding in settings for which it is not explicitly designed [32]. Embedding often entails conflicts between the practices and culture that the artifact embodies (along with its supporters) and the local practices and work culture (along with its proponents). The resolution of such conflicts through artifact adaptation make the system generic, giving it the characteristic of an infrastructure [36, 45]. The

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discursive dynamics and the cultural underpinnings of these conflicts in developing the standard ES design into an infrastructure are less understood [29, 32, 37, 43], and scarcely studied within CSCW stream, although ES has become a ubiquitous collaboration technology [32, 36]. Similarly, while highlighting the point that appropriation and adaptation are ongoing processes as technology affordances emerge in context and through discourse, recent HCI affordance studies call for exploring discursive power, agency, and user voice within implementer-user-technology trio [19, 47, 53]. By addressing these issues, this study helps understand design as a process complete through use. These are our first set of contributions.

Drawing on the interactionist-relational view of affordance in HCI field, we coined the term “Technology Non-Affordance” (TNA) to highlight the relevance of features and practices that were not included in the standard design and were this not afforded. Here, discursive dynamics was central to (1) the attempts to impose a culturally exclusive design, perpetuated as the gold standard, on user communities, and (2) users’ opposition to realize the potential for the system to be adapted. Our eight-month long interpretive case study in an India-based Western multinational company (MNC) captures the emergence of the TNA-related conflicts between consultants and user groups and among user groups over artifact adaptation versus user adaptation. Sustained user resistance resulted in a negotiated compromise to accommodate local practices and work culture into the standard design. Thus, we address challenges in creating culturally inclusive designs and in incorporating organizational needs in a developing country—two important issues for HCI community [1, 48]. Specifically, we show the feedback utility of user resistance in developing culturally inclusive design, questioning the ethics of undermining user resistance which will be interesting to ethical HCI design [1, 48] – our second contribution.

### THE INTERACTIONIST-RELATIONAL VIEW

During the past few decades, HCI literature has been witnessing a gradual shift from a cognitivist approach, which considers affordances as individual user’s perception of action possibilities based on the properties of the artifact, to an Interactionist-Relational approach. The latter conceptualizes affordances as dynamically emerging properties of the interaction between users and their environment including the artifact [17, 55]. The interaction is influenced by the sociocultural context in which the interaction occurs, and involves adaptation [21]. This situated nature suggests that designers and their intermediaries (e.g., system implementers) can influence the ongoing process of emergence and adaptation [17, 34]. They can thus shape user understanding of affordances which are created through technology use [21, 47].

For such shaping, often, cultural means are used since they mediate human actions like technology use and adaptation

[22]. One such significant cultural means is discourse [48] between relevant actors, such as implementers and users. By definition, discourse provides the conventions and range of reproducible meanings through which actors find possibilities to make sense of social situations. Creation of discourse, thus, is an exercise of power to the extent it draws boundaries of possible interpretations, excluding alternatives. Hence, affordance is redefined thus: “The action possibilities posed by an artifact in use and associate the artifact with practices. They emerge as the material [the capabilities that afford or constrain users’ action as they interact with the artifact] and the discursive are fused together during technology use” [47]. In other words, affordances arise when users’ discursively constructed meaning and habituated use (part of practice) of technology meet their experience of technology features as they use or appropriate the features. Yet, in HCI affordance studies, with its focus tied on the micro level and individual users, the immediate context, the role of discursive power and articulated user voice are under-explored [19, 47, 53].

This paper presents a case study that draws on the interactionist-relational perspective but applies it in a context where features are not afforded but left dormant or absent based on discursive justification. In such contexts, the consultants’ discourse related to both affordance and non-affordance gains weight. Non-affordances are action impossibilities posed by an artifact-in-use, an understanding of which is shaped through discourses, particularly on system limitations or constraints. For example, the consultants suggest that certain features or practices (which needs connections between features) cannot be accommodated because the underlying system does not support them – even if it does. Such discourses influence user beliefs and understanding about what system can and cannot support [2, 24]. Subsequently, user experience of system limitations and constraints, as users interact with the technology, may reinforce their discursively shaped beliefs and understanding about what system cannot do. These discourses are more likely to be significant in a context where users are unfamiliar with the technology, and the technology is too complex for them to develop quick visibility into it or understand it on their own. Thus, users may find it difficult to perceive dormant features embedded in the standard design and figure out useful features and practices absent in the design.

Consequently, users would have to lend credibility to the perceived experts’, such as consultants’, discourse on system capability and limitations, even when they do not accurately reflect what the system is actually capable of. Users’ belief in system incapability or constraints, which rest on the consultants’ discourses, may motivate them to self-limit request for redesigning the system to suit their needs. Thus, users could be forced to adopt the standard design, muffling articulated user voice. On the other hand, as users grow familiar with the technology, they may oppose implementers’ discourse, creating conflicts, as the

MIS implementation literature shows [2, 20, 57]. This shift in the discursive power can trigger negotiation for resolving conflicts. Thus, overall, discourse becomes a central means of negotiating adaptation of the system over time.

With their focus anchored on enabling aspects of affordance, HCI affordance literature and CSCL studies tend to ignore these constraining aspects of affordance, the related role of the implementers' discursive power over users and their use of technology, and the ensuing processes [19, 22, 50, 51]. We aim to address these issues of technology appropriation and the role of discourse in the context of implementing an ES – an information infrastructure.

#### **RESEARCH AIMS: TECHNOLOGY APPROPRIATION AND DISCOURSE IN ES IMPLEMENTATION**

Our research aims are to explore the following: (a) How do ES consultants discursively shape user community's understanding of ES functionality and the underpinning changes to work practices during the implementation? and (b) How do users respond to it as they appropriate the technology, and with what implications?

Our focus on ES is important for CSCW studies, particularly, that adopt an information infrastructure perspective. The collaborative technologies that are developed within short time across a few sites have been dominating both early and late CSCW scholarship [27, 36]. Unlike them, collaborative technologies such as ESs are shaped and used across many sites, span decades, and accommodate evolving heterogeneous user practices. Their development and implementation involve interconnections of numerous modules/systems, dynamically evolving portfolios of systems and shaping by an installed base of existing systems and practices. Hence, they are characterized as information infrastructure [14, 32, 36].

ESs, one class of packaged work process-oriented global software applications, are large integrated systems with slight design differences depending on the industry package that is being sold. ES vendors typically divide their software packages into standardized application “modules” such as production, accounting, and human resources. Organizations hire vendor-certified “system implementers” who claim to tailor the system to client organizations' specific needs. Vendors integrate implementation experience with various clients not just to identify requirements but to incorporate the difference between the practices embedded in the standard design and the clients' local practices into the standard design. Such incorporations make the standard design more generic – a process called generification - within which design extends into the implementation and use of the system [32, 37]. This stretching makes the design process a ‘continuing design in use’ [13]. Thus, design is completed by intermediaries, such as implementers, through incorporation (or its lack) of local practices into the standard design as well by users via

appropriation or ‘improvised use’ [34] in response to affordances [60] and non-affordances.

During implementation, the globally founded generic nature of ES occasions conflicts between the software embedded standardized practices and the specific unique local work practices. As a recent review highlights, the ES and related studies across a range of traditions show that such conflicts are hard to reconcile as they involve cultural and political dynamics [32, 36]. Yet, “an infrastructure occurs when the tension between local and global is resolved” [45, p. 114]. Hence, a cultural-political understanding of these conflicts and their resolution is important [15, 23]. However, such examinations are scarce within CSCW studies [29, 32], although a review of early CSCW studies had pointed to this need [27].

The MIS implementation studies that examine this process typically attribute these conflicts and the difficulties to resolve them to the misfit between the standardized generic needs embedded in the package and the user organization's specific needs, both bearing cultural roots [44, 46]. The user organization's needs typically stem from the way an organization would have been operating for years [44], in other words, patterned work practices that are built on shared norms, values, and beliefs, which interactively form organization's work culture [41, 54]. Similarly, in the case of ES, its standardized needs rest on its inscribed-culture as explained next.

Explicit structures such as functionality and data are given material form in the ES as coded transactions (i.e., data), and tables and relations (i.e., functionality). Both are instantiated in the system as explicit scripts. The way these structures are designed creates technological affordances (and non-affordances) that enable and constrain roles, control structures, and organizational culture - latent structures of the system [46] that are not perceptible to users. In this sense, ES is inscribed (implying the latent nature) with a work culture, which is accepted as an integral element of the artifact that exists as part of the delivered package separate from its use [42, 46]. Hence, the conflict in accommodating local work practices can stem from the contrast between the ES-inscribed culture and the user organization's prevalent work culture, if such a conflict exists. Thus, to understand the cultural underpinnings of potential conflictual discursive interaction between consultants and users during ES appropriation, we need to examine the ES-inscribed culture vis-à-vis the user community's work culture. Therefore, we begin our research with the following question: (a) How does the focal user community's work culture compare with the ES-inscribed culture? We follow it up with the questions we raised at the beginning of this section.

#### **METHOD**

We conducted an exploratory longitudinal in-depth case study in an India-based MNO, WestIndia (pseudonym), which had an ongoing ES implementation.

### Case Background

From inception in 1996 until the take-over of WestIndia by another Western business group in 2006, the responsibility for developing organizational practices was largely rested with the Indian managing director. Within two years of operation, WestIndia became the market leader with a reputation for customer responsiveness. However, from 2002 onwards there was increased market competition. WestIndia responded by increasing the number of specialty products from 10 to 100, of which nearly 70% were custom-made. To facilitate this high level of customization, managers and their subordinates (below managers, staff comprising engineers and officers (e.g., accountants) and below them supervisors) were given significant decision autonomy. They were expected to improvise to meet customer needs and manage the uncertainties involved in unexpected customer demands.

In February 2007, the new owners asked WestIndia to implement an ES to get an integrated view of the firm. Sales presentations by various consultants followed, and the contract was awarded to a non-Indian firm that had successfully implemented ES in neighboring countries.

### Data Creation and Analysis

Our field immersion started in July 2007, when the first module was implemented. The field research was designed to gain access to individual interpretations of reality by collecting and analyzing language and actions related to the ever-changing perceptions of technology. This subjective reality is accessed through the articulations of participants as they assign meaning to what is said and done. This indicates an interpretive approach [59, 56].

The first author, hereafter Field Researcher (FR), conducted the field investigation and analysis as part of his doctoral dissertation. During data collection, he related with the organizational members as a doctoral researcher. Primary data came from 70 semi-structured in-person face-to-face interviews each lasting 60 minutes or more (see Table 1) and participant observation (including participation in ten meetings) spanning eight continuous months.

# of interviewees	# of times interviewed (# of person* # of times)
3 consultants	$1*1+1*5+1*3$
9 managers	$4*3+2*2+3*1$
14 engineers/officers	$3*3+8*2+3*1$
9 supervisors	$5*2+4*1$
Total # of interviewees: 35	Total # of interviews: 70

**Table 1: Details of primary data collection**

The interviews were conducted at-the-time, as the system was rolled out in the company, and either on the company premises or the interviewee's residence as per interviewees' comfort. Interviewees were selected through snowball

sampling. To track changes in an individual's interpretations, FR conducted systematic repeat interviews (see Table 1). The interview was loosely structured around two broad themes: the meaning and expectations that the actors attribute to the packaged software; and any anticipated or actual changes in the software/firm perceived by the interviewee to be noteworthy. This interview approach was devised to encourage uninterrupted storytelling related to issues of central importance to the interviewee [56].

Supplementary data from other sources included WestIndian company documents, group discussions, minutes of ES-related meetings and reports provided to WestIndia by ES consultants, and researcher's field notes. The group discussion was not focused and orchestrated. Instead, when engineers and supervisors came together (typically in plant office) or managers and engineers got together (typically in the canteen), FR would raise some questions which created the discussion. We used the constructivist version of grounded theory for analysis [10]. During fieldwork, we started exploratory coding, grouped related codes, and created focused themes, for example, 'ES design', 'culture', 'discourse' and 'system limitations'. Based on the feedback from key actors and their narratives, FR refined codes, groups, and their assignment to themes. Key actors were identified based on FR's ongoing assessment of direct and indirect influence that the person seemed to exert. They included two consultants, six managers, two officers, four engineers, and three supervisors. They were repeatedly interviewed. Besides ongoing feedback, near the end of the fieldwork, FR sought oral feedback on his analysis which he narrated to them one-on-one.

This feedback-refinement cycle was continued until these analytic elements formed a coherent story. From these themes, we considered literature on affordance and coined TNA as a way to explain the political dynamics around system limitations. Since discourse was another major theme that emerged in our cyclic analysis, we focused on it in relation to non-affordances. Hence, we captured various discourses through creating narrative accounts. The focus on non-affordance-discourse relationship helped understand the political interactions that emerged in the implementer-user-technology trio during the encounter between ES-inscribed culture and local work culture.

### FINDINGS

#### The contrast between ES culture and WestIndian culture

Prior to the ERP implementation, without systematically checking the availability of materials and machines, WestIndia used to accept all customer orders. Subsequently, the managers would negotiate with each customer to fix the customer delivery dates that were orally expressed and treated as guidelines rather than deadlines. The confirmed sequence and details of customer orders and the corresponding delivery dates in the form of a weekly

production schedule would be issued for production. Subsequently, and many times as the delivery date (promised to customers) approached since some orders would not have sufficient machines or material for production, WestIndia managers would negotiate with customers to get an extension on delivery dates. This negotiation strategy continued for a long time. The result was that some customers would start pressing the managers to expedite delivery. Managers would “push in” these “emergency” orders for production, stopping and replacing other ongoing production.

Since the pushed-in customer orders would not have allocated production materials, the materials reserved for ongoing orders would be diverted to these emergency orders. Employees called this practice material diversion. The reallocation of materials was usually recorded later at the employee’s convenience and sometimes it was not recorded at all, indicating a lack of time-bound action. The result was an incorrect record of material consumption. It led to poor estimates of material requirements, and in turn, a shortage of production materials at the point of production. The results were production schedule slippage and delayed production, which were normalized. Whenever the schedule slipped, the managers would again negotiate with the customers and the cycle would repeat, reproducing and reinforcing the underlying temporal norms and meanings, which conflicted with the ES-inscribed culture. The objective of ES is to maximize profit through improving efficiency. Inscribed templates are designed to achieve efficiency by fostering procedural adherence at the cost of improvisation by forcing time-bound actions. For example, the technical ES documentation at WestIndia stated: “for better control and efficiency...user has to strictly follow steps..and [standard] procedures ..and make real time [data] input”. Consistent with this statement, if users deviated from standard procedures or did not provide real-time input, the software would raise red flags and error messages. Moreover, compared to the local practice, ES demanded rigid temporal order. For instance, in contrast with customer push-in, in the standard ES at WestIndia, after the confirmation and issue for production, the order and the dates were unchangeable within the Customer Order table.

Below is a summary of this analysis vis-a-vis aspects of the ES-inscribed culture, highlighting the contrast between the two.

Aspects of Culture	WestIndian Culture	ES-inscribed Culture
Production related value	Adaptation to local and customer needs through improvisation	Consistency of products and processes through standardization

	on	
Procedure-related value	Local autonomy resulting in process variations	Standard operating procedures with rigid adherence
Norms	Flexible temporal order Temporal imprecision Schedule slippage	Rigid temporal order  Temporal precision Schedule adherence
Belief	Time as flexible Time as less bound	Time as rigid  Time as more bound

**Table 2: WestIndian culture versus ES-inscribed culture**

### The Role of Discursive Power, Emergence of Non-Affordance, and User Community’s Response

We present below a narrative account of consultants’ discursive shaping of user understanding of ES functionality and the underpinning changes to work practices and users’ response, which was contingent on their experience of non-affordances. While presenting this account, we use the following notations: (1) source of data is mentioned except for interview excerpts, and (2) FR=interviewer, M=manager, O=officer, E= engineer, S=supervisor, and C=consultant.

#### Phase 1: Discursive Creation of inherently constrained ES and the First Opposition (Jun 07 – Sep 07)

In the sales presentation, ES was portrayed as flexible. Although this point was not a major selling point, it caught audience imagination. Consequently, many organizational members understood ES as a technology which could be tailored to the organization’s needs:

E6: *Many of us felt that there was a best practice technology, standard, but customizable to our needs.*

However, three months later, in the first implementation meeting the consultants highlighted the ES’s inflexibilities. As one manager recalled:

M4: *It seemed the only way for us was just fall in line (adopt the standard ES). They (consultants) repeatedly highlighted that they could do nothing that would disturb the [ES] core...since the system is so complex and has some in-built constraints.*

All managers, officers, and engineers attended this meeting. Most interviewees had similar recall of this meeting:

O3: *The takeaway (of the meeting) was ‘better you guys change since [ES] cannot change much’.*

After two weeks the second implementation meeting took

place. In this meeting, the consultants repeatedly highlighted the constraints built into the standard ES. However, some employees, particularly, a manager (M1), opposed the ‘mere adoption’, and suggested that ES must incorporate WestIndia’s best practices. Many interviewees recalled this meeting as ‘M1 vs. consultants’:

E2: *That (meeting) was a fight. They (consultants) repeated the need for adoption and the in-built constraints...They rejected M1’s most suggestions, saying such changes were impossible to make (since) ES by its very nature required some standard integrated links and formats.*

Meanwhile, as the minutes of ES meeting reveals, the consultants had noticed that delays and lack of efficiency (employees’ and processes’) were serious issues that bothered WestIndia. Subsequently, the consultants presented adopting standard ES as a solution to these problems:

C1: *As we did in your (FR’s) presence, we’ve been telling them [ES] implementation would solve their problems: inefficiencies and delays. For this, they should use its best practices, replacing their local practices.*

When many users accepted this discourse, the consultants extended it adding that the adoption of the standard ES would only result in delay reduction and efficiency increase. They also linked this to the need for accepting ‘inherent system constraints that make certain changes impossible’:

C2: *If you want to be more efficient with no delays, you should accept the system’s constraints as well. Isn’t it natural that every benefit comes at a cost? We aren’t hiding that cost (in project meeting 4).*

Most managers bought into this discourse resulting in a shared localized meaning of ES: a delay reducer and an efficiency increaser with built-in constraints:

M3: *It’s like [ES] comes, and the company has to fall in line...The result is delay reduction and efficiency increase...you can’t anyway change (standard practices) much; the system won’t allow, so adopt them for your good.*

However, a few engineers and officers informally inspired by M1 had a different view although they shared the same localized meaning of ES:

O7: *[ES] can reduce delays and increase efficiency better by accommodating our best procedures, for example, material diversion...not mere adoption. These technologies can accommodate some modifications. (in an informal conversation with FR)*

Thus, while accepting the situated meaning of ES as a delay reducer, this group challenged the consultants’ discourse around the meaning of ES as a largely non-modifiable product. Further, while the consultant categorized some modification suggestions as technically infeasible due to inherent system constraints, the opposing group categorized them as feasible. An example from a testing session that further illustrates this struggle over categorization follows:

E7: *In cargo, we face unexpected strikes and so lose time and money...[ES] should capture this variation.*

C2: *It will disturb the master tables..they are linked to payment, creating problems there too. This system does not allow modifying the master table this way.*

E7: *There can be some things the system won’t permit, but my request does not appear that huge. Why don’t you try?*

This opposing discourse favoring customization, however, did not mobilize a significant number and was ignored by the consultants and others. Consequently, WestIndia went ahead adopting the standard design and started the trial use.

#### *Phase 2: Users’ Initial Experience of Non-affordances (Sep 07–Nov 07)*

By now, as this section shows, through trial use, users came to two realizations: (1) The main action possibility that ES provides is delay reduction; realization of which warrants using the standard ES practices on a daily basis, and (2) the consultants’ claim of ES functionality constraints are true as the users’ frequent use of the new system showed them. Illustrations follow.

E10: *I tried getting in logistic variations by using workarounds. But, the system needs some high level of standardization to create efficiency. If you don’t enter standard input, it outputs junk! So, you got to act as the system prescribes; standards alone aren’t the full story.*

M5: *There is a big difference between what ES contains and what we’ve been doing for a long time...we aren’t time bound. Delays are normal and fine. Due dates are flexible guidelines; we skip SOP sequence. But, in ES, due dates are rigid, you should adhere to sequence and act on time...these reduce delays, making you more efficient.*

The consultants had also realized this contrast between the ES’s temporality and WestIndian temporality (see Table 2). The consultants anticipated that this contrast could potentially result in significant requests for customization. Below is an excerpt from an informal conversation with the consultants:

C2: *Huge work ahead (referring to the contrast). Buckle up to fight your way out or use the trick of the trade.*

FR: *What is the trick of the trade?*

C2: *...tell them it (user suggested modification) is technically infeasible, and make them buy it.*

Thus, categorizing users’ customization request as technically infeasible was the consultants’ intentional strategy to reduce customization, and hence was political in nature. This discursive control gradually undermined the articulated opposing voices.

Simultaneously, in coalition with some managers and linking to the issues of user discipline, the consultants created another discourse, which suggested that the standard ES design had the potential to bring about desirable discipline, for example, temporal discipline

around workflow:

M5: *We don't have proper records and time sensitivity..we need discipline. As [consultants] rightly say, [ES] helps here. I realized this in my daily use. [ES] can discipline and make us efficient...We (managers) have been helping them (non-managerial employees) understand it.*

Thus, the affordance of delay reduction and temporal behavioral discipline emerged in trial use as users were guided by delay reduction and discipline discourses. These affordances also confined interpretation of ES to delay reducer and discipliner and constrained user appropriation of ES features for meeting local needs. They also implied the need for the change in users' temporal workflow, local work practices, norms, and values. As a result, the local work culture would change for the better. Consequently, users did not pursue any of their modification suggestions once the consultants categorized them as technically infeasible, accepting this point. Illustrative excerpts follow:

O4: *If you are not doing the job the way system demands, it will catch you with warnings and errors...I realized that, as they (consultants) say, certain actions like clustering are impossible...so, we stopped wasting time on suggestions.*

E3: *Now, time runs out...we've to finish in time; it's the system forcing us to do so...we become more efficient.*

Thus, users experienced a quick change in their work culture – a shift to ES-inscribed culture (see Table 2) which made certain actions that they used to perform regularly, now, impossible. This TNA experience reinforced the credibility of consultants' discursive creation of TNA. Gradually, non-affordances became the cost one pays for experiencing certain new affordances while realizing the valued benefit – “increased efficiency”. Hence, in users' cost-benefit analysis, the discursively privileged highly beneficial efficiency increase justified perceived system constraints and thus further enhanced the credibility of the consultants' TNA discourse. Then, whether the technology design was factually non-modifiable was irrelevant because the discourse itself was powerful enough to convince but for a limited time as the next two phases show.

### **Phase 3: Recurring Non-affordances and the Second Opposition (Nov 07 – Jan 08)**

As the trial period progressed, the users experienced that the ES subjected them to more elaborate systems of recordkeeping and accountability (than the existing ISs did). This realization led to the second round of opposition to consultants' discursive creation of ES as a beneficial inherently non-modifiable product. Thus, while the manager-consultant coalition portrayed the ES as a beneficial discipliner favoring adoption, based on their experience and prior understanding, a group comprising some officers, engineers, and supervisors articulated ES as a disciplinary constraint that is detrimental to WestIndia and individual employees. Illustrative examples follow starting with an excerpt from a group discussion:

S8: *Also due to integration, ES doesn't allow you to violate procedures...it forces you to do things in time...We lost the freedom to decide on the fly...that flexibility had been cherished here.*

E4: *Efficiency at the cost of quality and flexibility, the hallmarks of WestIndia...Adoption brings more stress...In our system, we deviate from procedures; no one questions. It gives us...flexibility that we are losing now. In ES, others can see the violations; that makes us more monitorable.*

Next is an interview quote.

S5: *We can't deviate from the standard procedures as we used to do...It's not that the (ES) standards can't be modified. In some cases, it's possible but [consultants] just label them impossible; guys here buy that.*

This group realized the loss of a valued action possibility – the possibility to skip procedural steps, which allowed exercise of their decision autonomy. They found this action impossible within the ES. However, since they were suspicious of the consultants' categorization and believed that ES could accommodate local practices, instead of creating workarounds or appropriating partially, resumed challenging the consultants' discourse and categorization discursively. In certain instances, the opposition was explicit. An example from purchase module discussion follows:

M5 to M1: *When you suggest modifications, you should keep in mind the technical limitations of [ES].*

C2: *Look, I repeat, the system is pretty much complex...with accumulated limitations. Database and the language have its limitations and constraints; no one can do anything.*

(The argument between purchase staff and the consultants went on for half an hour and finally)

C2: *I can make the due date field editable; you vary the date depending on the vendor. But it's always better to standardize...it's not that we are reluctant to modify, but the system doesn't permit, it just cannot (permit).*

M4: *What we are asking is not that terribly basic..It can't be that impossible.*

Meanwhile, M1, whom many took as the informal leader of the opposing voices, was terminated from employment. This signaled a threat to the opposing group, and subsequently, the public opposition waned. Yet, in private conversations, many users grew skeptical of consultants' TNA discourse and categorization, although they had experienced non-affordances.

### **Phase 4: The Third Opposition and the incorporation of the local culture (Jan 08 – April 08)**

Although the consultants' political strategy of discursively shaping user experience of affordances and non-affordances to consultants' advantage had largely been successful so far, a significant number of users now started believing that the ES was modifiable:

M6: *Initially I believed that it (ES) can't be customized due to system limitations. Now, that belief is changing. I don't mean there aren't any system constraints. But, when we persist and pressure [consultants], their standpoint changes. So, there's this hope: we can get [ES] customized.*

As this excerpt indicates, this group that had so far been in coalition with the consultants, believing in consultants' justification of technical infeasibility for not incorporating user suggestions, now, noticed consultants yielding to some persistent demands. Hence, they started suspecting the credibility of consultants' TNA related discourse and believing in the opposing group's discourse:

M5: *Perhaps, they [the opposing group] have some points...Sure [M1], with his long experience, knew a lot.*

Meanwhile, in the [ES], the users had been searching for more features, which they had repeatedly been using as part of their existing work practices, such as a utility to do the what-if scenario analysis and perform customer push-in. The standard design did not support or include them. Hence, the consultants had to agree that the current version of ES was limited in its features. Users labeled these limitations as *system deficiencies* that needed improvement rather than as system constraints. Hence, managers in unison suggested incorporating certain local practices as a way to enhance the ES's functionalities. An illustrative example follows.

M6: *Here, we have a number of variables, which the [ES] is unable to factor in. It has limited features and is deficient in what-if-analyses, job clustering, dynamic scheduling, etc...If the system could dynamically self-rectify based on our feedback, we could've relied on it, avoided customer push-in and sorts (in a meeting with the consultants).*

Simultaneously, following trial use, the group that had initially sided with the consultants, along with a manager and officers/engineers who had been opposing the consultants' discourse, reflected on their interaction with the ES and the opposing discourse. Subsequently, they realized that by accepting the standard design, they were losing their decision autonomy and customer responsiveness. They decided to use these criteria for selecting the local practices for incorporation and to compel the consultants to yield to their demands pointing to the potential loss of customer responsiveness. The management had considered customer responsiveness as WestIndia's competitive advantage, and hence it had significant import. Gradually, the group mentioned above started citing the potential loss of customer responsiveness and the absence of certain features as the two grounds to demand incorporation of these local practices such as customer push-in, material diversion, and job clustering:

M3: *Adopting (ES) procedures will reduce our flexibilities. We've to rather completely rely on the system. This [ES] doesn't have many (design) features that we need...so, better we retain our flexibilities. If we don't, we will lose customers. This is our standpoint now.*

These employees created a new localized meaning for the ES, a flexibility reducer, an argument that was raised in the second round of opposition. In this new discourse, flexibility meant the capability to respond to customer needs dynamically that is enabled by certain local practices, freedom to make changes, and the skill to respond creatively to unexpected variations. As mentioned in the case background, these were valued aspects of WestIndian work culture. Illustrative examples follow.

M2: *Efficiency is good...but we also need exploration provisions...that skill to manage the unexpected is flexibility...these have been our traditional competencies.*

E3: *(standard) [ES] almost eliminates our flexibilities... soon we'll be at the system's mercy. (Chat between engineers and officers, field journal notes).*

Given that the previously opposing group had raised flexibility reduction (but not in terms of customer responsiveness), this discourse rapidly picked up momentum. The consultants kept warning WestIndia that incorporation of such local practices would significantly change the ES design, and reduce potential benefits for WestIndia. However, simultaneously, consultants started making a cost-benefit analysis of the customization and discussed this idea with the vendor over two months. Finally, apprehending the intensity of user opposition and a consequent potential contract revoke, the consulting firm agreed to develop a more flexible ES for meeting WestIndia's needs and work culture. In return, they asked WestIndia to be the consultants' service ambassador in India. Users demanded for incorporating customer push-in, material diversion, job clustering, what-if-scenario analysis, and pre-batch processing. However, the consultants informed that they could incorporate the practices that would retain customer responsiveness and would not take more than three months to complete. Users found these criteria satisfactory on the following grounds: (1) customer responsiveness was their main concern and the practices related to customer responsiveness retained their decision autonomy to reasonable extent, (2) the top management was getting concerned about time overrun. Thus, the conflict between users and consultants was finally resolved through a negotiated compromise.

The redesign included the development of user interfaces that linked the sales, production and materials modules, and a number of changes that enabled users to (a) push-in customers manually, (b) material diversion: re-allocate material reserved for job orders to fill emergency orders, and (c) enter output data from their spreadsheet-based what-if analyses into the ERP. The first change had been users' demand from the beginning of phase 4. The second demand was initiated by M1 and others in phase 1 and re-appeared in phase 3 and phase 4. The third was a compromise move: although users demanded incorporation of what-if-scenario analysis, they realized that it would take more than three months. Hence, users agreed to consultants' suggestion.



These changes required both activation of dormant features, inclusion of new features, and interconnection of features to create new work practices. Consequently, the temporal rigidity of the ES schedules was reduced. Still, in other modules, time-bound action was maintained. By adapting the standard ES design, WestIndia appropriated the system that embodied contrasting temporalities: rigidity (i.e., the culture inscribed in standard design) and flexibility (an aspect of the local culture). This adaptation created a culturally inclusive design that is sold widely as a generic product with work flexibility as a distinctive feature.

## DISCUSSION

This study presents a narrative account of how discourse is used as a means of shaping user understanding about the underlying features and practices in an ES which are not perceptible to the users. The study maps the entailing conflict between the proponents of global, standardized work practices embedded within the ES (demanding user adaptation) and supporters of locally valued work practices (suggesting artefact adaptation). Our in-depth case study explains how power relationships within implementer-user community-technology trio manifest in active discursive creations of situated meaning of technology through consultants on the one hand and local meaning that unfolds and changes through continuous user opposition on the other. The sustained user resistance led to a negotiated compromise. These contributions are important since HCI literature and CSCW technology appropriation literature have rarely examined such discursive power relationships and conflict resolution process closely [22, 26, 47, 48], while they are crucial to the process of completing design through use [36, 37] and to understand its ethical underpinning [3, 4].

The study shows how, despite initial resistance from a user group, consultants used discursive creation of TNA and supportive situated meanings of technology which compelled users to self-limit their suggestions to modify the standard design – one that was presented to them as the gold standard. Hence, attending to TNA may reveal the process of imposing a culturally exclusive design and perpetuating it as the gold standard – a common concern of ethical and culturally sensitive design [48], cross-cultural design [1, 47], and post-colonial studies [4, 18].

However, the perpetuation may not last long, if there is sustained meaningful user opposition, as our study illustrates. If users reflect upon their co-workers' sustained resistance along with their multiple interactions with the technology, the consultants' discursive shaping, and their yielding to the opposition, the initial resistance may mobilize others to the extent that the resistance is value-based rather than person-based [52]. Such collective user resistance can lead to the emergence of a culturally inclusive design that incorporates local practices. Following the perspective that is dominant in organizational change studies [52], recent ICT4 D and HCI4D studies consider

user resistance to adoption of the standard design as a bottleneck to overcome [e.g., 39]. Our study argues for a shift from this approach to understanding user resistance as productive [12] – a potentially useful feedback for creating a culturally inclusive design. This shift would help advance the design goal of “pluralism” that the third wave of HCI research pursues [5], given pluralism comes from thinking significantly different from way the dominant perspective prescribes. Although technology appropriation studies describe an alternate way of resisting, a passive resistance of non-use [40] or a non-evaluative approach to resistance [8], not all contexts may allow non-use. For example, often, in developing countries, work systems, which claim to replace traditional local practices with modern globally best practices, bring with it the impetus to adopt to these ways of working because one is paid to do so.

As technology appropriation literature, particularly from the information infrastructure perspective, suggests, design is an ongoing process that is complete through implementation and habitual use [7, 8, 36], which indicates the need to design for appropriation. The appropriation studies argue that informing designing-for-appropriation requires an understanding of how users attribute functional values to software [37]. Our study shows that functional values such as delay reduction that users attribute to the artifact, in the beginning, may depend significantly on the situated meaning of artifact that the consultants discursively create due to lack of user perceptibility of the underlying system. This dependence, however, can change as users grow familiar with the technology through repeated use, and as they start questioning the consultants' discourses based on their technology use, making their own collective meaning of the artifact. Beneath the expressed functional value and collective meaning lies the cultural value (which users may become cognizant of in due course). For example, while delay reduction privileged the cultural value of efficiency inscribed in the ES, customer responsiveness and dynamic customer prioritization privileged the cultural value of flexibility that underpinned local work practices. Hence, to the extent technology appropriation is a process of meaning making that involves cultural expressions, in short, cultural appropriation, [26] designing for appropriation should involve an understanding of cultural appropriation. This cultural appropriation, as our study illustrates, is inherently political since it encapsulates the question of whose cultural values count.

When designing for appropriation, designers should identify the adaptation means to be offered to users [40, 51]. Considering designing as a cultural engagement may help designers in this process since as our study shows, the requirement for adaptation of the standard design and related tension often arise from the mismatch between the artifact-inscribed culture and the users' existing work culture. Such a step would facilitate development of culturally sensitive design. Finally, if technology appropriation is considered as an interaction between the

local culture of the user-community and designer community's culture, an ethical approach to design for appropriation may privilege local culture in case of irresolvable conflict between the two cultures. This is because, finally, it is not designers but the user community who has to live with the technology. Of course, it raises a question of which user culture should designers privilege, in the case where conflicting subcultures exist within the user community.

Within our case, cultural inclusion via artifact adaptation indicated generification, since subsequent to the adaptation the incorporated cultural practices became a distinctive feature of the artifact in vendor packaging. Hence, this study shows the fine-grained political work that stemmed from TNA experiences which led to a specific generification strategy – cultural appropriation. While the existing information infrastructure studies focus mostly on generification prior to diffusion of the artifact [36, 43], our study details post-diffusion generification. Together these insights suggest that generification is an ongoing multistage process.

Regarding the fine-grained political work, this study highlights shifts in user discourses from supporting to opposing the consultants' discourse and the consequent negotiated compromise that involved not only persuasion but also perceived coercion (e.g., consultants' apprehension of contract revoke). Such nuanced understanding is necessary to advance the scholarship on the work involved in accommodating and developing information infrastructure [32, 36]. We further show how users form different interest-based groups and shift their interest over time, breaking away from the discursive coalition with consultants later to form a new coalition with other user groups. This dynamic account enriches the less-nuanced picture, which is prevalent in the extant literature, of pitting single user group with unvarying interest against consultant in developing information infrastructure and global software [36, 37].

Overall, this study argues for two expansions to broaden our current understanding of technology appropriation and connect it to related HCI scholarship: (1) conceptualize the dialogical interaction [49] between designers/ system implementers and users as a cultural-political engagement, rather than merely as appropriation, in which users' right to dissent is enshrined. Such a broad conceptualization fits within the suggestion of postcolonial designers to explore design as culture [28]. This step could transform the interaction into a democratic process that is ethically sensitive – a goal within the HCI4D scholarship [31]. (2) Explore the conflicts related to development/implementation of information infrastructures as not merely issues of knowledge integration [30, 38, 43], but as a cultural-political dynamic that entails ethical considerations beyond a cost-benefit based negotiated compromise.

## CONCLUSION

This study urges HCI scholars to examine designers/implementers as political actors who struggle to advance their self-interest using cultural means such as discursive creation of TNA with ethical implications for culturally sensitive designs. We thus show how attending to the emergence of non-affordances can become useful for developing culturally inclusive design.

We advocate a dialogical design process [49] to integrate action and meaning in cross-cultural design, which would make work systems usable, ethical and meaningful to those tasked with effectively utilizing the system. The key aspect of this approach is to consider user resistance as productive and a process valuable at par with the exercise of power by change agents such as implementers. Such a design approach could facilitate user empowerment and development of a critical reflective perspective, one of the stated objectives of critical HCI scholarship [4] and postcolonial computing [5].

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