

## FACTORS INFLUENCING BPM TOOLS

### The influence on user experience and user interfaces

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#### **Abstract:**

Business process management (BPM) tools are categorised as enterprise software, which offers many layers of functionality in producing effective and optimised business processes. One of the most important components of successful business process management is the group of enterprise software users - those people who interact with the workflows at various points in order to enable a certain task or objective to be completed. Good user interface design offers considerable benefits to these users. When user interface design complements the way users think and learn, accommodates their physical needs, and meets their expectations for comfort and convenience, the interaction of human and machine becomes more productive. This paper focuses on factors that impact on the user experience when using business process management tools to complete the tasks in support of business processes.

Keywords; User experience, human computer interaction, user interface design, BPM tools

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#### 1. INTRODUCTION

Business process management (BPM) tools belong to a complex category of enterprise software and a comprehensive BPM solution offers many layers of functionality to produce effective, optimised business processes. One of the most important components that determine the success of using business processes falls outside the software realm, and relates to the users, – those people who interact with the workflows at various points to enable a certain task or objective to be completed [Miers and Harmon, 2008].

Many BPM platforms involve the end users as part of the BPM development process, which works well in creating an initial process that seeks to improve an existing workflow within the enterprise, or in creating a new automation based on the study of user-work patterns. However, once a BPM application was launched in the enterprise and is used regularly by the end users, understanding their work patterns becomes even more critical to the ultimate success of the process. No matter how efficient or

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streamlined a particular business process was made using BPM technology, if the end users cannot use that application correctly the technology may be superfluous.

There is often little insight into what is actually happening when a business process application is used. While many BPM solutions provide feedback loops that track how well an application is performing based on traditional application management metrics, there is little insight into the way users interact with the application, what pages they are using, what areas they get stuck on for longer than anticipated, or alternative ways that they find of addressing problems that repeatedly arise and that may be inhibiting the ultimate performance of the process.

Thus to ensure that an organisation is maximising the efficiency and effectiveness of its business processes, there needs to be a component that incorporates the user experience (UX) when designing the BPM tool. Currently, there is a paucity of knowledge and research in the literature pertaining to the UX in using and designing BPM technology. In this paper we address this need by identifying the factors that impact on the UX and the user interfaces (UI) of BPM tools, specifically in the South African context.

In order to discuss the factors to consider from a user experience perspective for BPM tool use, we first give some background in section 2 by providing an overview on what UX is, BPM tools, BPM in South Africa and issues regarding BPM in UX. In section 3 aspects of the data collection approach is described, followed by the findings on UX in section 4. Section 5 concludes.

## 2. BACKGROUND

### *User Experience*

User experience (UX) is a term used to describe the overall experience of a person's interaction with a product or system [Garrett, 2000]. It is most commonly determined by the result of the integration of software design, business, and psychology concerns and can apply to the result of any interaction design. Several articles, presentations and conferences have been held relating to UX but yet no conclusive conventionally accepted definition of UX has been passed [Reiss, 2009; Law et al, 2006; Roto et al, 2008]. Several authors have proposed varying aspects defining UX, depending on the author's disciplinary viewpoint.

Variations in defining UX arise as a result of the multidisciplinary nature of UX. Designing for UX encompasses a variety of related aspects. Figure 1 depicts the interrelations between the aspects defining the nature and scope of UX.

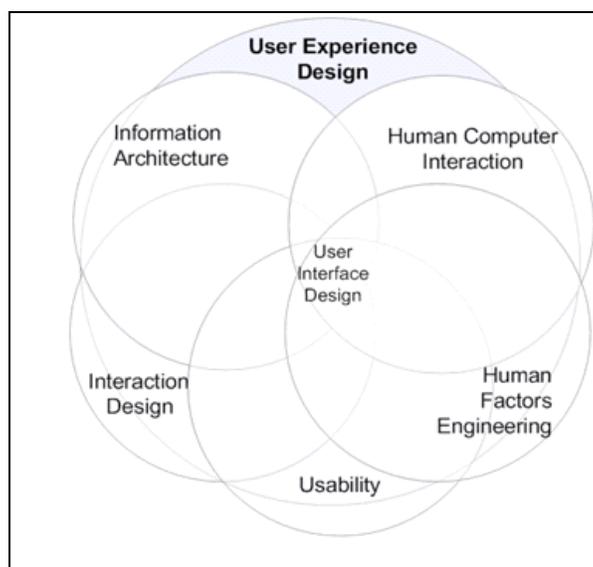


Figure 1: UX disciplines [Hess, 2009]

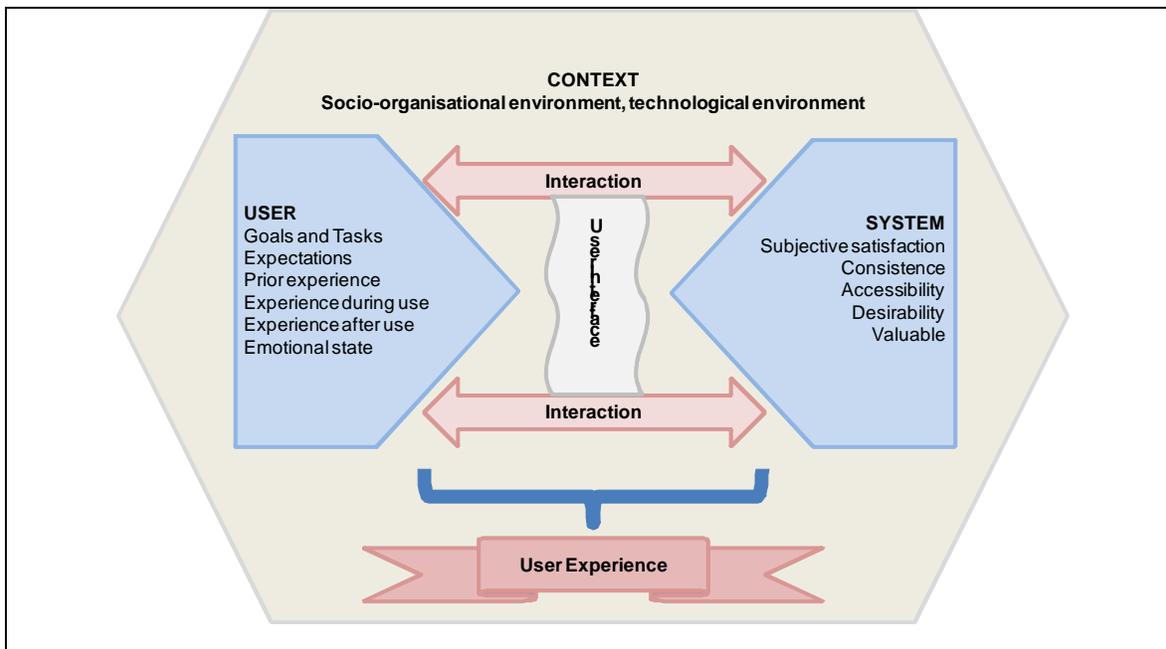


Figure 2: UX building blocks and facets [adapted from the ideas of Roto 2008]

The success of products is determined by a positive UX. UX is primarily influenced by the user interface and therefore by the design of the user interface. Good user interface design facilitates the completion of the task at hand. In order to gain an understanding of the way UX is affected by the user interface design, it is important to understand what elements comprise UX and the way these elements contribute to a design that ensures a good UX.

In the web environment, UX is at times used synonymously with usability, information architecture and user interface (UI) design, all of which are in fact components of UX. Nielsen and Norman [2004] describe UX as more than just user interface design. According to them it encompasses all aspects of the end-user's interaction with a product or system.

Drawing inference from the UX description, Roto [2006] argues that UX consist of three building blocks, namely user, system and the context of product use as depicted in Figure 2.

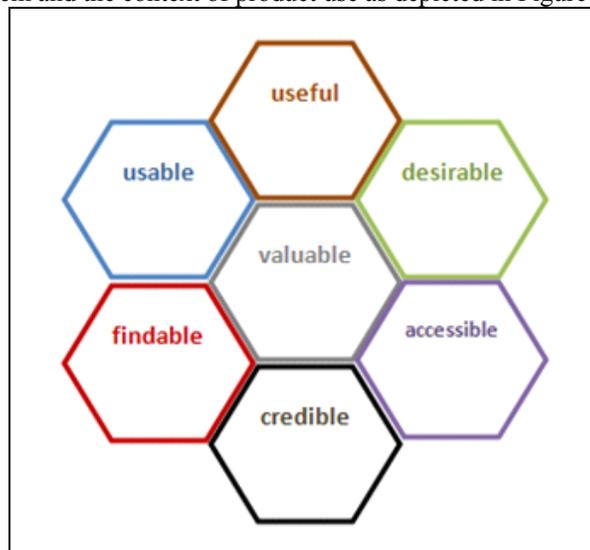


Figure 3: The honeycomb of UX [Morville, 2004]

Morville [2004], an information architect, cites seven facets that are relevant to the UX and which assist designers to move beyond usability. The Morville 'honeycomb' (Figure 3) serves several purposes: it is a tool for advancing beyond usability and for helping people understand the need to define user priorities. Morville explains the honeycomb model by asking the following questions:

- Is the application useful to the individual user and the specific task?
- Is the application usable by the individual user and the specific task?
- Is the application desirable for the individual user and the specific task?
- Is the application valuable for the individual user and the specific task?
- Is the application accessible and available to every individual user, regardless of disability?
- Is the target findable for the individual user and the specific task?
- Is the application credible for the individual user and the specific task?

UX design is therefore aimed at describing the user's satisfaction, delight or success in terms of an application, product or website. Furthermore, elements of UX may differ depending on the kind of application involved. For example, Garrett [2000], states that the differences found between web-based application software exemplify the different task-orientated systems; and that the web, as a hypertext application, is an example of an information orientated system. Although Garrett [2000] primarily refers to web-based applications, the task-orientated nature of the elements makes them applicable to a wider range of software. BPM tools are examples of task-orientated software whether web-based or not. In order to support a good UX, a UX design process and a user-focused design approach are required.

Literature indicates that most of the application tools fail to produce a positive UX [Lauder 1995], [Gilbert, 2003]. At times users find the different parts of the system to be working differently from their expectations and requiring different types of interaction throughout the system [Mathews, 2008]. Such interaction problems result in user frustration, confusion and lack of trust in usefulness and value of the system in supporting accomplishment of their goals. This is as a result of the lack of a common understanding of UX and a lack of formal frameworks and evaluation metrics for UX. The challenge facing application developers is to develop UIs that help users locate information easily, are easy to learn and satisfying within a context of use [Scholtz, 2006].

UI design and UX are therefore of significant importance in the design of any interactive system. A tool's UI is critical for human-computer interaction. To the end user of any application tool the whole system is often judged by the UI [Scholtz, 2006]. Thus the system's acceptance, success or failure is largely determined by its UI from the end user's perspective. It is thus important that the software developers should consider UI design directions for the intended users of their products.

### ***Business Process Management***

BPM technology supports the definition and execution of business processes. A business process is the set of all formally coordinated tasks and activities conducted by both people and equipment that leads to the accomplishment of a specific organisational objective [Perkins *et al.*, 2002].

Jeston and Nelis [2008] defines *BPM* as: 'The achievement of an organisation's objectives through the improvement, management and control of essential business processes'. BPM is a set of methods, tools and technologies used to design, enact, analyse and control operational business processes, and spans people, systems, functions, businesses, customers, suppliers and partners.

BPM is a process-centric approach for improving performance that combines information technologies with process and governance methodologies. It entails collaboration between business people and information technologists in order to foster effective, agile and transparent business processes [Jeston and Nelis, 2008]. From these perspectives, BPM impacts on cultures, roles, responsibilities, accountabilities, competencies, jobs and communication within the organisation.

Implementing BPM technology can assist an organisation to streamline organisational processes. However, in order to use BPM effectively an organisation must develop and acquire process management competencies [Smith and Fingar, 2004]. Such competencies equate to three components: namely business strategy, process implementation and people using both of the former effectively and efficiently. People competencies are considered to be requirements that are often referred to as the usability criteria of the system.

### ***UX in BPM***

There are conflicting opinions regarding UX and the influence it has in the corporate environment. In his blog articles, Anderson [2009] provides some updates and insights about UX in the corporate world. The

argument is put forward that UX can be repositioned as 'user insights'. Not only would this allow for more input but also for the user to be included from the onset. The argument is that designers include the users at a later stage of the design process, as they perceive UX to only be part of a semi-completed design.

What is evident in the literature and in BPM forums is that building a BPM UX competency requires three primary components [Moore, 2002]:

- A sound understanding by senior managers of BPM's strategic importance to the business.
- The setting of clear targets by strategists, defining precisely how BPM is going to be used.
- The possession of appropriate skills by implementers so they can do their work effectively and efficiently.

In the BPM environment every person is treated as an individual. The employee or individual can take on one role, but will usually be responsible for a number of roles, such as consumer, customer, user, client, investor, producer, creator, participant, partner, part of a community, member, to name but a few. Each person thus adopts a different role depending on the circumstances. It is furthermore important to note that UX takes the individual into consideration, as experiences can be part of a multilayered process [Markova, 2007].

### ***BPM in South Africa***

The cultural diversity of South African society has important implications for software and business processes. To cope with cultural diversity and still ensure optimum performance, a designer needs to know about a wide range of factors that will affect a person's work and social behaviour in a technological environment. This implies that the South African designer cannot function effectively without including ethnographic techniques in a toolbox for the design of BPM tools.

In South Africa, as in most developing countries, a chasm exists between the technological 'haves' and 'have nots'. Particularly for the have nots/deprived, the situation is very different, as users from these communities have different expectations of technology. Decision makers involved in BPM, and then more specifically in workflow and approval processes, are not immune to the impact of culture in the South African context. It should therefore be noted that the leadership paradigm has an important impact on the business processes in the organisation and, in addition, it impacts on the BPM in the organisation.

### **Factors that impact on UX in BPM**

In order to determine the factors that impact on UX in BPM, a study of the published literature was conducted to investigate and establish a theoretical framework for the typical factors that may have an impact on business processes. The literature study was combined with case study research, which incorporated focus groups, interviews, user observations and questionnaires as data collection techniques. This paper specifically reports on the findings from the literature review and the focus group with the emphasis on the UI of BPM tools and the factors that impact on the UX when using the tool to complete the tasks in support of business processes.

### ***Literature review***

BPM is a systematic approach to improving a company's business processes [Jeston and Nelis, 2008]. Process orientation starts with understanding the workflow and identifying manual processes that are highly repetitive, take place in high volume or are very sequential in nature. BPM starts with process modelling in order to understand workflows and identify manual and system automated tasks. However, the objective of process analysis today is not simply to eliminate manual efforts, but to understand the interactions and dependencies among the people, the systems they rely on and the information they require to do their jobs most effectively.

### ***Focus groups***

To ensure a better understanding of the interactions and dependencies among people and technology as described in literature, we conducted focus groups with representatives from various organisations.

For the focus group participant selection, purposive sampling was applied. The selected participants consisted of a diverse group of people with the intention of obtaining a range of inputs for the study, and this diversity contributed to the validity and reliability of the results. The criteria motivated the inclusion of decision makers involved in workflow and approval processes, as the literature review provided evidence that people in these positions are important for understanding BPM in the South African context.

Focus group participants included a number of representatives of South African BPM companies that have several clients in other African countries. The participation of these companies assisted in adding background information on business processes in South Africa and other African countries. Other sectors represented in the focus groups included a range of organisations from the mining, financial and government sectors.

The focus group discussions were guided by the topics identified from literature (section 2 and 3.1). The findings obtained from the discussions were grouped according to themes as the topics were discussed. The data collection involved representatives from small and medium-sized organisations in the Gauteng (South Africa) region.

Three different focus group discussions were held in the Johannesburg and Pretoria region. A total of 25 people, representing various organisations and a variety of sectors, participated in these discussions.

During the focus group discussions, each participant was asked to comment on what the organisation is *actually like*. The question focused on issues relating to the 'lived' norms and habits of the specific organisation and its employees. The majority of participants agreed that the organisational culture forms a part of organisational life. This refers to 'the way we do things around here', and includes both the bad and the good habits that become entrenched in an organisation. The discussion at times yielded stronger descriptions of the organisation – that friendliness at times was a substitute for a lack of clarity of purpose, informality masked an inability to function, that a deferral to management pointed to an absence of a specific function. All agreed that together with the organisation's mission, vision and strategy, the organisational culture constitutes the organisation's identity and expresses the way in which it conducts its work and business.

In an attempt to answer the question relating to what factors impact on the UX of BPM tools, the focus groups discussed reasons for implementing BPM and what is understood by the term BPM in their respective organisations, as well as in the broader emerging economy environment. The feedback from the focus group discussions indicates that most organisations implement BPM to ensure a competitive edge over their competitors. Not only does it enable such organisations to leverage advantages from proven methodologies, but it also enables them to understand the processes better. It furthermore enables them to manage service levels, quality and costs well. Participants indicated that BPM is used by middle and senior management to understand the principles and weaknesses of the daily operations and finances. It also serves to assist the organisation to become leaner on performance management. It became evident that the use of BPM in organisations is dictated by both internal and external influences.

The groups additionally cited several other matters which require consideration when implementing BPM. Organisations often struggle to differentiate between BPM and work management. Service management frameworks result in organisations considering the need for and specific uses of BPM. Organisations use BPM in an attempt to improve internal processes. This does not imply that organisations are compliant or understand the processes; merely that BPM is used as a means of managing the processes. As the processes are often unknown and undocumented, they require flexible BPM, which current market tools do not necessarily provide for. Linked to a lack of flexibility in such tools, is a lack of understanding and the inadequate knowledge levels of the users. These poor knowledge levels often relate to issues such as a lack of understanding of BPM or the organisational culture and even a lack of business processes in the organisation. It also became evident from the discussions that there are different issues to consider when implementing BPM in the private sector as opposed to the government sector. Use of BPM in the government sector is largely dictated by government policies, which are quite prescriptive in terms of processes. It should be noted, however, that users in government organisations are perceived as less sophisticated and knowledgeable than their counterparts in the private sector.

Participants agreed that there are also several challenges facing organisations when implementing BPM. Some of these include a lack of human resources to implement BPM, as these skills are highly sought after and availability is limited in South Africa. Linked to this is the scarcity of business analysts. Middle management often causes a bottleneck in the process owing to their lack of understanding of the processes and the way these relate to the organisational culture. The participants were representative of various sectors and it was obvious that the attitude to and understanding of BPM differs vastly between the different sectors.

Personal culture and background plays a limited role in the way BPM is implemented. Middle management, as a bottleneck in the organisation, is often intent on creating empires and silos in which to work. The attitude of 'the more people you have, the more important you are' is adopted in creating such

empires and often the organisational structure is created to suit this attitude. Based on this, middle-management often does not support BPM, as managers fear it may threaten their power structure. The lack of support furthermore relates to uncertainty about what can be gained from BPM implementation and what the impact would be on the individual. Hence, there seems to be a lack of understanding of the advantages and disadvantages of BPM.

In summary, participants concluded that existing BPM processes and methodologies are good and appropriate. They believe that what is required to ensure successful BPM implementation is a focus on the people and the way they interact with these processes. People in managerial positions require training to maximise the use of BPM tools so as to ensure the automation of processes. Non-functional issues, such as change management, the user interfaces of BPM tools and the organisational culture, were also considered. BPM is being used to streamline processes and ensure compliancy, but can only do so if the non-functional requirements are also in place.

From the focus group discussions, the factors indicated in Table 1 were identified for consideration when using BPM tools. Some of the factors affect the business processes whilst others impact the UX.

Table 1: Factors that impact on the usage of BPM tools

<p><b>Individual characteristics of approver:</b></p> <ul style="list-style-type: none"> <li>• Importance of approver.</li> <li>• Gender and language.</li> <li>• Leadership style of approver.</li> <li>• Is approver also a shareholder/owner?</li> <li>• Family relationships of approver.</li> </ul> <p><b>Individual characteristics of requestor:</b></p> <ul style="list-style-type: none"> <li>• Importance of requestor.</li> <li>• Gender and language.</li> <li>• Leadership style of approver.</li> <li>• Is approver also a shareholder/owner?</li> <li>• Family relationships to approver.</li> </ul> <p><b>Best practice principles:</b></p> <ul style="list-style-type: none"> <li>• The emphasis is on principles as opposed to rules which need to be followed. For example, known international best practices.</li> </ul> <p><b>Industry specific rules and regulations:</b></p> <ul style="list-style-type: none"> <li>• These are factors that are enforced by law for example the National Credit Act,, or the 'Health and Safety Act'.</li> </ul> <p><b>Organisational culture:</b></p> <ul style="list-style-type: none"> <li>• The understanding and knowledge of how things are done in the organisation.</li> </ul> <p><b>Company policy and standards:</b></p> <ul style="list-style-type: none"> <li>• Internal guidelines and rules enforced by the company. For example, employees are paid a per diem rate per day when travelling on business for the company. International standards such as ISO 9001.</li> </ul> <p><b>Conditions in the country of operation:</b></p> <ul style="list-style-type: none"> <li>• Political and social factors.</li> <li>• Economic factors, for example the economical conditions in the country.</li> <li>• Technological factors, such as the bandwidth availability in South Africa.</li> <li>• Legal factors, for example the foreign exchange regulations or employees receiving 15 days' leave per year.</li> <li>• Environmental factors, for example the organisation's position within a larger ecosystem.</li> <li>• Global/ Regional factors, including any events which take place in the SADEC region.</li> </ul>
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**Availability of resources:**

- Any resources which are necessary to conduct the specified process. For example money, budget, time and people.

**Urgency and importance of decision:**

- How urgent is the specific approval decision?
- How important is the specific approval decision?

**Competitors' actions and decisions:**

- Is the decision affected by the competitors' actions and decisions?

**Intuitive feeling ('gut feel'):**

- Does the approver have a specific 'feeling' about the decision?

**Authority of decision maker:**

- Some people in approving positions have more authority than others.

**Discussion**

The literature review findings illustrated that the concept of UX is understood in many different ways. UX has become too broad a concept to be used in practice. To be useful to practitioners, designers and researchers alike, the scope of UX has to be defined in a clear manner. The literature study also revealed a lack of frameworks and tools to evaluate and determine the UX of a product.

The importance of understanding context was highlighted by the building blocks and facets as proposed by Roto [2006]. When a new technology, for example a BPM tool, becomes part of traditional work tasks, it is essential to ensure that work activities are appropriately supported. If the context has not been identified and understood, the use of the BPM tool may fail or the UX may suffer.

The findings from the focus groups discussions indicate that business processes in South Africa range between strategic, operational and support activities. For business continuity it therefore becomes critical to have an interface that supports the information needs of the organisations so as to reach their critical success factors and attain organisational goals. The findings from the focus groups and literature review also indicate that UX factors unique to diverse user populations that impact on BPM were identified to include the following:

- An understanding of the intended users, their background and their role within the organisation (user needs as it relates to an ethnographic orientation).
- A thorough knowledge of user tasks and work activities to support the tasks (tasks supported as it relates to terminology and labels).
- Insight into the user understanding of the business processes and how these relate to their task (business processes as it relates to screen layout).
- Knowledge of the user levels of technology understanding and experience (interaction and interface design as it relates to navigation).
- An understanding of the user approach to automate business processes (information design as it relates to the ethnographic orientation of the users).
- Knowledge of the user language and literacy proficiencies (visual design it relates to linguistic and literacy diversity).

These critical UX factors can be divided into non-functional (the how of the system) and functional (what the system does) requirements.

Based on the literature review findings and the focus group discussions, non-functional fundamentals for UI design, were identified to be the following (illustrated in Figure 5):

- An ethnographic orientation (understanding of users) with regards to the user and the specific organisation.
- An understanding of the linguistic diversity of the intended target users considering their reading and writing ability as well as what their home language is.
- An understanding of the literacy diversity of the intended target users with reference to their written language knowledge and their exposure to technology.

Functional requirements were identified to be:

- Navigation which determines the sequence of structure and the page flow.
- Screen layout that determines the layout and organisation of information on the actual screen.
- The intended target users and their particular language and verbal style are reflected in the specific terminology and labels used.

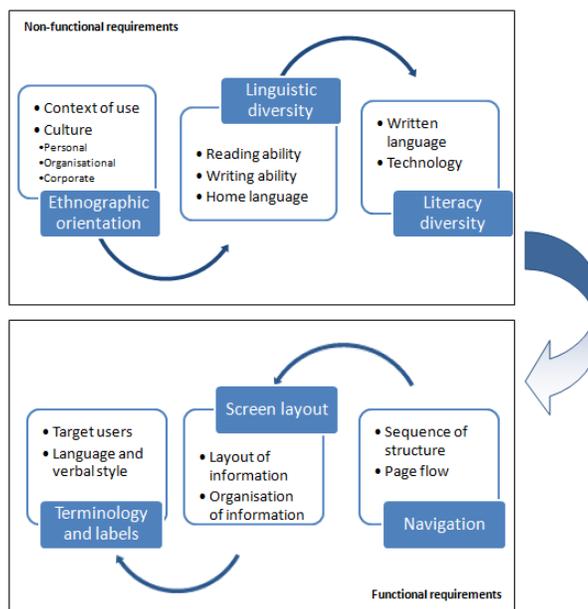


Figure 5: UI design fundamentals

In an attempt to narrow the scope of understanding UX, the non-functional and functional requirements can also be categorised into factors that impact on people, the business and the technology (illustrated in Figure 6):

- People factors consist of the visual design, the user needs and the interface design.
- Business factors consist of tasks supported and business processes.
- Technology factors are made up of interaction and information design.

The focus of the study was on interface design only and it therefore addressed one specific aspect of UX. The different factors (i.e. people, business and technology) and then specifically interface design as a people factor were identified as a key contributor to the UX.

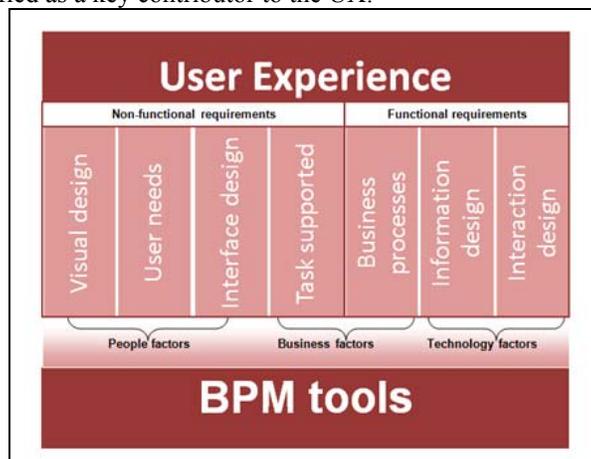


Figure 6: Critical UX factors for BPM tools

### 3. CONCLUSION

This paper highlighted the perceived understanding of BPM and specific factors to be considered when implementing business processes in South Africa. Some of these factors relate to BPM, others relate to non-functional UX matters.

The findings from the focus groups raised a number of issues relating specifically to non-functional issues. These include the following:

- Poor knowledge levels of employees in terms of business processes;
- Lack of understanding of business process management in the organisation;
- The need for compliancy in organisations in South Africa;
- Ever-changing regulatory frameworks impact business processes in South Africa;
- Lack of understanding of the organisational culture and how that relates to the business processes;
- A lack of flexible BPM tools to support the ever-changing business processes;
- A lack of user process centric BPM tools specifically aimed at the business processes in South African organisations.

In summary, it can be concluded that the critical UX factors can be categorised as the need to have an understanding of the users (ethnographic orientation) with respect to the organisational, personal and corporate culture. Furthermore, a thorough understanding of their literacy diversity (including written literacy as well as technology literacy) levels is required as this may impact on how they execute their tasks to support the business process within the organisation.

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