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Understanding interaction context for development interactive models

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Abstract: **We present ongoing research concerning to understand interaction context, its elements and factors emerging during HCI. This paper describes the components during HCI; we analyzed a case study an interactive exhibition in a museum where children are immersed on interaction context. Therefore, in this paper we studied the process of users' interaction based on user-exhibition interactivity. It gives a general idea, in order to understand how immersed elements can change people's way interaction negatively or positively.**

Keywords: **HCI, Interaction Context, Interactivity.**

1. INTRODUCTION

At present, interactive model's design is complex due to rapid technological change, often as a result of unproven and unpredictable technology, repercussions of possible failure that may be dramatic and costly rate. The complexity of interactive models can be defined as models that support dynamic processes involving hardware, software and human elements that interact in different ways. It is important, consider the complexity of technology, organizations, human factor inherently complex about the physical and cognitive abilities [1]. In many cases, humans are not able to appreciate a real situation without the aid of complex and interactive models. Users in dynamic environments must interact with models in order to create and maintain a knowledge society. However, human cognition has its capabilities and limitations understanding the critical cognitive phenomenon, which can be used for designing human-computer interfaces and provide interactions to help and maintain a knowledge society [2]. Human-computer interaction allows to user create and maintain an adequate level of awareness of the situation. An interactive model is a complex process in which several factors must be considered [3] . The complexity arises from the need to considering not only the factors that contribute to person's knowledge of situation also contributing factors when it belongs or is a member of a society of knowledge, leading to knowledge shared situation. A shared situation is not a simple concept is a complex process in which you must consider many different variables.

1.1 The need of interactive models:

The humans need interactive models to support a knowledge society, allowing them access to services or information in a continuous way, need models that provide instant access even to emergency situations, models evolve to meet the information needs, requirements, actions, behaviours and performance by humans [4]. An interactive model that supports a knowledge society should offer the following characteristics:

- Available Information everywhere, at any time and for all, regardless of their abilities.
- Information Access on different contexts. Have the same information distinctly of the diverse audience.
- Providing the same content to different devices.
- Interacting with information provided using a variety of different devices.
- Meeting the needs of users from access, manipulation, analysis and control of information.
- Integrated management of environment information.

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2. INTERACTIVE MODEL FOR KNOWLEDGE SOCIETY

An interactive model for knowledge society addresses issues regarding users attitudes, perceptions, technology use acceptance, how to interact with information and tasks [5]. Fig 1 represents an overview of some components considered in an interaction. The Figure1depicts the FIS structure.

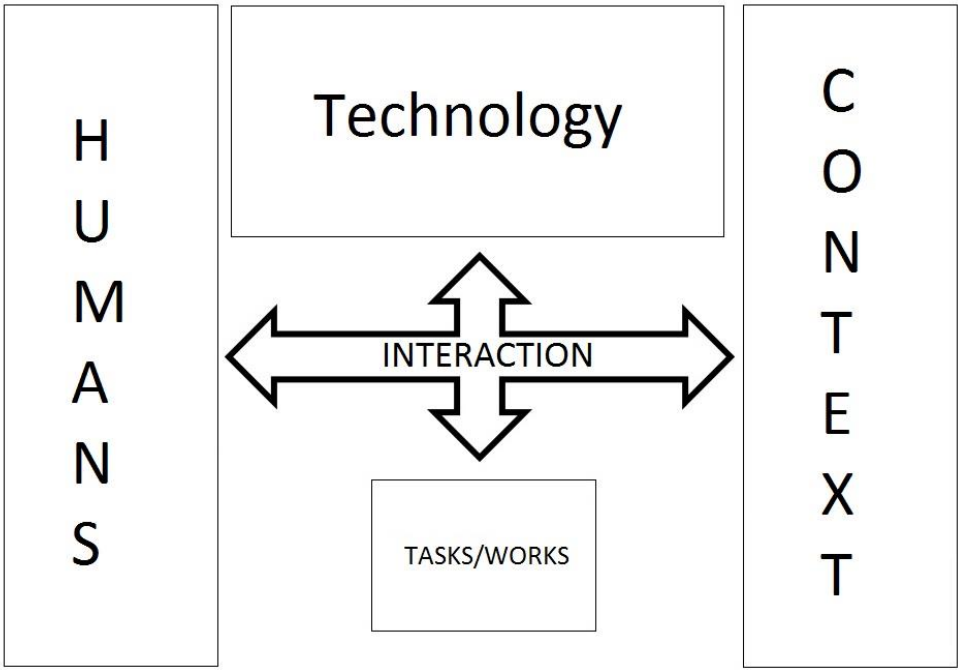

Fig. 1: Analyzed Interactive Exhibition Module

Each component are described:

- Interaction Component. It is considered the core of model because links up all the components, is a fundamental part of the model because feedback to other components, based on their inputs and outputs, the other components act in response to generated performance.
- Human component. This component consider users issues such as demographics, physical/motor, cognition, emotion and motivation, is a great importance component because interaction model links to other components based on the values of generated data by this component.
- Technology Component. This component includes all the technology that could be used during the interaction, this technology could be embedded in the environment even is not invasive being transparent to the user such as pervasive computing. The technology is broadly defined including hardware, software, applications, data, information, knowledge, services and procedures.
- Tasks/works Component. On this component all tasks and works are generated by user interaction, by society or by the self-incentive environment, this component supports users' relevant tasks to achieve its personal or group jobs and goals.
- Context. It is the set of circumstances where interactions between users and environment occur, this component consider all factors and/or elements that influence the interaction, this is composed of four elements: global context, social context, organizational context and group context.

The development of an interactive model supporting a knowledge society implies that this immersed in an interdisciplinary field because one single discipline is not enough to fully address a complex environment. The key to model considered "open mind" is to have a good convergence of related disciplines, it does get the best of each including the best of its features.

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2.1 Humans a key factor for interactive model:

It is important to consider humans as a key component of the interactive model regardless of the disciplinary perspective of the researcher [6]. The analysis of humans in the context users is based on ideas about human psychology, behaviour, actions, perceptions also users have been studied by some perspectives that are mentioned below:

- Users with single differences, such as general traits, specific traits, cognitive styles and personality [7].
- Users as a social actors in design, development and IT technologies, it could be argued that people who use IT use multiple applications on different roles in order to produce services, meanwhile they interact with others, often in multiple social contexts [8].
- Users as economic agents whose preferences, behaviours, personalities, and economic well-being are closely linked to information systems design [9]

In general, it is interesting to examine how the concept of the user has evolved from an individual to a group of people or society, and fuzzy society with dynamic membership. The inevitable evolution is challenging the design and research regarding interaction between societies as the knowledge of a shared situation.

In order to develop an interactive model for a knowledge society, we must consider the users as the center of development, considering their skills and tasks. We need to know clearly: Who are the potential users? How many are they? What is their current behaviour? What aspects of their behaviour are difficult to understand? What are your needs ?, likewise, we need to consider some key strategies such as involving users, we need to know the role of users performances [10], in order to respond all these questions was analyse a case study an interactive museum, in the next section we explain in detail

3. CASE STUDY INTERACTIVE MUSEUM

A case study was carried out by observing and modelling scenes on interactive environments; that may represent a magnificent example because they have a variety of interactive exhibitions and shows various situations that can arise due to the presence of groups of people.

In order to have a scenario that presents an interaction context, the interactive museum El Trompo located in Tijuana, Mexico, due to the extent of its facilities and the dynamic that presents by daily activities, is a great place to analyse users also allow to research perform an interactive model considering the users interactivity.

3.1 Kind of interactions on Interactive Museum:

In the interactive museum context is found different abstract interactions between user-exhibition, these interactions describe interactions ways between the various interactive entities, which are:

- Acquaintances Interaction. This interaction suggests that given two entities, one has a representation of the other and knows the location. This is minimal interaction between two agents and other support interactions.
- Communication Interaction. This interaction indicates that an entity can send messages to another. This interaction is known to support the communication channel.
- Subordination Interaction. This interaction describes the transfer of execution (task) between two entities.
- Operative interaction. This interaction represents the dependencies between related tasks. This interaction can happen to allow to entity perform a necessary task that another agent has previously run other.
- Information Interaction. This interaction establishes dependencies validity between things that entity know. This happens when the knowledge of an entity depends on another entity; therefore the knowledge of the first entity is based on its confidence in the other entity.
- Conflict Interaction. This interaction indicates that entities have a conflict over access to resources, will be necessary to coordinate efforts through negotiation.
- Competitive Interaction. This interaction corresponds to a competition between entities; this is a sign that its objectives are incompatible.

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3.1.1 Interactions between entities:

As we can see could exists a lot of interaction types, this types of interaction are immersed on interaction context, in order to develop an interactive model we need to understand firstly, how this entities interacting each other, this entities are context-aware, they know what happens around and during the interaction, following we show a formalism representing the interaction context with its interactions between entities.

An interaction context (IC) is a tuple of 4 elements:

$$\text{IC} = < \varsigma, \rho, \alpha, \delta > \qquad (1)$$

where:

1. ς is the finite set of interactive entities;
2. ρ is the finite set of entities profile;
3. α is the finite set of events emerging on interaction context;
4. δ is the finite set of interactions where: $\delta = \{\kappa, \zeta, \lambda\}$;

represents the interaction between entities. Where κ is the set of interactions attributes, ζ is the set of types of resources that exists during the interaction, λ is the set of information that exists during the interaction; Fig 2 shows a graphic representation of interaction context.

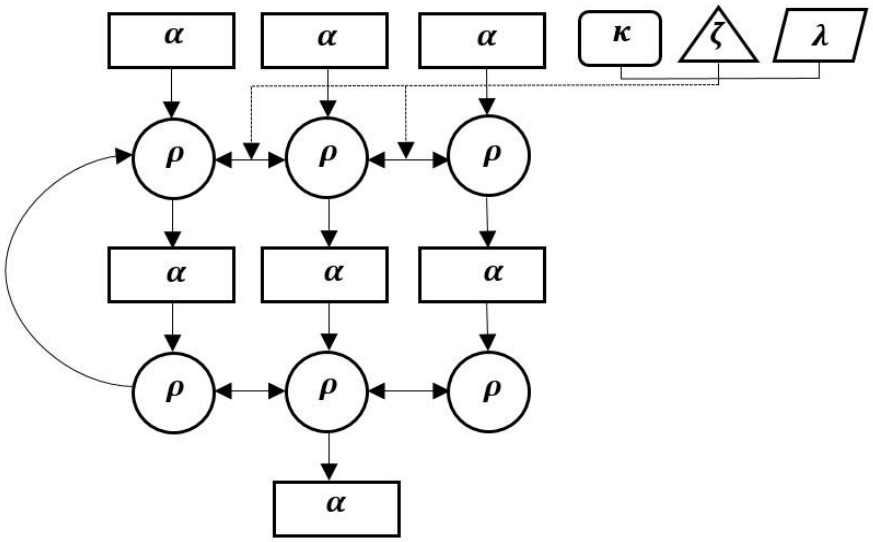

Fig. 2: Graphic representation of Interaction Context.

As we can see from Fig 2, the events emerging every moment, this events have directly impacted over the entities and

the entities need to have the capacity to react in the best way to all kinds of events, in order to do this, they need to interact with other entities for ask help or help another entities, in this interaction we can find attributes, resources and information, this elements can ease the interaction way once the entities have interaction, this works to increase experience from back events then they can use this experience to react quickly and correctly to new events improving to helps achieving objectives and goals of the events.

4. CONCLUSIONS

We have defined the context to be any information that can be used to personalize the entities situations; the entities can be a person, object or place. These entities are anything relevant during interaction because they are part of the context. We provide a general description of components during HCI. We need to be conscious at the moment of interaction we need to know what happens around the interaction; we need to be context-aware all the time. During interaction we need to know that different component can impact it, this component can be the humans, can be technology, can be tasks or

works, considering this we need to create an interactive model ready to response to the changes of this components. In order to help us to this situation, we can define an interactive model with categories of context-aware to represent information, services, automatic execution of services, etc.

The idea of defined categories of context-aware improve the response time and services quality of the interactive model really aware of users and are ready to help them all the time.

The paper also show as a case study in order to understand and explicit interaction context also we can know different kinds of interactions such as acquaintances interaction, subordination interaction, operative interaction, information interaction, conflict interaction and competitive interaction.

If we understand the majority of interactions, we can define good interactive model according to specific users. The formalism of the interaction context can help researchers understand the boundaries of interaction context, and help to create a better interactive model for different kinds of interaction context also can help to decide what context-aware features to implement.

This research can be an alternative for HCI researchers, in order to approach successful interaction; it can represent an option to know what we need to consider during the interaction and create interactive model according considering interaction context.

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