Entrain, Exploring New Territorial User Interfaces

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ABSTRACT

We aim at exploring the different approaches to design interactive applications for groups of users using a set of interacting surfaces to perform their tasks with an optimal user experience. Participants are invited to present both the models and/or design methods as well as the case studies and applications they are studying in this context. We would like to set up a discussion group in order to put each person's work in perspective with the notion of territoriality applied to ambient computing and multiple devices. The territoriality theory may serve as a basis for the design of complex interactive applications of quality. From these discussions will emerge a mapping of models and design methods that could be mutualized and combined.

CCS CONCEPTS

• **Human-centered computing** → *HCI design and evaluation methods*; *Graphical user interfaces*; **Collaborative interaction**; Displays and imagers; **Interactive systems and tools**; • **Software and its engineering** → *Distributed systems organizing principles*; • **Computing methodologies** → Distributed computing methodologies;

KEYWORDS

Design Space, Distributed User Interfaces, Interaction surface, Model-based approach, Multi-surface interaction, Territoriality, Territorial User Interfaces.

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1 INTRODUCTION AND BACKGROUND

As interactive and connected devices become more and more varied [15], user interfaces are becoming more and more distributed [1, 13, 16]. Interactive applications therefore increasingly involve groups of users interacting with a set of interaction surfaces to carry out their tasks. The definition of design spaces, models and design methods have proven themselves in HCI design in the fields of plasticity, multi-modality, distributed interfaces. As in proxemic interaction [12], territorial user interfaces are governed by several parameters, such as location, partitioning, and orientation. The design methods most often exploit models and rules to propose a step-wise structured approach that leads to all or part of the interactive computer application. Such models assume to provide answers to the following questions:

- What are the specific data to an application domain (*e.g.*, road traffic) and the constraints imposed on that domain?
- What are the tasks to be performed? What are the low-level actions (*e.g.*, create, delete, modify, search) and the high-level tasks (*e.g.*, putting a car on a road network?
- Which users are involved in these tasks, depending on their roles (not fixed in time) in the groups?
- Which devices are used (*e.g.*, from the smartphone to the large wall screen)?
- Which software platforms are used (*e.g.*, what operating systems, what data exchange protocols are planned)?
- How is the physical environment in which the users are when performing their interactive tasks using the provided devices?

In order to design interactive applications dedicated to groups of users interacting with a set of interaction surfaces to carry out their tasks in complex environments, like museums, public places, offices, theatres, with a quality user

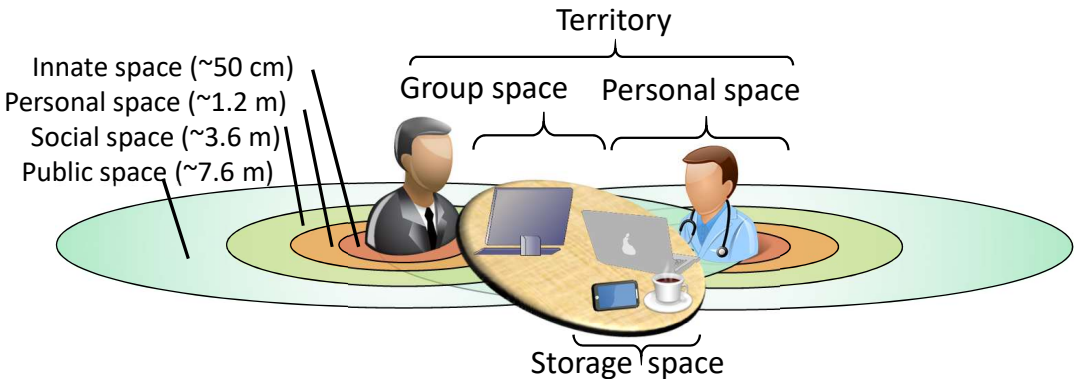


Figure 1: The concept of territoriality in UI design.

experience, we wish in this workshop to share the problems encountered and the solutions provided or envisaged. To this end, we wish to put submitted works in perspective with the notion of territoriality applied to ambient computing and multiple devices. The territoriality theory may serve as a basis for the design of complex interactive applications of quality.

Indeed the distribution of information is studied in the theory of territoriality for interactive tabletops [6–8, 16, 17]. The theory of territoriality [16] (See Figure 1) is indeed used to interpret the partitioning practices of the workspace constituted by the tabletop. Partitioning the workspace thus amounts to delimiting and managing different territories on the tabletop. Scott and Carpendale [16] distinguish three types of territory:

(1) *Personal territories*, which are used to carry out autonomous activities/tasks (*e.g.* reading, writing and classifying resource items); they are also important in collaboration because they "provide a visible and accessible area for other members of the group, allowing them to follow the autonomous activities of a teammate";
(2) *Group territories*, which provide group members with a space to work on the product of the task and to help each other;
(3) *Storage territories*, which allow to organize the resource elements on the table; they can be created on auxiliary surfaces that can be moved around the table.

A fourth type of territory is introduced by Li, Greenberg et Sharlin [11]: *private territories*, which are neither visible nor changeable publicly. Each territory combines three main characteristics [16]: (1) its purpose; (2) the typical activities or interactions it allows; (3) its spatial properties (size and shape). Territorial behavior is "based on perceived, attempted, or actual control of a definable physical space, object, or idea" [16]. The perception, partitioning, establishment, maintenance or change of territory (or transition between territories) are examples of territorial behavior.

Contributions from participants can help:

- To establish a literature review on the potential implications of the concept of territoriality in computer science.
- To make the link between the concept of territoriality and that of distributed interfaces,
- To list the models that could be used to design and develop the type of interactive applications targeted.
- To propose a method for developing interfaces by identifying input and output elements, guidelines and constraints to be respected.
- To identify case studies that can illustrate the problem and proposed solutions.

2 WORKSHOP OVERVIEW

Due to Covid-19 pandemic situation, the EICS 2020 Conference is canceled. So we reschedule the Workshop Organisation.

Workshop sessions dates

- Entrain, session 1 - initial contact: June, the 23th 2020: a remotely session
- Entrain, session 2 - thorough work: November, the 26th and the 27th 2020: at University Côte d'Azur (Nice, France), in face-to-face presentations if possible, remotely otherwise.

Workshop contributions

These two sessions are aimed towards gathering participants who are concerned by Models and Design Methods for Multi Surfaces User Interfaces especially excited about the opportunity to gather experiences around the territoriality notion.

Participants will be invited to submit an abstract on topics such as: the use of the concept of territoriality in the context of a distributed or non-distributed interactive application, the use of model definition in interactive applications for a group of users interacting with a set of interactive surfaces to perform their tasks, the use or definition of development

methods, rules, guidelines for interfaces on multi-surfaces, case studies to illustrate the problem and proposals for solutions in areas such as games, crisis management, collaborative design, trips in public places.

Workshop selection

- For the June session, we will select participants based on their positioning relative to the topic. Submit your positioning on the online form: https://bit.ly/nomos-2020-06-23
- For the November session, we will select up to 20 contributions. The workshop will begin with flash presentations. We will provide a consistent format for the presentations. We will discuss in sub-groups to put the work and the notion of territoriality into perspective. We will meet to synthesize the results of the groups as a mapping of each proposed models or approaches. We will establish a future research agenda.

Workshop website

The initiative web site is accessible at https://nomos.i3s.unice.fr/fr/node/10.

3 ORGANIZERS

The organizers of this Workshop are partners of the NOMOS project supported by the Hubert Curien Partnership Tournesol program which facilitates scientific cooperation between France and Belgium: Prof. M. Winckler, AM Dety Pinna and P. Renevier Gonin assistant professors in the I3S laboratory; S. Lepreux assistant professor and C. Kolski professor in the LAMIH laboratory UMR CNRS 8201, UPHF; J. Vanderdonckt professor in Université Catholique de Louvain (UCLouvain).

In ancient Greek, Nomos (όμο, "law" or "custom") derives its etymology from the verb ´μ(to dispense or to allot), with Nomos being the result of allotment or the manner of allotment or dispensing. We used this metaphor to express the concept of territorial user interface, a novel type of a distributed user interface that is regulated not by the physical principles of platforms or the implementation constraints imposed by widgets, but by the interpersonal space end users have among themselves.

The I3S team is basing part of its work on the composition of IU on model engineering [3–5]. The publications [10], [9] and [1] attest to the knowledge of LAMIH in terms of tangible interaction and multi-surface interfaces. The I3S and LAMIH laboratories explore the notion of territory in the design of distributed interfaces [5].

Jean Vanderdonckt is full professor in information systems leading the Louvain Interaction Lab, Université catholique de Louvain, Belgium. His research focuses on the contextual adaptation of user interfaces [14] and intelligent techniques to support the adaptation of user interfaces at the time of design and/or execution [2]. He is a past president of the ACM IUI '04 conference and is co-chair of the ACM EICS '20 Full Papers conference.

4 FUTURE DIRECTIONS

The key outcomes of the workshop will be shared online, as a blog post on the workshop webpage. In addition, we also plan to organize a follow-up workshop in 2021 with a similar theme. This is aimed towards not only ensuring continual exchange and collaboration among the participants, but also to attract other members of the wider HCI community who might not be present at EICS.
A "white paper" synthesizing the results of the workshop can be considered if it is conclusive. In the longer term, a book in the HCI series could be considered, once sufficient contributions have been received.

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