



# CISELab

Computational and  
Intelligent  
Systems  
Engineering  
Laboratory

# The Marketplace of User Interface Real Estate

Luigi Troiano and Gerardo Canfora  
University of Sannio

## ABSTRACT

Financial markets suggest new ways to design, organize and evolve user interfaces. In this paper we present an approach based on marketplace simulations, where UI resources are sold and acquired, attempting to prove that this metaphor can innovate the way we think about UI design and deployment, relying on self-ruling emerging properties of complex systems.

## CONTACT

Luigi Troiano  
University of Sannio  
Viale Traiano, 1  
82100 Benevento (Italy)

luigi.troiano@unisannio.it  
luigi.troiano@gmail.com  
www.ciselab.org

## CONTRIBUTORS

Giovanni Alluvatti  
giovanni.alluvatti@ciselab.org

Manuel Morini  
manuel.morini@ciselab.org

## CONCEPT

In our proposal interface components are not cooperating, but they are competing to gain interface resources. This competition is ruled by a marketplace in which interface assets are regularly on sale, and applications attempt to acquire them spending credits.

Coordination is not coming out by cooperation. Instead, it is expressed as equilibrium among competitors. The problem of agents competing for limited resources is quite old, and widely studied by Economics to model social behavior.

Stock Exchange provides a good example from which to take a move. In this market, trades are based on an auction market paradigm where a potential buyer bids a specific price for a stock and a potential seller asks a specific price for the stock. When the bid and ask prices match, a sale takes place on a first come first served basis if there are multiple bidders or askers at a given price. Exchange is aimed at facilitating the trading of securities between buyers and sellers.

This inspires a novel approach in conceiving user interfaces. Not a set of resources used by applications according only to their needs, but a set of assets that must be acquired in order to perform application functionalities. The UI real estate is made of different assets, such as screen regions, audio channels, keyboard, pointer and other input devices.

The marketplace (Fig.1) is where the demand and the offer for UI assets meet. The UI orchestration is reached according to rules governing the marketplace. In First-Price Sealed-Bid (FPSB) auction, participants make a simultaneous bid without knowing the bids made by the others.

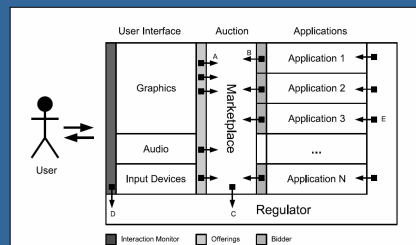


Figure 1. Structure of the marketplace

## EXAMPLE

We considered the deployment of three applications: Media Player, Mailer and Instant Messaging. Each application is provided with different interface components. In particular, the Media Player has a title selection list, a video display and a control panel. The Mailer has a login dialog, a message list, a message window and a compose dialog. The Instant Messaging application has a contact list and chat dialogs.

We considered as UI assets the screen regions in which a graphical layer has been divided as depicted in Fig.2.

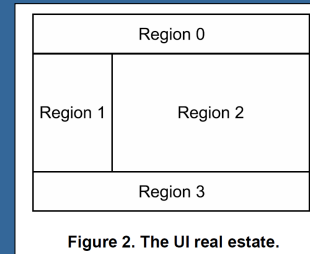


Figure 2. The UI real estate.

Applications gain the control of UI assets for a limited time. When the asset is released it goes on the market for sale. Applications decide which assets to make bid on. The Marketplace decides the auction winner. Applications holding assets also pay a maintaining tax. Taxes and auction revenues are given to the Regulator, that is in charge of redistributing collected credits according to two policies: Capitalism, to reward most used applications, and Welfare State, to assist application with lower credit availability.

The scenario we considered has an initial activity for choosing a video and start to watch it, with mail messages arriving in the mailbox. Later chat session starts, whilst the movie ends.

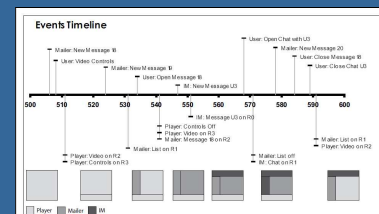


Figure 3. Events timeline between 500-600 sec.

## DISCUSSION

The approach we are presenting, provides benefits from both the application user and designer point of view. Designers are not forced to think about how to organize components in their application, and applications are not forced to cooperate within a framework in order to get the components orchestration. Designers are only demanded to provide a bidding strategy to their applications, and asset assessment criteria on which to base the bidding decision. Indeed, some assets could be more valuable than others according to the application needs.

On the other side, users can interact with a set of applications without being obliged to control and orchestrate explicitly the components deployed at the interface. Applications becomes more independent on GUI layout. They can automatically adapt to different layouts, as they are able to estimate the quality of assets according to their properties, despite how assets are arranged together.

## CONCLUSIONS

We believe that the Efficient Market Hypothesis [4] can be applied to the UI marketplace. Finding design rules able to make the market efficient is important, as it makes the application behavior independent from each other, and it allows to build robust bidding strategies.

The approach can be applied to other problems, where a demand of resources must face limitation of them, such as the service orchestration and the job allocation in Grid Computing.

## REFERENCES

1. P. W. Anderson. More is different: Broken symmetry and the nature of the hierarchical structure of science. *Science*, 177(4047):393–396, Aug. 1972.
2. H. Dieterich, U. Malinowski, T. Kuhme, and M. Schneider-Hufschmidt. Adaptive User Interfaces: Principles and Practice, chapter State of the Art in adaptive user interfaces, pages 13–48. 1993.
3. J. Duhl. Rich internet applications. White paper, IDC, Nov. 2003.
4. E. Fama. The behavior of stock market prices. *Journal of Business*, 38:34–105, 1965.
5. A. Ganek and T. Corbi. The dawning of the autonomic