The Marketplace of
User Interface Real Estate

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Graphical User Interface Assets

www.apimac.com
Holographical User Interface

- **The UI assets can be different according to the interface features.**
  - Typical assets are screen regions, audio channels and input devices.

- **Each asset is characterized by properties that make it more or less suitable for the application needs.**

- **Moreover, some assets can result more appealing than others.**
  - For instance, eye tracking studies have proved that the upper-left quadrant gets more the user attention.

- **Applications do not know the number and qualities of assets at design time.**

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Coordinating a GUI
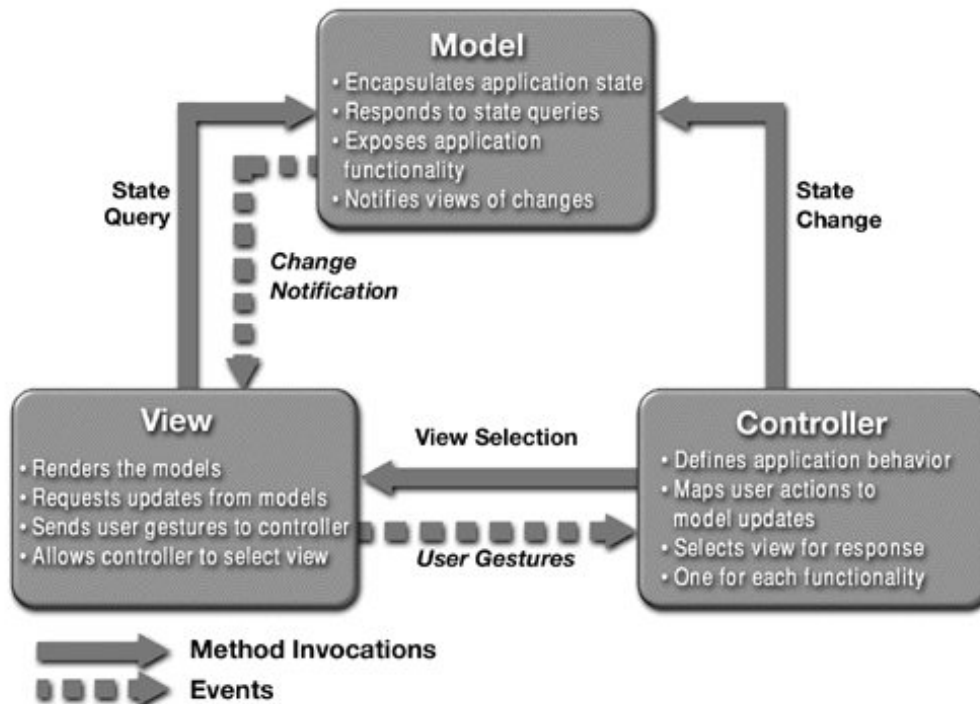
- **Coordination of GUIs**

- **Cooperative approach:**
  - Model-View-Controller

- **Question: Is cooperation necessary in order to coordinate the User Interface?**

Resource Allocation

- **A logic to assign a discrete set of resources to a set of agents**

- **Strategies:**
  - Cooperative
 - Supervised
  - Optimized
  - Competitive

Key Idea

- **A competitive approach in analogy to financial and stock markets**

- **User Interface is regarded as a set of discrete resources (assets)**

- **Each application holds a credit used to gain control of UI assets for a limited time**

- **Useful applications are rewarded by receiving back credits**

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A Reference Model
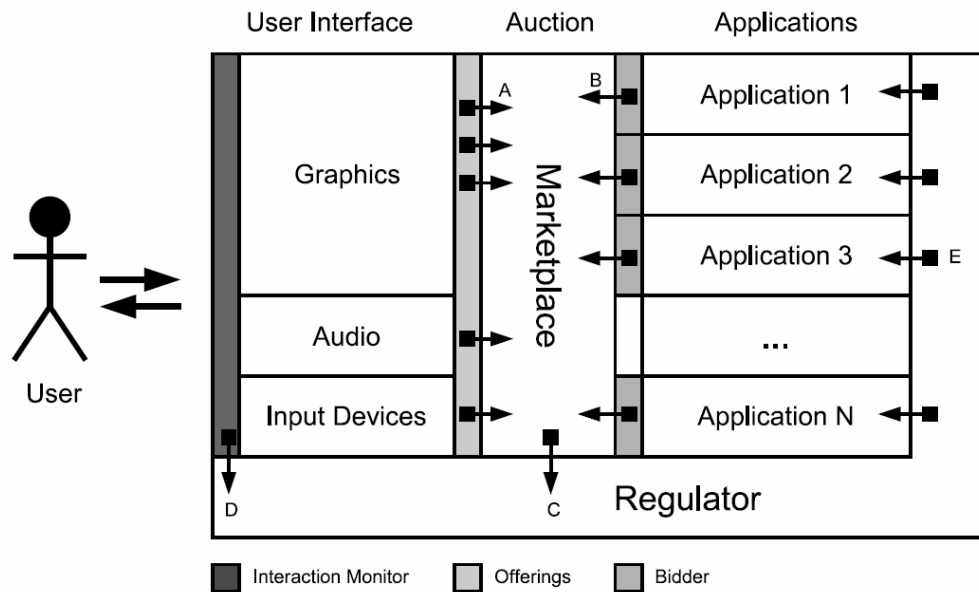
- **When the asset is released it goes on the market for sale (A).**

- **Bidders make an assessment and decide which proposals to make bid on (B).**

- **Marketplace run the auction, deciding the winner and collecting the credits.**

- **Taxes and auction revenues are given to the Regulator (C).**

- **Credit is collected by the Regulator according to the user interaction (D).**

- **The Regulator redistributes credits, on the basis of two main policies (E):**
  - Capitalism: the more applications are used, the more they receive capital gains
  - Welfare State: for assisting application with a lower credit availability.

Auction

- **Auction vs Out-of The-Counter (OTC)**

- **Types of Auction:**
  - Open Ascending Price (English) auction, where participants bids each against one another;
  - Open Descending Price (Dutch) auction, where auctioneer starts from a high initial asking price that is lowered until there is a participant who accepts the ask price
  - First-Price Sealed-Bid (FPSB) auction, where participants make a simultaneous bid without knowing the bids made by the others;
  - Sealed-Bid Second-Price (Vickrey) auction, similar to FPSB but the winner pays the second highest bid plus an increment.

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Market Features and Rules (1)
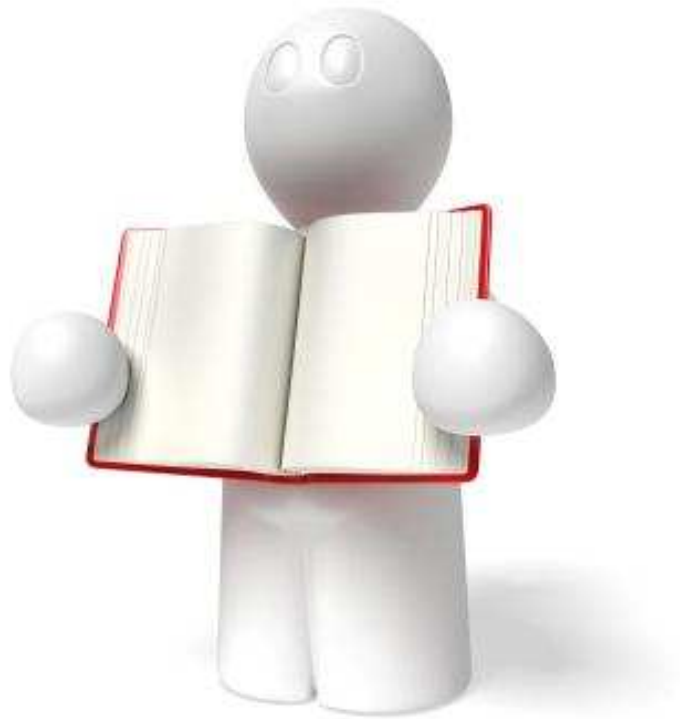
- **Application can express a high/normal level of interest for an asset.**

- **The minimum asset ask price is determined by considering bids on the asset within a time interval.**

- **Holding taxes should be related to the asset value the application gained the control for.**

- **Two or more winning bids can have the same value.**

Market Features and Rules (2)
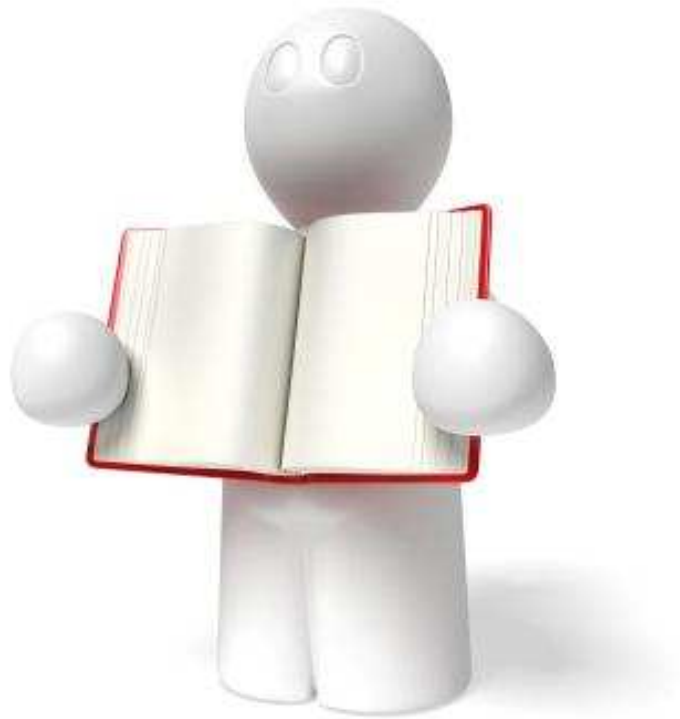
- **The capital revenue should be distributed among all applications, in order to give to each participants enough credits to gain assets in the future, but preventing application from monopolizing assets.**

- **Bankruptcy is an event inevitable in every financial system.**

- **The system can register inflation and deflation trends in the asset prices.**

- **Capital growth should be limited, in order to avoid a liquidity crisis in the market.**

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- **Goal:**
  - to provide a set of usable applications to the user.

- **Rationale: Satisfaction of needs**
  - user aims at interacting with applications
  - applications have been designed and implemented in order to deliver functionalities to the user
  - each application attempts in isolation to capture the user attention gaining the control of parts of the user interface
  - for this reason, applications are ready to compete and pursue their goal
  - the application gains some space in the UI, it is able to interact with the user.
  - if an application results as useful to the user, it will produce a capital gain,
  - more useful applications will gain more chances to acquire resources

Example: Applications
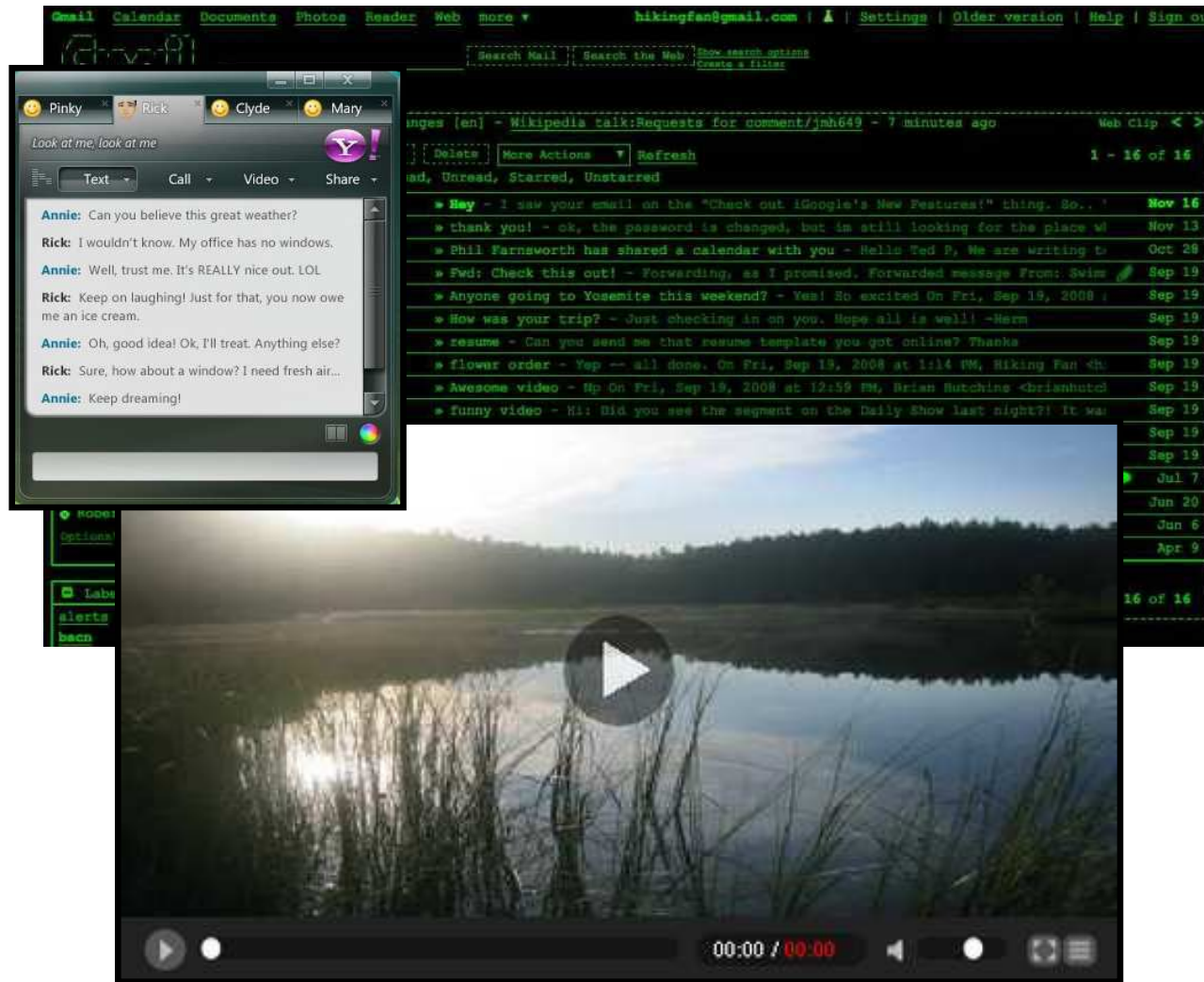
- **3 Applications:**
  - **Media Player**
    - Selection List
    - Video Display
    - Control Panel

  - **Mailer**
    - Login Dialog
    - Message List
    - Message Window
    - Compose Dialog

  - **Instant Messanger**
    - Contact List
    - Chat Dialogs

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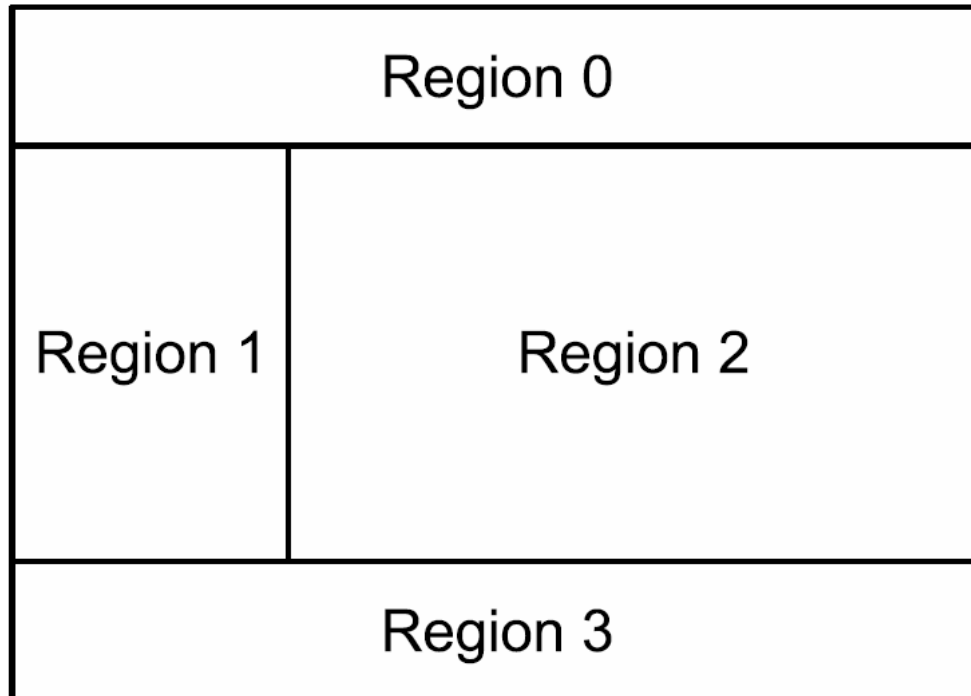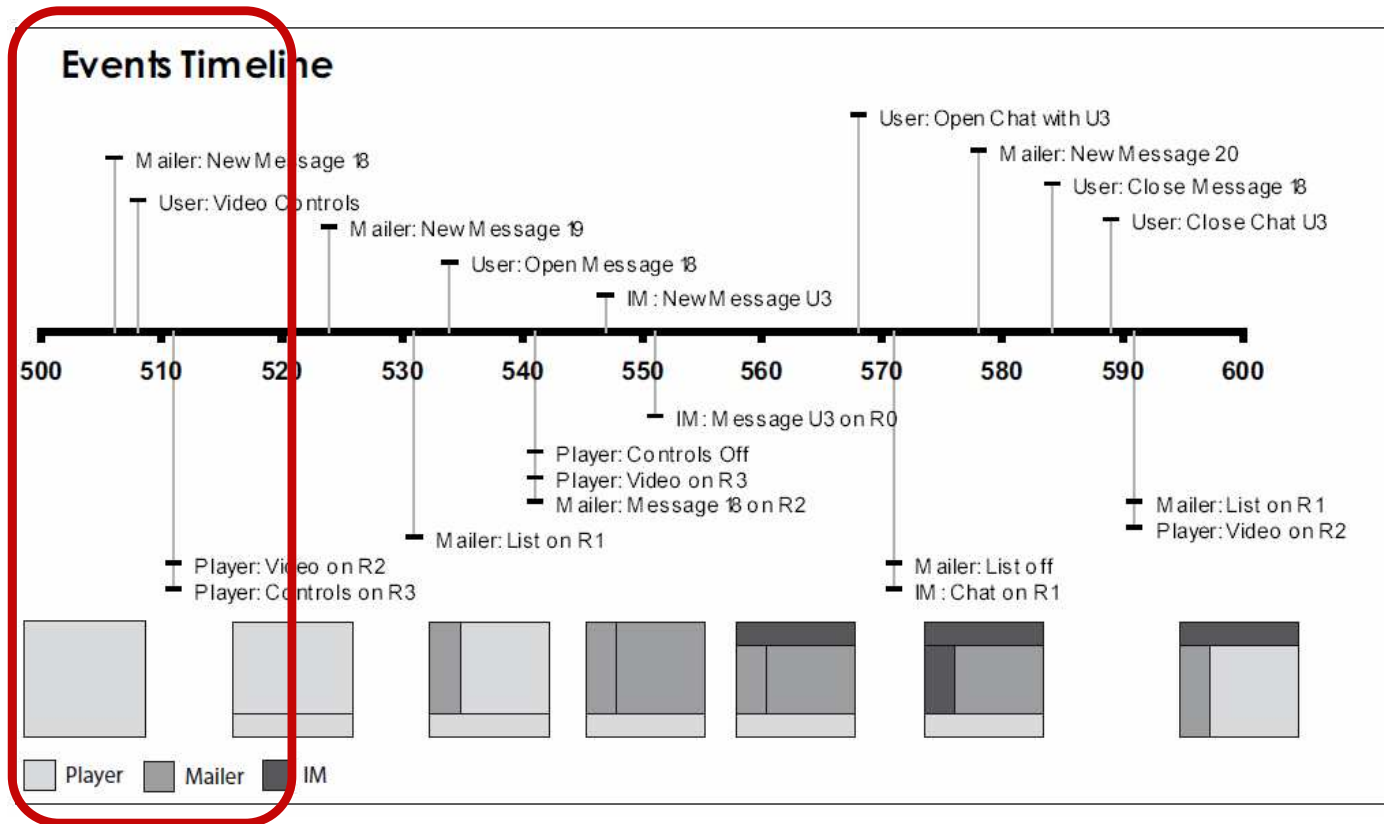# Example: GUI assets and allocation


Figure 2. The UI real estate.

- **Display split in 4 regions**

- **Regions are able to expand when not required**

- **Applications respond to events**
  - Selection of new video
  - New mail message
  - New contact on-line
  - …

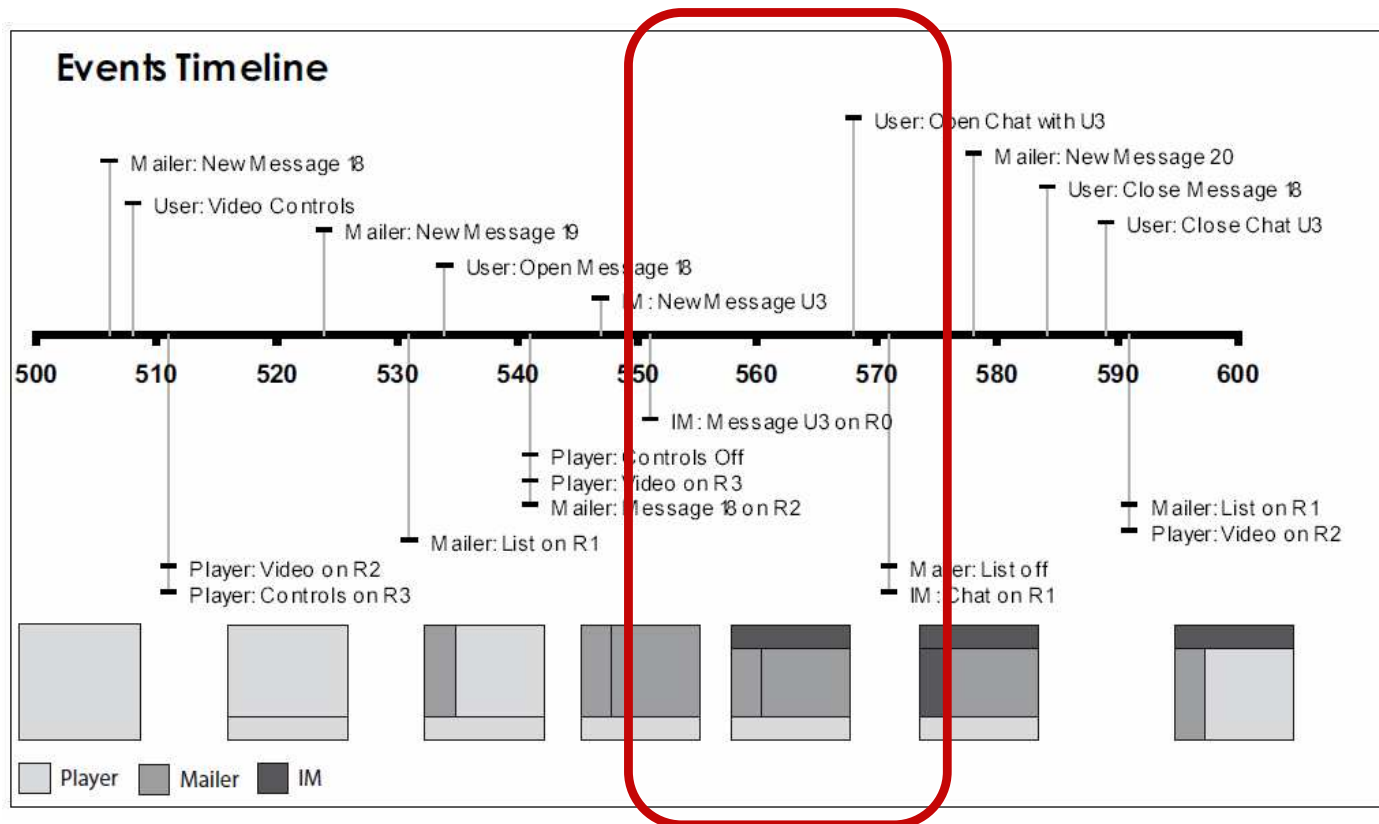- **Regions are dinamically assigned to applications**

Example: Scenario 1/4

- **The user is watching a video**
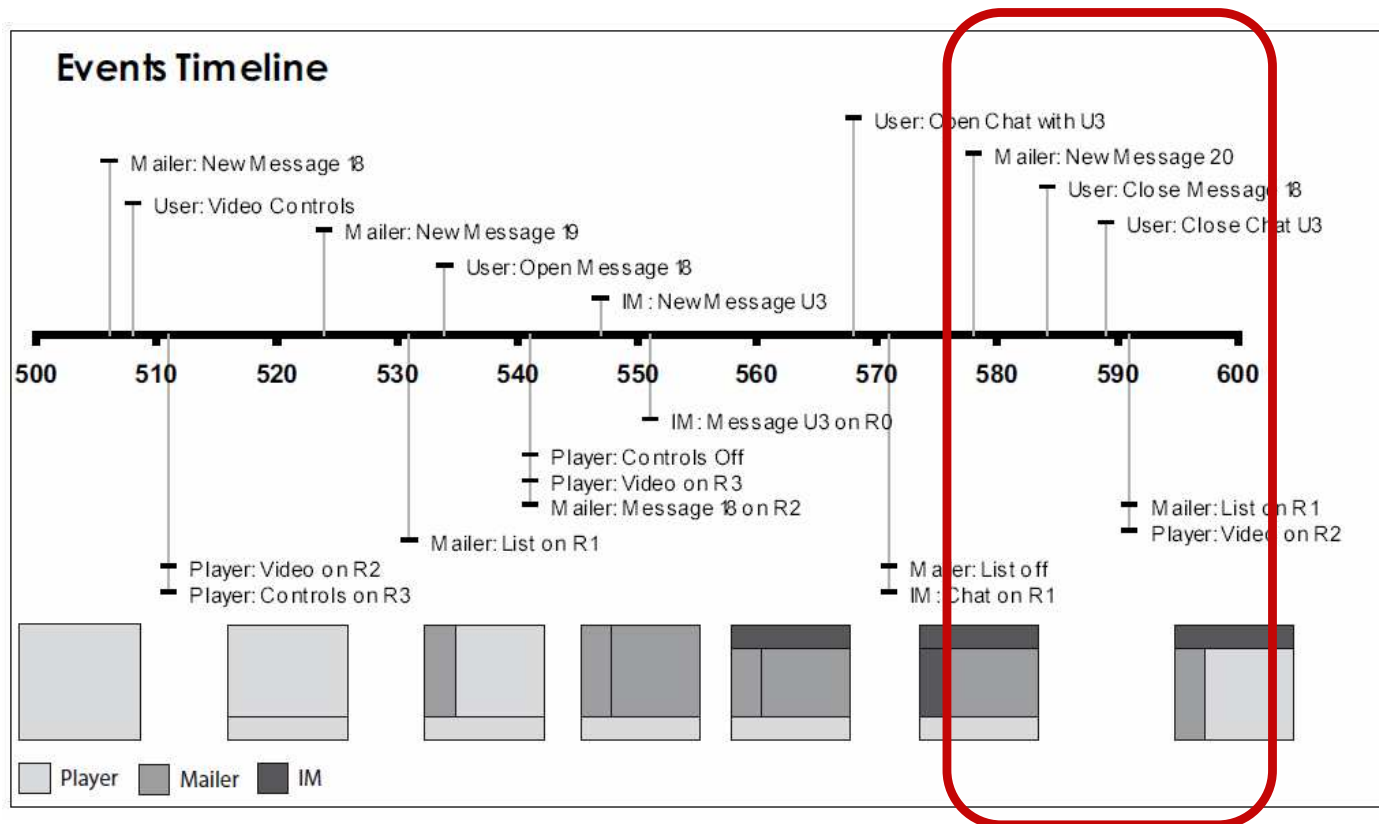- **The user requires to control the video volume and timeline**

Example: Scenario 2/4
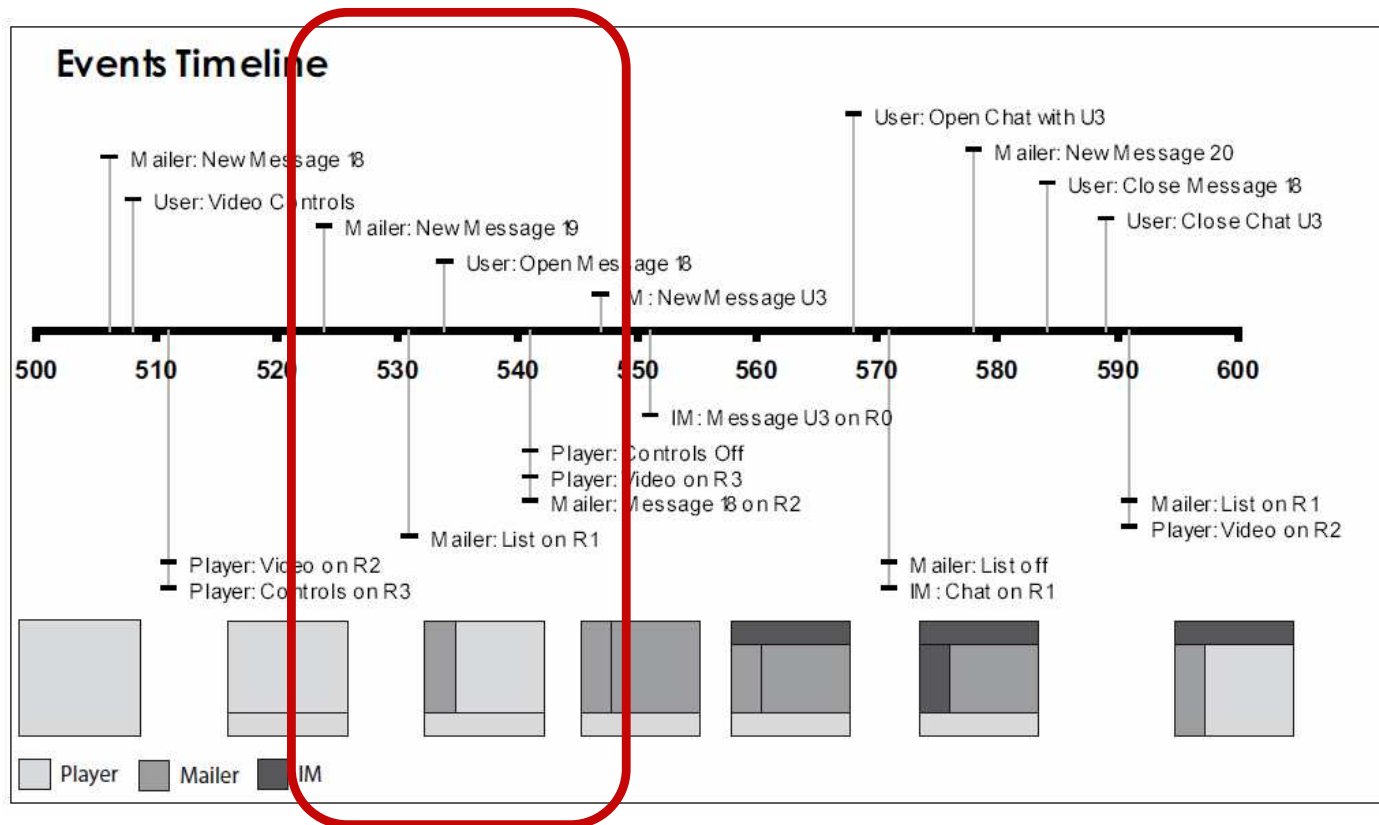
- **A new mail message arrives in the mailbox**

- **The user get access to the message**

- **The user reply to the message**

- **Meanwhile the user is composing the message, a new instant message arrives**

- **The user starts to chat**

Example: Scenario 3/4

Events Timeline

- **A new message arrives**

- **The user read briefly and close the message**

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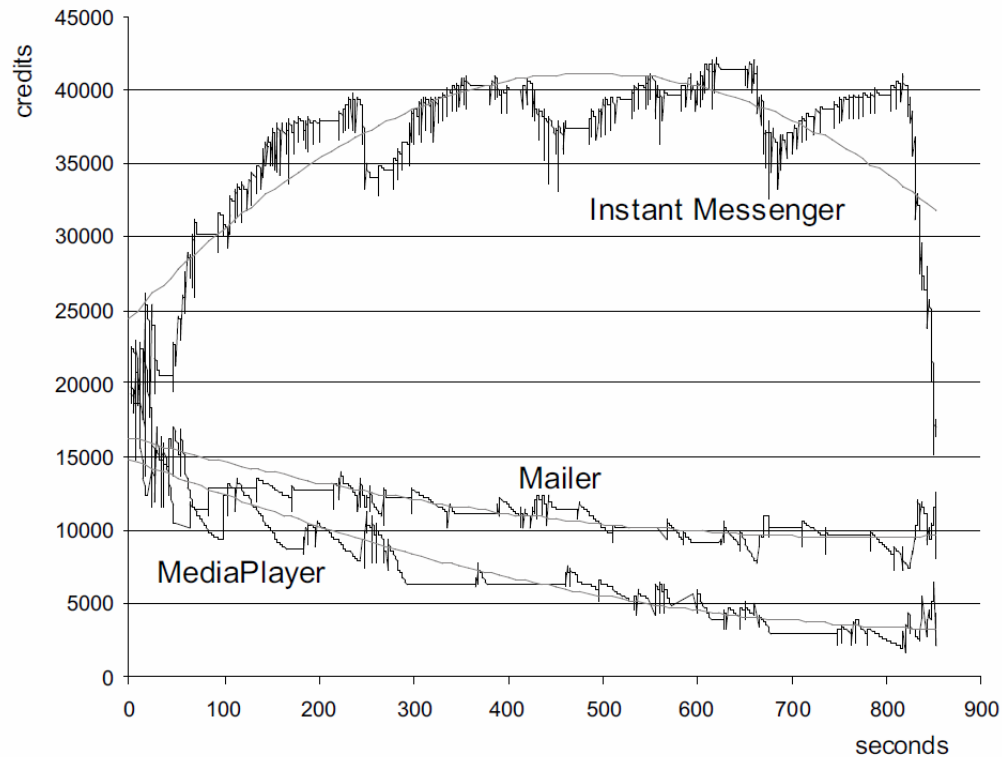
Conclusions

Figure 4. Application capital time series.

- **Findings:**
  - Cooperation is not required
  - Competition is an alternative
  - Needs and resources can be a drive

- **Open questions:**
  - How to choose a winning strategy
  - How to test applications
  - How to decompose the UI in components
  - How to self-rule the market
  - How to assign credits
  - …

Future Directions

- **On going:**
  - Developing a prototype
  - Identifying basic bidding strategies

- **Future:**
  - Experimentation of Econometric tools
  - Application to other resource mgt. problems
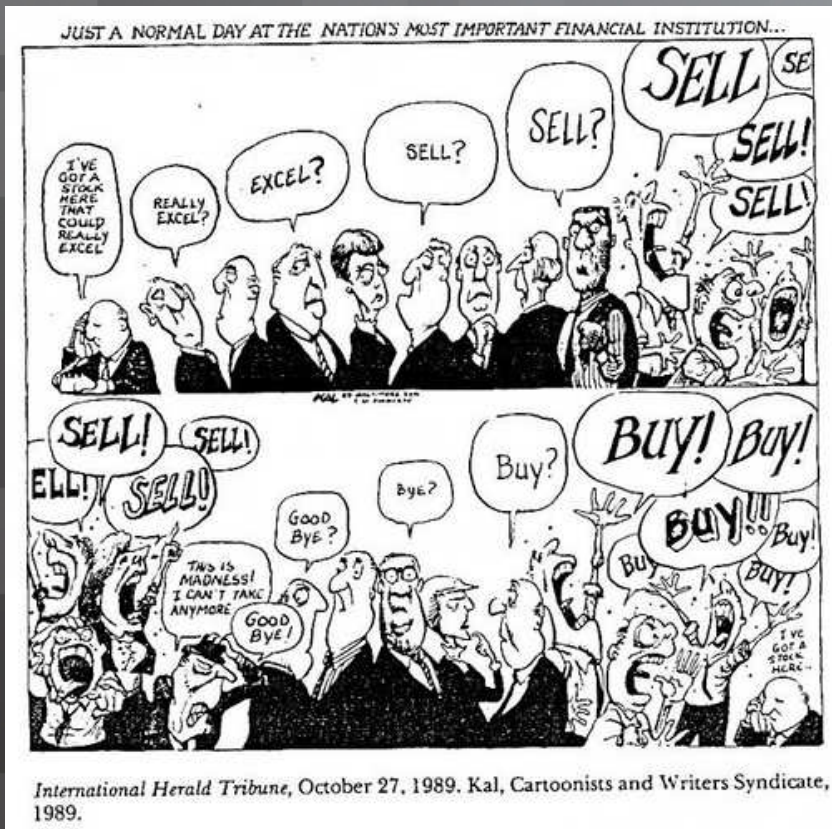 - Definition of design guidelines

An Interesting Question

- **Efficient Market Hypothesis (EMH):**
  - prices on traded assets already reflect all known information, and rapidly change to reflect new information

- **Is EMH met by the UI Market?**
  - YES,
    - Indipendent Application Behavior
    - Robust Interface Evolution
  - NO,
    - A certain level of cooperation is required

- **How can we assure the EMH?**

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JUST A NORMAL DAY AT THE NATION'S MOST IMPORTANT FINANCIAL INSTITUTION...

International Herald Tribune, October 27, 1989. Kal, Cartoonists and Writers Syndicate, 1989.

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