Critiquing in the EDC

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What is Critiquing?

Critiquing is a dialog where the interjection of a reasoned opinion about a product or action triggers further reflection on or changes to the artifact being designed.

A Critiquing System is a decision support system that allows the user to make the decision first; the system then gives its advice when the user requests it or when the user's decision is out of the system's permissible range.

Why do systems need critics?

- Incomplete evaluative knowledge
  - Taking into account symmetry of ignorance
- Evaluating from multiple perspectives
  - Designer, different groups of users, etc.
- Recognizing problematic solutions
  - Solutions that conflict with established design constraints

Critiquing Criteria

- Perspective-based Critiquing
  - Designer's vs. User's perspective
- Consistency vs. Analytical Critiquing
  - Consistency critiquing = Janus-like
  - Analytical critiquing = EDC-like (we do not want to hamper social creativity)
- Multiple Intervention Strategies
  - Active, Midway or Passive Critics
  - Level of Intrusiveness

Active vs. Passive Critics

- Active: Criticism during the whole problem solving process
- Passive: after-task batch criticism
- We want critiquing in the action space. Currently the web survey, which is the only form of critiquing in the EDC, is done in the reflection space.

Implementation in Janus

- Janus used for Kitchen Design
- Completely passive critiquing
  - option for calling critic at user's convenience
- Knowledge base divided into
  - generic critic - gives general rules
  - specific critic - allows for fine tuning of rules based on user's or designer's preference
  - interpretive critic - allow for other factors
- There is an argumentation space in the system

Implementation in VDDE

- VDDE used for voice dialogue design
- Completely active critiquing
- Rule base divided into four:
  - USWest rule set
  - UMUIF rule set
  - International rule set
  - Consistent with:
- During design process, analytical evaluation procedure is used to compare design against first three rule sets
- Consistency evaluation is done using the last rule set
- There is an argumentation space in the system

What we need to keep in mind

- Rule base is divided into parts (based on severity)
- Selection of individual parts that will participate in critiquing left up to user
- In general, active critiquing works better BUT we need to keep intrusiveness under control
- The level of design experience of the user/designer is relied upon for selection of parts of the rule base, as well as for selection of active or passive critiquing.

The EDC Domain

- Application: urban design and transportation planning
- Users: Commuter population using the bus
- Domain knowledge: Personal requirements of the bus system (including bus stop location, frequency, etc.)
- Issues: Users are not trained to be professional designers

Why does EDC need critics?

- We foresee extensive real-world application of the EDC (general public use)
- Multiple designers/users lend too many perspectives in the already ill-defined design space
- Approaches like expert systems will not work in this scenario since no optimal solution exists
- So we need d*esign-critique-reflect-modify* cycle

EDC needs a balanced critic

- Active critiquing can be very responsive (watchdog-like) however it can become too literal without involving any deeper thought into the design process.
- Passive critiquing can be much smarter but in domains like EDC, smartness at the end of the whole design process does not contribute much to the actual design of the system.
- This is why we think a balance is needed between these two kinds of critics and we suggest such balance for critics in the EDC.

Current Critiquing in EDC

- Critiquing in reflection space through the web survey
  - How long would you wait for the bus when you were going to school?
  - How often do you use the bus?
- Human designer has to review the results of the web survey and manually implement these recommendations into the system.
- EDC by itself is not aware of the user's satisfaction or dissatisfaction with the system

General Guidelines for EDC

- Critiquing in the action space so that user's can take advantage of backtalk from artifacts
- Active critiquing should be employed at all times, with the option of consistency critiquing though passive critics
- Use of previous sessions for argumentation space
- Critiquing should not retard social creativity
- Intrusiveness should be kept under control
- Option should be given for user to ignore critic's recommendation

Proposed EDC Implementation

- Generate rule base with design constraints - Split rule base into two parts
- Strict rules are placed in Part 1 - these cannot be violated; the user has to make changes to ensure rule is adhered-to:
  - Distance between bus-stops cannot be greater than the defined distance
  - Bus route and bus stop cannot traverse secondary or tertiary roads (this would require all roads/streets to be labeled as primary, secondary and tertiary)
  - If route is pre-established and currently in-use (eg. Route 209 through Gunbarrel), bus-stops at public institutions like schools, and malls cannot be removed.

Proposed Implementation (2)

- Part 2 includes prioritized "design rules" can be temporarily violated until the user specifically requests critiquing on the current stage of the system. In case a rule from Part 2 fires, the user has the option to ignore the critic and move on with the design process (unlike those in Part 1).
  - Bus-stop may not be more than walking distance preferred by the user
  - Two bus-stops may not be closer to each other than the defined distance
  - Bus should ply in both directions at any given spot on the route
  - In pre-established routes, current bus-stops should not be changed (those that are heavily used by commuters)

Proposed Implementation (3)

- User/designer is allowed to select completely-active critiquing - in this case all rules in rule base are fired actively on violation
  - Both Part 1 (rules that cannot be violated) and Part 2 (rules that can be violated temporarily) are fired actively. This might result in over-intrusiveness of the system.
- User/designer is allowed to select partially-active critiquing - in this case rules in Part 1 are always fired on violation, and violations of rules in Part 2 are fired only on request for passive critiquing.
  - Part 1 is fired regardless of the user's choice, Part 2 is fired only when user requests overall critiquing at the end of the design process.

Problems with our Approach

- The current EDC system implementation is too modular to implement unified rule base as we suggest; an attempt should be made to make it as declarative as possible.
- Labeling roads as primary, secondary and tertiary is hard to implement (based on personal judgment)
- The real-time nature of the EDC system allows choices to be far from binary (it allows a user to move the road to suit the bus-stop; to move a house/school/mall to suit the route; etc.)
- Rules are not mutually-exclusive for this domain. Changing one rule may affect another in the rule base.

Questions

- What other rules would you put in Part 1 (those that cannot be violated)?
- Who decides which rules go into Part 1?
- Who decides what rules go into Part 2?
- Do you have any questions for us?
- Questions for Gerhard and Hal? :)