**Graphical User Interface**
**Assignment – U1 & Quiz Solution & Review Material**

Assignment U2 consisted of the following two activities.

> *Consider the attached document - Vacation-Pro-MRD. The document is a skeleton of the marketing requirement document for a vacation / leisure travel management system. For the attached MRD:*
>
> *a. Define the usability requirements part of the relevant PRD,*
> *b. Define procedures for testing the usability of your system,*

In the enclosed solutions, I am elaborating on the definition of usability and its main component as per the two ISO standards. In addition, I am providing a sample of requirements related to the Vacation-Pro-MRD. Note that the requirements are user centered. That is, these requirements relate to "in use" – end user view. So, for example, "superb" system response is assumed to be a trivial requirement and not listed here. Additionally, the requirements are stated in a way that reminds "lawyer language" and in this sense are similar to contract base requirements. A better approach would be to use the same requirements with pre and post conditions (using the contract based approach). In this set of solutions the pre and post conditions are implicit. Next, I provide a sample of testing procedures for the specified requirements. Note that there might be a "chicken and egg" issue between requirements and tests, in general, the requirements should not dedicate the test procedure; but this is not always the case.

The questions and answers are also similar to those given in the midterm.

In general, the answers are based on the usability standards and usability measurements methods presentations provided in class and available in TRACS. I plan to place in TRACS a few relevant papers for further individual study by students.

Please review these solutions as similar questions might be given in the final.

1. **Define Usability**
   - "The ease with which a user can learn to operate, prepare-inputs for, and interpret outputs of a system or component." (IEEE 1990)
   - "The Extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use." (ISO 9241-1, 1998)
   - "The capability of the software product to be understood, learned, used, and attractive to the user, when used under specified conditions" (ISO 9126-1, 2001).

2. **Define the following terms:**
   - Effectiveness – The product enables users to achieve specified goals with accuracy and completeness in a specified context.
   - Efficiency – The resources expended in relation to the accuracy and completeness with which the user achieves goals.
   - Satisfaction – The comfort and acceptability of use.
   - Productivity – The product enables users to expend appropriate amount of resources in relation to the effectiveness.
   - Understandability - The ability of a user to understand the capabilities of the software.
   - Learnability - The ease with which a user learns to use the software.
   - Operability - The capability of a user to use the software to accomplish a specific goal.
   - Attractiveness - The appeal of the software to a user.

3. **Specify the usability requirements of Vacation-pro WRT each of the terms defined in question (2).**

   I am supplying one example of USER CNTERED requirement per term. Note that system response is assumed to be a trivial requirement.

   - Effectiveness – At least 90% of the users will complete at least 90% of the task of hotel reservation under a specific set of required amenities with 90% accuracy of compliance with the requirements, in less than 10 minutes.
   - Efficiency – Given $x$ productive-users[1] attempting $y$ tasks of hotel reservation under a specific set of required amenities, at least 90% of the users will expand no more than 120% of the resources expended by experts attempting these $y$ tasks under the specified set of constraints
   - Satisfaction – The mean score on the SUMI scale will be greater the 50.
   - Productivity - Given $x$ productive-users attempting $y$ tasks of flight reservation under a specific set of budget constraints at least 90% of the users will expand no more than 120% of the resources expended by experts attempting these $y$ tasks under the specified set of constraints (quite similar to efficiency).
   - Understandability – Productive users will have less than 5% of errors of type 1 (assuming functionality that is not available in the system) and less than 5% errors of type 2 (insufficient knowledge of available system functionality).
   - Learnability - The average novice user will reach the level of productive user after $x$ number of executions of each specific scenario based independent identical set of tasks.
   - Operability - (quite similar to efficiency).
   - Attractiveness - At least 95% of the users that have any experience with the system will rank the system appeal level at 8 or above on a scale of 1 (low attractiveness) to 10 (high attractiveness).

4. **For each of the requirements listed in question (3) please define complete procedures for testing the compliance of the system with the requirement. At least one of your procedures should stem from cognitive approach and at least one should steam from quantitative objective measures-based approach. Effectiveness is evaluated for a task instance that includes completing the task (e.g., hotel reservation) under a set of constraints such as location, budget, and set of required / preferred amenities.**

   - Effectiveness, develop a code snippet that verifies task completion (a hotel room was reserved) and compliance with constraints (e.g., the room is in the right location, at the right price, with the right set of amenities). Additionally, measure the ToT.
   - Efficiency, Productivity, and Operability - Measure the average ToT of $x$ productive users attempting $y$ independent identical tasks of hotel reservation under a specific set of amenities constraints.
   - Satisfaction – Administrate the SUMI tests. Alternatively, assess user satisfaction via one-way mirrors.
   - Productivity - Measure the average ToT of $x$ productive users attempting $y$ tasks of hotel reservation under a specific set of amenities constraints and compare it to the ToT of an expert.
   - Understandability – Administrate a set of tests to check the average rate of errors of type 1 and type 2 in associating functionality to the system by a set of $x$ productive users.
   - Learnability – Plot the average learning (effort) curve (e.g., using eye path traversed as the effort measure) of $x$ novice users. Identify the point of reaching a productive level state for each user.
   - Attractiveness – Using questionnaires assess the ranking of appeal of the system by a set of users with any level experience with the system.

[1] The definition of productive-users is given in the slides Measuring-Usability