Human-Centred Systems Design Group Project

2. Scenario

The following scenario describes your customer, and some information that you have gained from them, over a series of interviews. This information should be used as the source content for your UML models (in requirements and design), your HCI design and your team's database system implementation. The first interview has established the business context. The second interview has established more detailed business information. The third interview has established how the stakeholders expect to interact with the system.

2.1 Business Context

A private dental practice, *Sheffield Dental Care*, has commissioned you to design an information system to manage client registration, appointments and fee calculation. The practice consists of a dentist and a hygienist, who are the partners who own the practice, and a secretary. The clients of the practice are known as patients. A patient may visit the hygienist to have their teeth cleaned (de-scaling to remove plaque), or visit the dentist for a regular check-up (an inspection only), or visit the dentist for some remedial treatment for tooth decay (such as a tooth filling).

A patient must first register at the practice, a process managed by the secretary. The patient may choose to subscribe to a healthcare plan, to cover the cost of regular check-ups and hygiene visits, in which case the secretary records that the patient is on the plan. As part of this she asks the patient to sign a bank mandate. Separately, patient's bank will then debit a monthly sum from the patient's bank account, paid to the practice, to cover the cost of regular visits.

Initially the secretary will book appointments for a patient to visit both the dentist and the hygienist (in any order) on the same visit. Thereafter, she books the next appointment(s) at the end of the patient's previous visit. Check-ups are typically every six months, but hygiene visits may be more frequent. If the dentist identifies any dental problems after a check-up, the secretary will book one or more treatment visits (a course of treatment) at the same time for the patient. All appointments are made in the same way on a calendar. Treatment visits take longer than check-up/hygiene visits. A patient can ring up in advance, to cancel an inconvenient visit, in which case the secretary cancels that appointment and books a later appointment.

The secretary and both partners can view the appointments calendar. The dentist and hygienist do this to find out which patients they will see each day. After each patient visit, they record that they have seen the patient, logging how much the check-up or treatment should cost. Treatment may cost more than the amount covered by any healthcare plan. The secretary checks out each patient after every visit, to see whether they owe anything, and to arrange their next appointment. If the patient is undergoing a course of treatment, payment is only required at the end. The system doesn't handle payments with the bank; checking out simply prints a receipt for the amount owed and paid by the patient. The patient pays by separate debit card transaction (e.g. Visa).

2.2 Business Information

The dental practice's information system handles the following information. Every patient record has a title (Mr, Ms, Dr, etc.), forename (given name, e.g. "John"), surname (family name, e.g. "Smith"), date of birth (in dd-mm-yyyy format), and a contact phone number. Names and birth-date are not sufficient to identify a patient uniquely. Groups of patients often come from the same family living at the same address. An address records the house number, the street name, the district name, the city name, and the post code. The house number and post code are sufficient to identify an address uniquely. At least one patient lives at each address.

Booking a single appointment involves finding a free time-slot on the calendar for the dentist or hygienist, between 09:00 and 17.00, Monday-Friday, excluding public holidays. A check-up or a hygienist appointment lasts for 20 minutes. A treatment appointment lasts for one hour. The calendar can be considered as a collection of appointments. Every appointment has a date, a start-time and an end-time. Each appointment is for one partner to see one patient. Each partner and each patient can have many (non-overlapping) appointments. An appointment is uniquely identified by date, start-time and partner. The secretary can also book empty appointments (with a default "blank" patient), to indicate that the partner is not available for a given time period (e.g. because they are on holiday).

After an appointment, a partner may record one or more treatments given during that appointment to the patient. These are chosen from a fixed list of possible treatments. Each treatment has a name (e.g. "hygiene", "check-up", "amalgam filling") and a cost. Sample costs include £45 for a check-up or hygiene visit, £90 for a silver amalgam filling, £150 for a white composite resin filling, or £500 for fitting a gold crown. After a visit, the system will print a paper receipt for the total cost of the appointment, itemising the costs of treatment and giving the total due, based on the sum of treatments. If a patient has subscribed to a healthcare plan, some treatments will be offered for free, considered pre-paid out of the plan.

A patient optionally has a healthcare plan; and may have none. Each plan has a unique name, a monthly payment and the level of service covered for check-ups, hygiene visits, and repair work (cosmetic work cannot be paid out of a plan). There are only a few different kinds of plan, and many patients may subscribe to the same plan. Examples include: the *NHS free plan* (only for children under 18), no monthly charge, 2 check-ups, 2 hygiene visits and 6 repairs per year; the *maintenance plan*, costing £15 per month to cover 2 check-ups and 2 hygiene visits only; the *oral health plan*, costing £21 per month, covering 4 hygiene visits and otherwise like the maintenance plan; and the *dental repair plan*, costing £36 per month, covering up to 2 repairs and otherwise like the maintenance plan. The system records how much of their prepaid treatments have been used each year, by each patient, and resets this information each year.

2.3 Stakeholder Interaction

The secretary works in a reception area and has access to a regular desktop computer. She must be able to perform the following actions easily (and be able to see the results):

- View all the appointments for a given week (week-to-view), showing the calendars for both partners (the dentist and hygienist) on separate tabbed panes.

- Book an appointment, or cancel an appointment, or find an appointment for a given patient to see one of the partners. The result should appear on the calendar (week-to-view).
- Book an empty appointment (i.e. with no patient) for either partner, to indicate days when the dentist or the hygienist are not available (e.g. on holiday).
- Subscribe a patient to a particular healthcare plan, or unsubscribe them later.
- Review the treatments given to a patient after one or more appointments and display these treatments, their individual costs, and their total cost (see below).
- Be able to see whether some of these treatments (see above) have been pre-paid, according to the patient's healthcare plan, and therefore the total owed is less than the full amount.
- Record when a patient has paid their outstanding bill, such that their latest treatments have been paid for, and the total cost owed is now zero.

The dental partners work in a surgery and only have access to a simple touch-screen device. Each of the partners (the dentist and the hygienist) must be able to perform the following actions easily at the end of a consultation (and be able to see the results):

- View all their appointments for a given day, seeing clearly which patient is up for the next appointment on a given day.
- Record one or more treatments given to the patient in the last consultation, indicating the kind of treatment and its cost.
- Record that they have now finished seeing this patient, committing the above changes to the shared database.