Model-driven Development of Mobile Personal Health Care Applications

Abizer Khambati[2], John Grundy[1,2] , James Warren[1] and John Hosking[1]

[1]Department of Computer Science, [2]Department of Electrical and Computer Engineering
akmail049@gmail.com, {john-g, jim, john}@ cs.auckland.ac.nz

THE UNIVERSITY OF AUCKLAND
NEW ZEALAND
Te Whare Wānanga o Tāmaki Makaurau

OVERVIEW

Mobile personal health care programs let patients enhance their health via reminders, monitoring & feedback to doctors. Such applications are challenging requiring generic care plans, per-patient instantiation, & development & deployment of supporting web and mobile device applications.

BACKGROUND

Existing mobile applications for self health management e.g. weight wellness monitor, My Health, My Life are ad-hoc. Visual modelling approaches, e.g. Protégé and Asbru, don't support application generation. We wanted high-level care plan modelling tools fully-generated mobile care applications.

OUR APPROACH

A health care provider develops care plans using a novel domain-specific visual language (DSVL), Visual Care Plan Modelling Language (VCPML). They instantiate saved models for a patient, specifying e.g. when to exercise; take medication; take health metrics e.g. weigh, pulse; and provide patient-specific advice on their care plan. A second DSVL, Visual Patient Application modeller (VPAM), supports specification of mobile device interfaces for the care plan. VPAM generates OpenLaszlo code which is compiled to Flash to run on mobile devices.
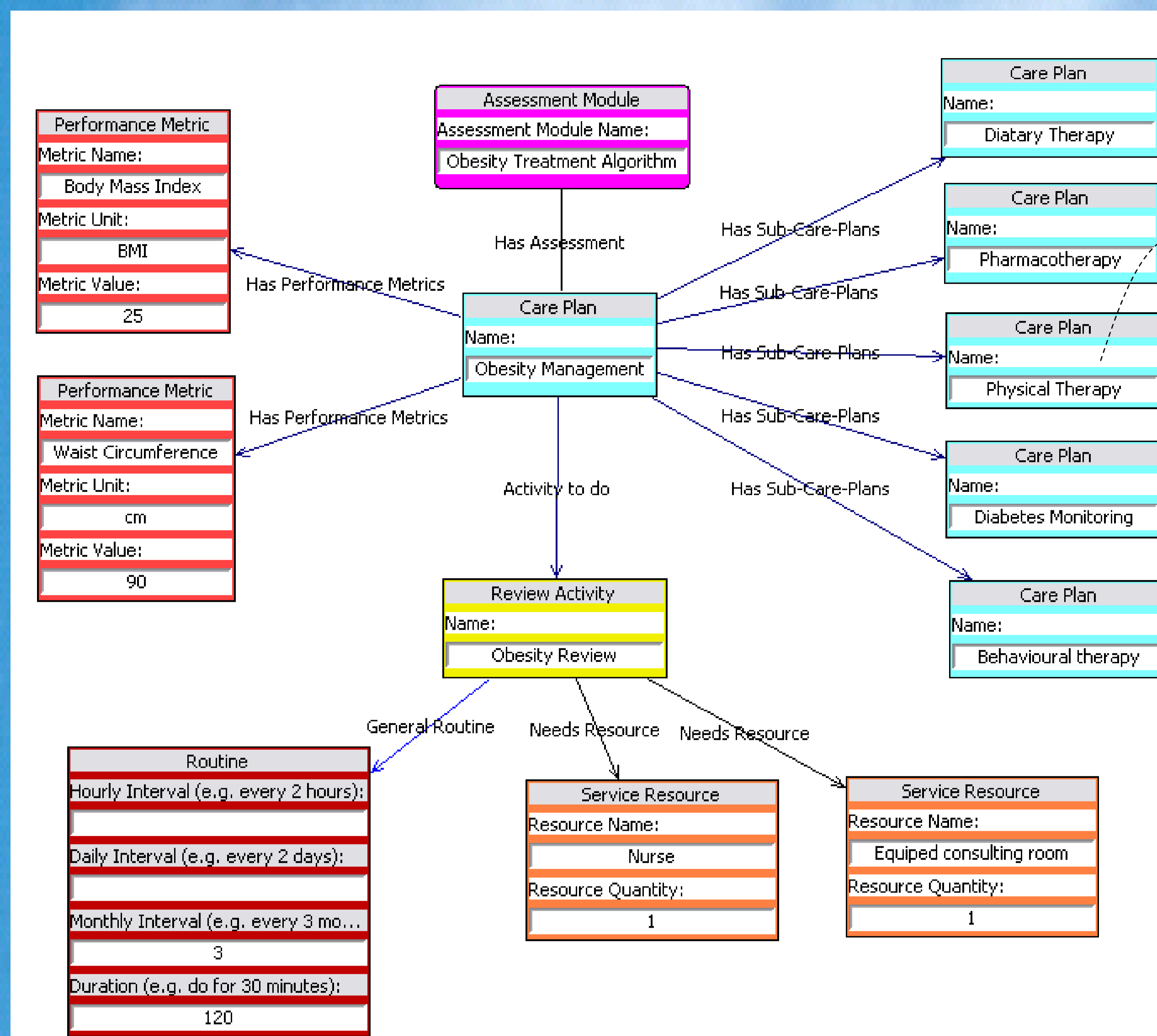
EVALUATIONS

We have evaluated our VCPML and VPAM DSVL tools using:

- Cognitive Dimensions
- Formative small group surveys & open ended interviews
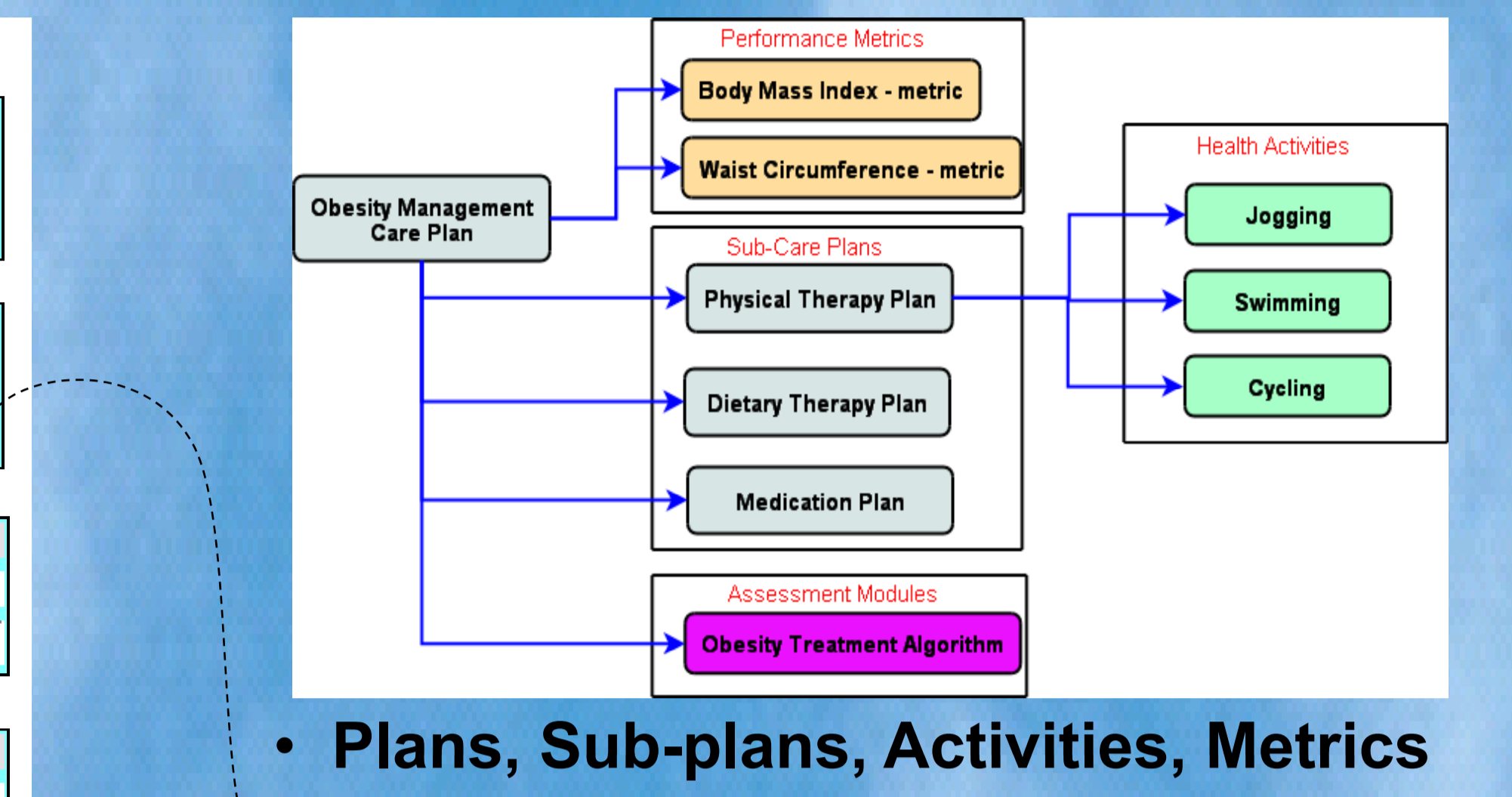- Prototyping several care plan applications

Results have been positive with fully-functional personal health care applications generated by non-technical end users. Further development and evaluation with health practitioners is planned.

Visual Care Plan Modelling Language (VCPML)   High-level Care Plan
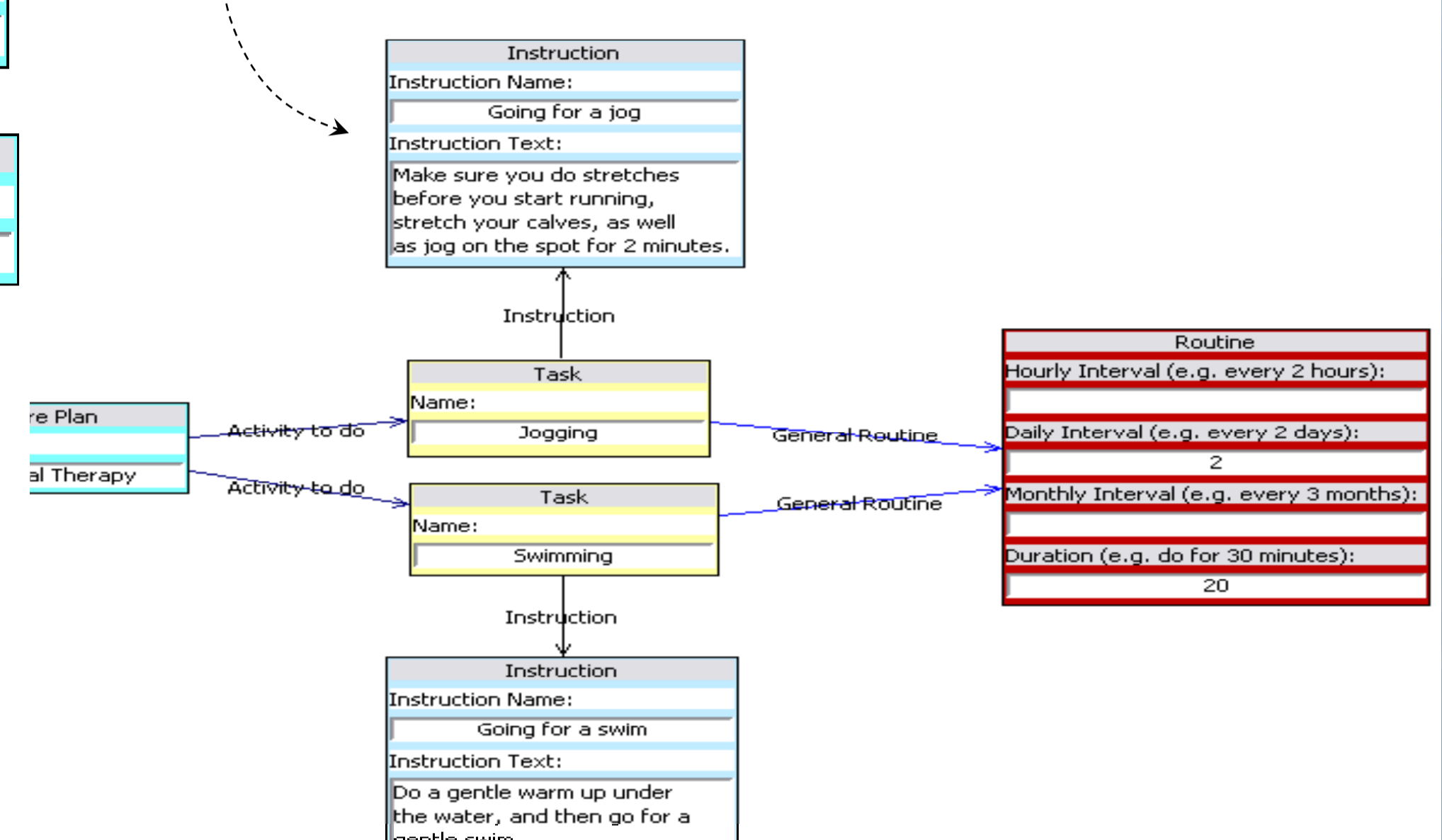

- Plans, Sub-plans, Activities, Metrics

- Provides DSVL for care plan representation
- Includes sub-plans, activities, measurements, tasks, actions
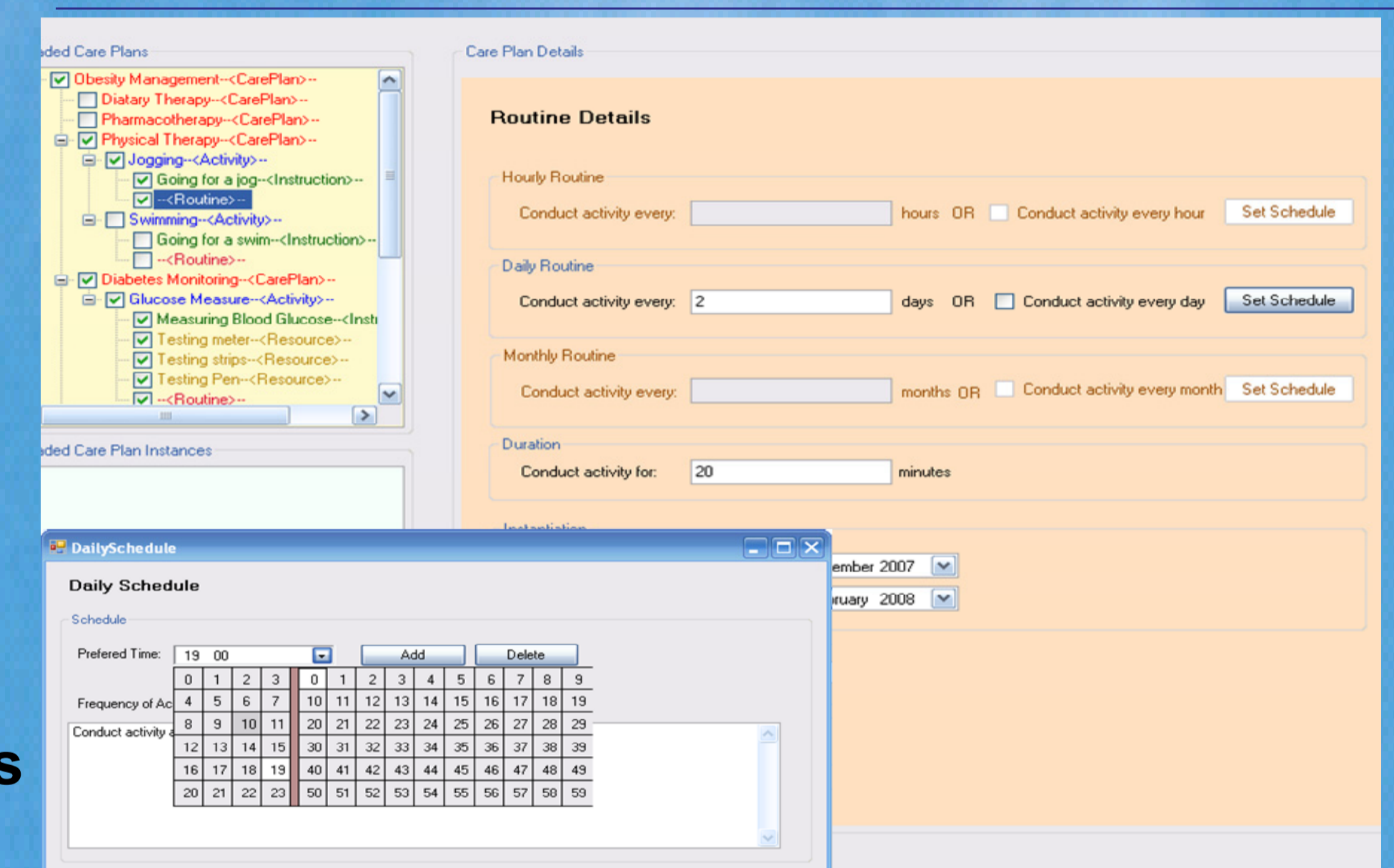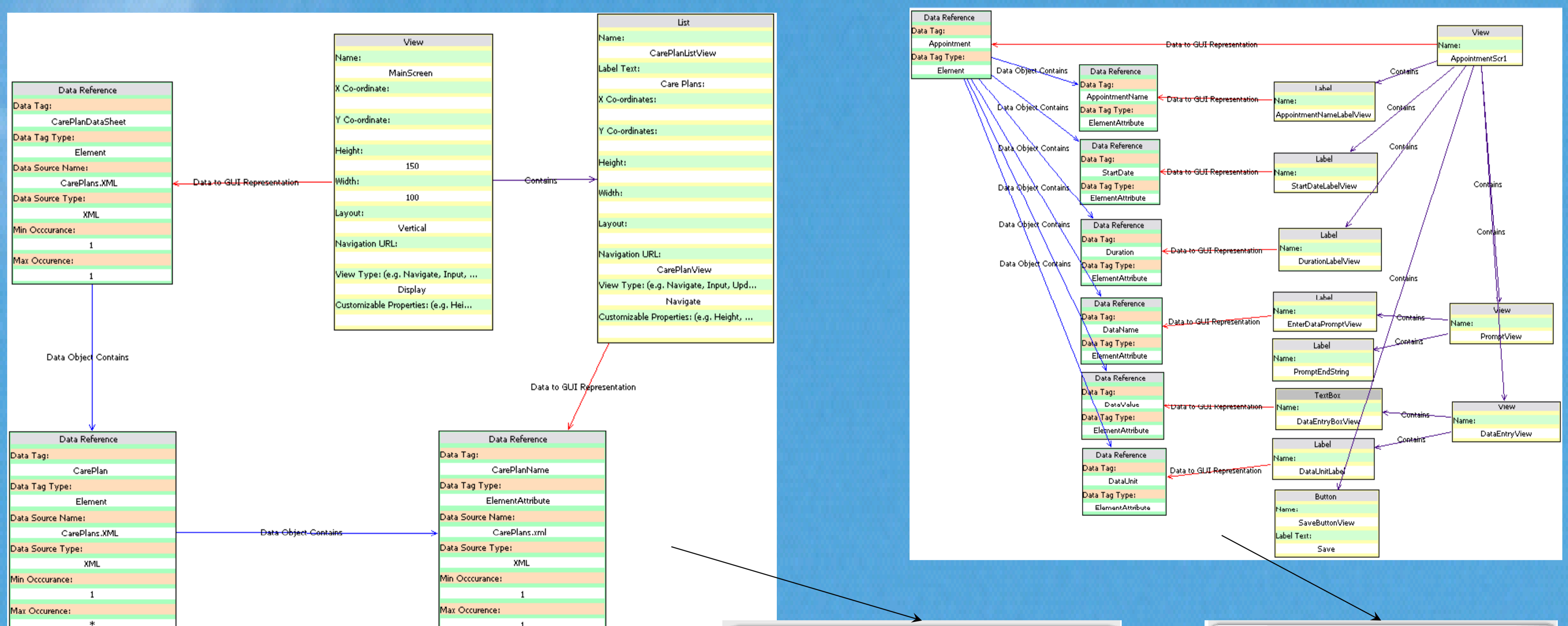- Plans are generic and can be tailored to specific patients

Care Plan Instance

- Care plan instantiated per-patient
- Remove items; specify patient-specific needs
- Saved to XML for use by VPAM

Visual Patient Application Modeller (VPAM)

- Specifies graphical elements to render on device for care plan instances
- Includes screens, pages, buttons, text labels, text fields, radio and check boxes, pop-up menus, images
- Generates OpenLaszlo XML; runs as Flash swf on mobile PDA, phone
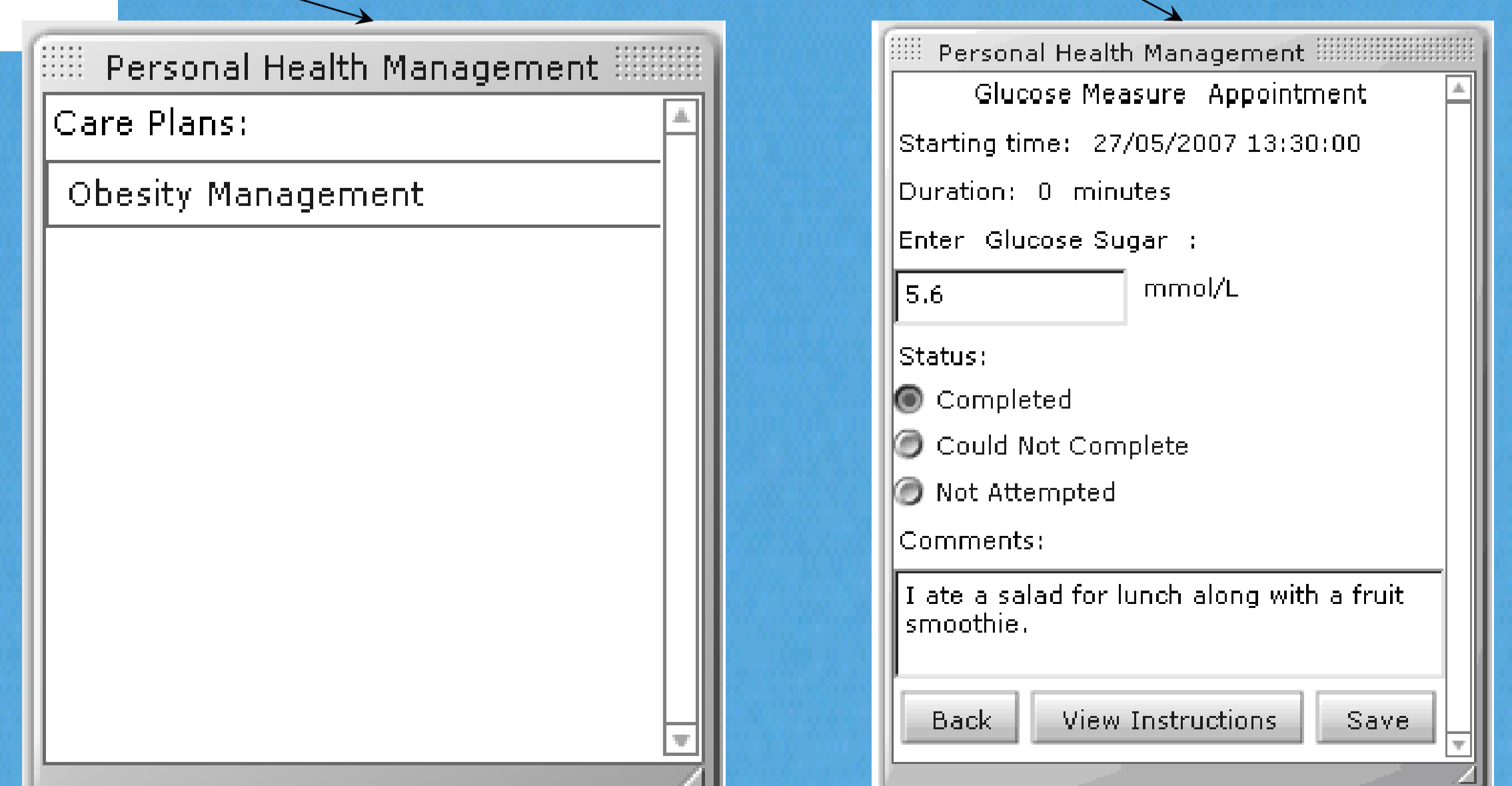
The Marama toolset used to build VCPML and VPAM has now been released in an open source form (https://wiki.auckland.ac.nz/display/csidst/Welcome).