


**Using eHF to develop  
LifeSensor Diabetes**



ICW Developer Conference  
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**Agenda**

- Introduction
- LifeSensor Diabetes technical specification
- LifeSensor Diabetes features, Demo
- Using eHF to develop LifeSensor Diabetes
- Technical details of Graph component (Flex, ActionScript, JSON)
- Technical details of AJAX sliders
- Questions

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## Introduction – What is LifeSensor Diabetes?

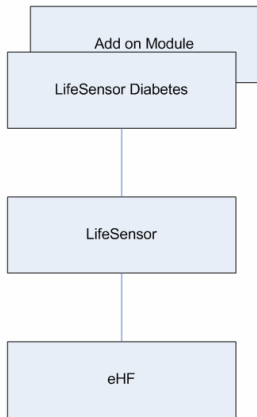
The LifeSensor Diabetes is an add on module to LifeSensor.

- Targeted for users with Type 2 Diabetes.
- Keeps the user continuously motivated for well-balanced and active lifestyle.
- Helps the user to get control over diet, medication, testing.
- Leverages the user’s personal support buddy network.
- Provide quick data entry screens, interactive graphs and medical content.

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## Introduction – LifeSensor Diabetes Architecture



```

graph TD
    A[Add on Module] --- B[LifeSensor Diabetes]
    B --- C[LifeSensor]
    C --- D[eHF]
            
```

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## Technical Highlights

**Development Methodology:** Agile development using SCRUM.



**Domain Model:** Model Driven Software Development (MDS) using UML and eHF generator.

**Presentation Layer:** Uses eHF and LifeSensor web components, (JSF, MyFaces, Tomahawk, AJAX4JSF, Facelets, Adobe Flex, ActionScript, etc).

**Assembly:** Plugged into LifeSensor as an add on module mainly by JSF configuration and Spring configuration files.

**Additional configuration:** Authorization Profiles, codesystem product codeset etc.

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## LifeSensor Diabetes - features

**Overview:** Home page.

**Profile:** User profile and health targets.

**Action Plan:** Personal action plan to reach goals.

**Log:** Personal actions, results (AJAX input forms, Sliders).



**Graphs:** Display and compare logged data as interactive graphs.

**Trophy:** Receive reward when user meets or exceeds targets.

**Learn:** Interactive body rollover model and Diabetes related medical content.

Demo of LifeSensor Diabetes.

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## LifeSensor Diabetes – Overview



This is the home page for returning users.

- Aggregates information from the rest of the module.
- Shortcuts to primary tasks.
- Encourages lifestyle change to a committed testing regimen.

Includes:

- View Goal progress.
- AJAX inputs for Daily Quick Log.
- AJAX sliders for Diet, Exercise, Medication.
- View Reminders.
- Motivation, Support pictures and Statements.

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## LifeSensor Diabetes - Profile

4 optional step Profile Wizard to minimize initial data acquisition:

**Basic:** Height/Weight, Gender/Age from PHR, and meal times.



**Motivation:** Upload motivating picture and a inspirational statement.

**Support:** Designate a support buddy, upload support buddy's picture.

**Health Targets:** Patient sets personal goals for medical data. Inputs current and/or target data.

Then the user is redirected to **Action Plan** to set up goals and reminder schedule.

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## LifeSensor Diabetes – Action Plan

Patient optionally defines action plan to reach goals.



**Diet Plan:** Eat less calories or reduce meal portion size.

**Exercise Plan:** Set Exercise schedule.

**Medication Plan:** Take meds or not.

**Testing Plan:** Reminder schedule to test Blood Glucose & Blood Pressure.

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## LifeSensor Diabetes – Log



**Data Acquisition screens:** Activities and Health Targets as Observations in LifeSensor.

**Ajax Sliders:** Diet, Exercise, Medication.

**Contextual feedback:** Blood Glucose, Weight, Blood Pressure, A1c, Cholesterol Input form field turns red/green.

**Awarding immediate trophies:** Weight, A1C, Cholesterol.

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## LifeSensor Diabetes – Graphs

**Interactive Flex graphs:** Drag and Drop, Tool-tips, Navigation, Overlay.

- Dynamic and contextual related graphs.
- Flex component uses secure http service to retrieve observations in JSON notation.
- JSON format data is processed on Client side.
- No reload from server if graphs is viewed over different time scale.
- Time zone calculations are based on the client's Time zone.
- Includes print view.



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## Using eHF to develop LifeSensor Diabetes

- The whole development team at San Mateo Lab was new and LifeSensor Diabetes was the first engagement.
- Underwent training on eHF and LifeSensor modules.
- Used eHF customized IDE and deployment platform. (Apache, Tomcat, Eclipse, Maven, OAW, SVN)
- Flex SDK and Flex Builder.
- Wiki as a Collaboration platform.
- Other tools for building and testing: JIRA, CruiseControl, Hudson, local Maven repository proxy and local subversion.

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## Using eHF to develop LifeSensor Diabetes

**Mockup:** Collaborate with FROG design to create a mockup.

**Product Backlog:** Product Manager used Agile/SCRUM.

**Implementation and Delivery:** Development and QA team used Agile/SCRUM.

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## LifeSensor Diabetes – feedback

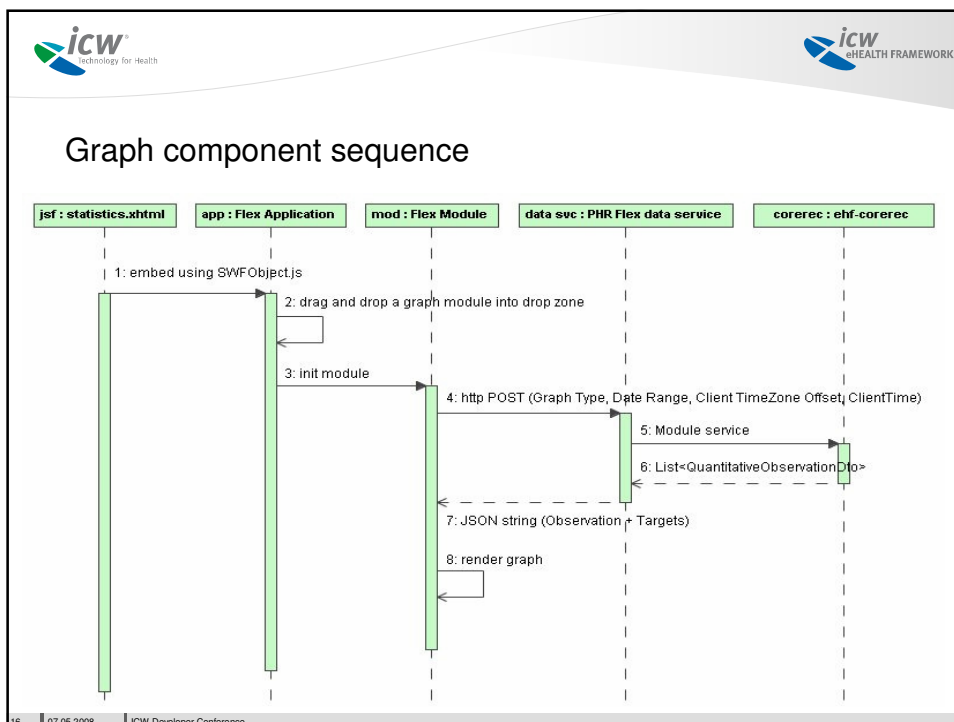
- We were able to use eHF to create module very rapidly.
- Currently it is assembled with LifeSensor.
- Currently investigating ways to directly integrate it with eHF.
- Advantages of this would be multiple-fold,
  - To reduce build & deployment time.
  - Promotes modularization and reusability of components.



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## Technical details of Graphs component

- Medical observations are displayed as interactive Flash charts
- Technology used:
  - Flex 2 SDK with charting component
  - Flex Builder 2 (eclipse plugin)
  - Flex 2, ActionScript
  - JSON
  - SWFObject
  - Adobe Flash Player
  - HTTP service for retrieving data

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## JSON String for Observations



JSON String for Blood Glucose before and after dinner with target values

```


{
  "logs":[
    {"d":"080501","t":"20:00","k":"di1","v":"77"},
    {"d":"080501","t":"21:00","k":"di2","v":"90"},
  ],
  "rc":"00",
  "targets":[
    {"k":"bfl","v":"77"},
    {"k":"bfh","v":"88"},
    {"k":"af1","v":"77"},
    {"k":"afh","v":"88"}
  ]
}

```

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## Technical details of AJAX input sliders




- Input text fields displayed as a dynamic image using CSS and .JS
- onBlur() event triggers AJAX update
- Position on sliders stored as % value in ehf-record-medical

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## Technical details of aggregated sliders



- Backing bean aggregates 7 day observations and returns value.
- JavaScripts interprets value and adds css style sheet class.
- Animated so user sees sliders resolving.

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## Questions?

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