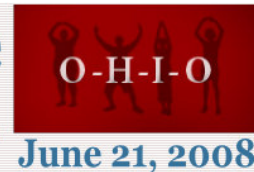# Creating natural dialogs with VoiceObjects

Tobias Göbel, M.A.

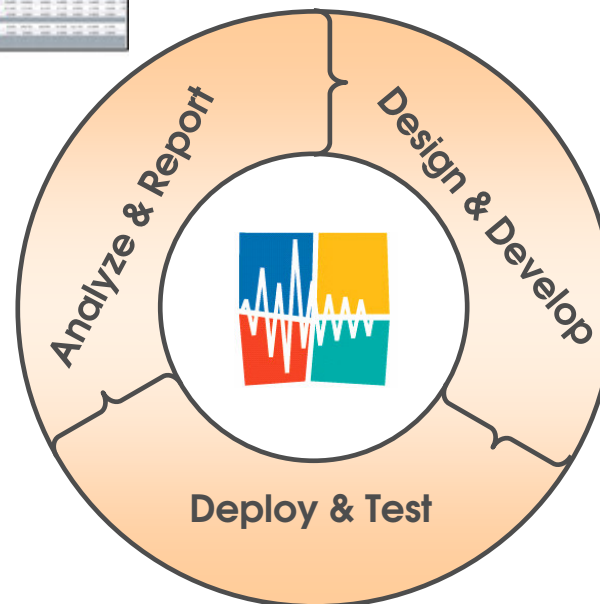tgoebel@voiceobjects.com

Young Researchers' Roundtable on Spoken Dialog Systems 2008
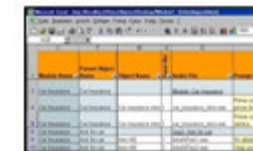
O-H-I-O

June 21, 2008

VoiceObjects 7 (v7.3)

VoiceObjects Analyzer

VoiceObjects Desktop

Analyze & Report

Design & Develop

Deploy & Test

Storyboard Manager

Control Center

Debug Viewer

Phone Simulator
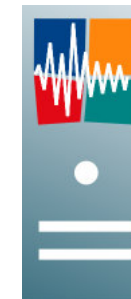
VoiceObjects Server

Multiple Phone Channels

VoiceObjects

Interactive
Voice Response

Voice　　　*DTMF*

Interactive
Text Response

Text

Interactive
Video Response

Video

Interactive
Web Response

Mobile Web

Multiple Phone Channels

VoiceObjects

**Interactive
Voice Response**

Voice

DTMF
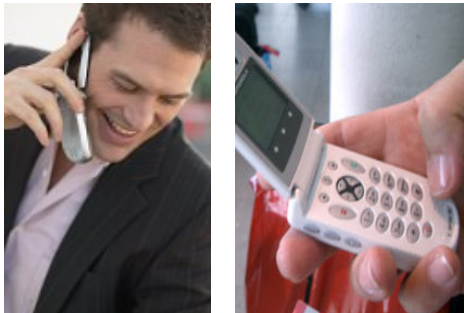
**Interactive
Text Response**

Text

Interactive Phone Response
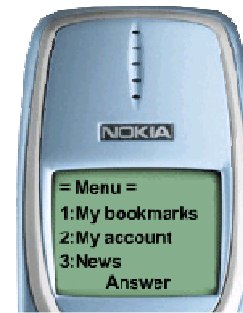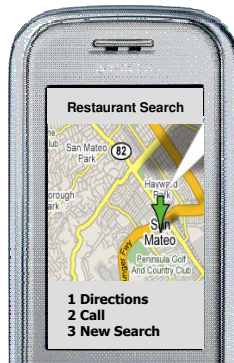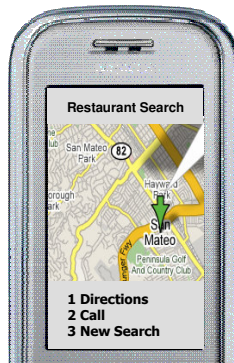
Video

**Interactive
Video Response**

Mobile Web

**Interactive
Web Response**

Phone Application Server

VoiceObjects

Voice, Video
Device

ASR, TTS, Call Control
VoiceXML Browser

VoiceObjects
Desktop
IDE

Media Platform Driver

VoiceObjects
Phone Application
Server

Connector Framework

Statistics

Apps

VoiceObjects
Analyzer
Reporting

**Service
Creation
Environment**

**Service
Execution
Environment**

**Service
Analysis
Environment**

Back-End Systems
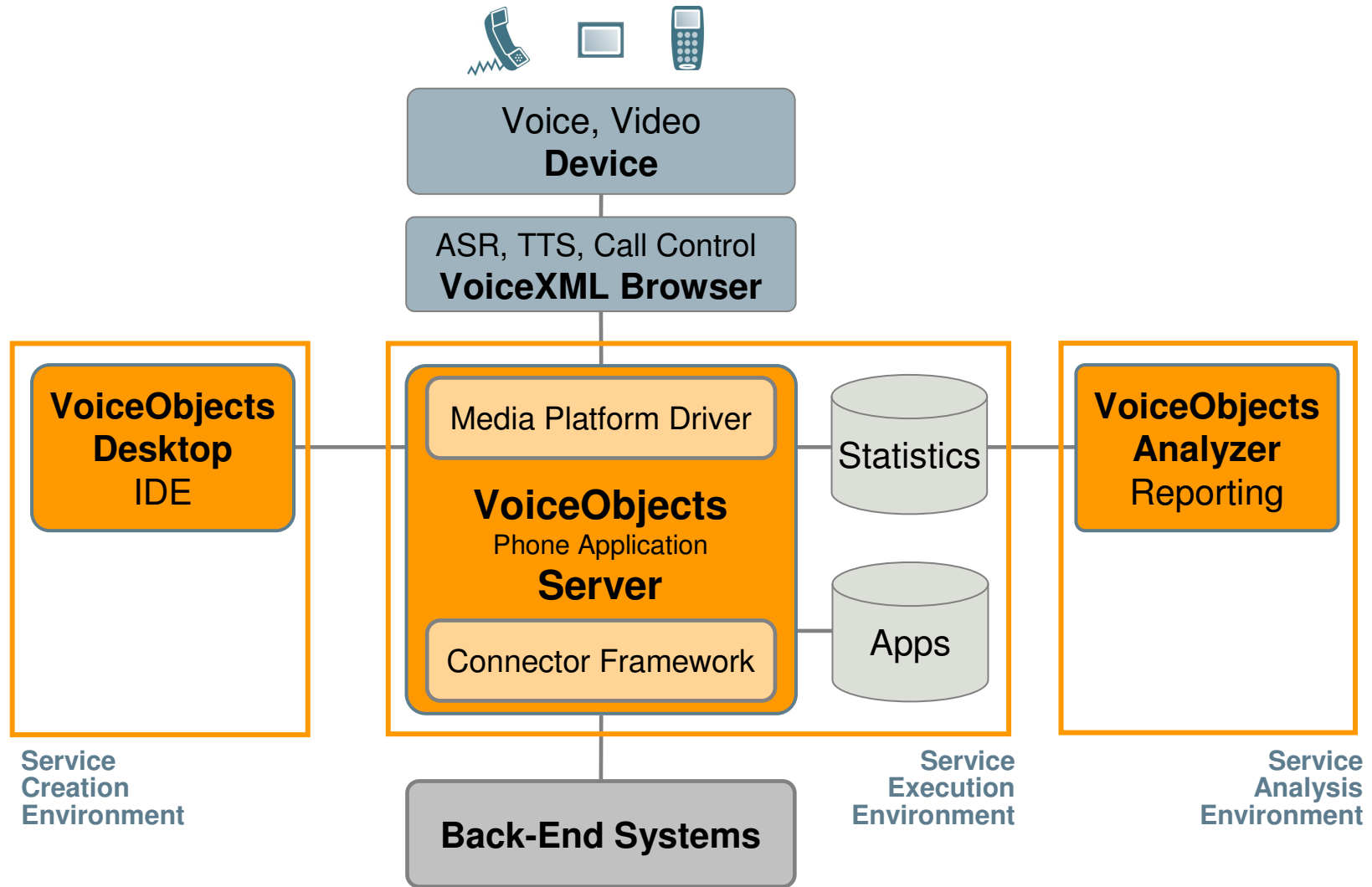
Service Creation
Model and Parameterize the Call Flow

VoiceObjects

- Easy-to-use object library,
  No manual coding

- Consistent, extensible and
  maintainable call flow definition
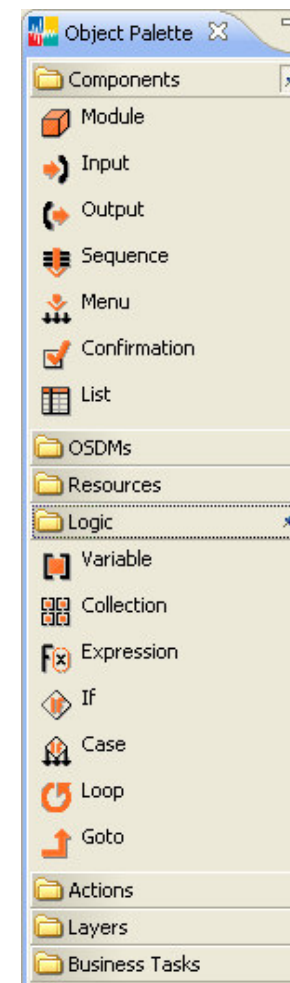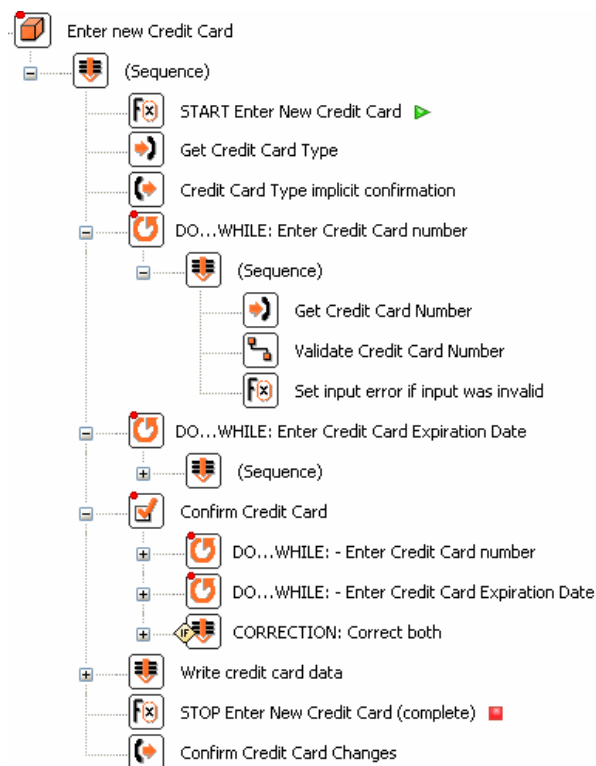
Dialog components:
Best practice user
interface design patterns

Resource management:
Back-end abstraction,
Audios, Grammars, ...

Presentation logic:
Variables, Expressions,
call flow control elements

Actions:
Caller navigation and
call transfers

Service Creation
Development Productivity

- **Personalization Engine** (**Layer Concept**)
  - Create **dynamic, personalized dialogs …**
  - across multiple channels and languages …
  - for different customer categories, customer values, preferences, transaction history, …
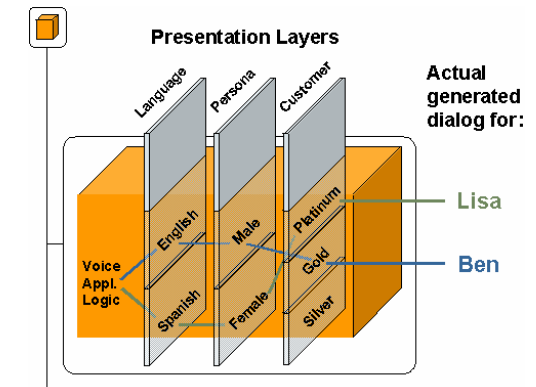
- **Modularization, Shared Libraries**
  - Reusability **increases productivity**
  - … and **simplifies maintenance**
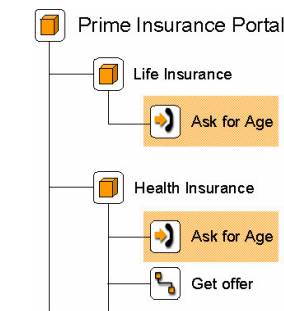
- **Object Inheritance**
  - Definition of generic dialog functionalities like **navigation and event handling** in a single place
  - Helps build a **Consistent user interface.**
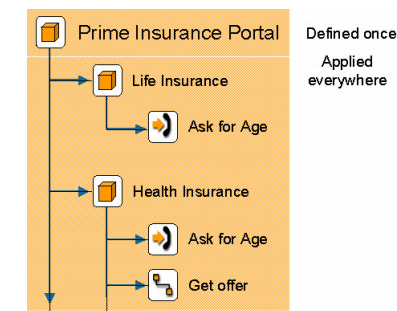
Natural Dialog Management

VoiceObjects

- Ensure **human-like, natural interaction** with caller – let them control the dialog, adapting to their speaking style

- Core features
  - Barge-in
  - Global commands
  - Random Prompting
  - Multilinguality
  - N-Best result handling
  - All Grammar types supported: *Closed, Statistical, Robust Parsing, Garbage models, …*
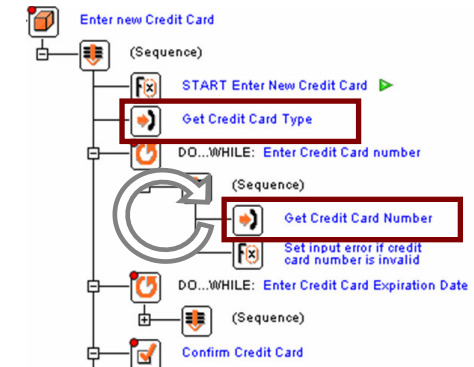
- Advanced features
  - Mixed-initiative dialogs, Implicit correction `>`
  - Natural pronunciation `>`
  - Adapt-to-caller `>`

VoiceObjects Grammar IDE

- Scope
  - **Create** and **analyze** grammars
  - Control the **grammar coverage**
  - Build and manage grammar **test cases**

- Advantages
  - **Quicker** grammar development
  - Better grammar **quality control**
  - Seamless **integration** with Desktop for Eclipse
  - Exports to grammar formats for **multiple platforms**
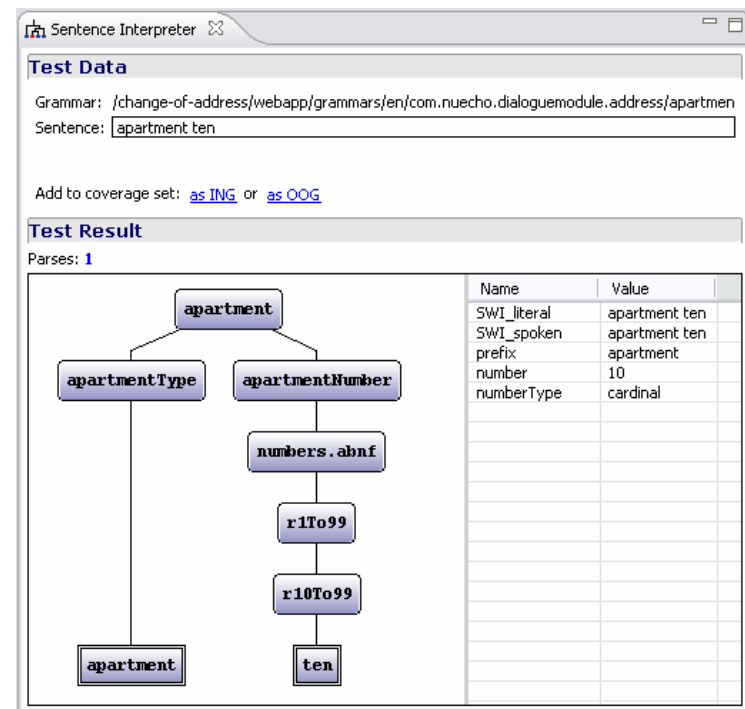
VoiceObjects Developer Portal

- **http://developers.voiceobjects.com**

- Developers get <u>free access</u> to:
  - VoiceObjects Developer Edition
    - *Desktop for Eclipse
      (5 ports, standalone mode)*
  - Information and resources
  - Getting Started Guide
  - Tutorials
  - Recommended IVRs
  - FAQs

- Monthly Jam Sessions

- Free Email Support

Thank You!

Questions

Phone Channels in Self Service

Speech + DTMF

USSD (Text)

Restaurant Search

1 Directions
2 Call
3 New Search

Video

Phone
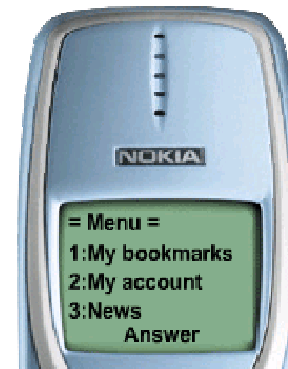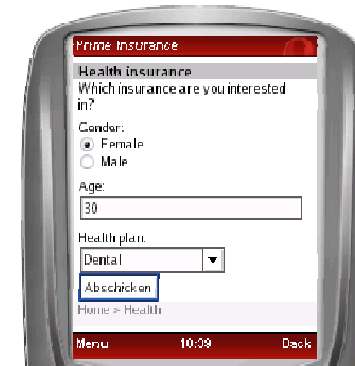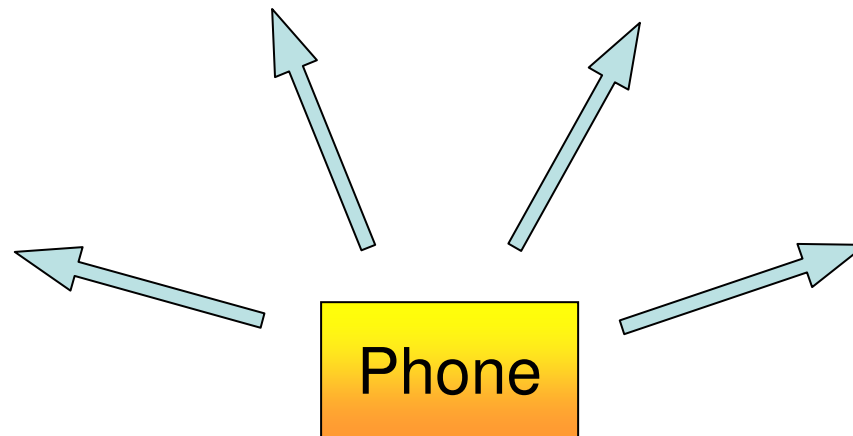
Mobile Web

Background: USSD Browsing

- A **USSD-Dialog** is started by typing in a Service code, e.g. ***123#**

- A dialog consists of

  — Menus   — Simple text input

Which content, which UI for the mobile Web?
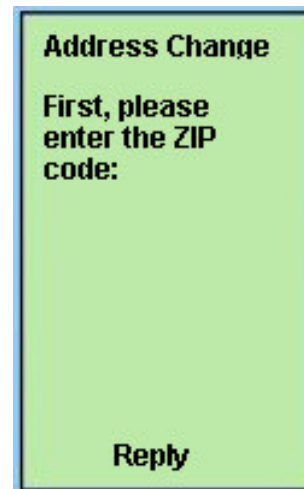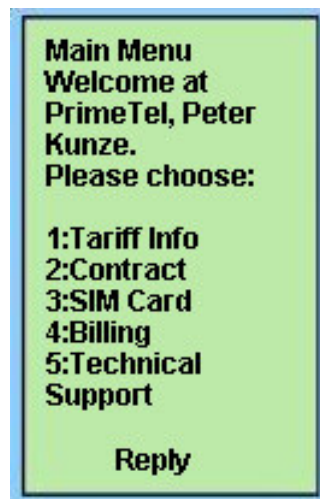
- Web site

Which content, which UI for the mobile Web?

VoiceObjects
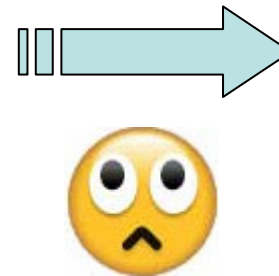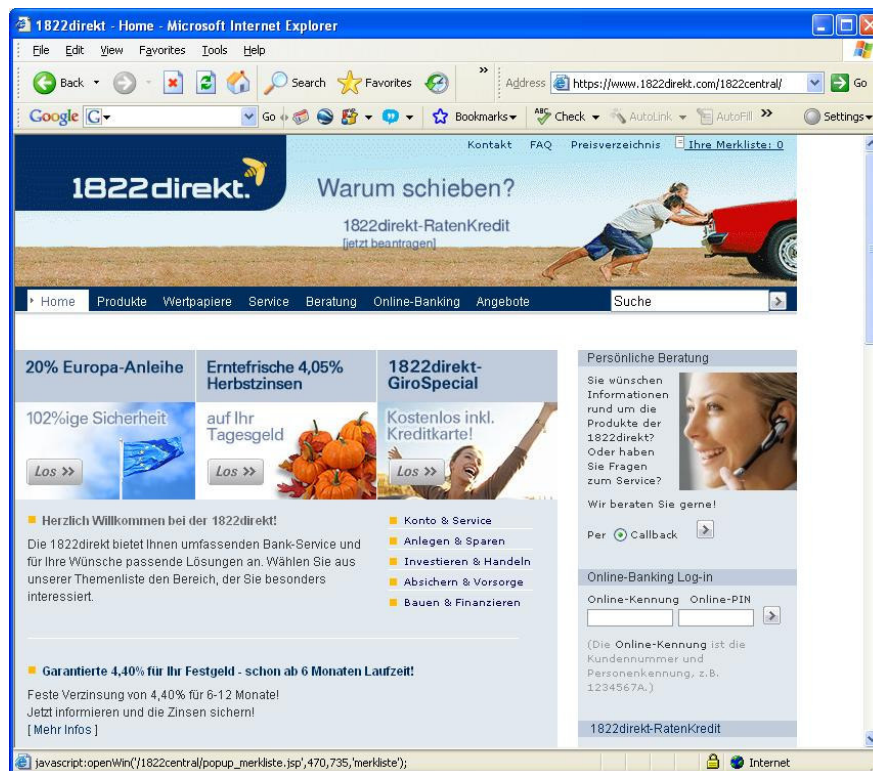
- IVR Call Flow
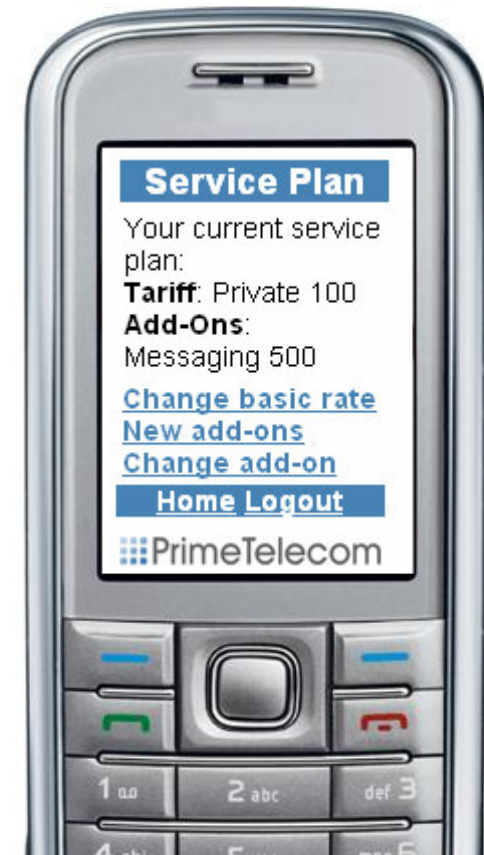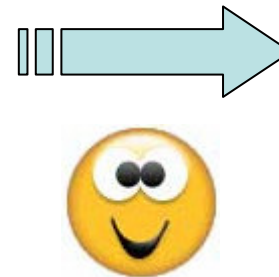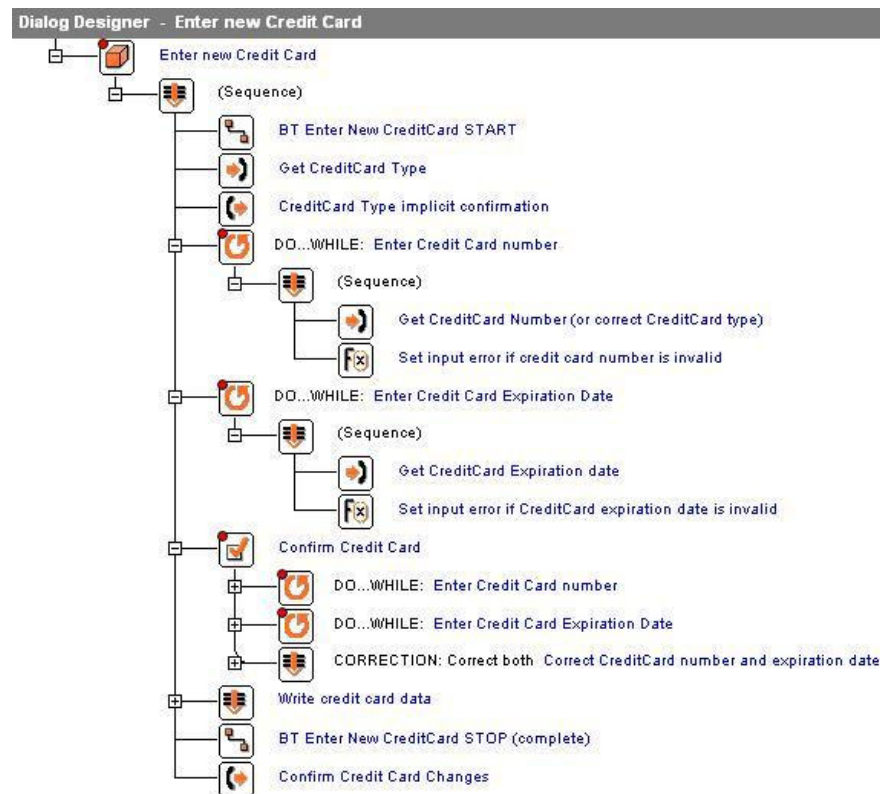
The customer perspective
A Consistent User Interface

- Menu-driven Navigation
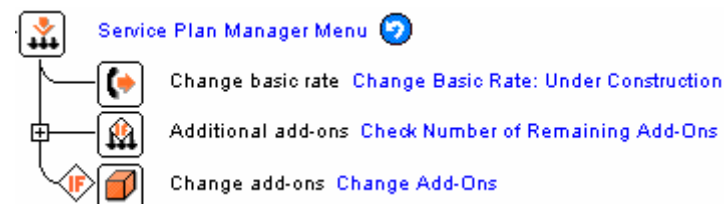
Mobile Web	IVR (Voice/DTMF)	Text (USSD)
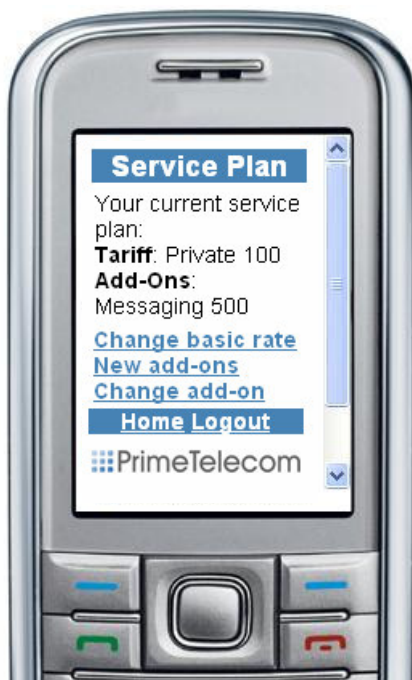
…What do you want to do – change your basic rate, order new add-ons, or change add-ons?

The customer perspective
A Consistent User Interface

- Form-Filling: Selection

(Sequence)

START Enter New Credit Card ▶

Get Credit Card Type

Credit Card Type confirmation
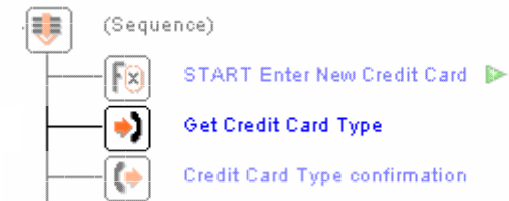
Mobile Web	IVR (Voice/DTMF)	Text (USSD)

…and what is the new Credit Card – Visa, MasterCard, or American Express?

Payment Settings

New credit card type:

○ Visa
○ MasterCard
○ American Express

OK

Home Logout

PrimeTelecom

Payment Settings
New credit card type:

1. Visa
2. MasterCard
3. American Express
0. Home

Reply

▪ Natural Dialog Management

Natural Dialog Management

■ Ensure human-like, natural interaction with caller –
   let them control the dialog, adapting to their speaking style

■ **Basic features**
  - Barge-in
  - Global commands
  - Random Prompting
  - Multilinguality
  - N-Best result handling

■ **Advanced features**
  - Mixed-initiative dialogs
  - Implicit correction
  - Natural pronunciation
  - Adapt-to-caller

Implicit Correction

- Allow the caller to correct the system without explicit confirmation steps

"What's your credit card?"

"It's an AmEx Card."

"And what's the number of your MasterCard?"

"No, it's AmEx!"

"Sorry, AmEx. And what's the number?"

"3469 - …"

Enter new Credit Card
(Sequence)
START Enter New Credit Card
Get Credit Card Type
DO...WHILE: Enter Credit Card number
(Sequence)
Get Credit Card Number
Set input error if credit card number is invalid
DO...WHILE: Enter Credit Card Expiration Date
(Sequence)
Confirm Credit Card
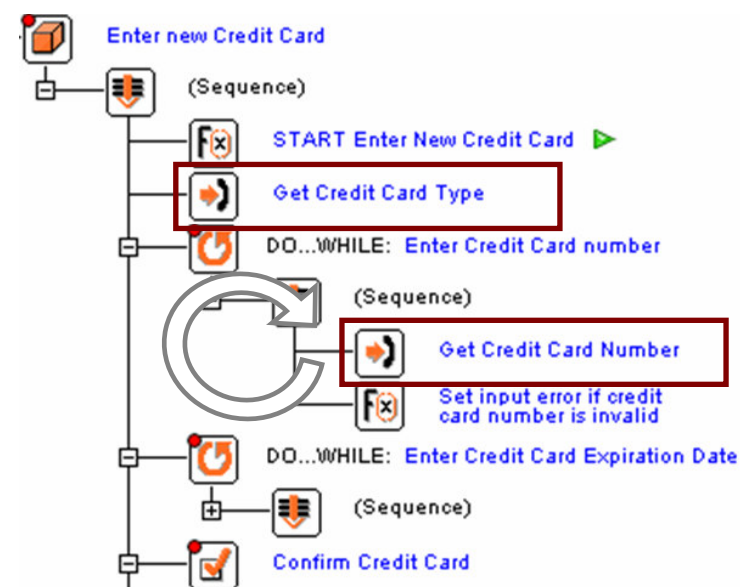
Mixed-initiative Dialogs

VoiceObjects

- Allow the caller to steer the dialog freely

"Service Plan, Customer Data, Billing Questions, or Support?"

"I have a Billing question."

"Ok, Billing. Your invoice number, please?"

"Oh, I rather want to update the expiration date of my Visa card!"

"Sure. So, what's the new expiration date of your Visa card?"
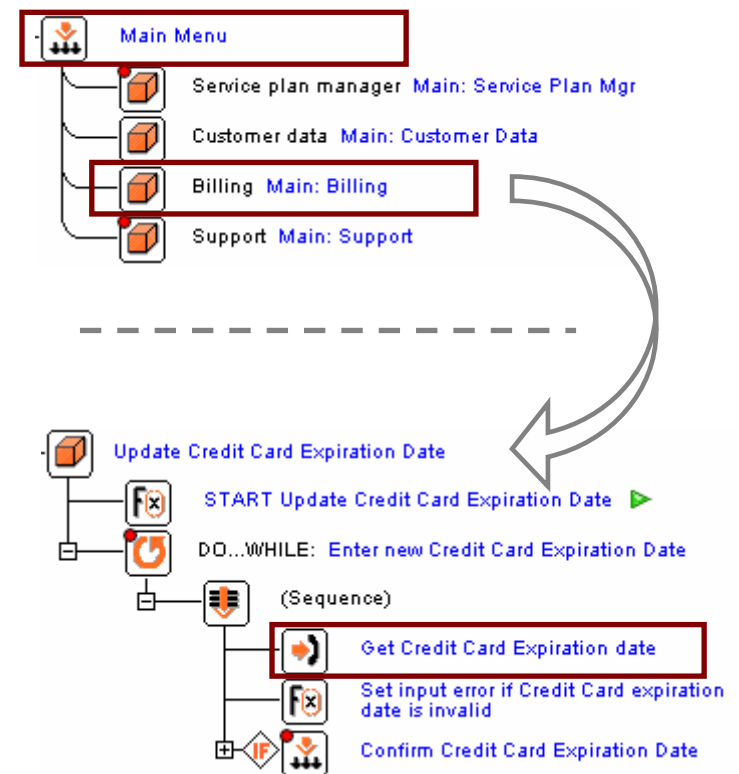
Natural Dialog Management
Adapt-to-Caller

- Adapt to caller's speaking style: **Synonyms**

"What's your credit card?"

"It's an AmEx Card."

"And what's the number of your *AmEx* Card?"

"It's 3469 - …"

"What's your credit card?"

"American Express"

"And what's the number of your *American Express* Card?"

"It's 3469 - …"

Natural Dialog Management
Adapt-to-Caller

■ Adapt to caller's speaking style: **Number Patterns**

"Your phone number, please?"

"one two three, six nine zero zero "

"Ok, *one two three, six nine zero zero*. Correct?"

"Correct."

"Your phone number, please?"

"one two three, sixty-nine hundred"

"Ok, *one two three, sixty-nine hundred*. Correct?"

"Yes, that's right."

Natural Dialog Management
Natural Pronunciation

VoiceObjects

- ## The VoiceObjects "Formatting Bus"
  - Natural pronunciation of dynamic content
  - Best-practice standard formats provided
    - *Date, Time, Digits, Number, Currency, Credit Card, …*
  - Custom formatting can be added
  - Multi-channel support

Formatting

Default | Forma

Type: Format Audio -Phone Number

- Default (Text)
- Format Audio -BLZ
- Format Audio -Cardinal Number
- Format Audio -Credit Card Expiration Date
- Format Audio -Credit Card Number
- Format Audio -Currency Value
- Format Audio -Date
- Format Audio -Decimal Number
- Format Audio -Digits
- **Format Audio -Phone Number**
- Format Audio -SSN
- Format Audio -Time
- Format Text -Credit Card Expiration Date
- Format Text -Credit Card Number
- Format Text -Currency
- Format Text -Date
- Format Text -Decimal Number
- Format Text -Digits
- Format Text -Headline
- Format Text -Time

**{ PhoneNumber }
= 4816034927**

Format Text

Customer Data

Your new phone number is (481)603-4927.

Home Logout

PrimeTelecom

Format Audio

4_N.wav   *8_F.wav*   *1_U.wav*   …

en-US

de-DE