

# An Emotion Aware Voice Portal

Felix Burkhardt, Markus van Ballegooy

-T-Systems International

Richard Huber

- Sympalog Voice Solutions

# An Emotion Aware Voice Portal

## Contents

- Introduction
- Architecture
- Acoustic Classifier
- Conciliation Strategies
- Evaluation
- Outlook

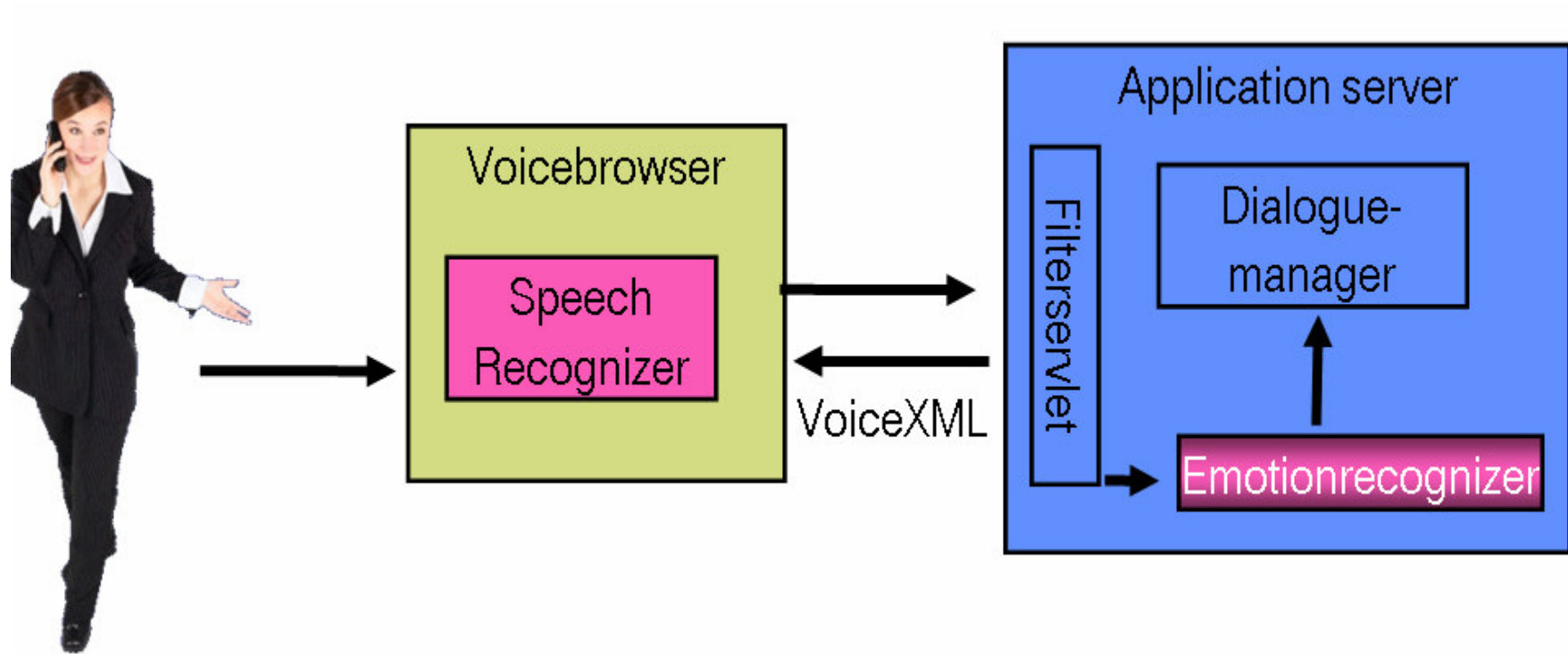
# An Emotion Aware Voice Portal

## Introduction

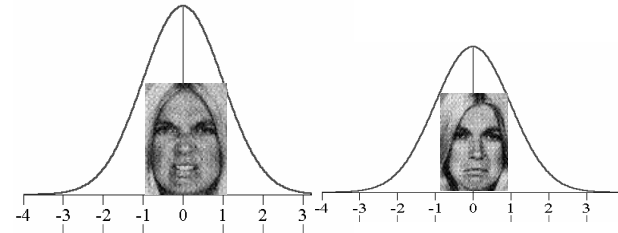
- Project: Enhance a Voice portal by acoustic anger detection module
- Hypothesis: Callers often get angry but machine has not awareness
- Anger gets stronger: customer never calls again



# An Emotion Aware Voice Portal Architecture – VoiceXML Framework



# An Emotion Aware Voice Portal Acoustic Classifier





	Phase 1	Phase 2
<b>Database</b>	<b>15 min faked (acted) data</b>	<b>3 hours faked data, 5 hours real data</b>
<b>Classification</b>	<b>1 class: return value anger probability between 0 and 1</b>	<b>Three class problem: no. low and high anger</b>
<b>Discourse history</b>	<b>Not regarded</b>	<b>„delta features“ measure distance from one recognition to next</b>
<b>Acoustic features</b>	<b>13 prosodic features</b>	<b>31 prosodic features</b>

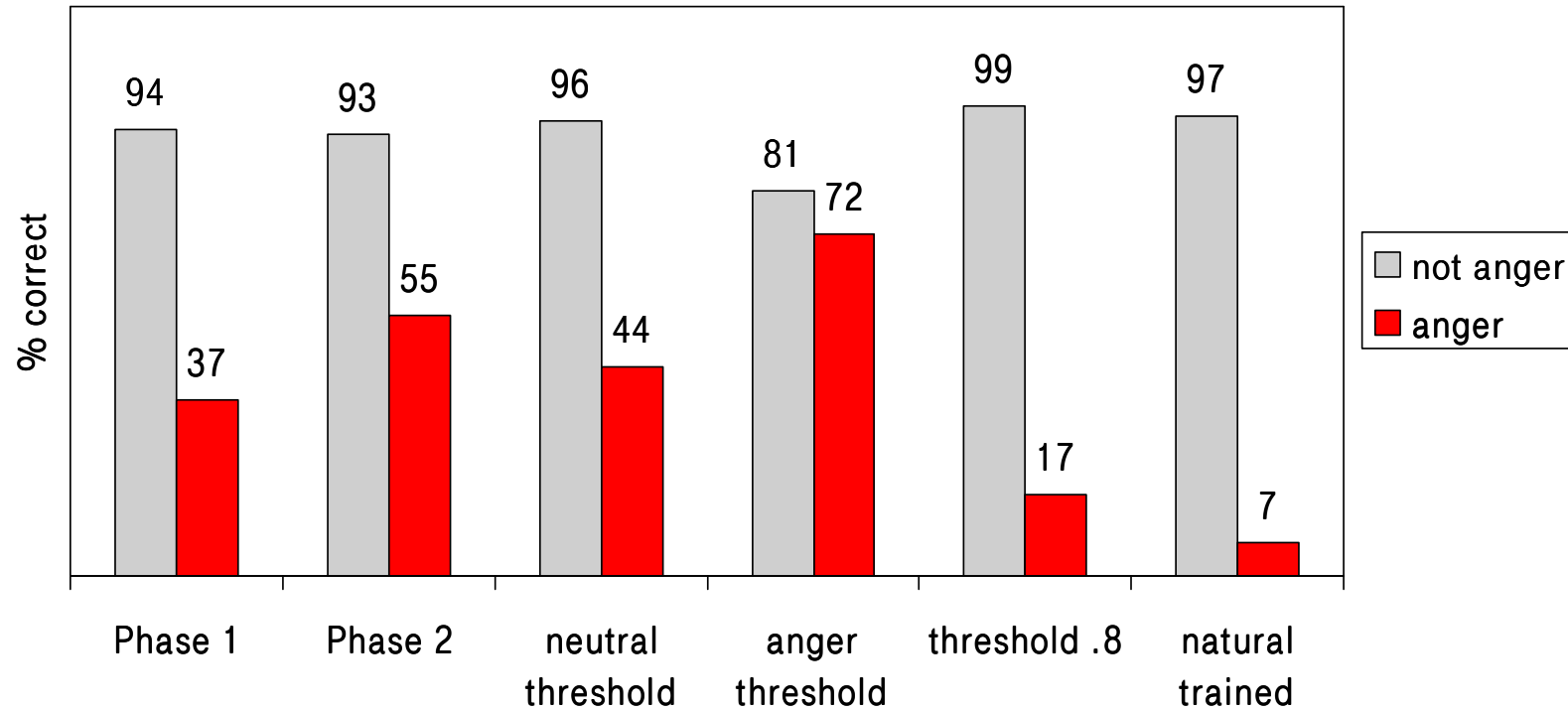
**Engineered by Sympalog Voice Solutions**

# An Emotion Aware Voice Portal

## Conciliation Strategies

- Distraction – change of topic
- Providing Information
  - to rebut the possible wrong assumptions
- Feedback – Mirroring  first step
- Empathy
- Further encouragement
  - to express emotional state
- Pointing out alternatives  second step
- Humor / Joking / Teasing

# An Emotion Aware Voice Portal Evaluation



Test DB: recorded conversations, told callers to “express anger” – 700 neutral, 170 anger (15 min)

Training DB: faked application to elicit anger : 2000 neutral, 1000 anger (3 hours)

Neutral threshold means that judgements over .95 neutral are classified neutral, irrespective of anger value

Anger threshold likewise

Natural trained: Training DB is 5 hours recordings from real application

# An Emotion Aware Voice Portal

## Evaluation 2: high/low anger detection

Table 2: *Confusion matrix for low and high anger (in %)*

Ref. \ Test	no anger	low anger	high anger
no anger	89	9	1
low anger	46	49	4
high anger	28	45	16

# An Emotion Aware Voice Portal

## Outlook

- We'll try to enhance the anger detection by taking word boundaries into account and dismiss absolute values (like e.g. global pitch mean).
- We will go back to a binary anger-detection but will work on the confidence values.
- A personalized version where the anger probability is computed as deviation from a neutral speech sample is envisaged.
- Simplify the interface to train new data in order to feedback the system more easily.
- A first pilot operation is supposed to result in a collection of "real" voice-data as well as evaluation data with the system.

# An Emotion Aware Voice Portal

## Conclusion

- Emotion Aware Voice Portal: try to soothe angry callers
- Based on standardized architecture (VoiceXML)
- Analysis of “anger degree” difficult
- Question of labeler-agreement
- Apply conciliation strategies: success not clear yet

# An Emotion Aware Voice Portal

Thanks, Merci  
;-)