



EVALITA 2009: Loquendo Spoken Dialog System

Paolo Baggia

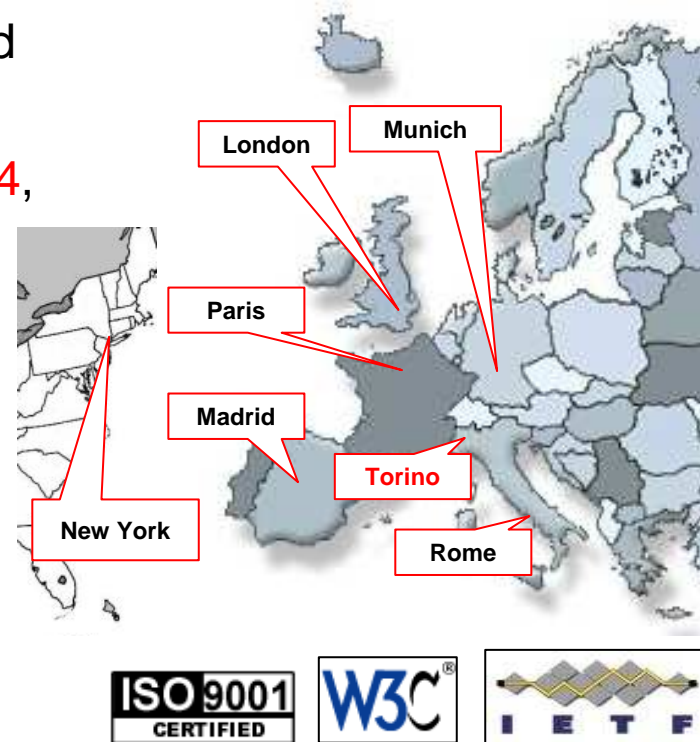
Director of International Standards
Speech Luminary at SpeechTEK 2009

Evalita Workshop
December 12th, 2009

Loquendo
VOCAL TECHNOLOGY AND SERVICES

Company Profile

- Privately held company (fully owned by Telecom Italia), founded in 2001 as spin-off from Telecom Italia Labs, capitalizing on **30yrs experience and expertise in voice processing**.
- **Global Company**, leader in Europe and South America for award-winning, **high quality voice technologies** (synthesis, recognition, authentication and identification) available in **26 languages** and **62 voices**.
- **Multilingual, proprietary technologies** protected over 100 patents worldwide
- **Financially robust, break-even reached in 2004**, revenues and earnings growing year on year
- **Growth-plan investment** approved for the evolution of products and services.
- **Offices in New York**. Headquarters in Torino, local representative sales offices in Rome, Madrid, Paris, London, Munich
- **Flexible**: About 100 employees, plus a vibrant ecosystem of local freelancers.

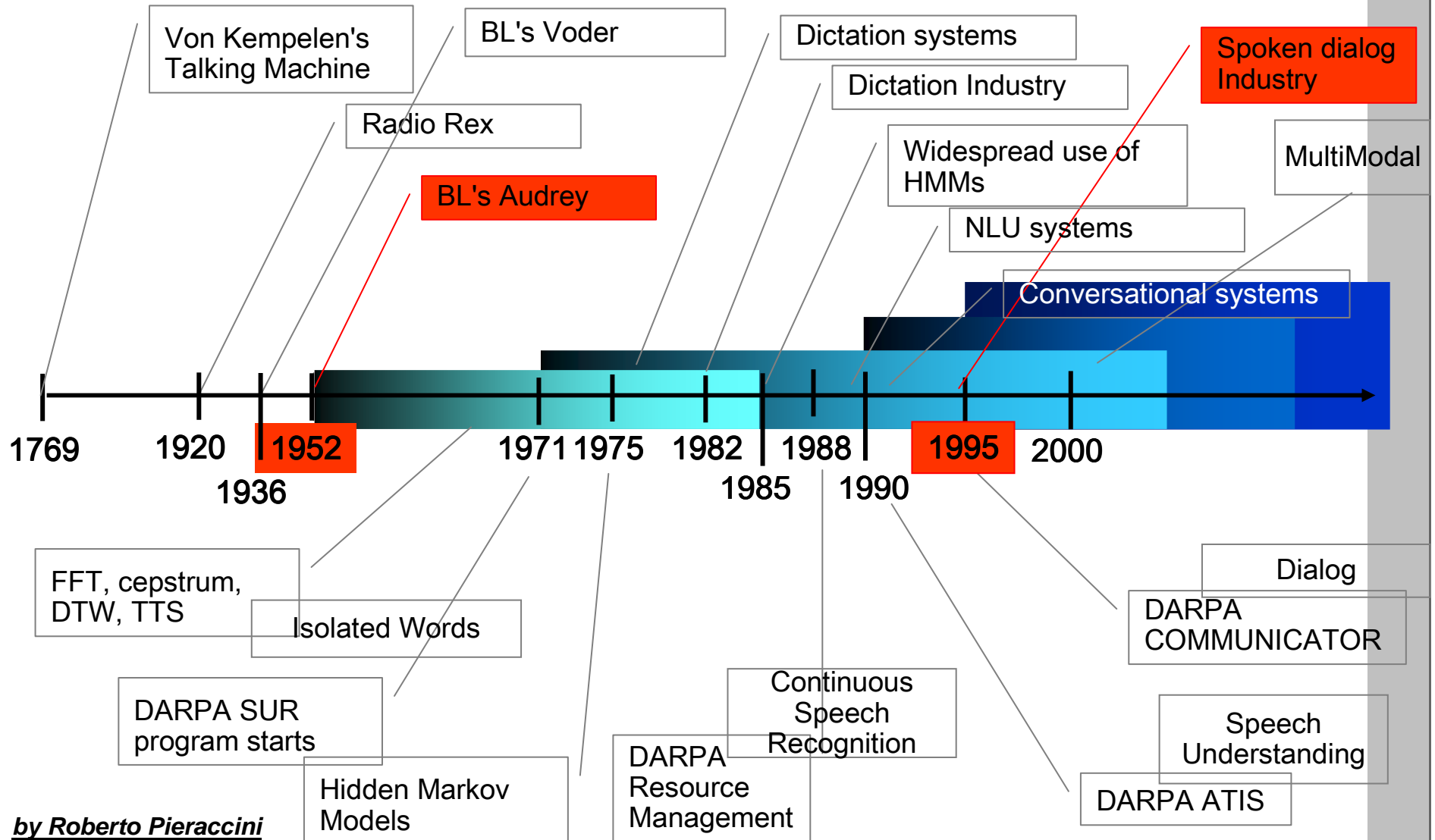


- A Bit of Context

- Loquendo Spoken Dialog System
 - Loquendo VoxNauta VoiceXML/CCXML platform
 - SDS – Ingredients
 - Grammar Handling
 - Evaluation

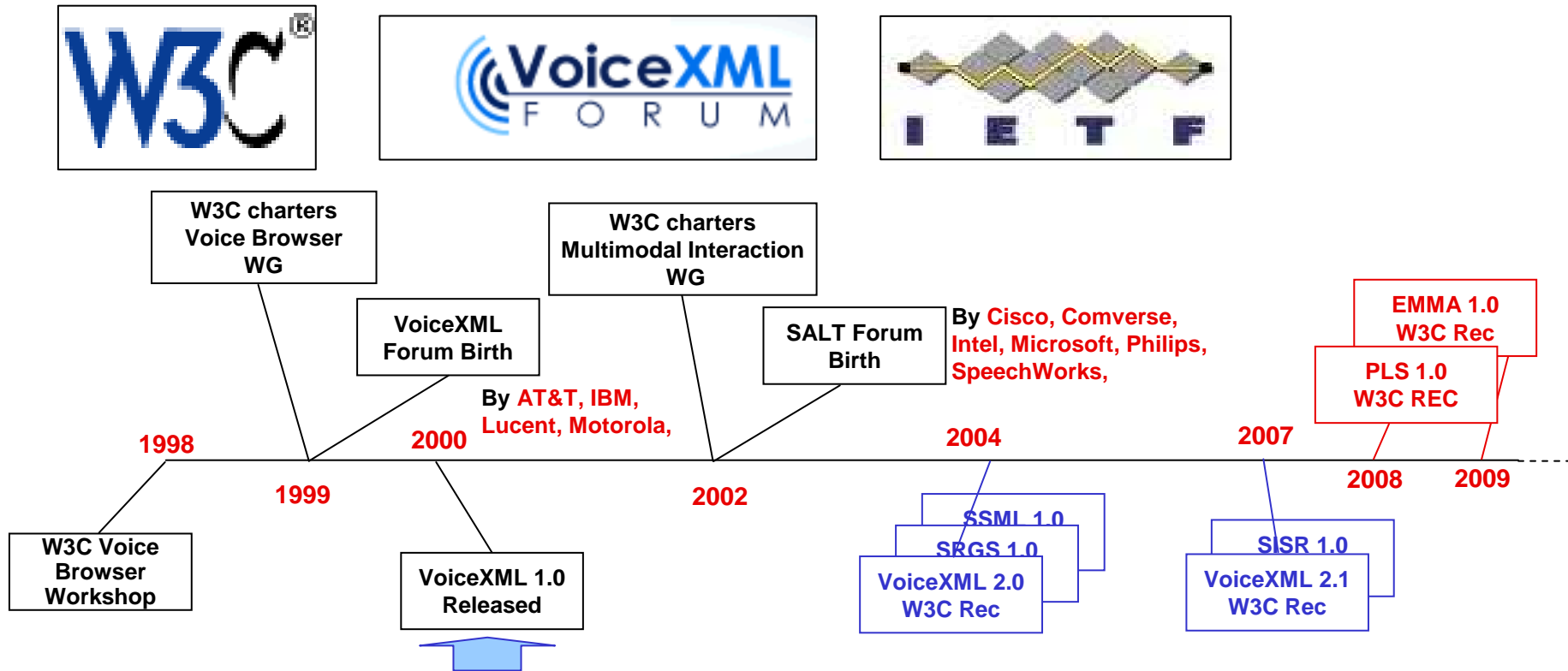
A Bit of Context

A Brief History of Speech Technologies



by Roberto Pieraccini

The (r)evolution of VoiceXML 1998 - 2004

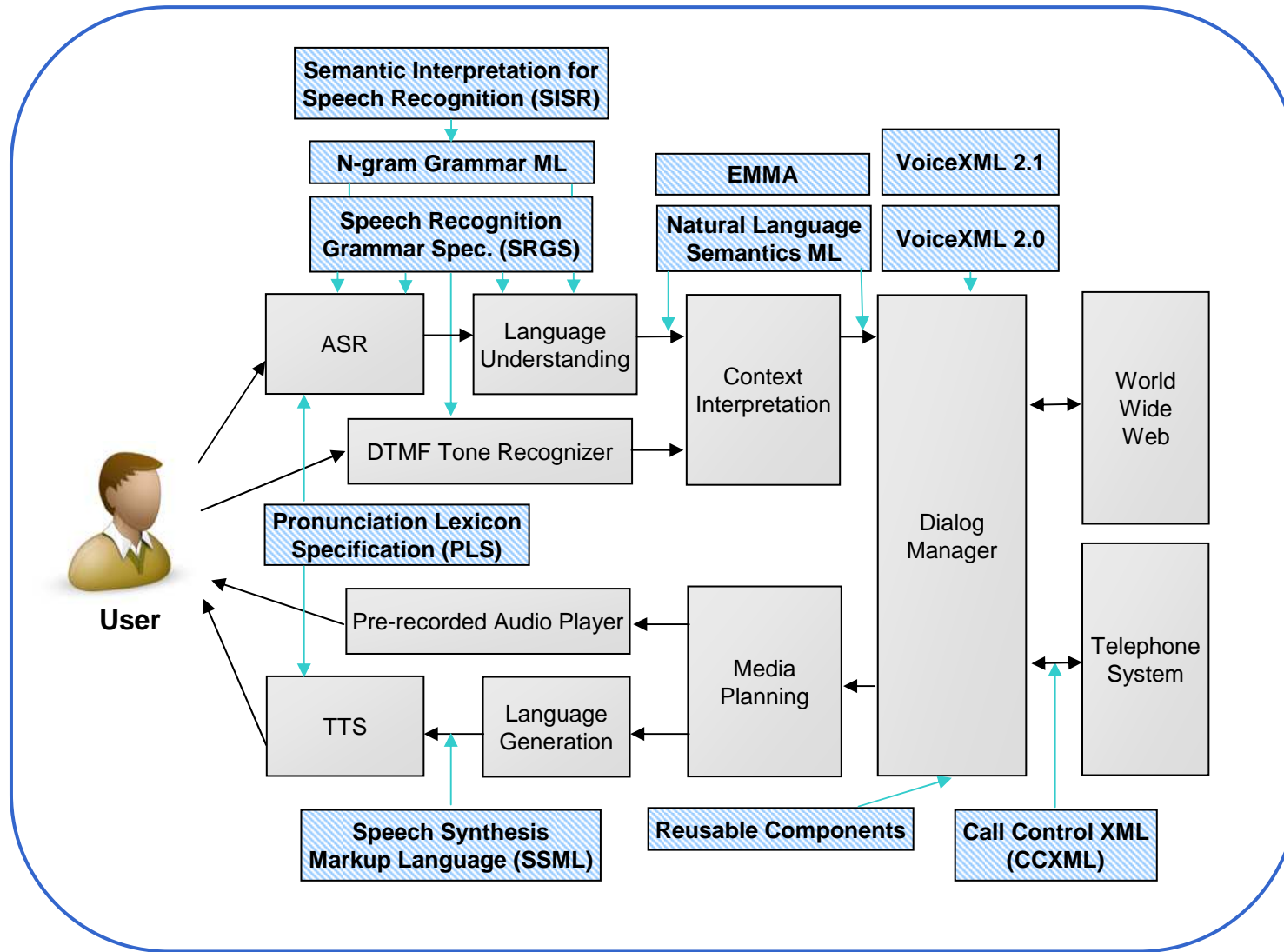


Preparing to announce VoiceXML 1.0
Friday Feb. 25th, 2000
Lucent, Naperville, Illinois

Left to right: Gerald Karam (AT&T), Linda Boyer (IBM), Ken Rehor (Lucent), Bruce Lucas (IBM), Pete Danielsen (Lucent), Jim Ferrans (Motorola), Dave Ladd (Motorola).

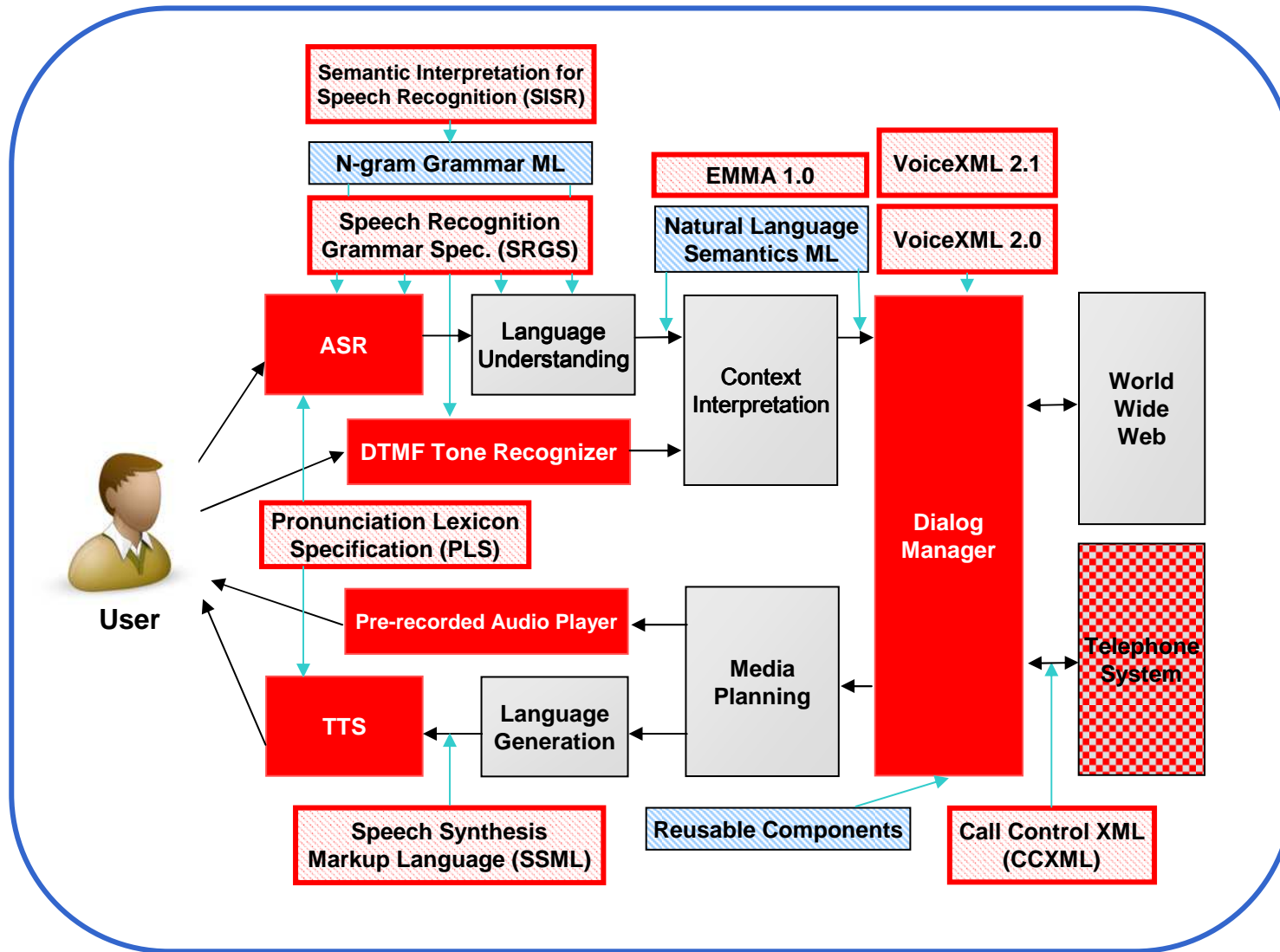
Speech Interface Framework in 2000

(by Jim Larson)

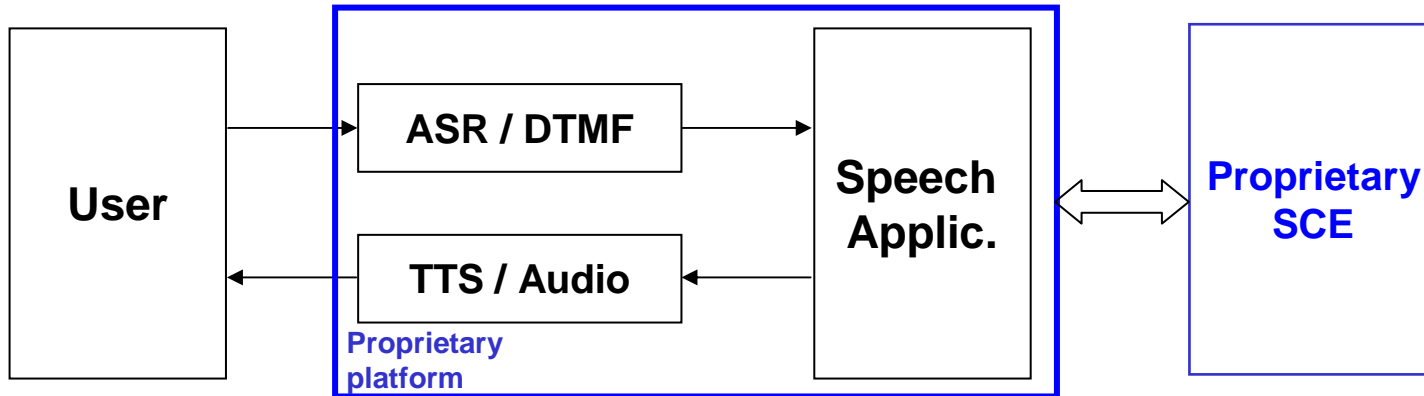


Speech Interface Framework - End of 2009

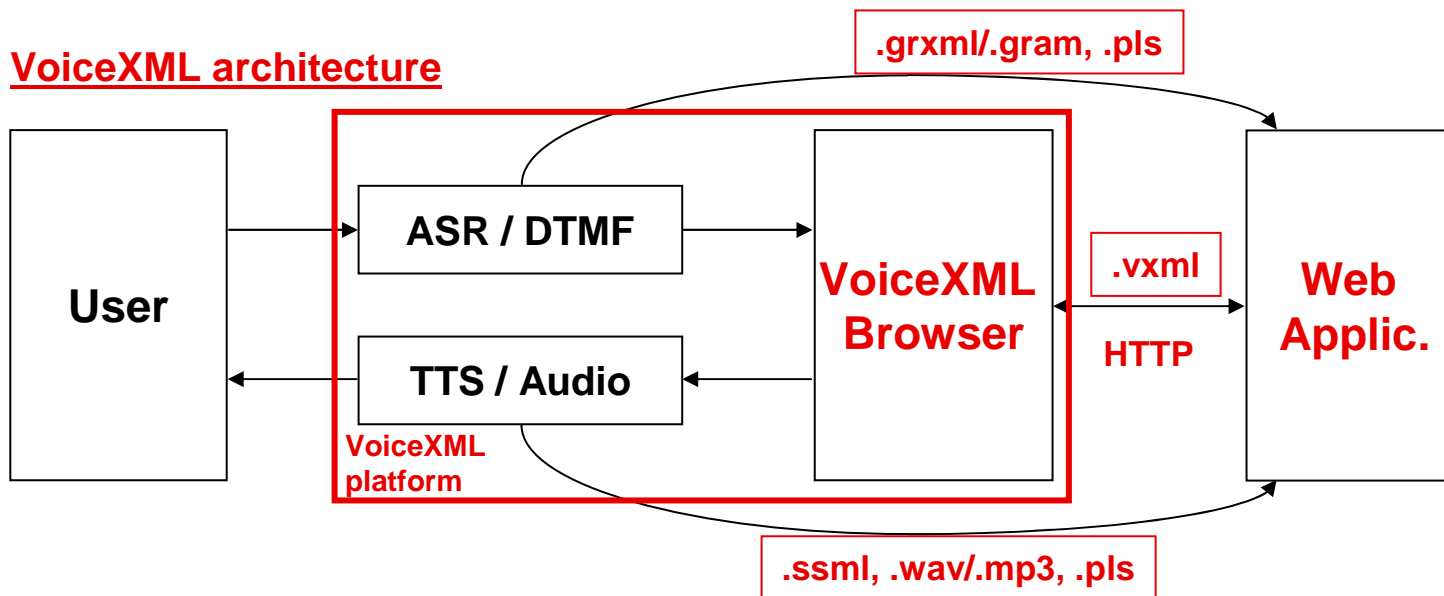
(by Jim Larson)



Traditional (proprietary) architecture



VoiceXML architecture



VoiceXML changed the **landscape of speech application** development
From proprietary to standard-based speech applications

Before

- Proprietary platforms (HW & SW)
- Proprietary applications (by proprietary SCE)
- Mainly DTMF and pre-recorded prompts
- First attempts to add speech into IVR

After

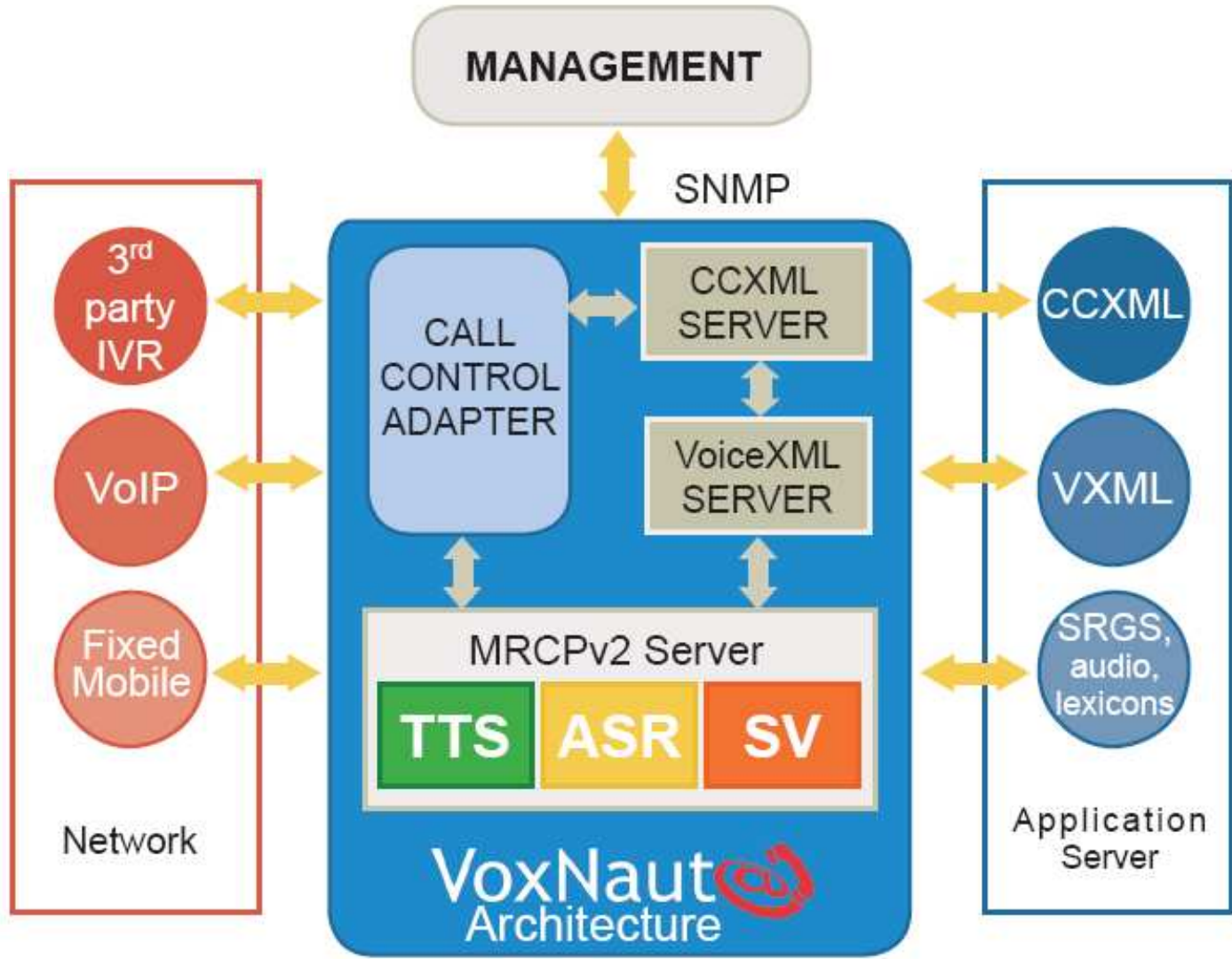
- Standard VoiceXML platforms
- Standards for Speech Technologies
- Standard tools for VoiceXML applications
- Integration of DTMF and ASR
- Still predominance of DTMF, but more and more speech applications

VoiceXML Key Features:

- It takes the *web paradigm* to the core of speech applications development
- It is a *powerful abstraction* – Easy to author

Loquendo Spoken Dialog System

VoxNauta – Internal Architecture



Dialog Implementation:

- VoiceXML *mostly* static application (JSP for dynamic pages)
- VoiceXML mixed initiative for multi slot input
- Barge-in always present (to interrupt prompts and shift focus)
- Data in mySQL DB

Speech Grammar Development:

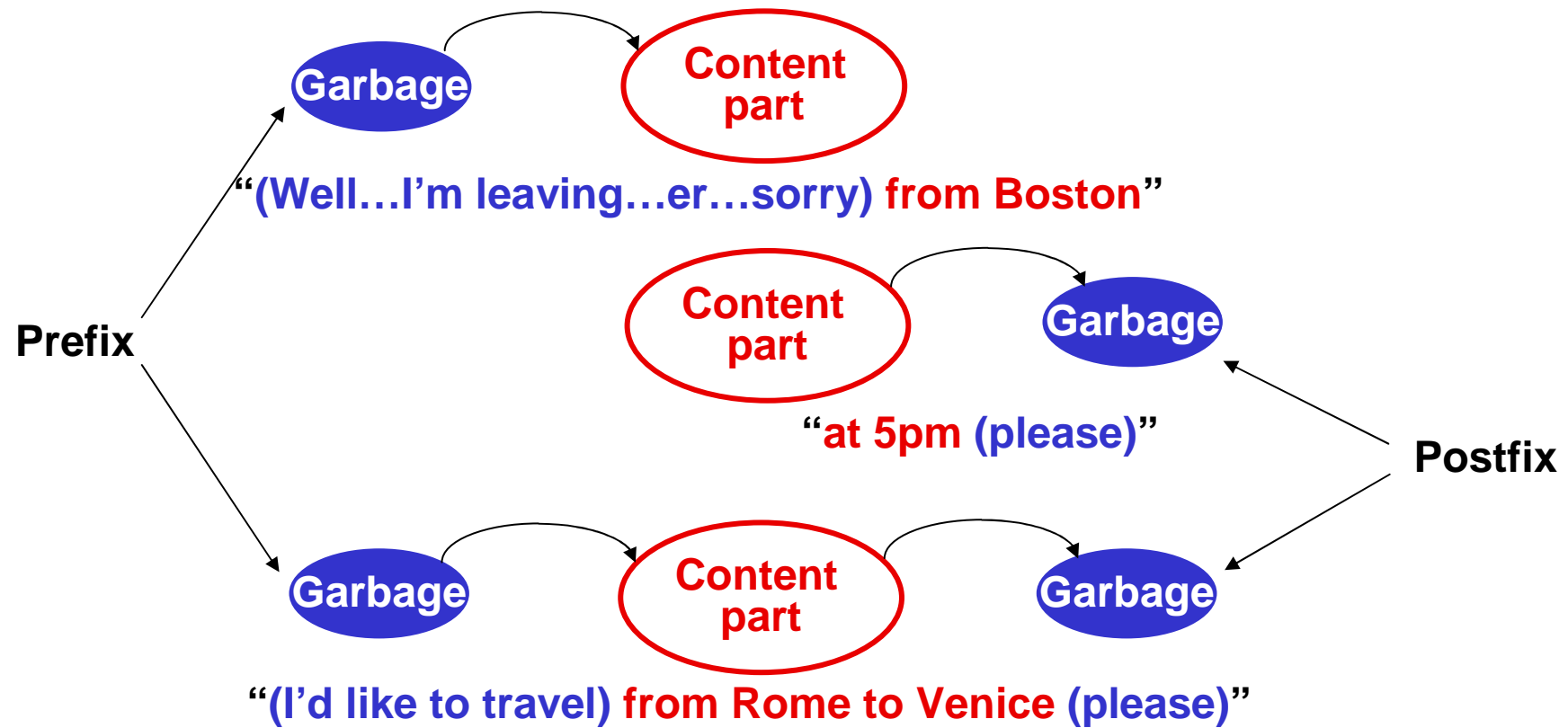
- SRGS grammars no SLM
- Mostly dynamic grammars (JPS generated)
- Wild exploitation of Garbage Rule (of SRGS)

Prompting:

- Pure TTS, untuned

→ Development / Tuning: 1 week

Typical Garbage Topologies:



→ An attempt to explore limits/advantages in conversational dialogs

Robust Domain Concept Grammars:

- For Brands, Categories, Codes, Names

Component Grammars:

- First level of composition of domain concepts

Combinatorial Grammars:

- Combination of Components in different orders
- Insertion of Garbage Rules

Short Dialogs:

- Mixed initiative and flexible grammars were effective

Task Success Rate:

- Very high for implemented task

Some Tasks were not Implemented:

- Initial requirements a bit vague
- Very precise testing scenarios
- No last minute tuning of Loquendo SDS

Final Evaluation Table

Task	UniNA		Loquendo		UniTN	
	Duration (turns)	Tsr (corr/req)	Duration (turns)	Tsr (corr/req)	Duration (turns)	Tsr (corr/req)
Identify representative	1.9 ± 0.4	100.0% (19/19)	2.4 ± 0.8	95.0% (19/20)	3.1 ± 0.5	90.5% (19/21)
Ask customer detail	2.0 ± 0.0	83.3% (5/6)	2.3 ± 0.5	88.9% (8/9)	3.4 ± 1.6	54.6% (12/22)
List orders	2.5 ± 1.5	0.0% (0/8)	2.0 ± 0.0	80.0% (4/5)	3.0 ± 0.0	75.0% (3/4)
List customers	2.0 ± 0.0	50.0% (2/4)	2.0 ± 0.0	0.0% (0/8)	3.0 ± 0.0	66.7% (2/3)
New order	4.6 ± 1.5	36.4% (4/11)	4.3 ± 1.8	42.9% (9/21)	7.5 ± 2.8	63.2% (12/19)
List products - other	2.0 ± 0.0	0.0% (0/4)	3.0 ± 0.8	25.0% (2/8)	3.8 ± 1.6	44.4% (4/9)
Search single product	2.3 ± 0.4	55.6% (5/9)	2.8 ± 1.6	77.8% (14/18)	3.5 ± 2.5	78.6% (11/14)
Overall (corr/req)	-	58.4% (45/77)	-	62.2% (56/90)	-	63.5% (73/115)

THANK YOU

for clarifications or questions:

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