ICT Mission Rehearsal Exercise

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MRE Background

- Jeff Rickel @ Soar Workshop 2000

- Project Goals
  - Team training in virtual reality
  - Virtual humans play the role of missing people
  - Focus on scenarios that require face-to-face interaction
    - Complements prior work in battlefield simulations

- Research Areas: Virtual Humans
  - Virtual human bodies
  - Virtual human instructors and teammates
  - Spoken task-oriented dialogue
  - Model of human perception and attention
  - Task-oriented model of emotion

Beyond Limited Interactions

- Existing virtual humans in military simulations and computer games support limited interaction
  - Computer-generated forces have successfully controlled combat vehicles in battlefield simulations
  - Most computer games focus on similar combat interactions
  - Characters that support more collegial interactions are largely scripted

- Our goal is to develop virtual humans that support face-to-face dialogues and collaboration
  - Mentors
  - Teammates
  - People from other cultures

Key Virtual Human Requirements

- Embedded in virtual world
  - Perception, cognition, motor control

- Spoken dialogue
  - Speech recognition, natural language understanding and generation, speech synthesis

- Emotions
  - Appraisal, emotional state, emotional expression

- Human figure animation
  - Realism (e.g., motion capture) and flexibility (e.g., inverse kinematics)

Key Challenge:
A Unified Architecture

- A single integrated agent architecture
  - Must include all of these capabilities
  - Must address the interplay between them, e.g.,
    - Close coupling of verbal and nonverbal behaviors
    - Close coupling of emotions with all behaviors (cognitive and physical)

- Target result: a reusable virtual human
  - General capabilities vs. domain-specific task knowledge
  - Configurable to allow individual differences

MRE Demo 2000

- Relied heavily on STEVE, with only a few new pieces
  - Coarse-grained integration with BDI bodies
  - Pre-recorded voice clips (actors and speech synthesis)
 - Partial integration of emotion code for one agent (mother)

MRE Demo 2001

- Ambitious integration of many capabilities:
  - Perception (Hill, Van Lent, Kim)
  - Speech recognition (Narayanan)
  - Natural language understanding (Hovy, Traum, Ravichandran)
  - Dialogue management (Traum)
  - Task reasoning (Rickel, Gratch, Marsella)
  - Emotions (Gratch, Marsella)
  - Action selection (Rickel)
  - Natural language generation (Hovy, Fleischman)
  - Body control (Rickel, Marsella, Lance)
  - Speech synthesis (Johnson, Narayanan)
  - Human figure animation (BDI)
- Color code: New   Improved

Video of MRE 2001
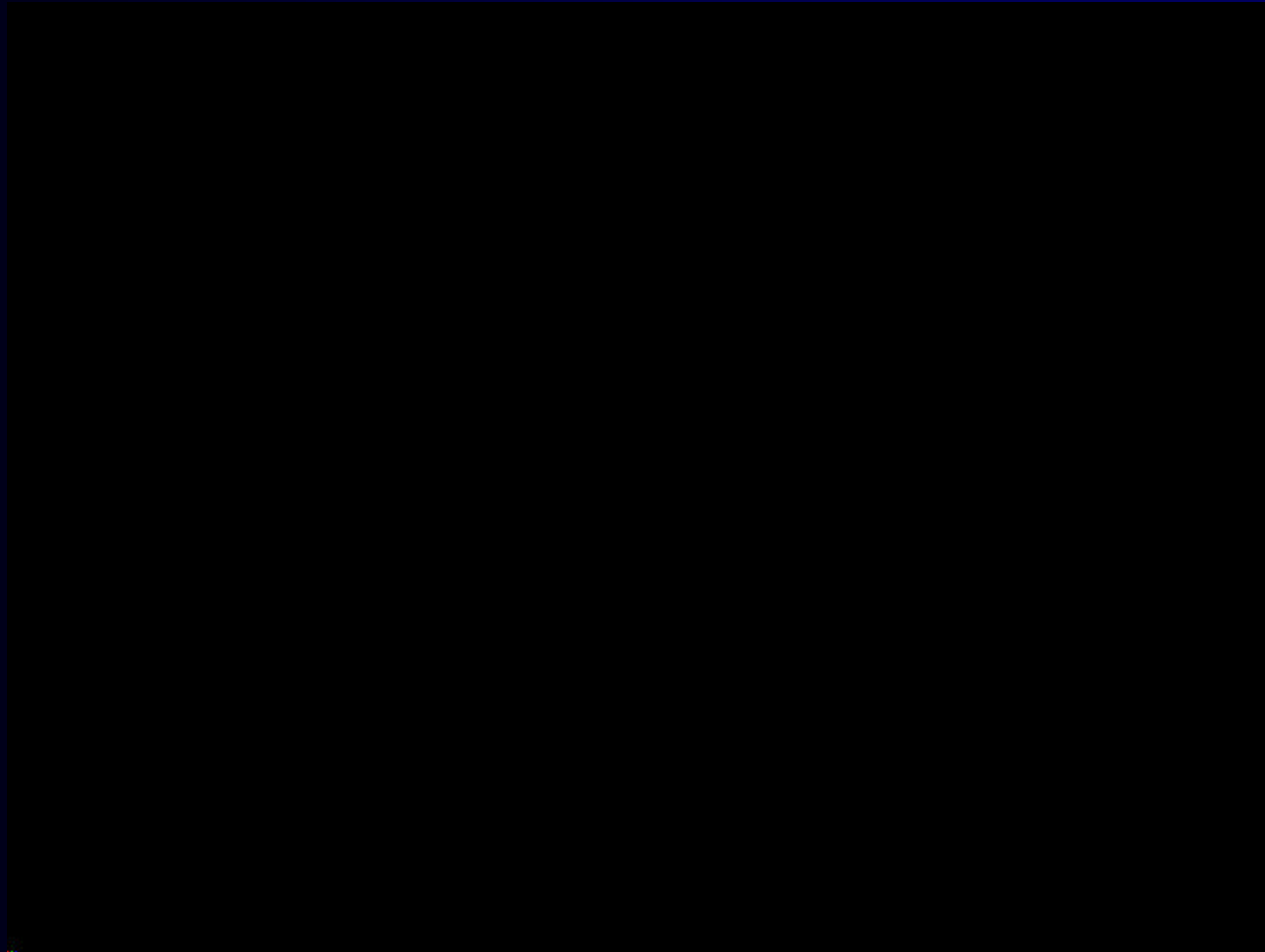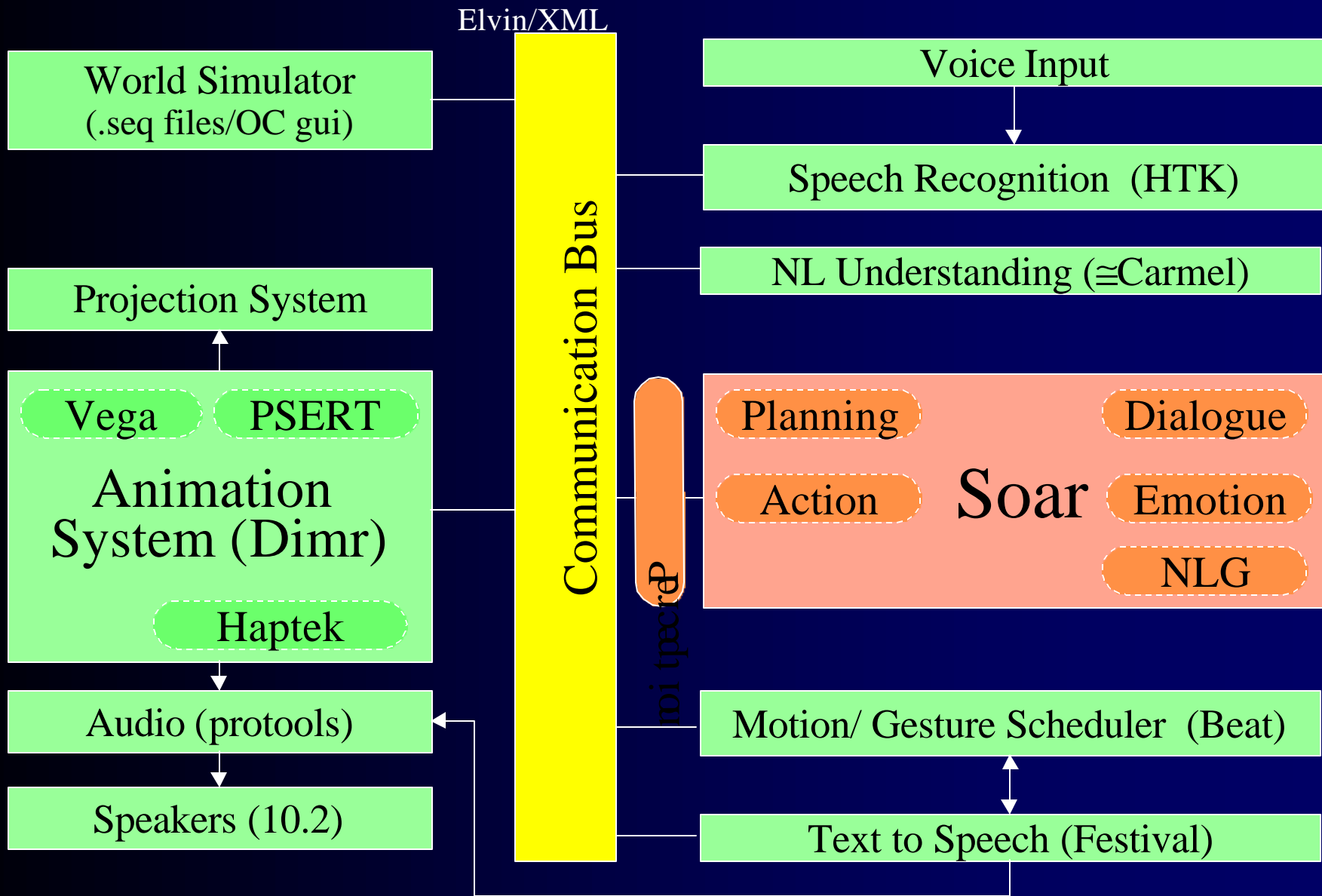
Animation System (Dimr)

Vega

PeopleShop Runtime Environment (PSERT)

Haptek

What does Soar buy us?

- Blackboard system
  - Many modules communicate through WM
  - Common knowledge representation

- Systems built around Soar
  - STEVE
  - Commish
  - Elvish

- Decision cycle
  - Conflict resolution
  - Mediation between operators

Nuggets and Coal

- Nuggets
  - Most advanced integrated virtual human in existence
  - Integrated efforts of over 15 researches
  - Soon to be fielded at Fort Sill, OK

- Coal
  - Legacy code
  - No plans to move to Soar 8
    - Even Soar 8 in Soar 7 mode
  - Many modules still outside of Soar