



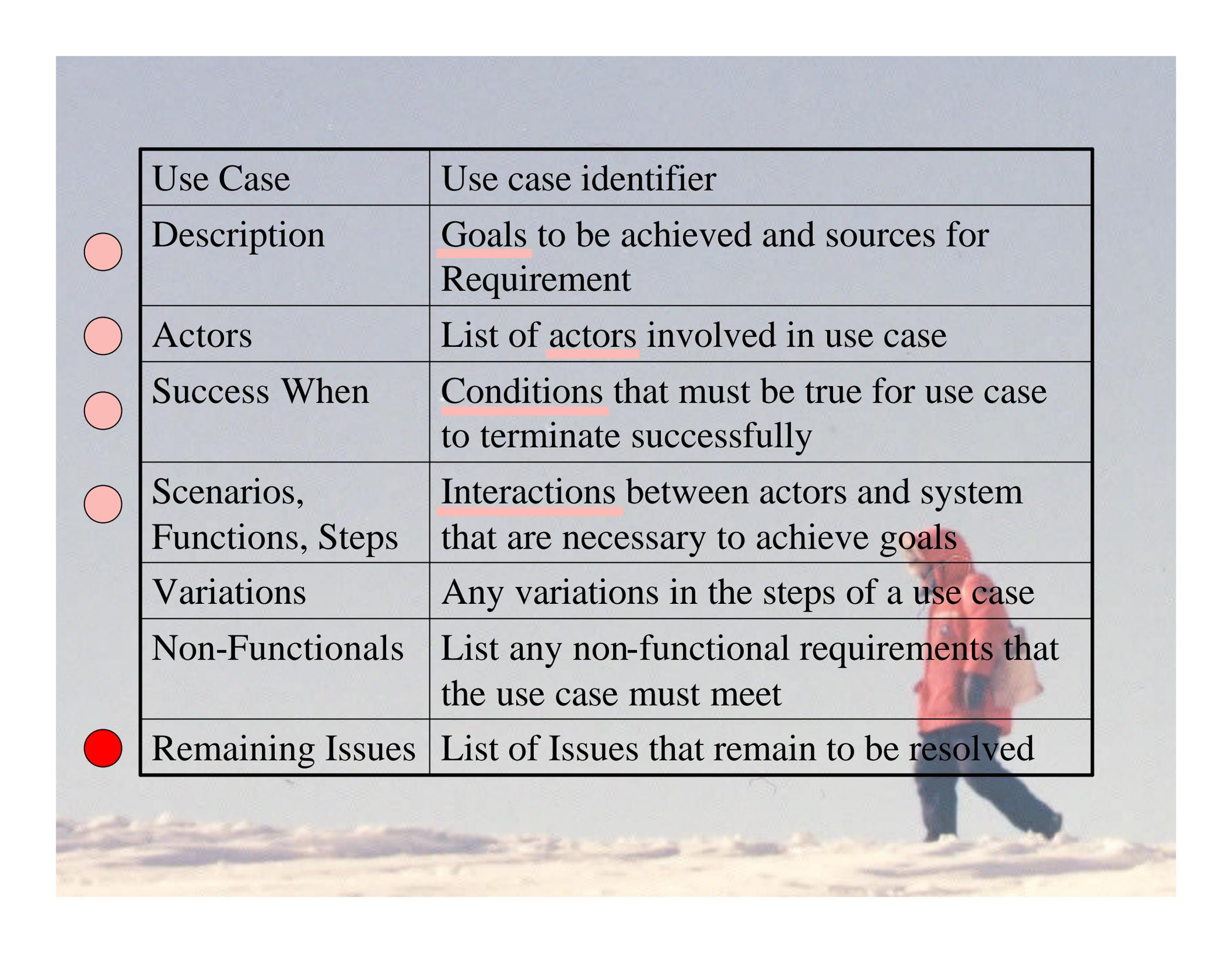
OUTPOST
... an AG 10.0 Use Case

AG Technical Retreat

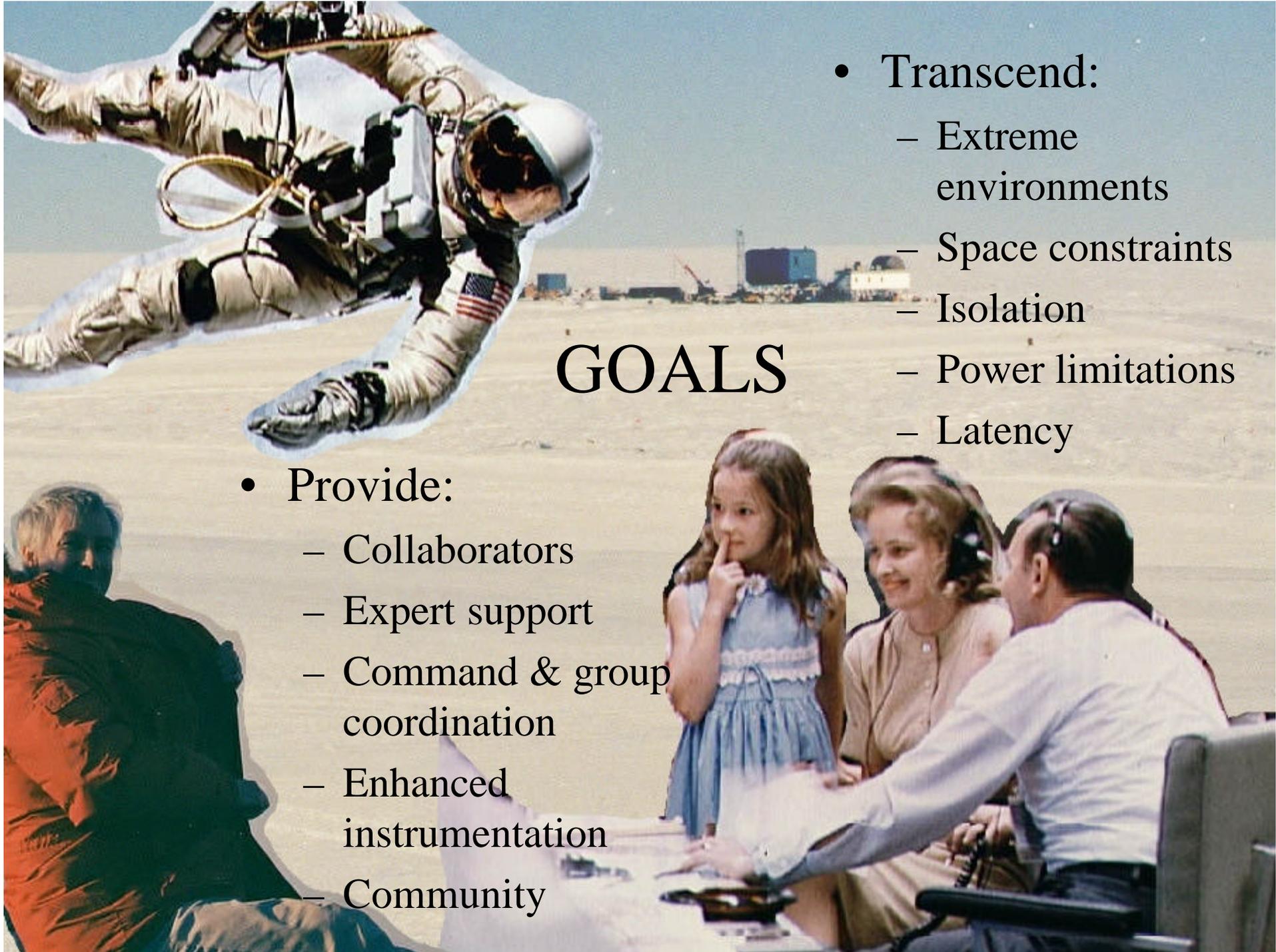
March 4-5, 2002

San Diego, California

Mark Hereld



Use Case	Use case identifier
○ Description	<u>Goals</u> to be achieved and sources for Requirement
○ Actors	List of <u>actors</u> involved in use case
○ Success When	<u>Conditions</u> that must be true for use case to terminate successfully
○ Scenarios, Functions, Steps	<u>Interactions</u> between actors and system that are necessary to achieve goals
Variations	Any variations in the steps of a use case
Non-Functionals	List any non-functional requirements that the use case must meet
● Remaining Issues	List of Issues that remain to be resolved



GOALS

- Transcend:
 - Extreme environments
 - Space constraints
 - Isolation
 - Power limitations
 - Latency
- Provide:
 - Collaborators
 - Expert support
 - Command & group coordination
 - Enhanced instrumentation
 - Community

Use Case	OUTPOST
Description	Provides Enhanced Communication btwn Actors in Inhospitable Environments
Actors	{Explorers, Daredevils, Remote Agents } and {Couch Potatoes}
Success When	1. just like Being There 2. supports Mission Critical Functions 3. Convenient & Transparent
Scenarios, Functions, Steps	REMAINING SLIDES
Remaining Issues	Nearly Everything Starbucks Stream Management Tools

- Stations

- Mars Station Zero
- South Pole Station
- Int'l Space Station
- North Sea Oil Rig

- Capsules

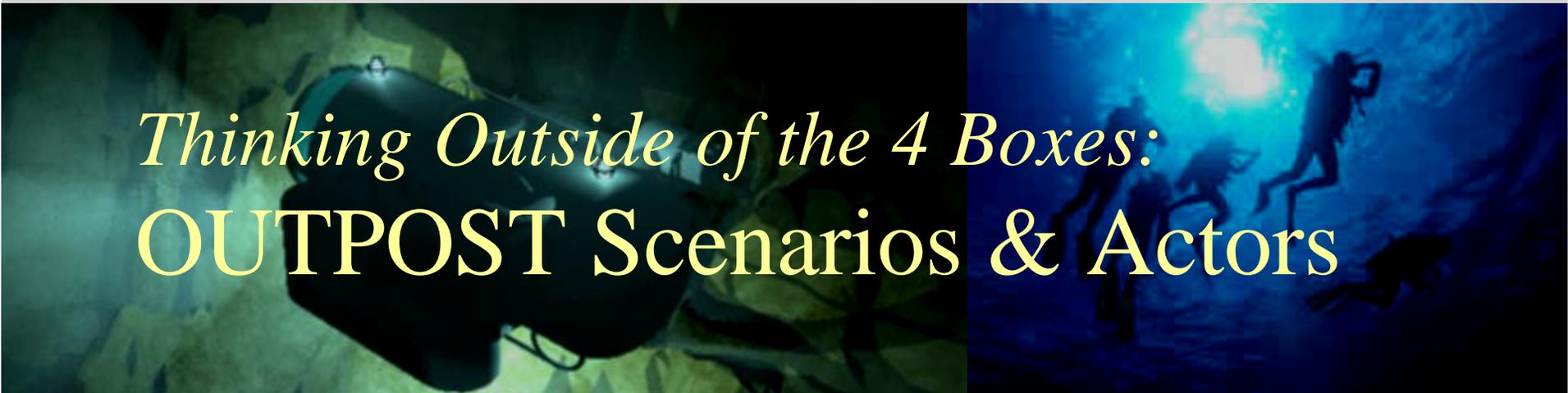
- Submarine
- Mobile Command
 - Air Force One
 - AG-inna-Tank

- Individuals and Packs

- Emergency Rescue
- K2 Ascent Team
- Access-Safari
- Spelunk-a-Node
 - Extreme co-exploration

- Group-2-Bot

- Unmanned Surveillance
- Shared Deep Sea Explorer
- Volcanic Presence



Thinking Outside of the 4 Boxes:
OUTPOST Scenarios & Actors

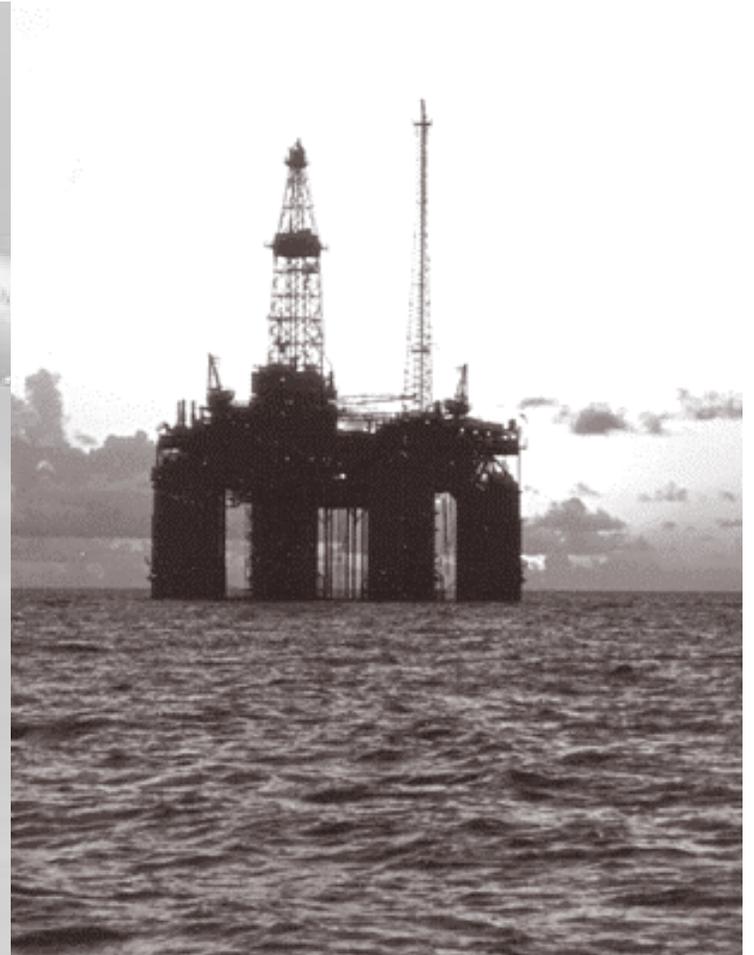
Appropriated Resources

- Power
 - Existing infrastructure
 - Environmental (solar)
 - Personal (body heat, mechanical)
- Network Bandwidth
 - Existing
 - Bluetooth, Wireless
 - Line-of-sight laser
 - Piggyback (over power)
 - “Bread crumb” relays
 - Smart rope
- Virtual speakers
 - Reflective auralization
- Space for visuals
 - Natural surfaces
 - Ad hoc display
 - Integrated Overlays
 - Body (“hand panel”)
 - Eye gear (HMD, Direct Retinal)
- Integrative Opportunities & Cannibalism
 - Instrumentation
 - Integrated overlays
 - Augmented reality
 - Virtual instrumentation
 - e.g. Mineral identification
 - Existing data streams
 - Biometrics
 - Instrument/sensor streams

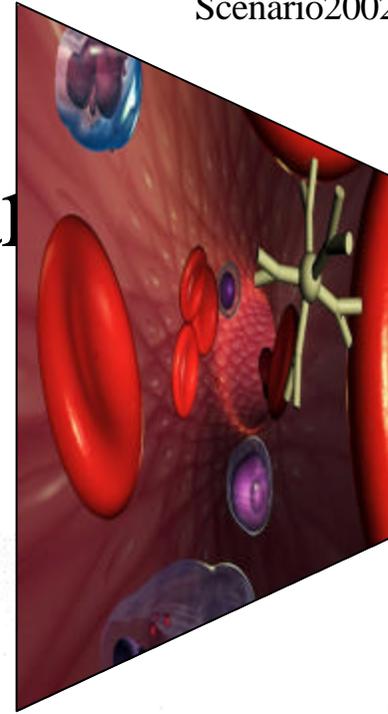
Example Point Sol'n: Projector Head

- Immersive Mobile System
- Hands free
- Local surfaces as communication substrate
 - Visual – projection
 - Aural – reflective
 - Instrumentation – virtual
- Challenging audio environment
- Active Systems
 - alignment
 - Gimbals, Micro-Projectors, Cameras
- Power considerations
 - More battery
 - Less physical instrum.
- Communication + Instrumentation + Augmented Reality

Scenario20020305-201 *“Blimp Fleet and Scuba Crew”*



Scenario20020305-419 "Surgeon in a Lear Jet"



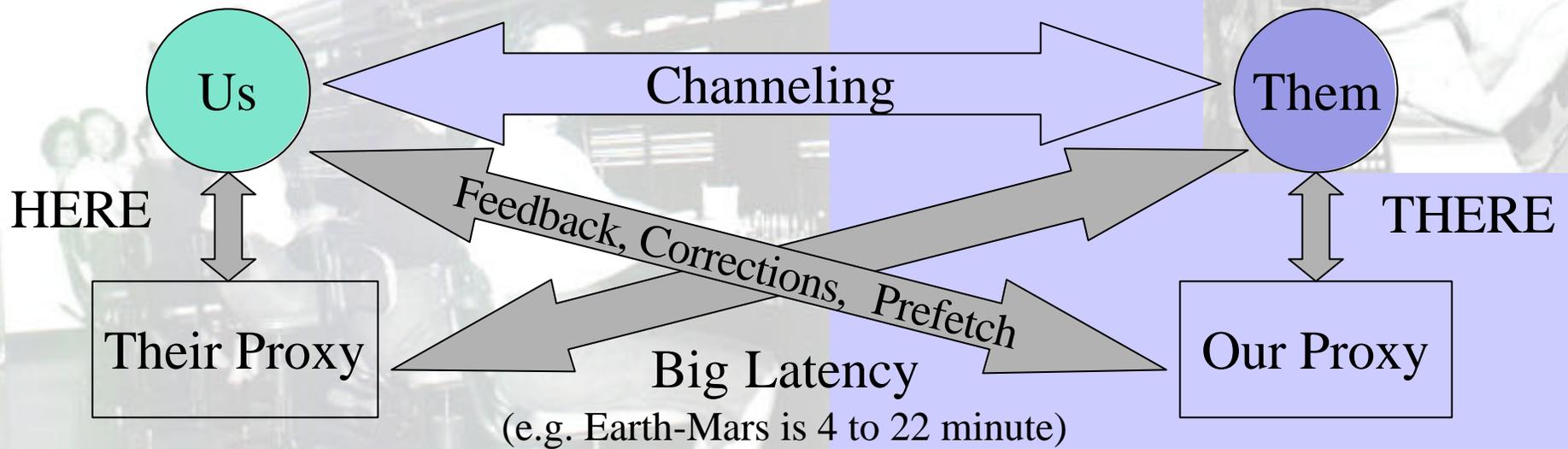
MARS Exploration & Colonization

- Orbiter & Base Station
 - Efficient spaces
 - Line-of-sight (satellite cloud?)
- Surface Team
 - Individuals & Groups
 - Environmental Suits
- Remote Roving Agents
 - Sensor rich
 - Autonomous
 - Intelligent agents

MASSIVE LATENCY
(4 to 22 minutes!)



Latency Management by Proxy Butterfly



- Intelligent Discourse Proxy
 - I (you) talk to yours (mine)
 - Prefetch: information, stance, style, modes, rules, constraints
 - Adaptive: minimize Δ You
- Backup Plan: “Channeling”
 - Incur latency hit
- High bandwidth information exchange
- Promotes presence
- Error correction by addendum at speed of light
- “Game of Telephone”

Computing *(bits are light and small)*

- Stream Munging
 - Synthetic
 - Proxy representations
 - Virtual camera pose
 - Augmented
 - Intertwined
 - Cross-stream cues
 - Lo-res plus hi-res
 - Stream reading
- Spatialized sound
 - “Environmentally correct”
 - Helmets and masks
 - Ear buds and jabra/boom
- Interrupt management
 - Critical tasks
- Body-based Node-ware-wear
 - “Dockers”
- Biometric streams
 - for medical evaluation
 - Gesture processing
- Voice-to-text & T2V



The truth is out there.

Reality as a Metric

- Really Sad
 - Telephone
 - Video conferencing
- Real Real
 - Quality audio
 - Quality video
- Our Post-Real Future
 - Augmented & Synthetic
 - Generally more computing behind the multimedia



Somewhere in Antarctica



150 Miles Above the Equator

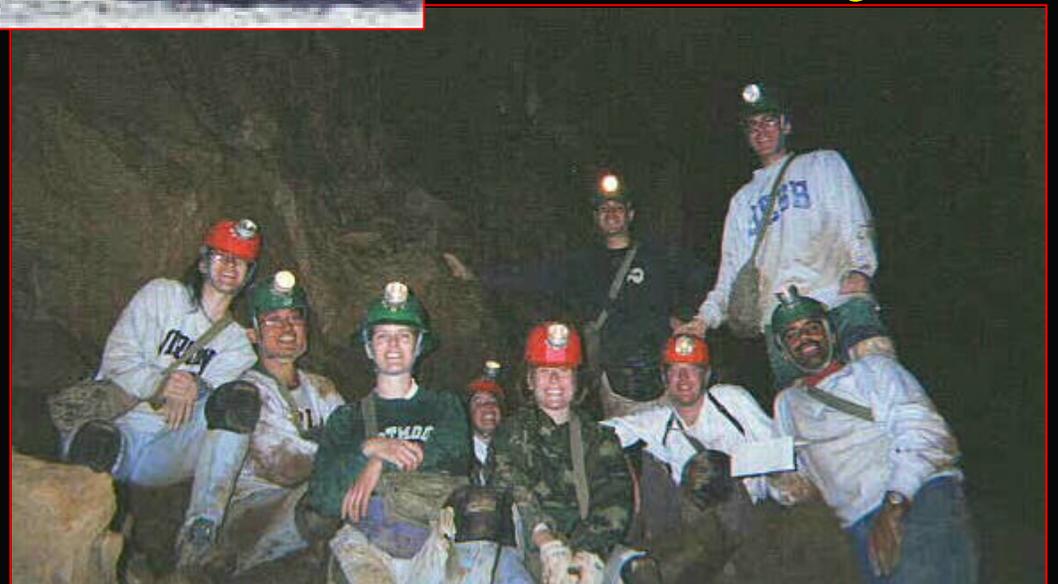


Mission Control



Questions?

1 Mile Underground



Somewhere Under North Pole