



Using The Concept Design Center's GST Model to Represent and Analyze Alternative Ground System Architectures

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Acknowledgments

■ GST Study Team

- Lyle Abramowitz, Joseph Aguilar, Kim Bell, Suzanne Dawes, April Gillam, Walt Green, John Hsiao, Leila Jennings, Joan Kisylia, Rick Marken, Harry Minert, Jim Murrell, Mike O'Brien, C. C. Patel

■ Program Office Contributors

- Don Konold, Carl Sunshine, Wayne Otsuki, Neal Elyashar, Dianne Sakaguchi

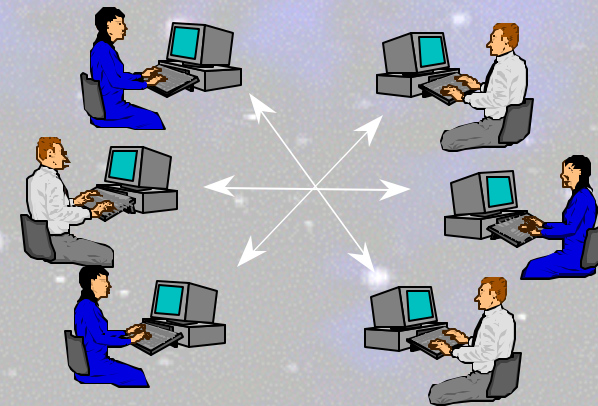
■ Consultants and Enablers

- Steve Presley, Rhoda Novak, Rami Razouk, Denny Pidhayny, Daniel Faigin, Vince Canales, Bob Fricks, Dennis Plunkett, Wayne Sloan, Frank Casserino

CDC is an Application of Integrated Collaborative Engineering

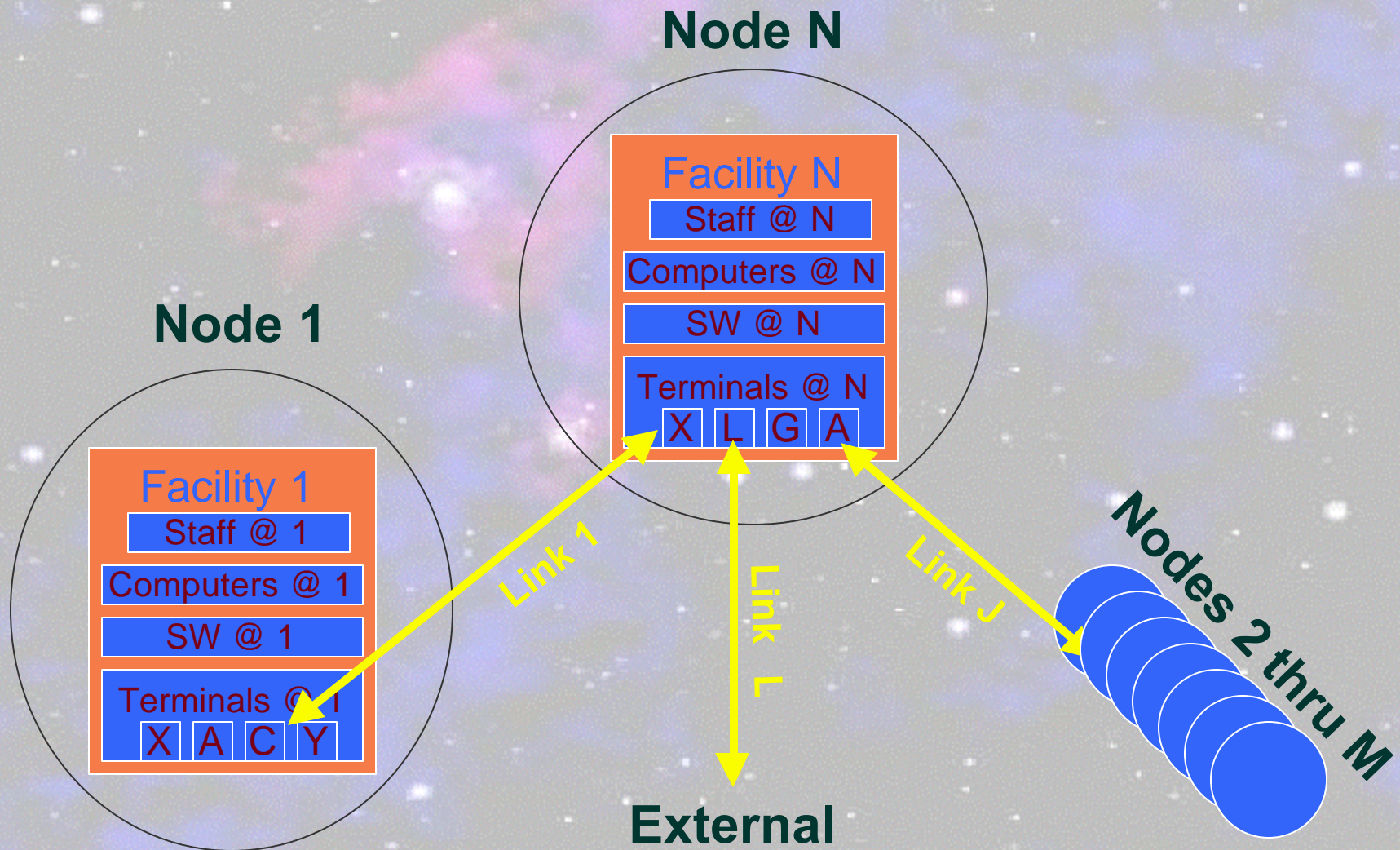
- Interconnected computer models

- Real-time iteration

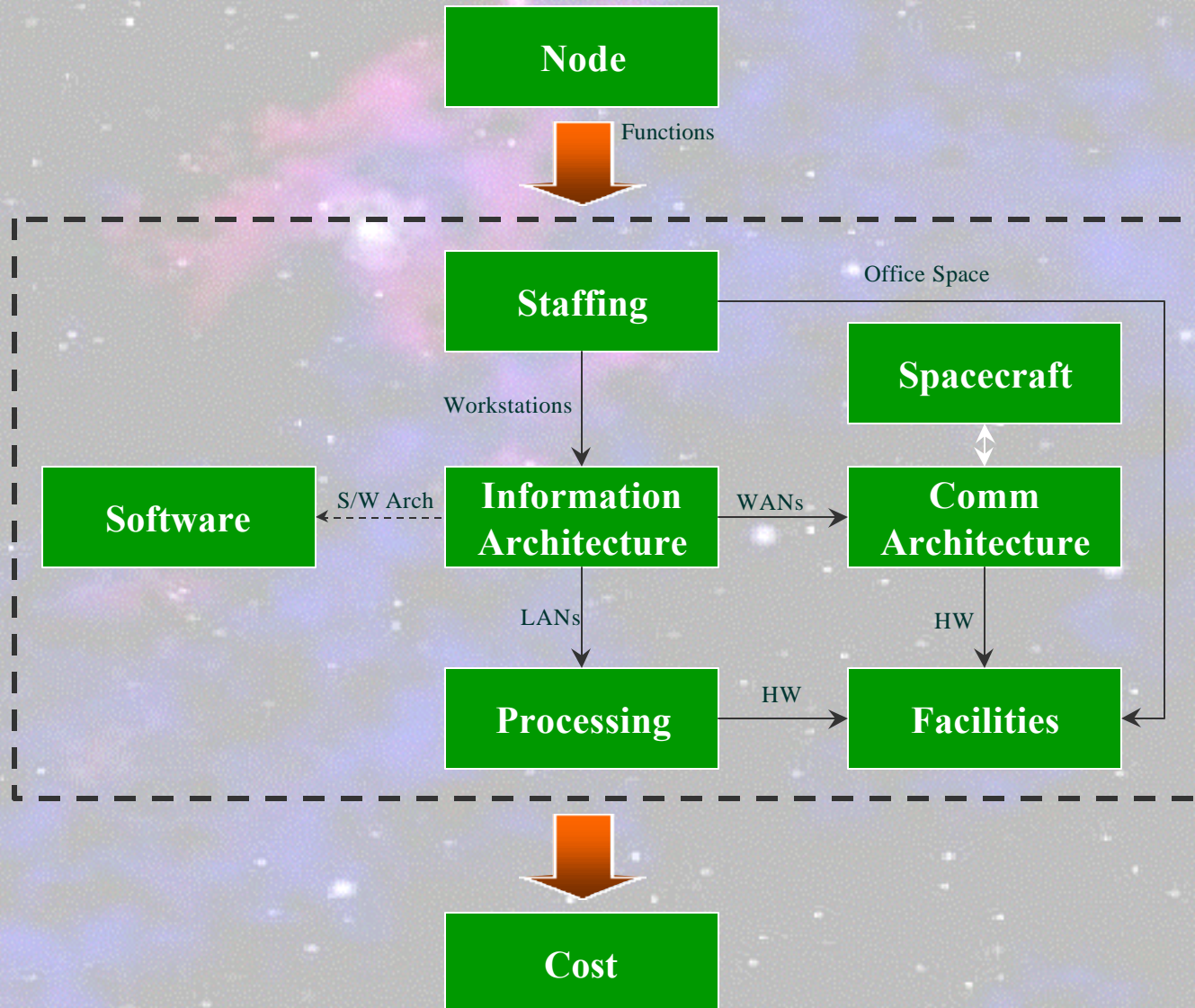


- Multidisciplinary collaborative teams

Ground Systems Architecture Framework



Key GST Module Interfaces



First “Operational” GST Study

- Air Force Satellite Control Network (AFSCN)
 - Architecture 1: Baseline upgrade of AFSCN RTSs to standard configuration, WAN-based communications, and centralized contact scheduling
 - Architecture 2: Outsource nominal contacts to commercial provider of satellite contact services
 - Architecture 3: Replace terrestrial RTSs with a GEO constellation of space-based data relay (SBDR) satellites
- April 2000-September 2000
 - Formal architecture definitions
 - GST tool enhancements and cost data collection
 - Simplifying assumptions
 - Reuse of satellite portion of CDC SAT study on SBDR

Study Metrics

Architecture	# Nodes	Sessions	Functions
Baseline	12	9	30
Outsource contacts	7	3	20
Space-Based Relay	7	2	26

Benefits to Customer

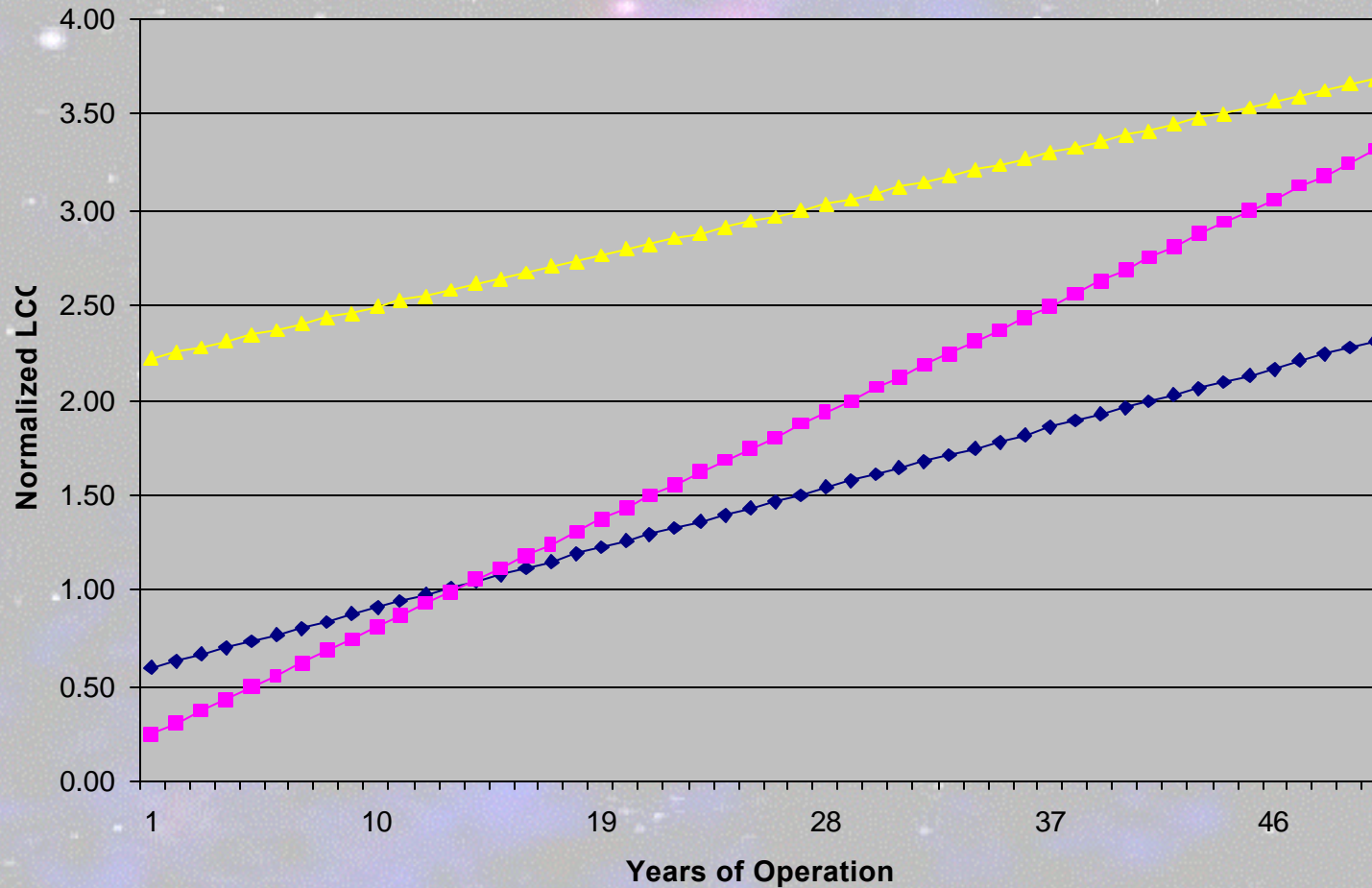
■ Baseline Architecture

- Identified ambiguities in requirements documents and concept of operations
- Highlighted alternate technologies with potential of significantly reducing acquisition and operations costs
- Researched requirements relaxation with potential for cost reductions
- Identified topics for further study (e.g., high-power antennas)

■ Alternate Architectures

- Identified issues and key decisions for concept of operations
- Quantified limitations of space-based relay approach of a previous CDC study

Sensitivity of LCC to Operations Period



Ranking (by estimated LCC) of the three candidate architectures depends on the operations period selected!

Challenges to Customer

■ Study Limitations

- Assessing impact of simplifying assumptions
- Interpreting results in an “apples-to-apples” manner
 - » Differing capabilities among architectures
 - » Differing operational periods

■ Identified Risk Areas

- Credibility of staffing assumptions
- WAN sizing dependency on low utilization
- COTS cost fidelity -- integration costs, operations costs
- Assumption of facilities reuse and modifications

Conclusions

■ Direct Benefits

- Actual Study Results -- cost, risk areas
- GST models themselves -- available for refinement and follow-on studies

■ Collateral Benefits

- Increased insight -- into requirements, including CONOPS, and their system implications
- Potential cost savings -- by relaxing requirement

■ Indirect Benefits

- Education -- GST team “up to speed” on aspects of AFSCN and future options
- Experience -- GST tools, team, and process