



# **Facilitating Middleware for Polymorphous Computing Architectures & MorphWare Stable Interface Forum Meeting #1**

**Presentation to DARPA PCA PI Meeting**

**27 June 2001**



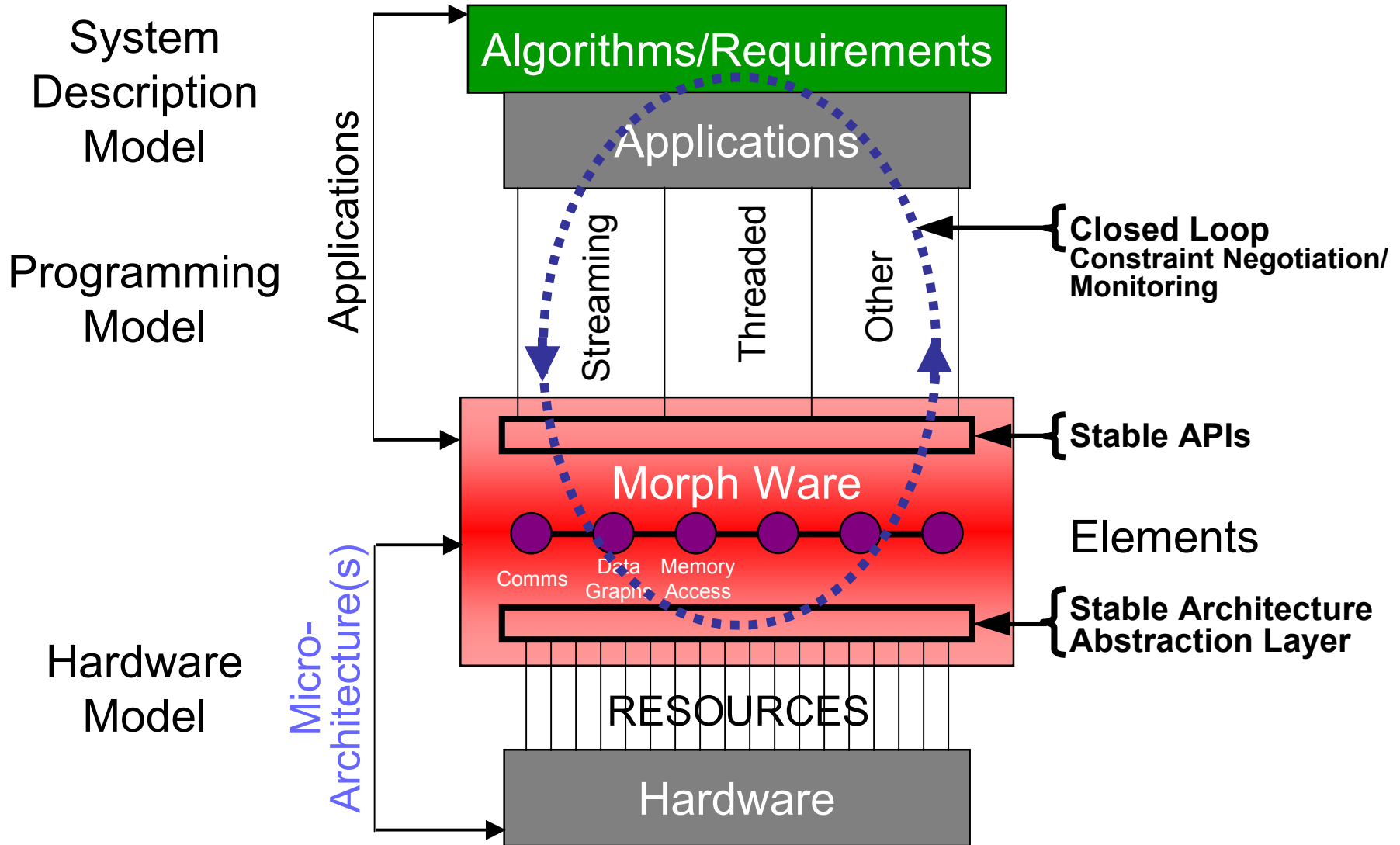
# Outline



- **Objectives, Goals, & Products**
- **Facilitation Team Members**
- **Morphware Stable Interface**
- **Getting to an MSI: The MSI Forum**
- **1<sup>st</sup> MSI Forum Meeting ...**



# Initial Working Model of PCA Structure



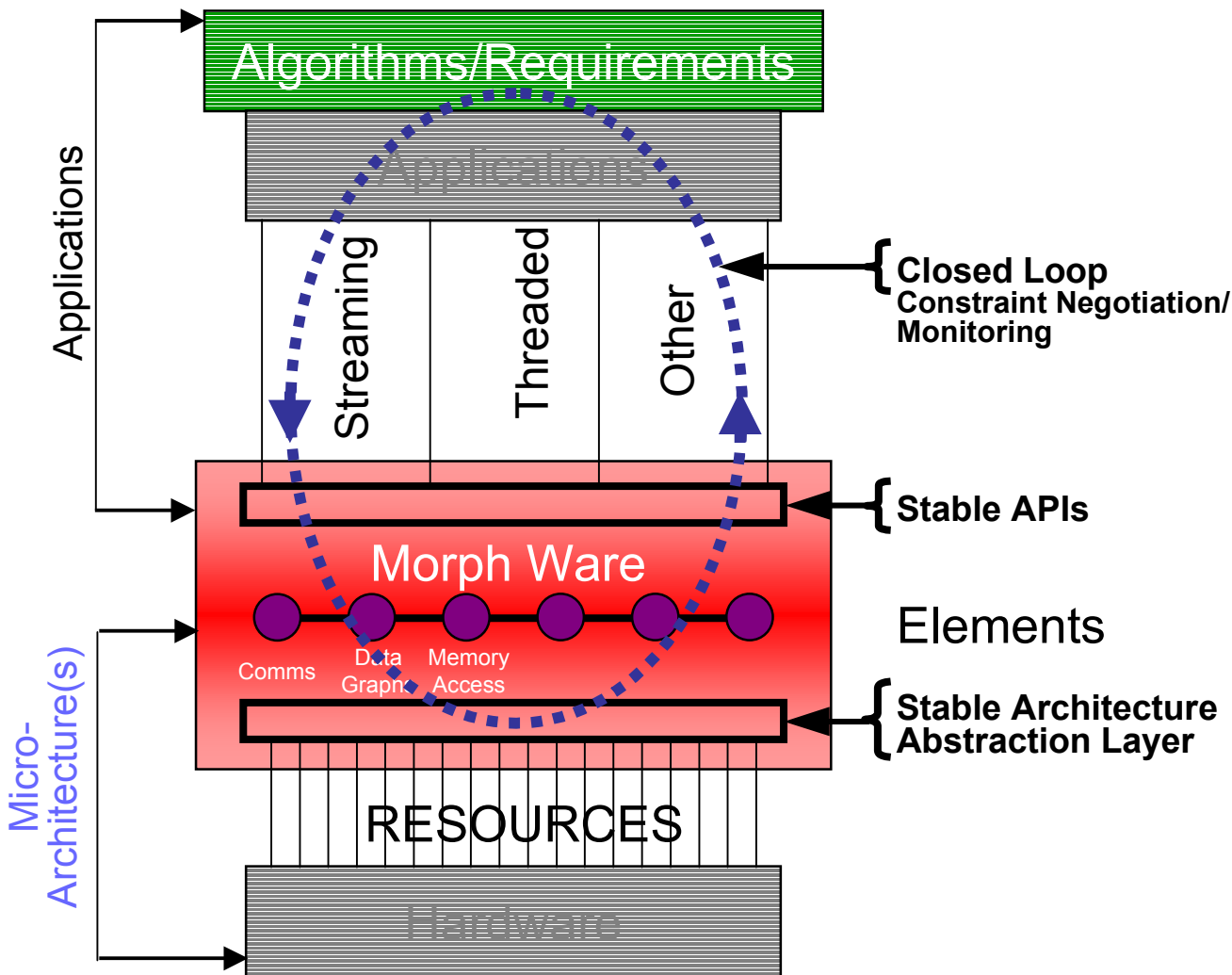


# Objective



- **“... facilitate the rapid evolution, in parallel with the evolution of PCA technology, of a community consensus on the programming paradigm for PCA machines, and ...”**
- **“... begin development of Morphware Stable Interface (MSI) standards ...”**

- **Facilitate development and documentation of a software development approach that**
  - spans the space of PCA architectures
  - spans the space of application classes
  
- **and offers the application developer**
  - portability
  - performance
  - satisfaction of constraints
  - ease of use



- **Architecture layer abstracts resources**
  - multiple libraries, libOS's, etc
- **API layer defines services available**
  - Multiple virtual machine models
- **Morphware**
  - Bridges HW and app layers
  - Negotiates constraints
    - possibly app-down *and* HW-up



# Defining the Target



- **To make progress on community-wide concepts and standards, we need to adequately define**
  - application scope
  - target hardware scope
- **MIT/LL leading application scope development**
  - incorporate independent results of PCA developer projects
  - critique/extend through MSI Forum and PI meetings
- **To define target hardware scope**
  - define leading candidates
  - define “generic” PCA(s)
  - abstract their characteristics
- **Develop testbed(s)**
  - generic PCA emulator in portable software
  - testbed of multiple physical architectures



# Facilitation Team Members



## Organization

## Primary Role(s)

### ■ Georgia Tech Research Institute (GTRI)

- Mark Richards      Principal Investigator
- Dan Campbell      MSI development and documentation
- Ken Mackenzie      Advanced computing architectures
- Bill Ballard      Electronic support services

### ■ SPAWAR Systems Center - San Diego (SSC-SD)

- Randy Judd      MSI development and documentation
- Dennis Cattel      MSI development and documentation



# Getting to an MSI



- **Establish, lead MSI Forum**
  - program-specific community standards body
    - similar to VSIPL, MPI, DRI, ...
    - *not* IEEE, ANSI, VITA
  - coordinate with developer activities
- **Develop and publish MSI documentation and software products**
  - includes defining copyright policy and group document ownership/control
- **Develop and publish reference implementations and compliance test suites**
  - needs an architecture and testbed to write to ...
- **Independent experimentation, test, and evaluation of concepts and products**



- **PCA program direct participants**
- **Other invited parties TBD**
  - **architecture, hardware, and software developers from industry and academia**
    - **Industry Advisory Council**
  - **DoD application developers**
  - **DoD computing technologists**



# Rules of Conduct for the MSI Forum



- **Be an impartial broker**
- **Keep the horse before the cart**
  - concepts before code
- **First (Third?), do no harm**
  - don't penalize one architecture over another
- **Minimize performance penalties**
  - don't penalize all architectures over "native"
- **Don't reinvent the wheel**
  - use what is already available

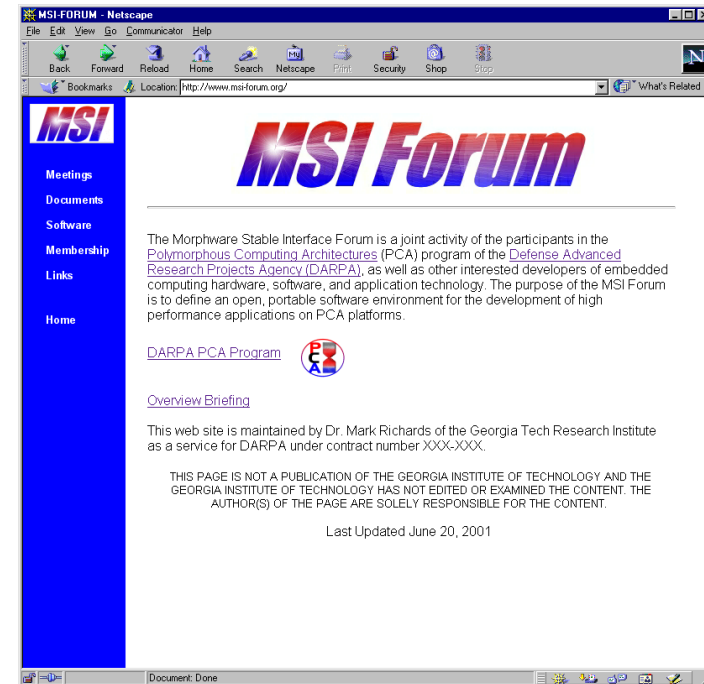


# Forum Collaboration Tools



## ■ MSI Forum Web Site

- Have pre-emptively purchased domain names `msi-forum.[org,com]`, `morphware.[org,com]`, `morphwareforum.[org,com]`
- Public access to information, documents, *etc.*
- Means to join e-mail reflector(s)
- Meeting information, minutes, *etc.*
- Collaboration tools and repository
  - minutes, code, working papers, experimental results, *etc.*

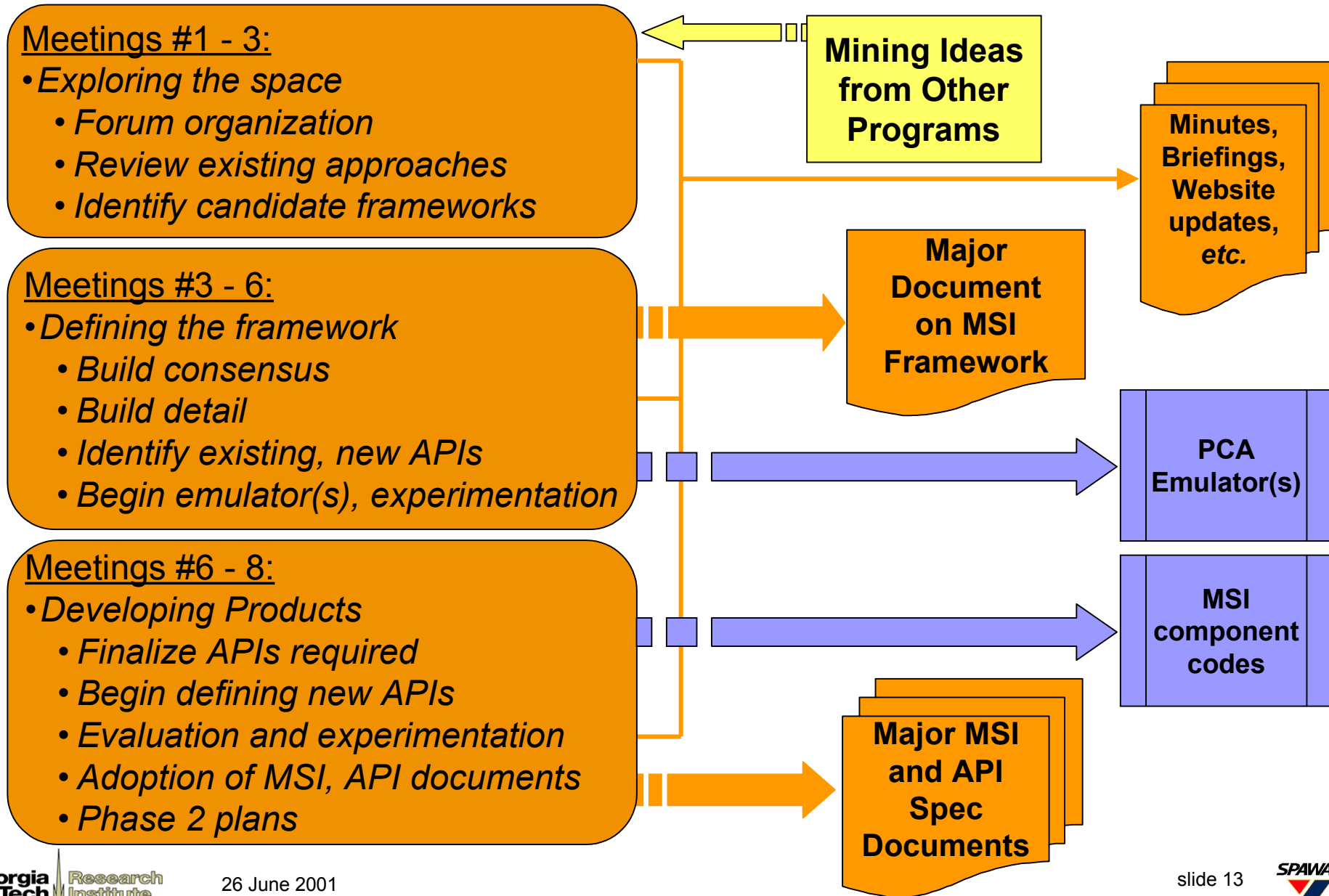


## ■ E-Mail Reflectors

- Will be established after first Forum (PI) meeting based on name selected
  - e.g., `msi-forum@list.gatech.edu`



# MSI Forum Phase 1 Meeting Plan





## ■ Effective MSI Forum Activity

- organization: membership, voting, *etc.*
- distance collaboration tools: web site, listservers, maybe revision control for documents
- MSI promotion: papers, workshops

## ■ Documents

- meeting minutes and records (presentations, *etc.*)
- working and concept papers
- software standards
- tutorial documents
- evaluations, benchmarks, *etc.*

## ■ Software

- reference implementation of appropriate components
- test policy and test suite for standards
- PCA testbed emulator



# Phase 1 Product Goals



## ■ Year 1

- **Develop substantially complete morphware concept**
  - Programming paradigm and morphware structure
  - Required MSI architecture and API abstractions
  - Well documented
- **Substantial start on PCA emulator(s) and morphware snippets**

## ■ Year 2

- **Refined morphware concept**
- **Refined PCA emulator(s)**
- **Significant MSI reference implementation components**
- **Early experiments and benchmarks**
- **Substantial start on test policy and test suite design**



# For More Information



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