Professional Services
CUG Interactive Session

HPC Solutions

May 2002

Contents

- A Computing Platform to solve a problem
- A Scientific Problem looking for a solution

The Newest Cray – Release in 2003

Cray SV2

- **Unprecedented system capability**
  - Tens of TFLOPS in a Single System Image (SSI)
  - Focus on sustained performance on the most challenging problems
- **Very powerful single processors**
  - High ILP, high bandwidth vector memory system
- **Best in the world scalability**
  - Latency tolerance via streaming vector processors
  - Very high-performance, tightly integrated network
  - Uniquely scalable system software (T3E Unicos/mk technology)

A grand challenge machine for our HPC customers' biggest issues.

Apply to all major grand challenge problems?

Government-Classified

Naval Research Laboratory

Washington, DC ✦ Stennis Space Center, MS ✦ Monterey, CA

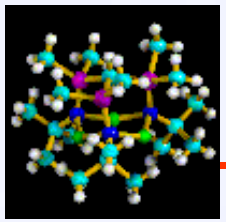
Government-Research

Aerospace

Automotive

New

Bioinformatics



Chemical/Pharmaceutical

Petroleum

Weather/Environmental

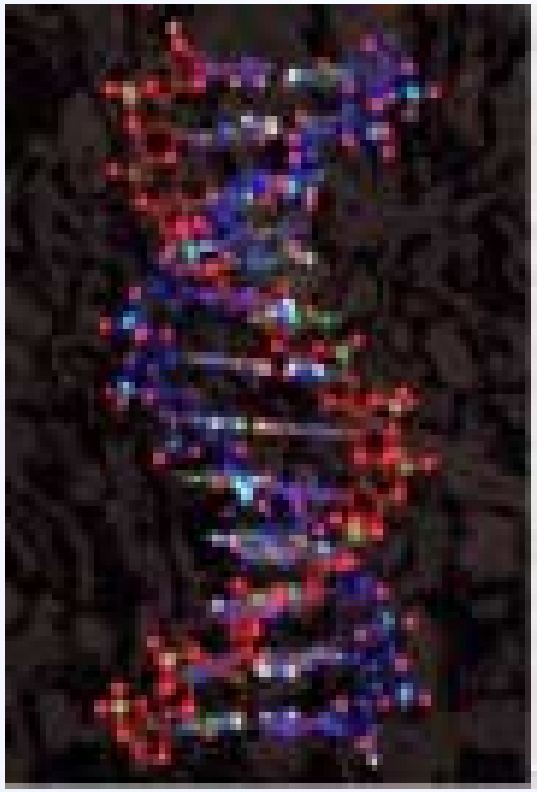
Academic Research

The Cray Product Line

Cray SV1ex

- **High Performance vector CPUs**
  - 2.0 GFLOPS SV1e CPU (500Mhz)
  - Configurable as a 8.0 GFLOPS in MSP mode
  - Increased Cache bandwidth
  - Reduced Cache latency
  - First Customer shipment was March, 2001
- **SSD capability with SV1ex memory**
  - 32 or 96 GBytes of internal SSD (can be larger)
- **High Reliability CMOS/SDRAM Technology**
  - Over 10,000 Hours hardware MTTI for SV1 systems
- **SV1e/ex systems can be clustered for additional capacity**

SV1 focused to solve problems with DNA Sequencing



- Nucleotide encoding: 600M characters/sec.
- Difference counting: 200M positions/sec.
  - For a 32 nucleotide sequence, this is 6.4 billion nucleotides/second
- Reverse complement: 4 billion nucleotides/sec.
  - For example, the complete human genome can be reverse complemented in about 1 second

Targeted System – SX-6

Vector

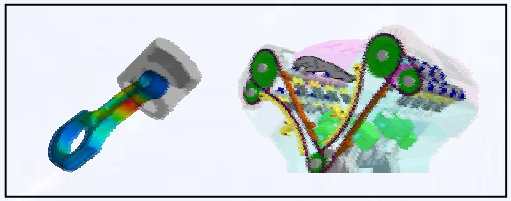
CPU:	**64 GFLOPS**
(8 TFLOPS)	**Max. 1024 CPUs in 128 nodes**
Memory:	**DDR-SDRAM Max. 8 TB**
I/O:	**Max. 800+GB/s**
IXS:	**1 TB/sec**
Heat:	**36,000 kJ/h**
Power:	**10 kVA**

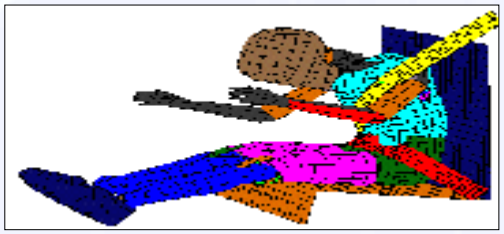
"Providing a high performance vector platform for North American Commercial and Industrial customers."

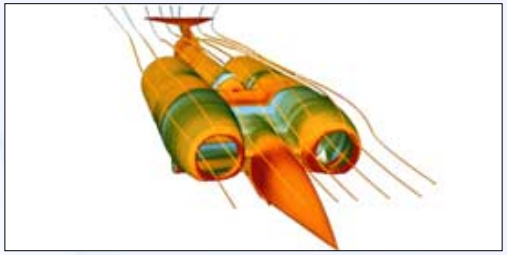
- **Practice Leader**
  - Steve Sugiyama
- **Marketing Platform Manager**
  - Per Nyberg
- **High Level Processes for SX-6**
  - System Configuration and Quotes
  - Code Benchmarks
  - System NEC Order Management
  - Integration and Factory Test
  - System Installation and Set Up
  - Acceptance Testing
- **Field & Central Service**
  - Analyst Support
  - Hardware Maintenance
- **Also see - Professional Services**

High-end vector capabilities delivered to our customers today.

Problem types for the SX







- Weather prediction
- Virtual Engine Prototyping
- Crash Simulation
- Computational Fluid Dynamics

Targeted System – MTA-2

Multithreaded

CPU:	**.75 GFLOPS Max. 256 CPUs (192 GFLOPS)**
Memory:	**SDRAM Max. 1 TB**
I/O:	**200 MB/p/s bi-directional**
IXS: latency	**4GB/s/p 0.8 micros av**
Heat:	**Water cooled**
Power:	**.8 kVA/p**

Targeted for customer problems requiring:

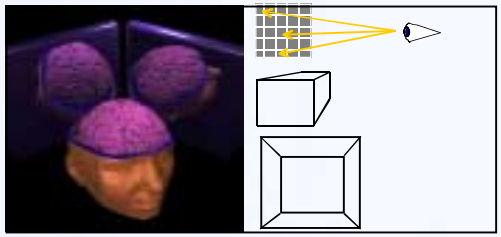
- Fine Grain parallelism
- Irregular parallelism and communication
- Data location transparency
- High bandwidth global interconnect

E.g. Visualization & MCNP

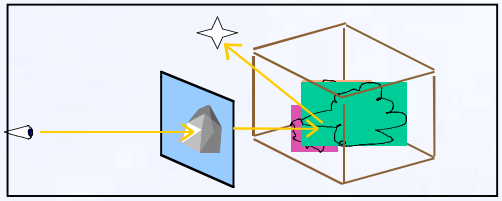
- **Practice Leader**
  - David Harper
- **Marketing Platform Manager**
  - Gail Alverson
- **High Level Processes for MTA**
  - Solution Design
  - System Configuration and Quotes
  - System Development & Manufacturing
  - Integration and Factory Test
  - System Installation and Set Up
  - Acceptance Testing
- **Field & Central Service**
  - Analyst Support
  - Hardware Maintenance
- **Also see - Professional Services**

Truly different technology that is guided by our customers' computational problems

Problem types for the MTA

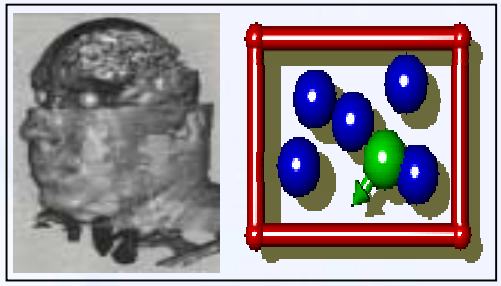


- Perspective Visualization



- Direct Volume Rendering with Backward Raytracing

- Interactive/Real Time Visualization



- Monte Carlo Simulation for Radiotherapy Dose Analysis to Electric Power Simulations

Targeted System – HPC Cluster

Scalar

Built to Spec

CPU: P3 & Beyond
"Current to Moore's Law"

IXS: Quadrix
Myrinet
GigE

OS: Linux

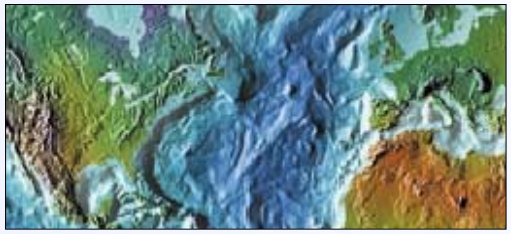
HPC Cluster Solution
Provided by professional services.

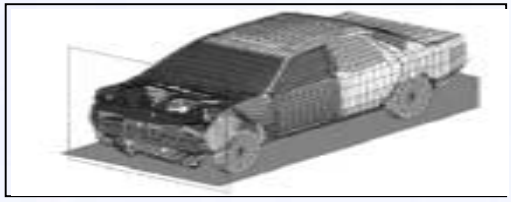
"A solution leveraging Dell's high quality hardware technology and Cray's deep HPC knowledge."

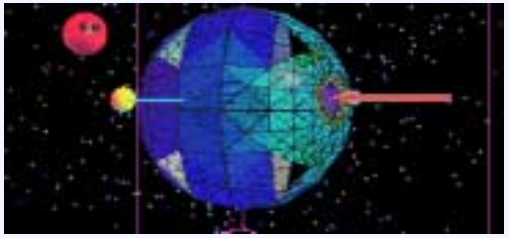
- **Practice Leader**
  - Frank Chism
- **Marketing Platform Manager**
  - John Levesque
- **High Level Processes for Clusters**
  - Solution Design
  - Systems Design and Configuration
  - Custom System Assembly
  - Code port
  - Integration and Factory Test
  - System Installation and Set Up
  - Acceptance Testing
- **Field & Central Service**
  - Analyst Support
  - Hardware Maintenance
- **Also see - Professional Services**

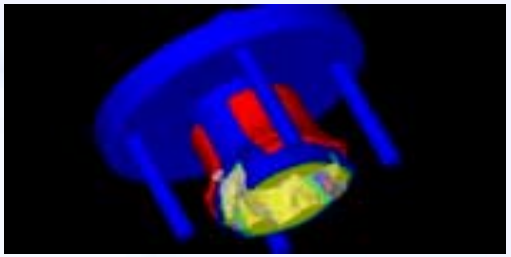
There are n! cluster technology choices, Cray delivers ONE! that meets your needs.

Problem types for the HPC Cluster









- **Standard Scientific ISV codes such as Q-Land for Seismic Processing**
- **Standard Scientific ISV codes such as LS-DYNA for Crash Simulation**

Applications spawned from ASCI

- **Interaction with three-dimensional models using mesh refinement**
- **Deflagration**

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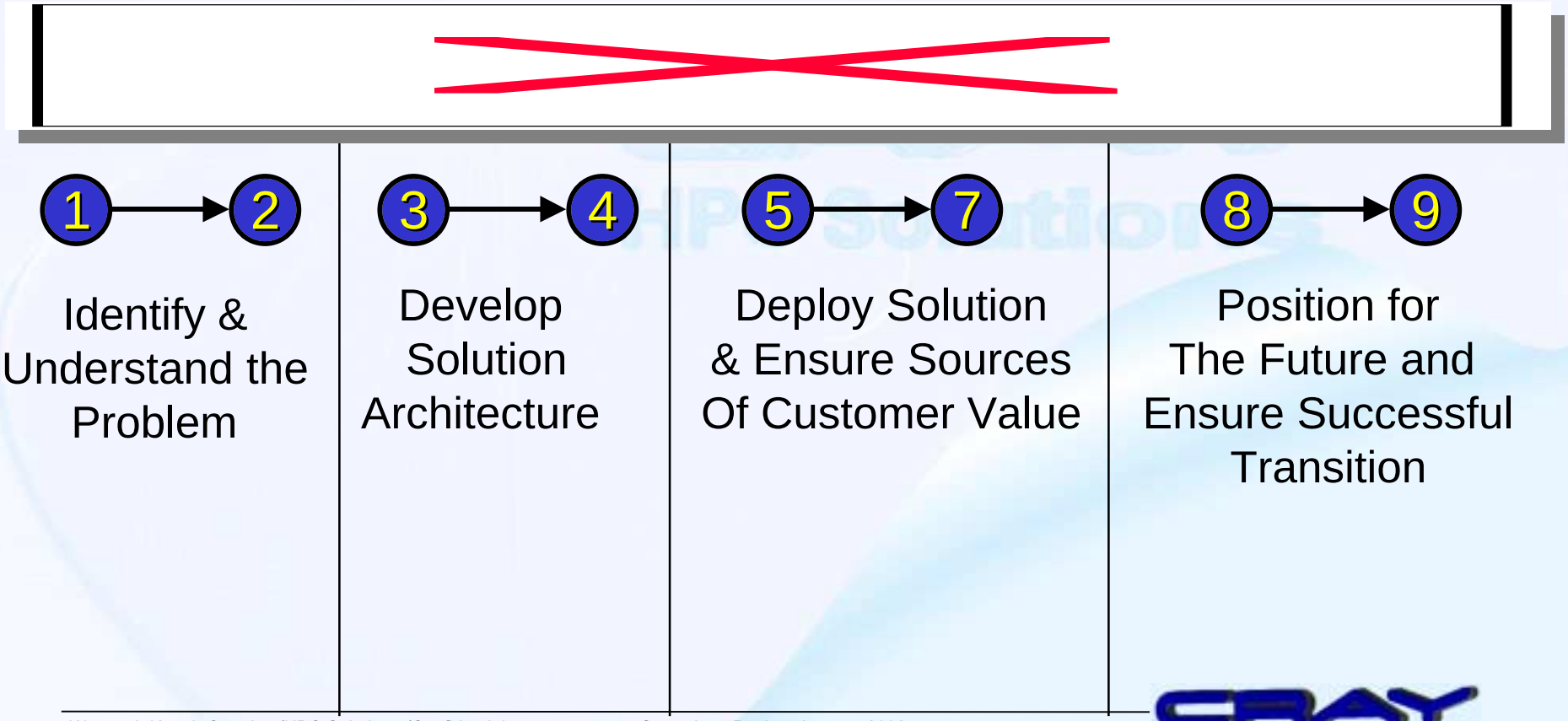
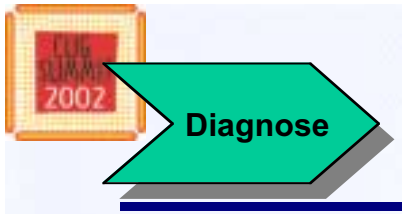
- A Scientific Problem looking for a solution

Cray HPCS Methodology

The 9-Step approach to HPCS Solutions ensure customer value throughout the lifecycle, allowing problems to become true business opportunities.

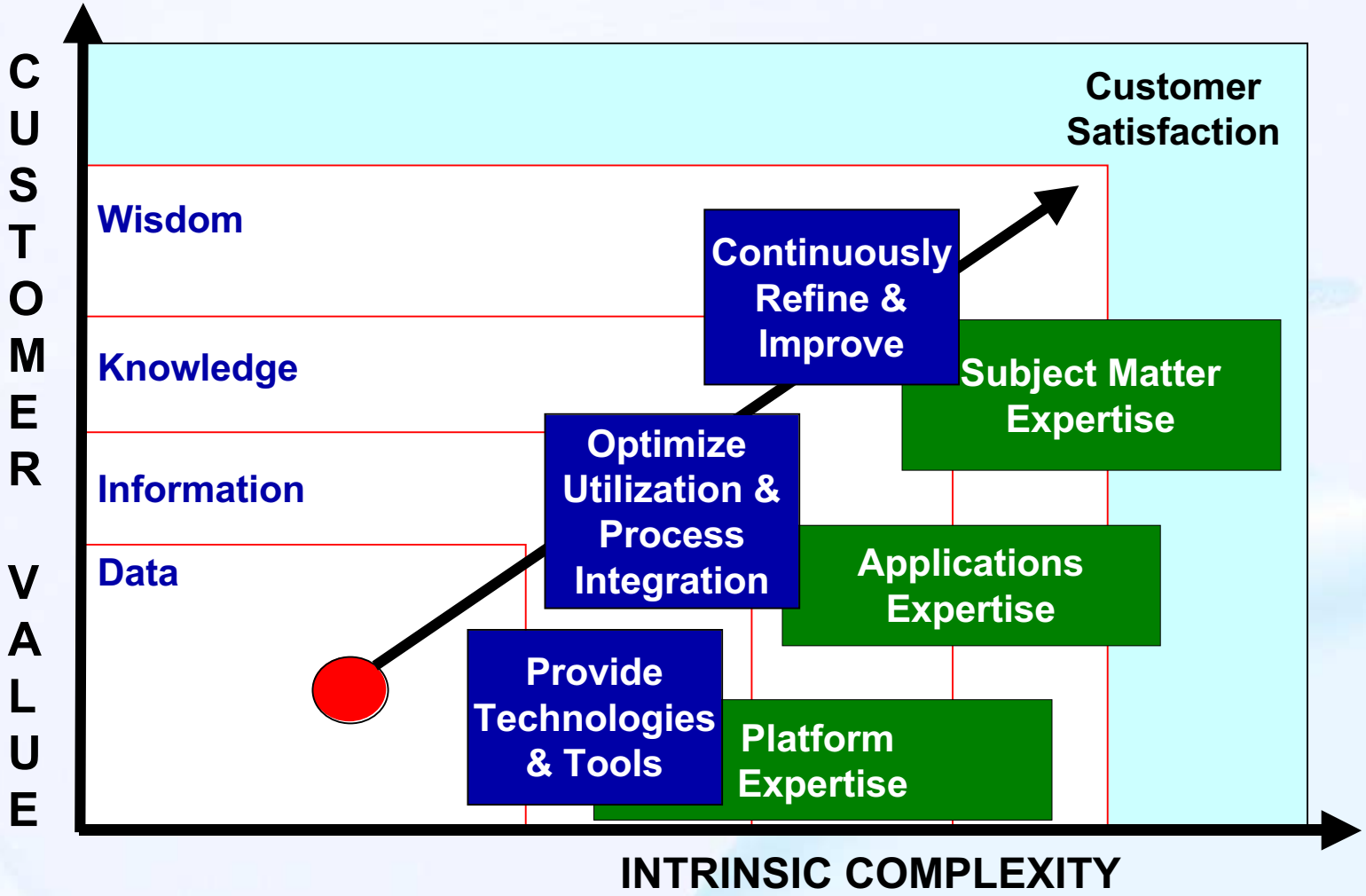


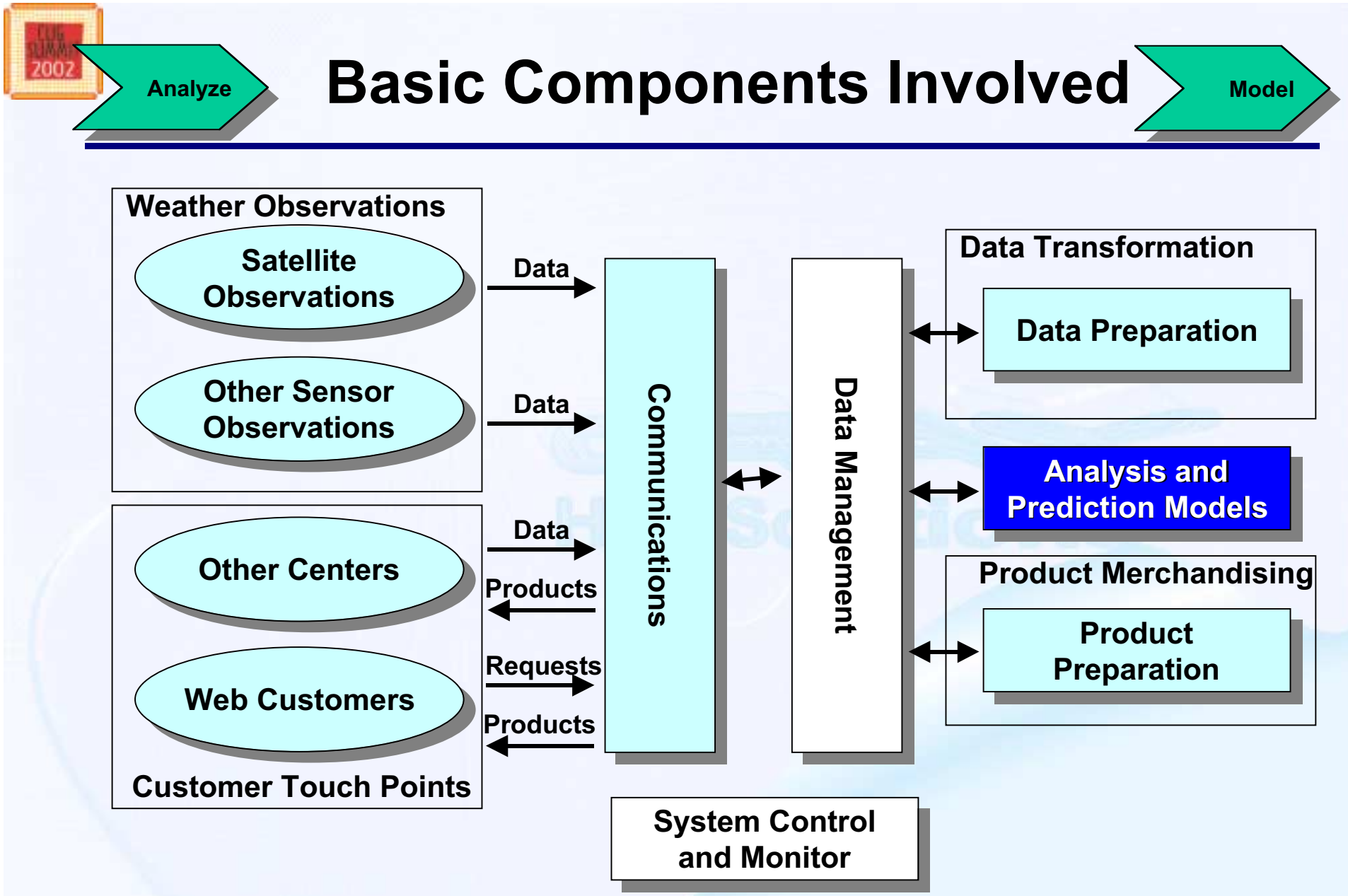


What's the Problem

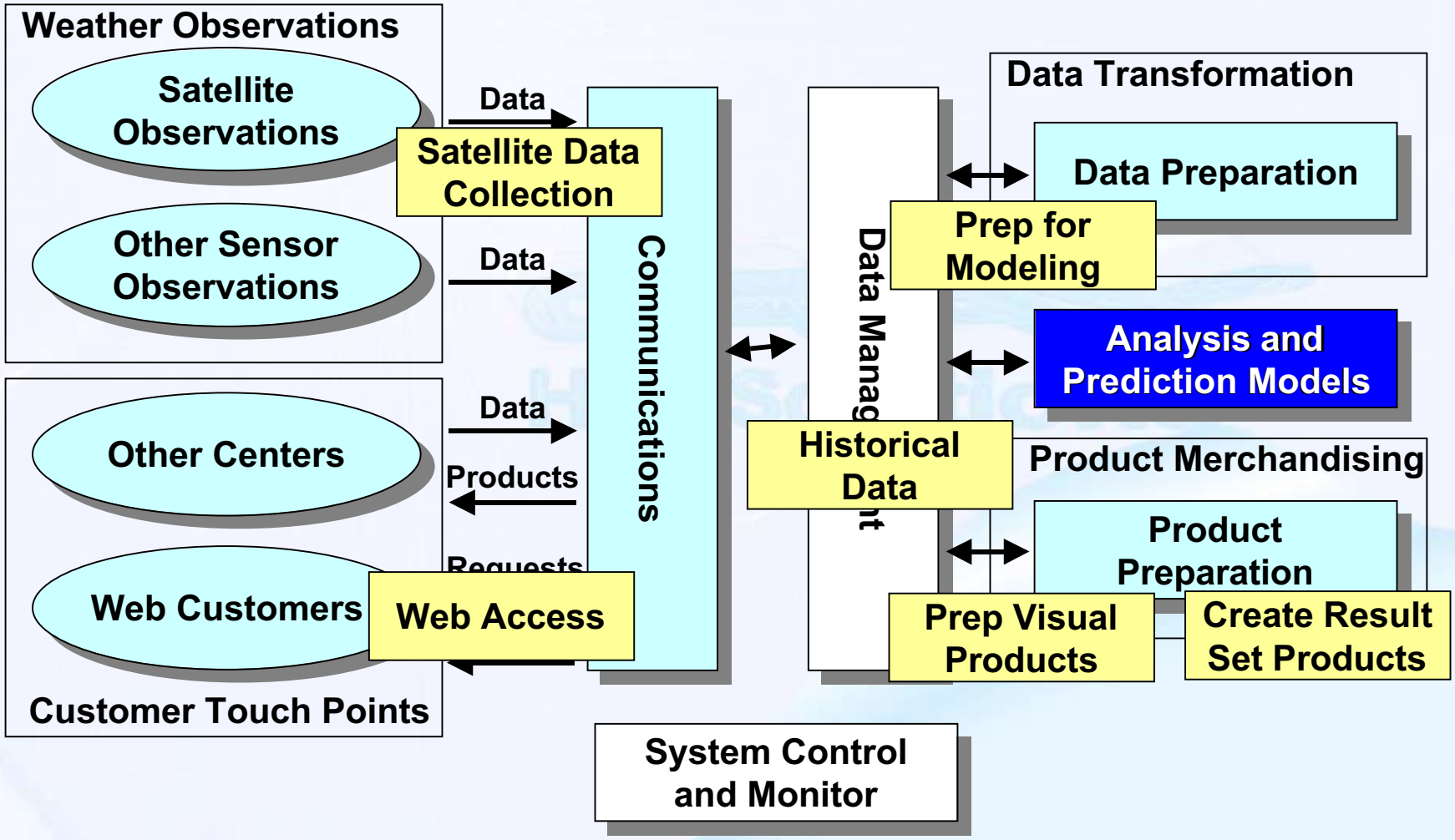
The user needs high resolution and higher frequency forecasts to build the best potential simulation for dispersion of harmful gas given multiple environmental conditions

The foundation of the problem: data, wisdom and action




Analyze
Basic Components Involved
Model
Weather Observations
Satellite Observations
Other Sensor Observations
Other Centers
Web Customers
Customer Touch Points
Data
Data
Data
Products
Requests
Products
Communications
Data Management
Data Transformation
Data Preparation
Analysis and Prediction Models
Product Merchandising
Product Preparation
System Control and Monitor

What points in the value chain have unique computational needs



Engage

Methodically Build the Solution

Integrate

Concept | Definition | Development | Validation | Introduction | Production

Evaluate Concept

Technology Evaluation

Define Customer Requirements

Development Plan

Technical Specifications

Plan & Design

Pilot & Beta

Ramp to Volume

Production

← TODAY

Lead Responsibility

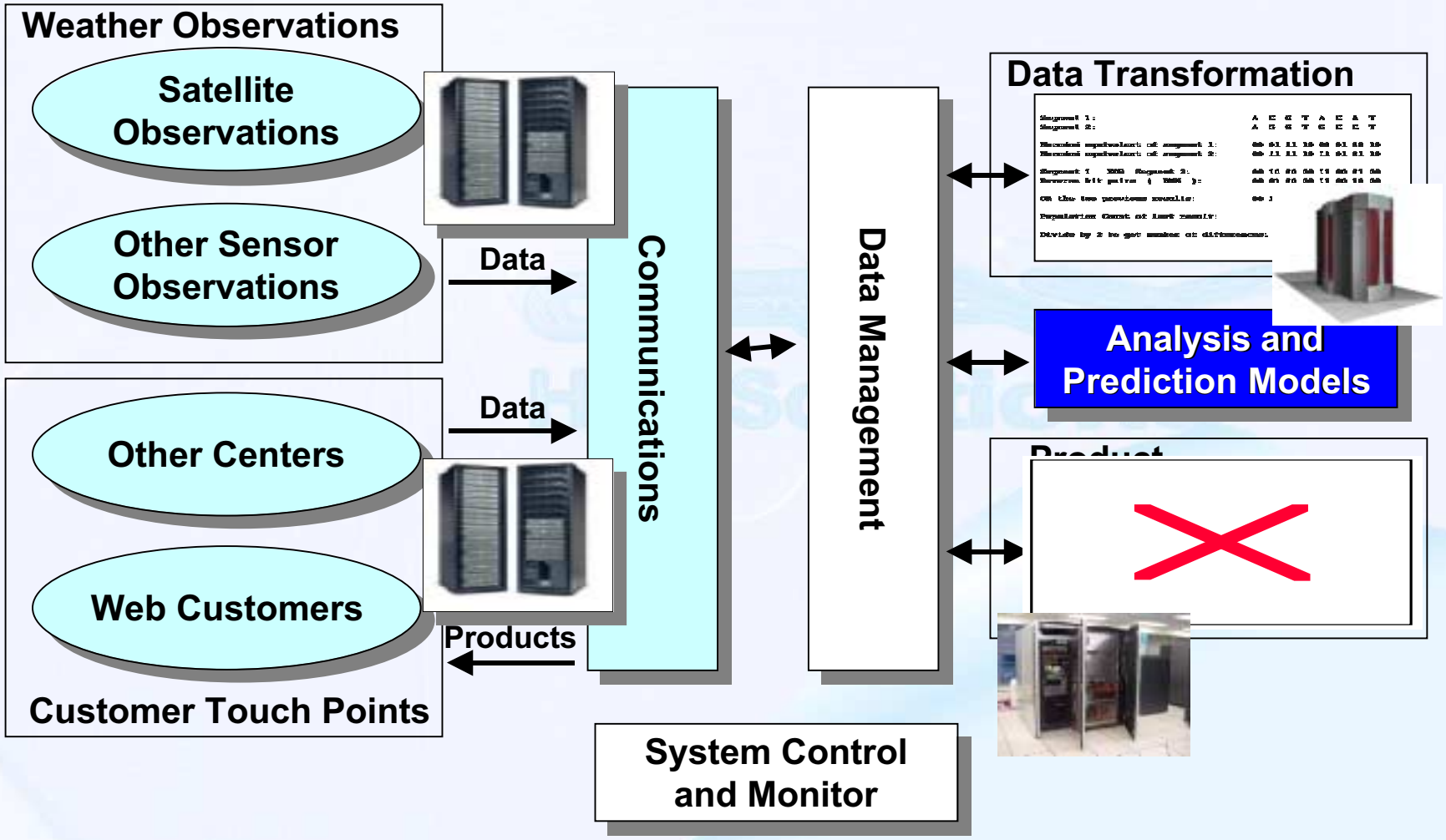
Concept Team

Functional Team

Partnership

CRAY

Deploying the Solution



Questions

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Thank You

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