

The Control Loop

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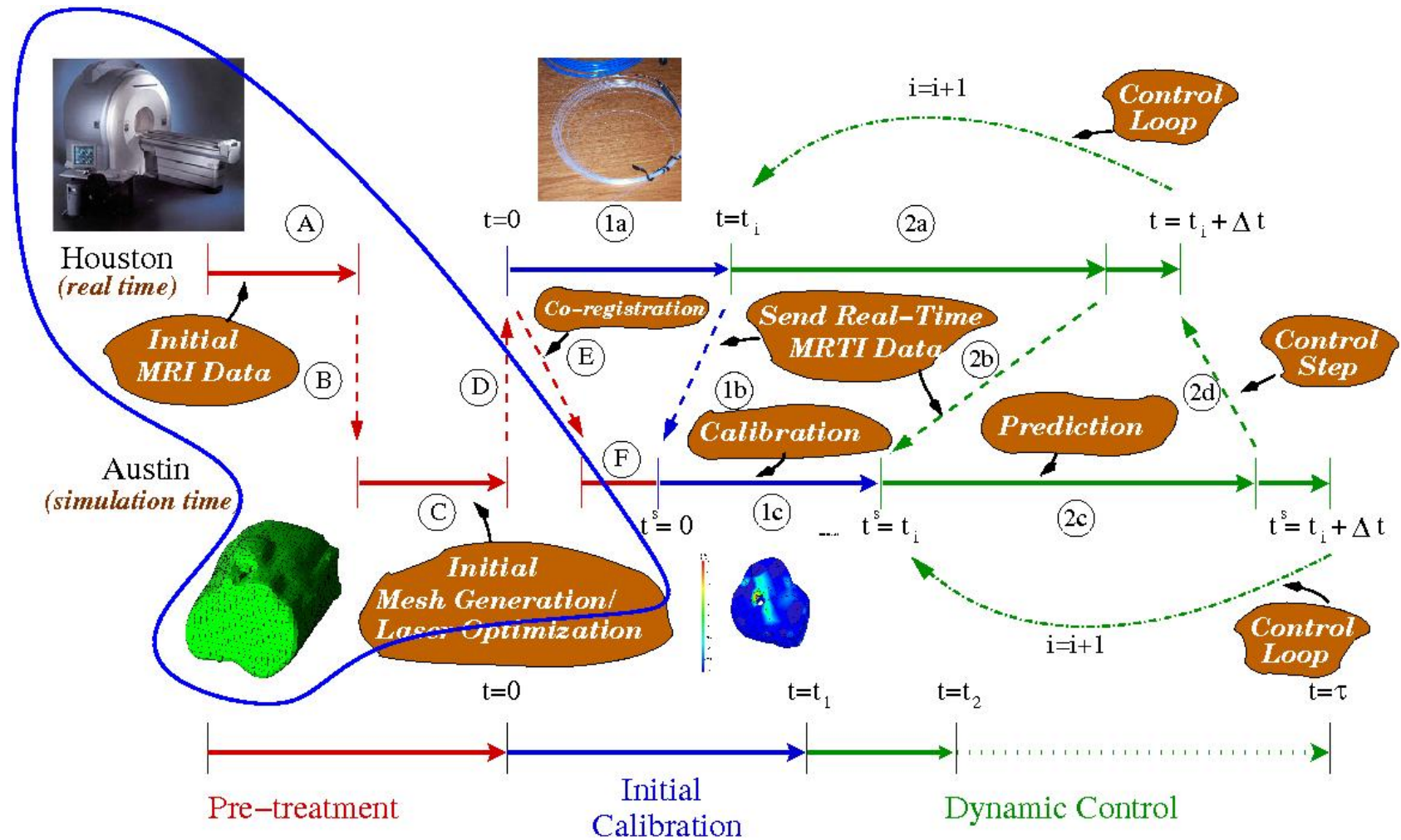
**Austin, Texas
June 22, 2006**

Outline

- **Project Status**
 - **Control Loop Walk Thru**

- **Priority List**

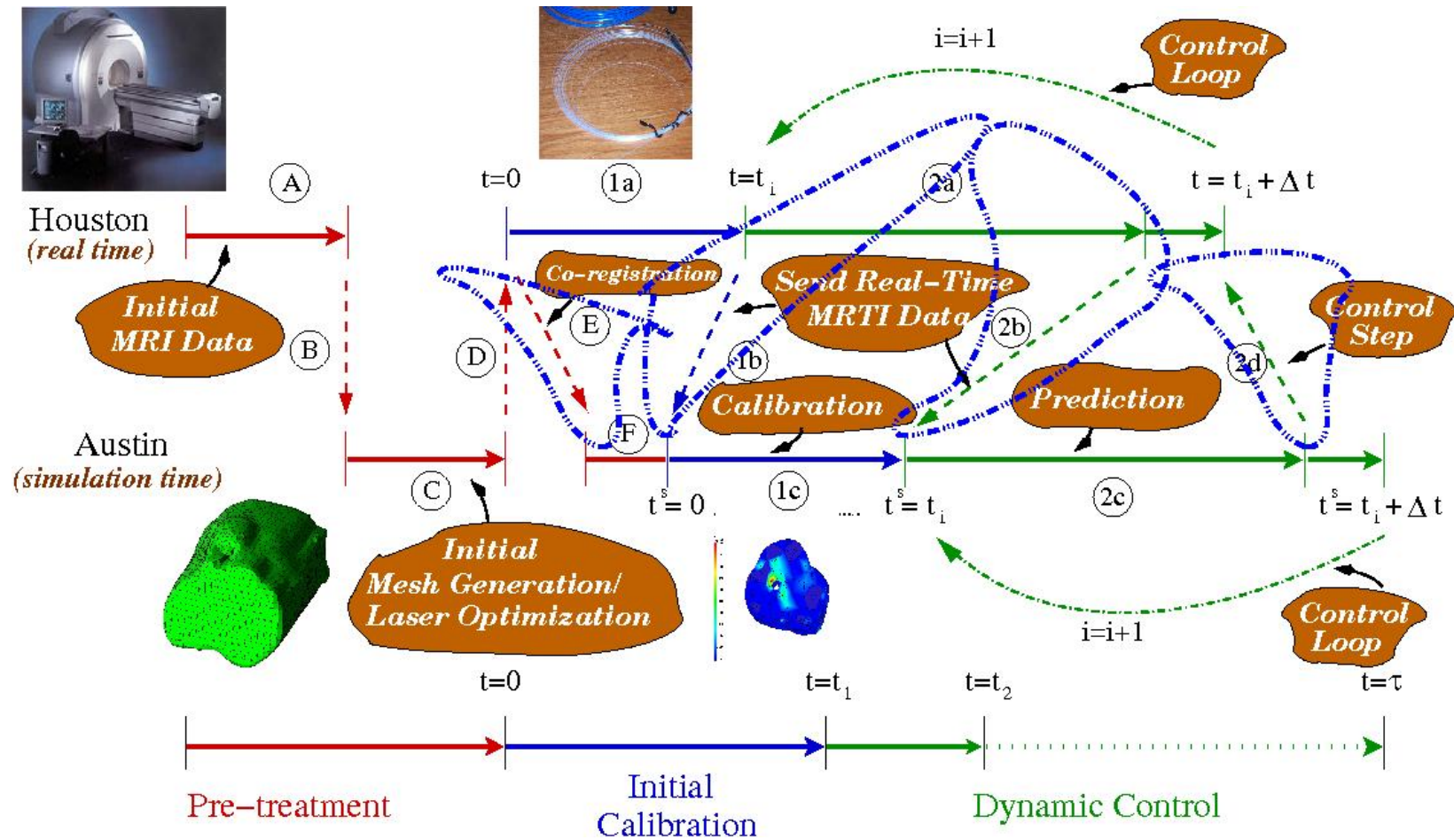
The Control Paradigm: Initial Mesh Generation



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- **Have:**
 - **LBIE generated hexahedral elements based on finite element jacobian computation at the 8 vertices**

The Control Paradigm: Data Transfer



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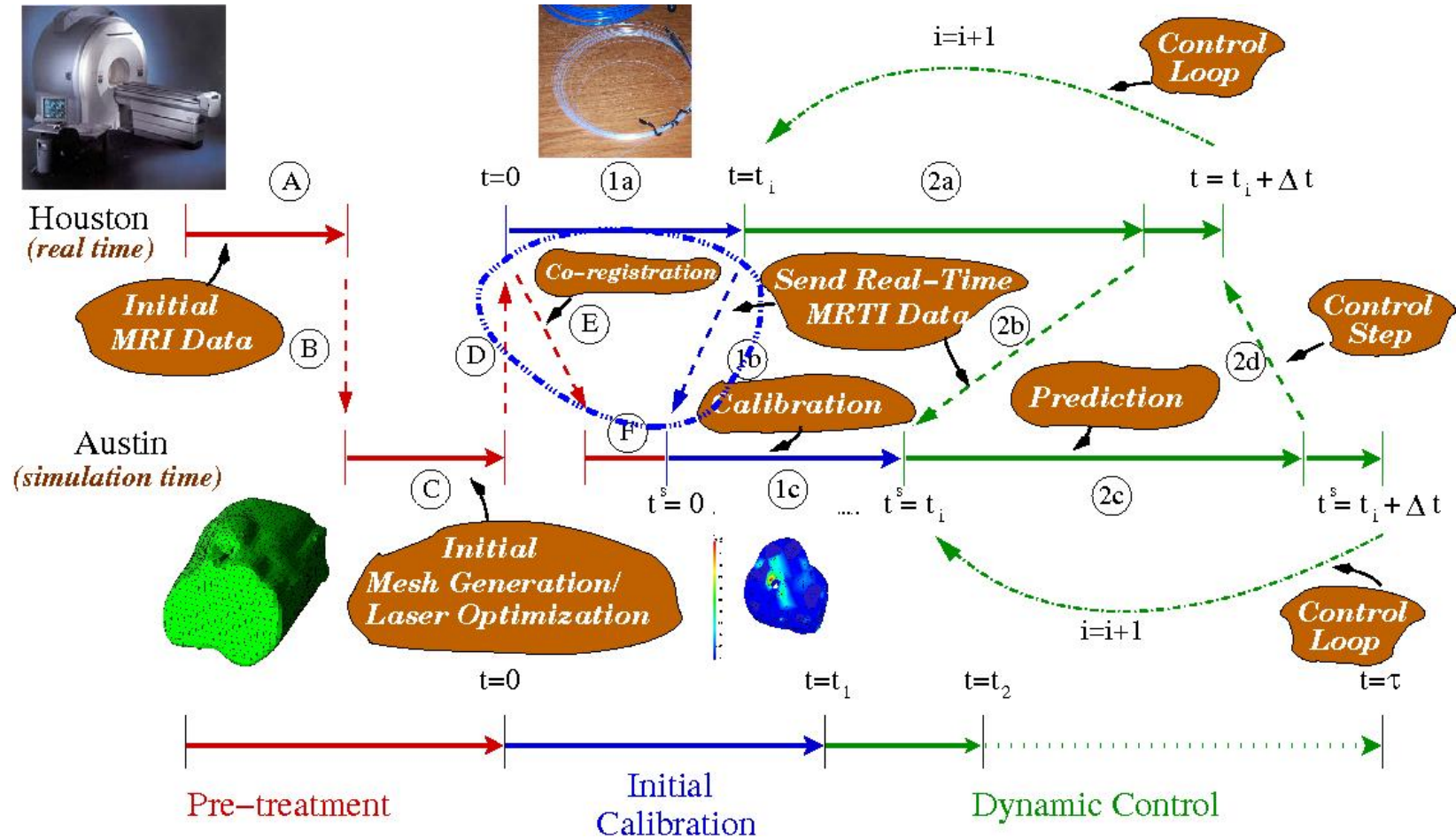
- **Have:**

- Seven 2-D slices put into directory on linux machine (in Houston) every 5 secs

- **Need:**

- Setup File Transfer Between Houston/Austin
 - * Accounts at Houston/TACC and on ICES clusters
- Test File Transfer Rates

The Control Paradigm: Co-registration and Data Overlay

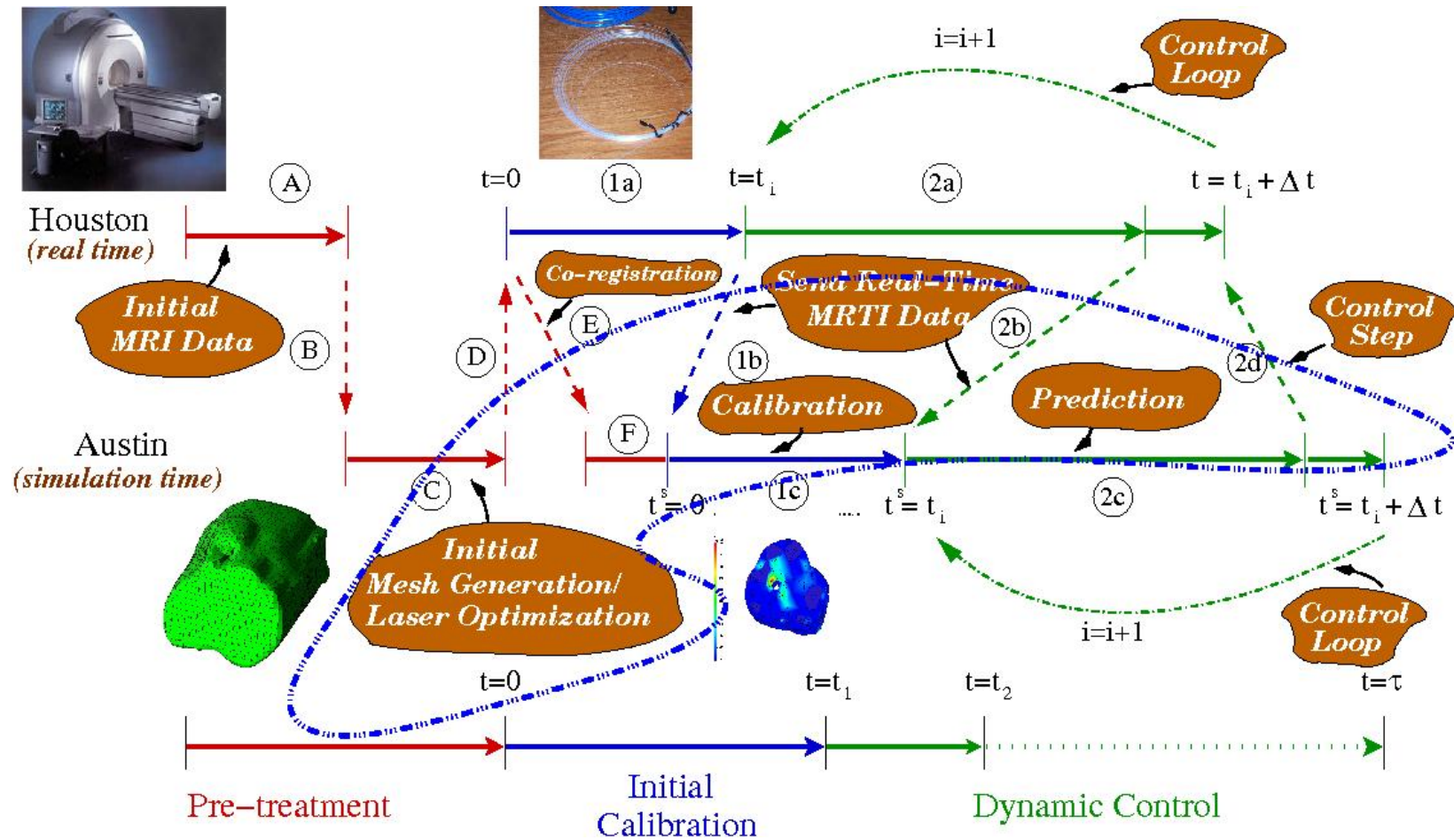


The Control Paradigm: Co-registration and Data Overlay

- **Have:**
 - **Library for Optimization**

- **Need:**
 - **Software for Co-Registration**
 - **Overlay Temperature Data on to LBIE Generated Mesh**

The Control Paradigm: Core Computations



The Control Paradigm: Core Computations

- **Have:**

- **Software capable of Calibration/ Optimal control**

- * **p=2**

- * **Constant coefficients: Power, position, model parameters, etc.**

- **Need:**

- **Add capability for spatially and temporally varying coefficients**

- **Profile the parallel code at TACC and BEVO**

- * **Optimize performance**

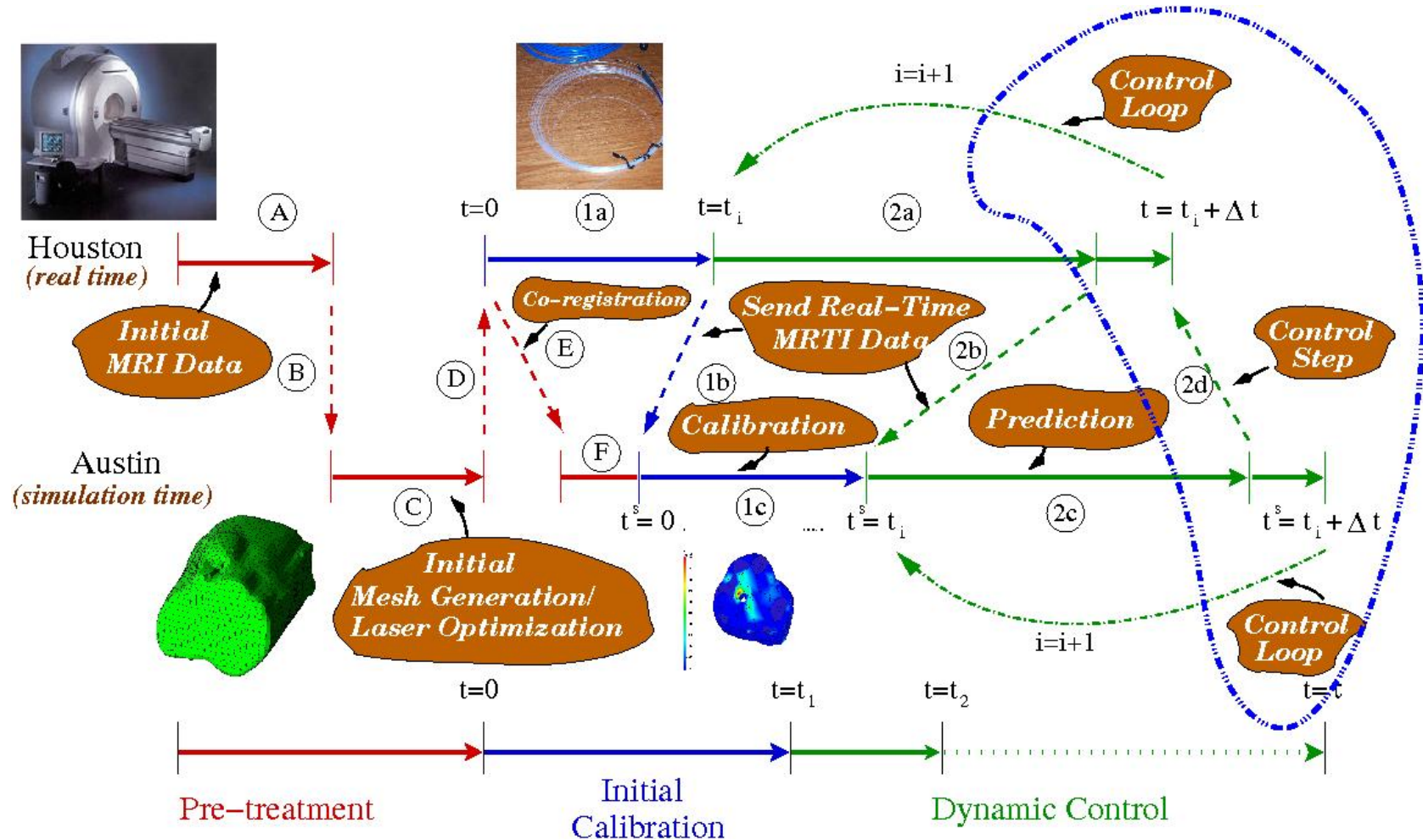
- **turn on optimization flags**

- **eliminate need to copy element matrices into Petsc Data structure**

- **more efficient matrix-vector multiply**

- **Make speed-up plots**

The Control Paradigm: Decision Criteria



The Control Paradigm: Decision Criteria

- **Need:**
 - **Develop decision making criteria to control the code execution using the run times for Calibration/ Optimal Control on multiple processor**
 - **How much time in advance do we need to compute/ can we compute?**
 - * **5 sec simulation w/ 10,000 dof = 8 proc. at TACC running at 25% peak for 1 sec**

Priority List

1. Data Transfer: **(Feng)**
 - Setup Accounts and Test Data Transfer Rates
2. Co-Registration and Data Overlay: **(Fuentes/ Hawkins)**
 - Formulate as an optimization problem use current software
 - Data overlay done in matlab convert to C/Fortran
3. Code Profiling: **(Fuentes)**
 - Setup Accounts at TACC and on BEVO
 - Profile and Optimize
4. Decision Criteria: **(Feng)**
 - Develop logic to control the calibration/ optimal control/ error estimates