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Title: MDMC Member Update: Los Alamos National Laboratory

Author(s): Philip Schembri

Intended for: MDMC Meeting 19

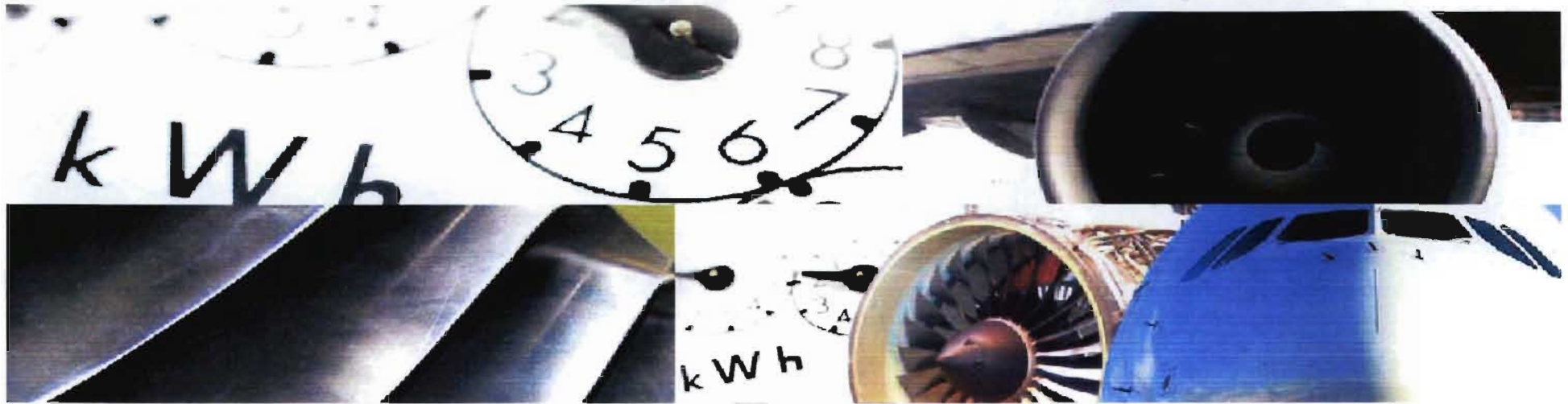


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### MDMC Member Update: Los Alamos National Laboratory (abstract)

These slides provide an update to the Material Data Management Consortium (MDMC) on the LANL implementation of the Granta/MI material database. An logistical overview of the database implementation is given, followed by an explanation of the recently revised database structure. The database is centered around a Calibrated Material Model (CMM) table, composed of a constitutive equation, material parameters, and common material properties, which are mapped from a separate table and can be shared among multiple CMMs. This structure addresses the needs of the database users as defined in the list of Objectives. Progress to date and future plans are summarized.

# MDMC.net



## MDMC Member Update: Los Alamos National Laboratory

19<sup>th</sup> MDMC Meeting

January, 2012

19th MDMC meeting

Jan 2012

[www.grantadesign.com](http://www.grantadesign.com)

## The structure of the LANL implementation:

- 2 Databases/servers
  - ▶ Unclassified (Yellow network)
  - ▶ Classified (Red network – air gapped)
- Users
  - ▶ ~30 Read only users (W-13 group, plus a few from MST)
  - ▶ 1 Edit (Matt Lewis)
  - ▶ 1 Admin (Tien Appert)

We have recently restructured the classified database to specifically meet the needs of the W-13 group. Other groups are seeing the improvements, and the user group may expand.

Complete restructuring, including adding the necessary material data, will take ~2 years.

We are enthusiastic about the increased attention being given to user-friendliness and ease of use for interrogating and retrieving data from Granta/MI.

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# LANL Granta/MI Implementation Update

Philip Schembri, Tien Appert, Matt Lewis  
January 2012

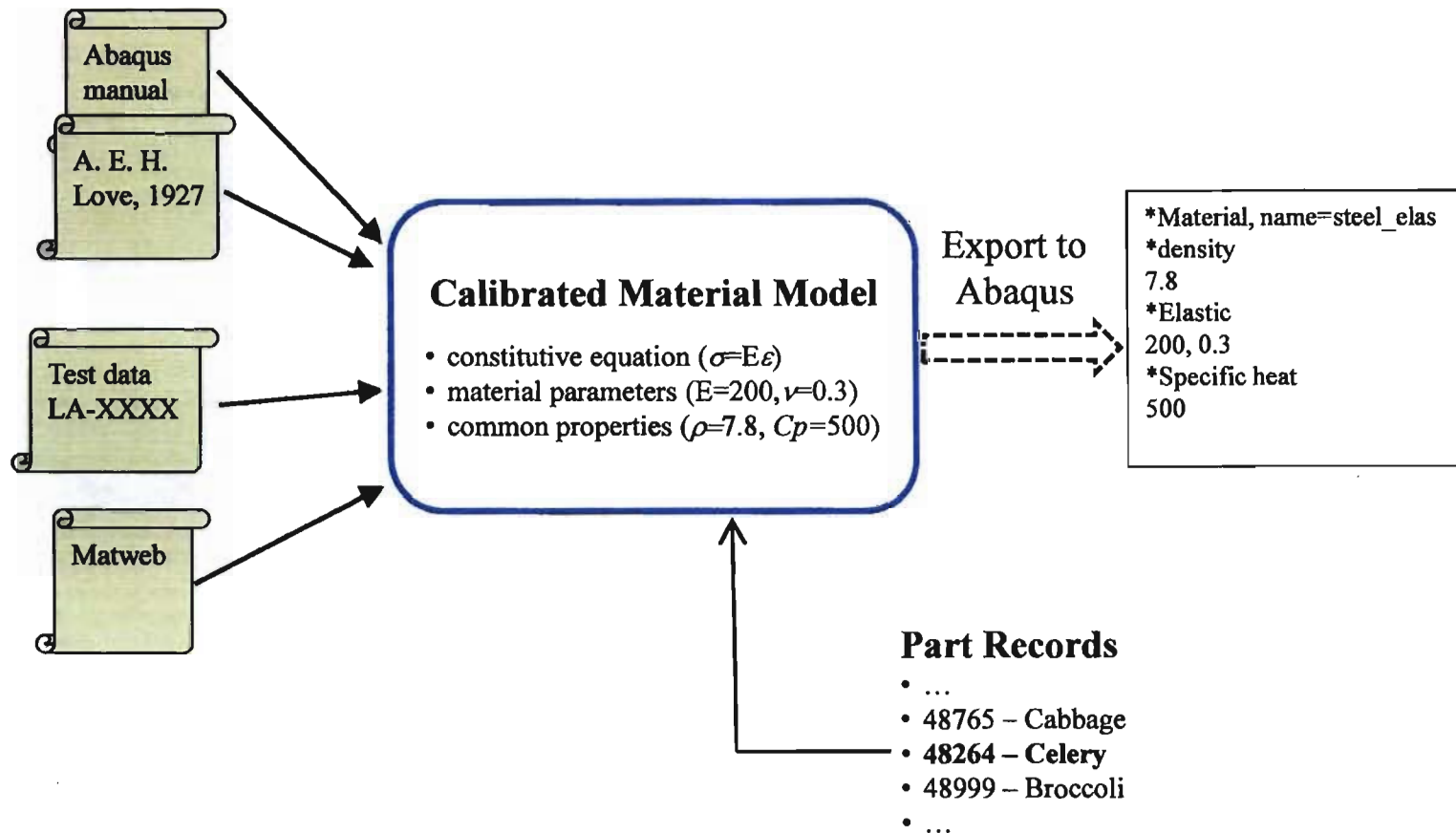


## Objectives revised in 2011

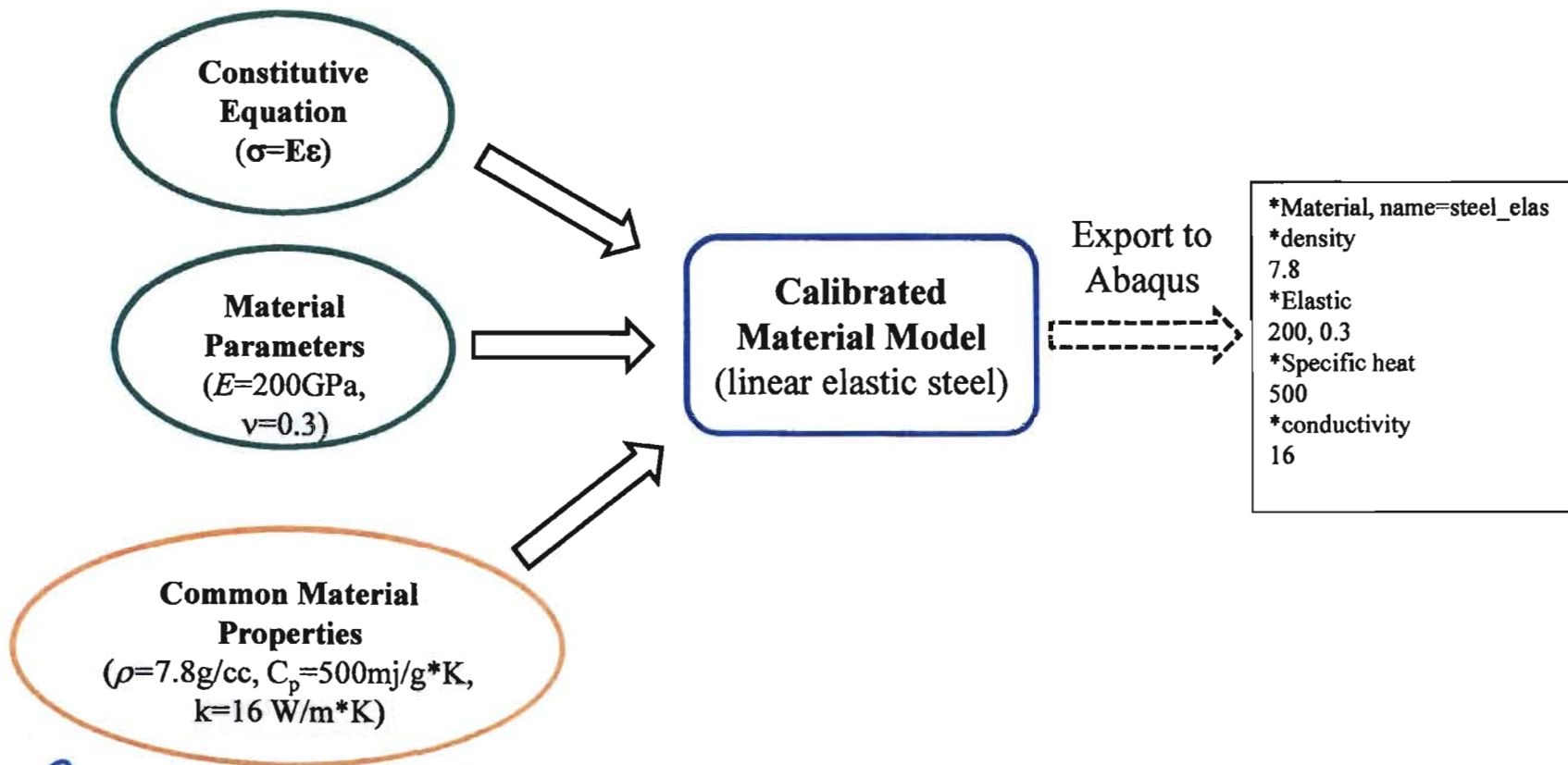
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1. Store, in a central, easily accessible location, Calibrated Material Models
2. Export Calibrated Material Models in Abaqus (and/or other) format
3. Store and link pedigree information for Calibrated Material Models. Each parameter is either:
  - Traceable to test data or to “trusted” (tbd) alternate data source
  - Flagged/commented as lacking pedigree
4. Provide an intuitive interface to find material for a particular part in a particular system, or that has been used in a particular FE model
5. Store material test data for use in future material model development
6. Store currently unused material information (equations and/or data) for reference and future material model development
7. Provide version control for Calibrated Material Models

## Database structure (overview)



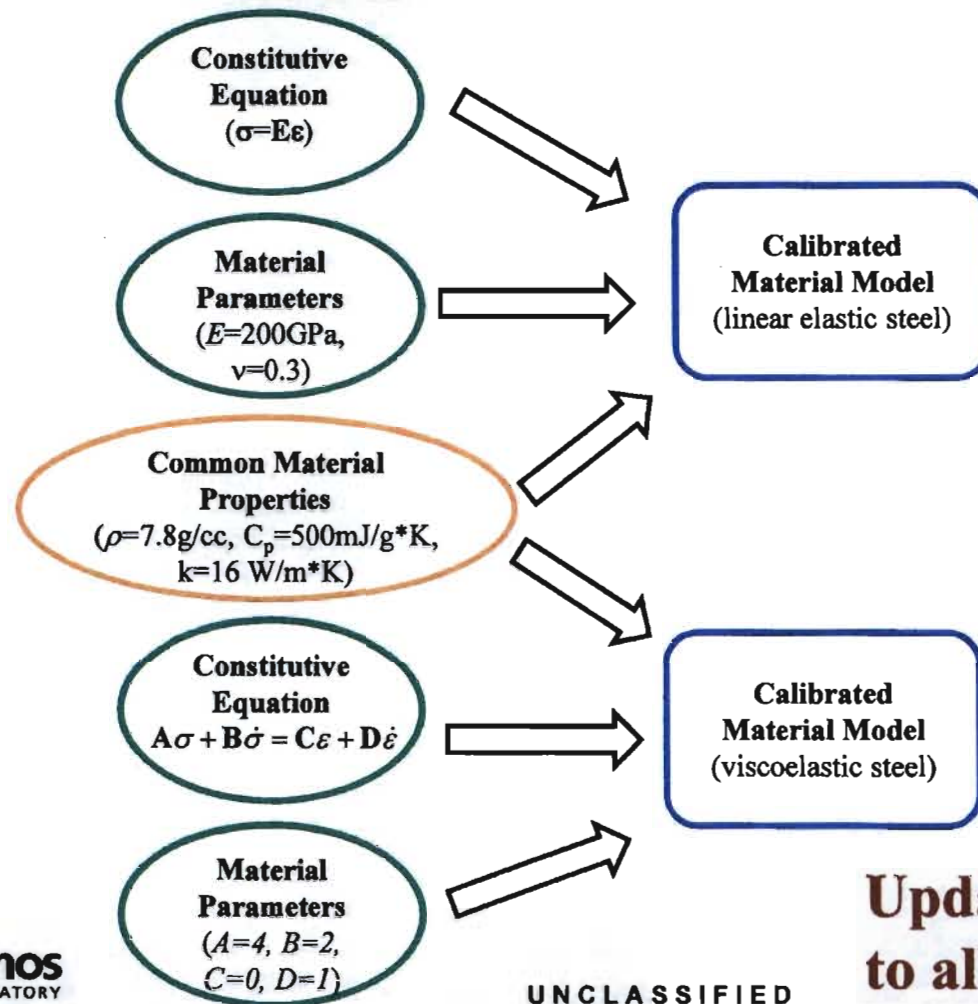
## Database structure (unpacking the CMM)





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## Common Material Properties may be shared by multiple Calibrated Material Models



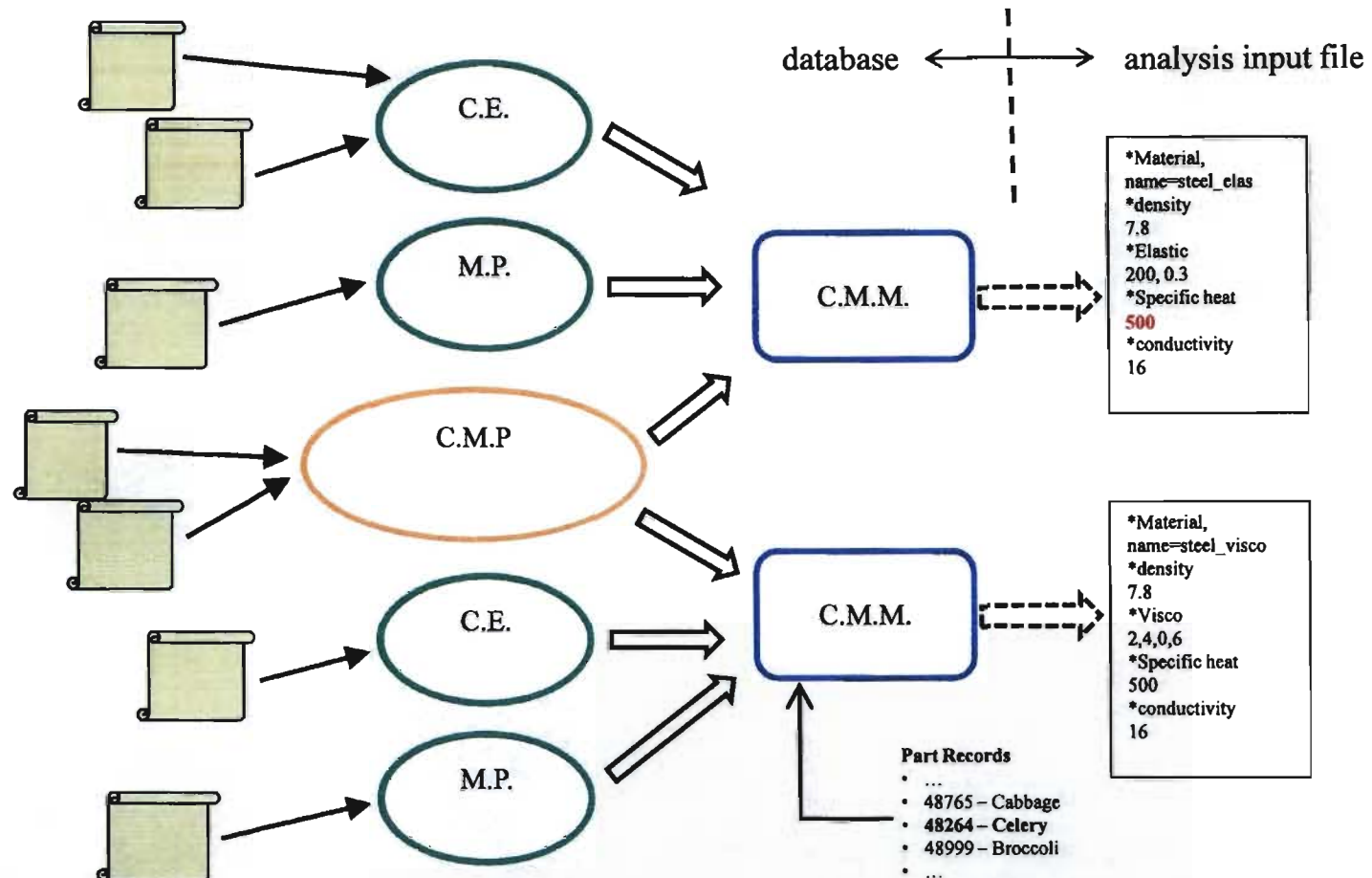
**Updates in CMPs apply to all CMMs**

Slide 4

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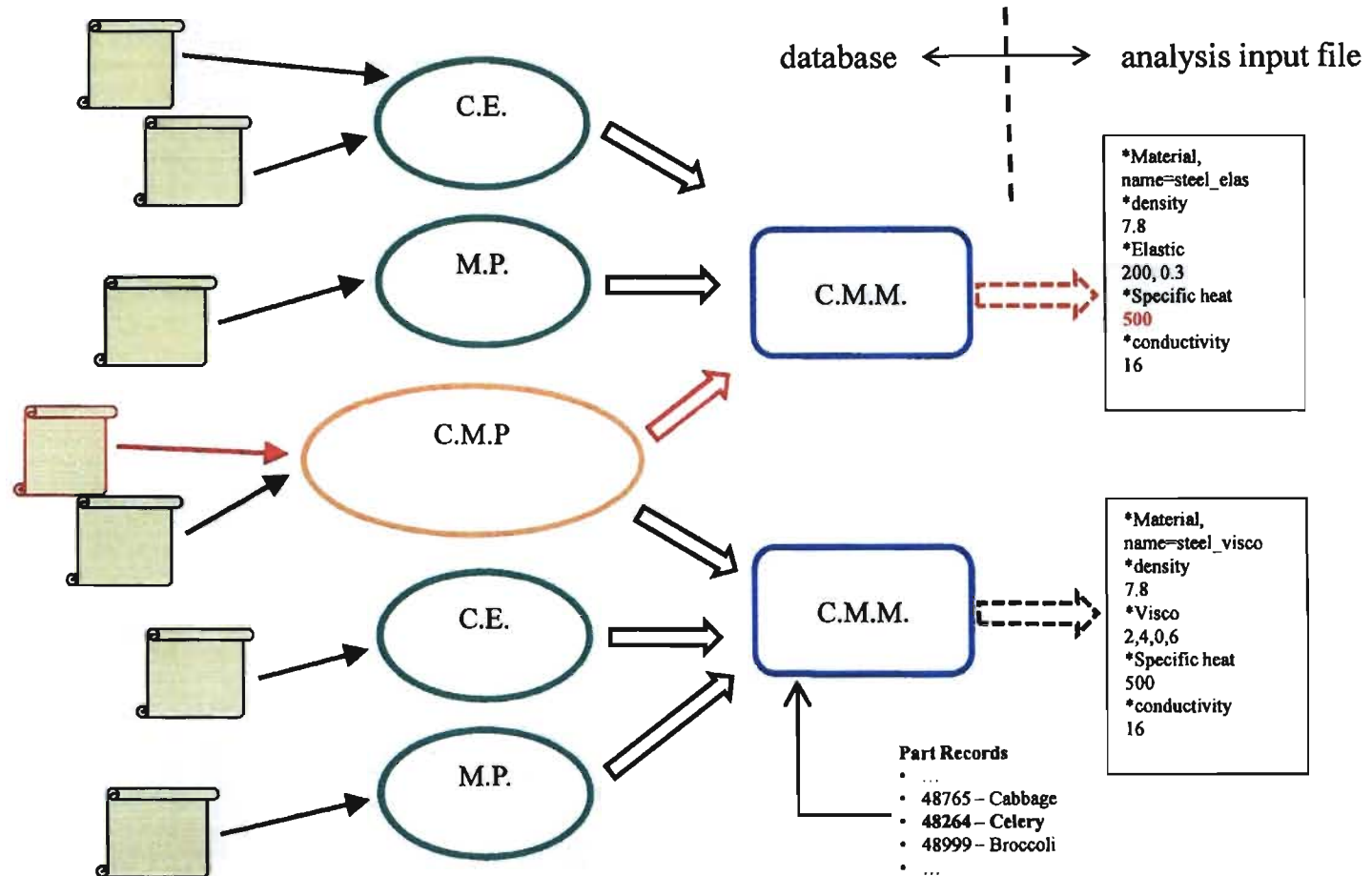
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## There is a traceable link between reference sources and the analysis input file



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## Current status (for Pilot System)

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- **Completed:**
  - All Pilot System calibrated material models are in database
  - Export routines have been written to export materials to Abaqus
  - “New” database rolled out to W-13 group: Positive feedback, new users
- **In progress:**
  - Checks are being run on database values and links
  - Material Working Group being formed to bring system engineers, analysts, and material scientists together to prioritize material needs
- **Near term future:**
  - Link calibrated material model records to parts in PDMLink database (CAD database)
  - Add other systems to database (3 more to go)
- **Long term future:**
  - Add “interaction properties” to database
  - Consider adding physics material models (e.g. equations of state)