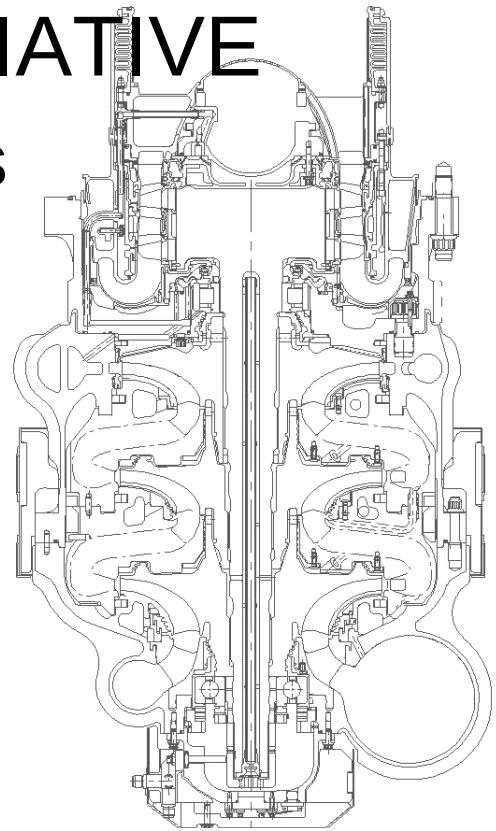
PROPULSION SYSTEMS KNOWLEDGE MANAGEMENT INITIATIVE

Pilot Project Status



October 21, 2005

Paul Caraccioli/ER32

Knowledge Management?

Definitions:

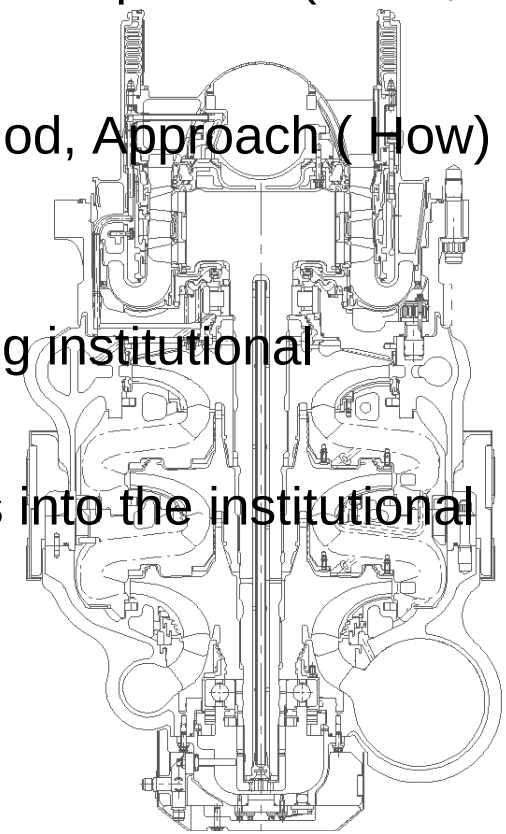
Information - Relates to Description, Definition or Perspective (what, who, when, where)

Knowledge – Comprises Strategy, Practice, Method, Approach (How)

Knowledge Management (KM)

Acquiring, capturing, organizing, preserving institutional intellectual assets

Disseminating/infusing intellectual assets into the institutional strategy, practice, method, approach

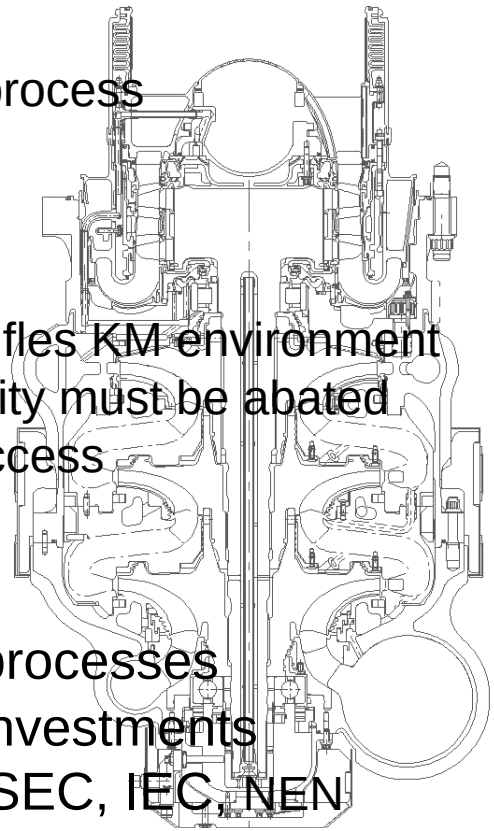


It is not just information management

KM Success Criteria

KM Initiatives reliant on Infusion

- Requires full management commitment/endorsement
- Aggressive management support
- Funding commensurate with commitment
- KM environment utility and value added to the process
- Wide promotion and publicity



Cultural changes necessary

- Pride of ownership/ “invented here” mentality stifles KM environment
- “Questions exhibit weakness/ignorance” mentality must be abated
- Sharing/collaborating environment is vital to success

Synergy with related initiatives

- Can not afford reinventing and redundant processes
- Must dovetail with existing and future KM investments
  - LASSE, REIMR, LLIS, VIPA, PARSEC, IEC, NEN
  - Legacy Data systems

Why KM?

" If MSFC is to remain world-class in rocket propulsion systems design and development, substantial improvement in access to current and historical design, development and operational information must be made." *

"NASA has not demonstrated the characteristics of a learning organization after investigators observed mistakes being repeated…"**

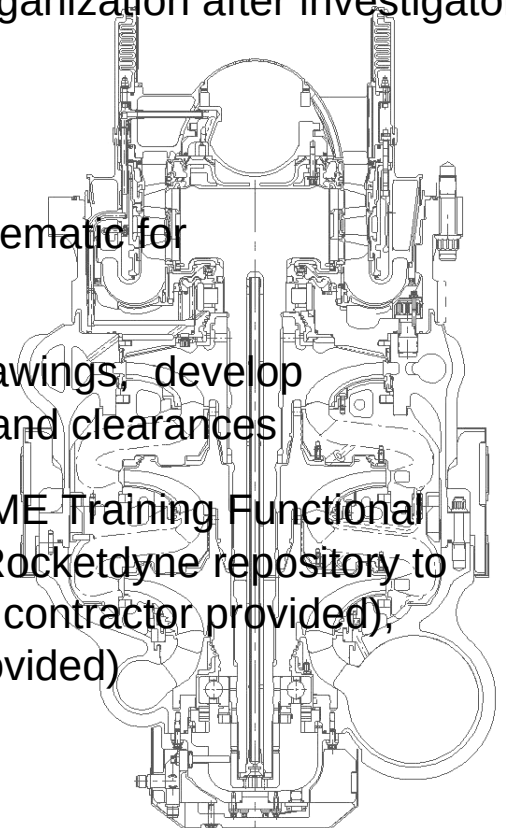
Where are we today?

Task: Develop detailed, SSME ASI Propellant flow schematic for CFD/transient modeling

Process: Determine current ASI configuration, find ASI drawings, develop dimensioned schematic by hand calculating fits and clearances

References: SSME Materials Control Report, circa 1982, SSME Training Functional Schematic, five 5-drawer file cabinets, MSFC/Rocketdyne repository to replace obsolete drawings, SSME drawing list (contractor provided), SSME 2058 Indentured parts list (contractor provided)

Duration: Approximately 8 weeks (not full time effort)



*MSFC Knowledge Management Evaluation Proposal – Basis of Earmark ** CAIB report

KM Functions/Objectives

Understand strategies, processes, practices, methods

Identify, Collect, and Catalog intrinsic information

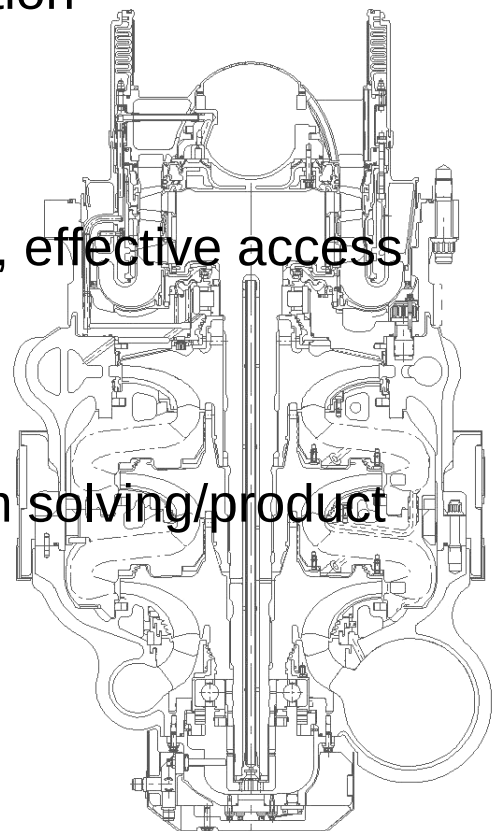
- Capture/retain organizational Knowledge
- Identify/acquire/categorize/prioritize
- Enable collaboration/sharing

Infuse relevant, useful information for efficient, effective access

- Rapid access to the right data to assure utility
- Integrated desktop access
- Process interfaces/interlocks

Innovative data processing to support problem solving/product development

- Search and indexing schemes
- Enable creative problem solving



KM Implementation

Congressional Earmark provides initial KM evaluation funding

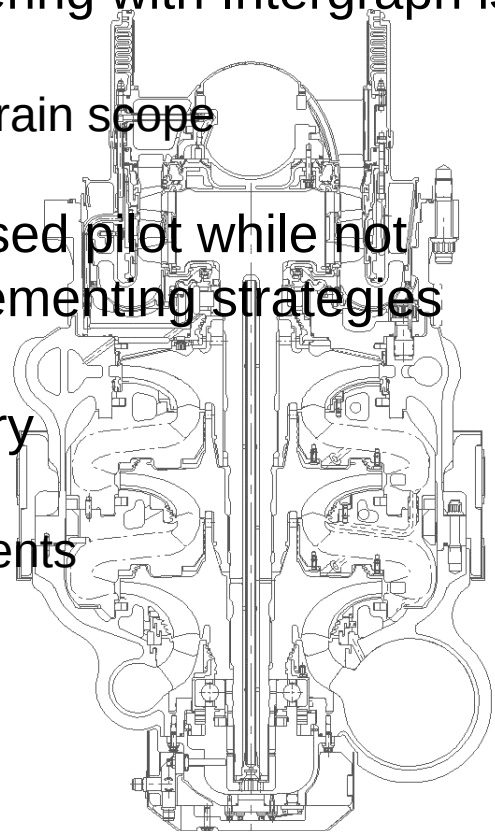
Grant with the University of Alabama partnering with Intergraph is in place

- Funding and schedule limitations constrain scope

Spiral approach envisioned to provide focused pilot while not constraining growth, global vision and implementing strategies

Pilot will focus on SSME AT Turbomachinery

- Existing and manageable dataset
- Most recently developed flight components
- Current electronic data systems



KM Implementation

Will utilize on-site Intergraph KM System developers

MSFC network/servers will facilitate pilot

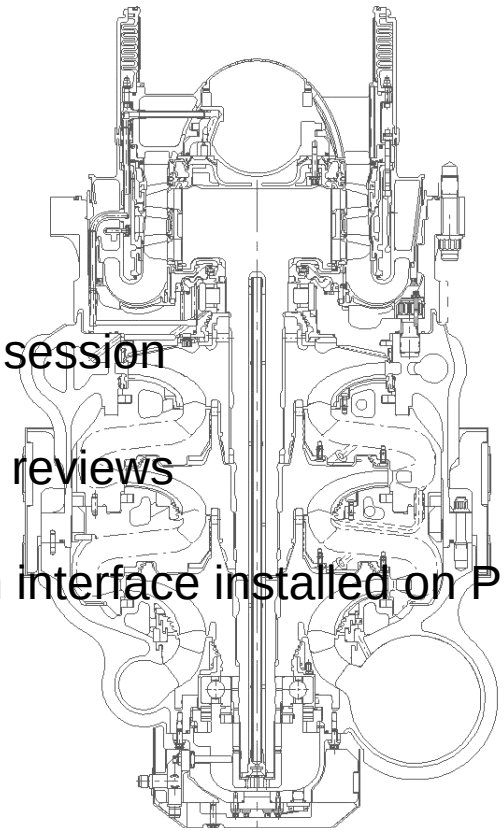
MSFC Team Support

Support Kick Off - KM environment formulation session

Support interviews, intermittent status/progress reviews

Support pilot implementation interactive system interface installed on PC

Support evaluation/success metrics inputs



KM Team Members

University of Alabama

Dr. Randy Smith – Principle Investigator

Intergraph

Bill Mommsen – Technical Manager

Mike Mc Carter – Strategic Planning

Barry Wilson - System Developer

Dick Porter – System Developer

TBD – (2) System Developers

Sub contractors

Tom Vanadoe – KM consultant

“ASK ME” software consultants

????

NASA/MSFC

Pravine Aggarwal- Analysis/ Advisor

Greg Swanson – Analysis/Advisor

Eric Earhart – Rotordynamics

Eric Eberly - Turbomachinery

Darrell Gaddy – Thermal Analysis

Lewis Maddux – SSME Project Office

Matt Marsh – Turbomachinery

Kathy Mims – Dynamics

Rob Minor – Component design

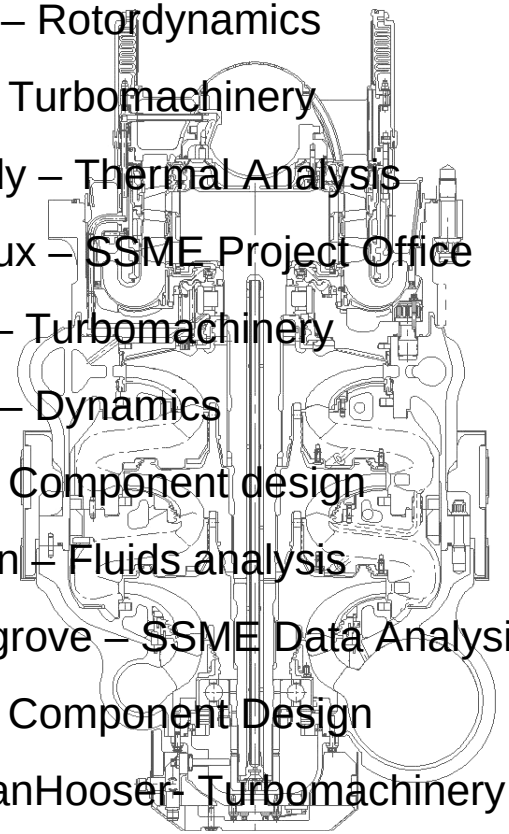
Tom Nesman – Fluids analysis

Robert Polsgrove – SSME Data Analysis

Dawn Ray – Component Design

Katherine VanHooser- Turbomachinery

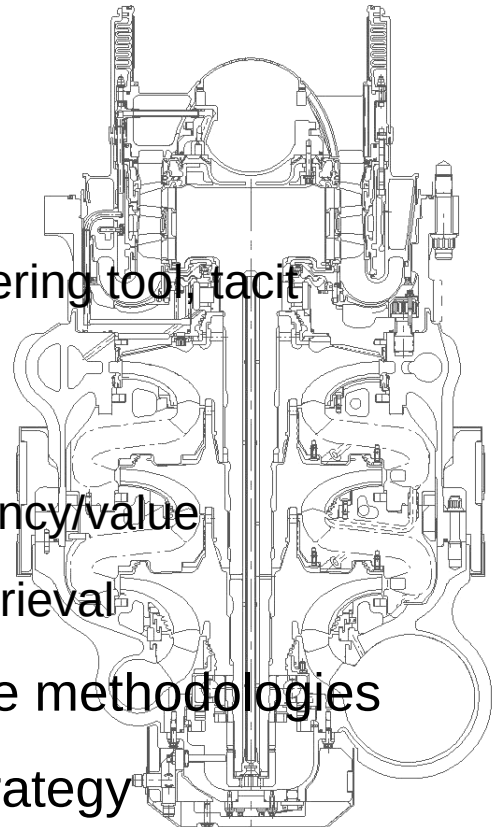
Paul Caraccioli – COTR



KM Pilot Strategy

Develop KM Strategy for Propulsion Systems Department /MSFC

- Conduct focused pilot project given funding/schedule constraints
  - SSME Turbomachinery
    - Failure and Anomaly Prevention
- Incorporate KM strategies/techniques
  - Query the experts - collaborative engineering tool, tacit knowledge resource
  - Data acquisition/utilization
  - Taxonomy development to assure efficiency/value
  - High powered “intelligent” search and retrieval
- Develop infusion/collaboration/culture change methodologies
- Pilot supports insight/calibration for global strategy formulation/implementation



KM Pilot Approach

Obtain Data access/interface requirements from KM System developers based on KM system benchmarks

Utilize KM customers, Turbomachinery Engineering, performing "today's" Propulsion Systems Engineering role to define scope

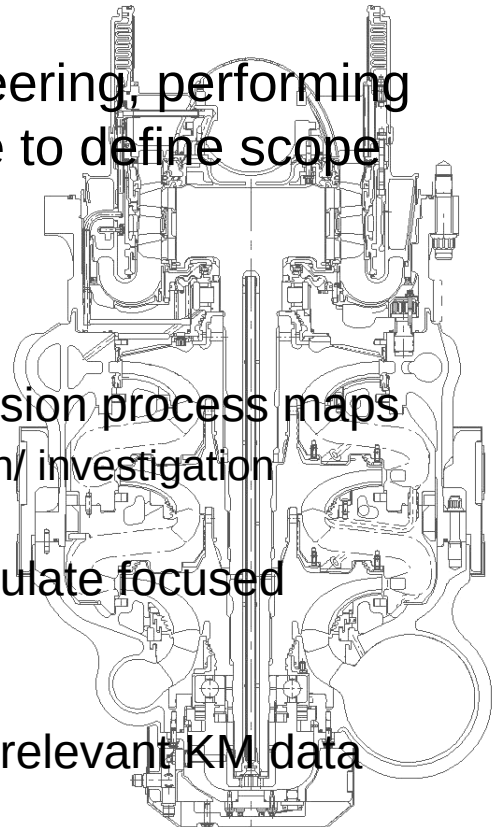
"What do you do and how do you do it?"

Develop detailed engineering support/decision process maps

Include failure and anomaly resolution/ investigation

Determine processes and patterns to formulate focused system

Determine goals and requirements set for relevant KM data integration

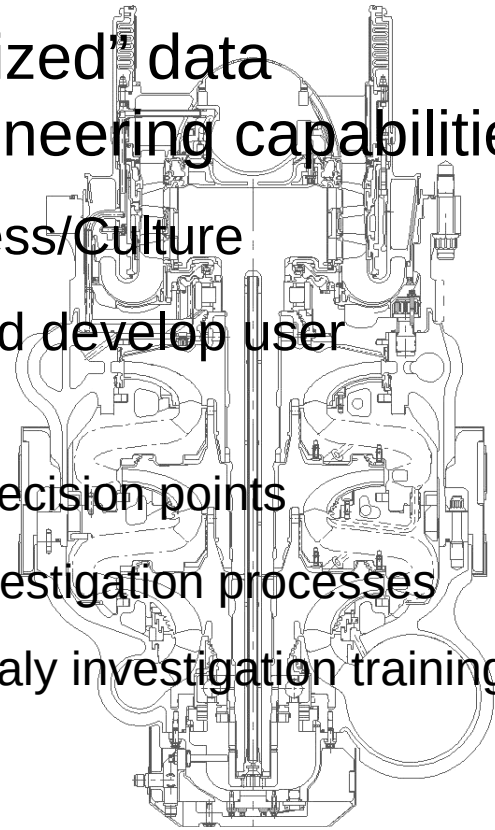


Pilot Goals

Propulsion Systems Department KM Strategic Implementation Plan

Turbomachinery KM tool to include “prioritized” data interface/interaction and collaborative engineering capabilities

- Infuse KM tools into the Engineering Process/Culture
- Install interface to user for trial period and develop user patterns/KM system metrics
  - Interfaced at critical support process decision points
  - Includes failure/anomaly resolution/investigation processes
  - Classroom or web-based failure/anomaly investigation training



KM Pilot Schedule

ID	Task Name	Duration	Start	Finish
1	1 Project Start	0 days	Mon 10/31/05	Mon 10/31/05
2	2 NASA Propulsion Systems Knowledge Management (PSKM)	300 days?	Mon 10/31/05	Fri 12/22/06
3	2.1 Research Area Reports	297 days?	Mon 10/31/05	Tue 12/19/06
4	2.1.1 Strategic Plan Report	57 days	Mon 10/31/05	Tue 1/17/06
15	2.1.2 Evaluation Requirements Report	72 days	Wed 1/18/06	Thu 4/27/06
16	2.1.2.1 Create Interview Guides	10 days	Wed 1/18/06	Tue 1/31/06
17	2.1.2.2 Failure/Anomaly Investigation Process Workflow	35 days	Wed 2/1/06	Tue 3/21/06
24	2.1.2.3 SSME Turbomachinery Knowledge-Base Workflow	40 days	Wed 2/1/06	Tue 3/28/06
25	2.1.2.3.1 3-D Model Requirements Definition	5 days	Wed 2/1/06	Tue 2/7/06
26	2.1.2.3.2 Develop Draft - TurboMachinery Process To-Be Workflc	30 days	Wed 2/8/06	Tue 3/21/06
33	2.1.2.3.3 Develop Final - TurboMachinery Process To-Be Workflow Re	5 days	Wed 3/22/06	Tue 3/28/06
34	2.1.2.4 Legacy System Interfaces & Storyboard Web Design	72 days	Wed 1/18/06	Thu 4/27/06
35	2.1.2.4.1 Evaluation Data Collection Report	50 days	Wed 1/18/06	Tue 3/28/06
36	2.1.2.4.2 Research "Query the Experts" Capability	50 days	Wed 1/18/06	Tue 3/28/06
37	2.1.2.4.3 Search and Retrieval	50 days	Wed 1/18/06	Tue 3/28/06
38	2.1.2.4.4 Web StoryBoard Development	50 days	Wed 1/18/06	Tue 3/28/06
39	2.1.2.4.5 3-D Model Prototype Development	72 days	Wed 1/18/06	Thu 4/27/06
49	2.1.2.5 Draft Evaluation Requirements Report	30 days	Wed 2/22/06	Tue 4/4/06
50	2.1.2.6 Final Evaluation Requirements Report	8 days	Wed 4/5/06	Fri 4/14/06
51	2.1.3 Evaluation Design Report	20 days	Mon 4/17/06	Fri 5/12/06
58	2.1.4 Mid-Point Report (PowerPoint Presentation)	2 days?	Mon 5/15/06	Tue 5/16/06
62	2.1.5 Evaluation Implementation and Deployment Report	157 days	Mon 5/15/06	Tue 12/19/06
63	2.1.5.1 Web Design/Development	155 days	Wed 5/17/06	Tue 12/19/06
64	2.1.5.2 Product Evaluation	155 days	Mon 5/15/06	Fri 12/15/06
65	2.1.5.3 Evaluation Verification	30 days	Mon 11/6/06	Fri 12/15/06
68	2.1.5.4 Report Complete	155 days	Mon 5/15/06	Fri 12/15/06
69	2.2 Grant Progress Reporting	295 days	Fri 11/4/05	Fri 12/22/06