

**FEDERAL AVIATION ADMINISTRATION
OFFICE OF COMMERCIAL SPACE
TRANSPORTATION
CENTER OF EXCELLENCE FOR
COMMERCIAL SPACE
TRANSPORTATION
SECOND ANNUAL ADMINISTRATIVE
MEETING
(FAA AST COE CST AAM2)
FINAL REPORT**



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EXECUTIVE SUMMARY

The Federal Aviation Administration (FAA) Office of Commercial Space Transportation (AST) Center of Excellence (COE) for Commercial Space Transportation (CST) Second Annual Administrative Meeting (AAM2) was conducted at the Florida State University in Tallahassee, Florida over a two-day period, on April 25-26, 2012.

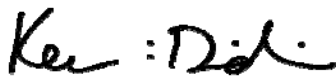
COE CST 10 Principal Investigators from 8 of the nine member universities, 4 students and 4 administrative personnel were in attendance for all or part of the two-day meeting. In attendance via telecom were 2 administrative personnel and 1 PI from the remaining member university. In all, there were 21 people who participated in the two-day AAM2.

Presentations were made for 13 different agenda items and generated nine action items, but the agenda items that generated the most discussion or had substantial impacts on the COE CST administration are discussed below.

- **YEAR 1 EVALUATION RESULT:** The primary findings of increased role for industry and FAA leadership set the stage for the ultimate consolidation of COE CST administration into a single entity. (See section 1.1.)
- **EXTERNAL OPPORTUNITIES:** The idea that COE CST member universities need to initiate their own intra-center collaborative efforts in response to external funding opportunities, such as NASA Research Announcements and Broad Area Announcements. (See section 4.3.)
- **COE CST COOPERATIVE AGREEMENT & MANAGEMENT PLAN CHANGES:** Changes to the cooperative agreements of all nine COE CST member universities were discussed to reflect the changes in administrative functions (being transferred from a grant with NMSU to a contractor) and quarterly reporting collection (from NMSU and Stanford being assigned responsibility to aggregate reports from certain universities to a fully distributed system where each university is responsible for submitting their own reports). Beyond minor organizational chart edits, the major Management Plan change discussed would, if agreed upon by the member universities, unify the Planning Committee (Ken Davidian, Pat Hynes and Scott Hubbard) and the Coordinating Committee (consisting of principal PIs from each of the universities and led by Pat Hynes) into a single Executive Committee. This would be a major stride toward unifying the center into a single whole entity that was two distinct and separate halves only one year ago. (See section 4.4.)
- **STRATEGIC PLANNING OVERVIEW:** An interesting activity was conducted to identify the benefits of a collaborative strategic planning exercise by the COE CST member universities and the diversity of responses was enlightening. (See section 4.5.)

Finally, the highest priority issue facing the center was identified as a lack of funding and attention was focused on achieving an annual budget more typical of a government grant program (identified as \$10M). Secondary issues included industry involvement and raising the visibility of the COE CST.

In summary, the meeting was very productive and demonstrated the great progress that has been made by the FAA COE CST in the past year.



Ken Davidian
COE CST Program Manager & FAA AST Director of Research
FAA Office of Commercial Space Transportation

Abbreviations and Acronyms

Below are the abbreviations and acronyms used in this report.

| | | | |
|--------|-------------------------------------------|------|-------------------------------------------------|
| AAM2 | 2nd Annual Administrative Meeting | OAT | Orion America Technologies |
| AOB | Any Other Business | OMIS | Orion Management Information System |
| AME | Aero-Propulsion, Mechatronics and Energy | NASA | National Aeronautics and Space Administration |
| AST | Office of Commercial Space Transportation | NMSU | New Mexico State University |
| ATM2 | 2nd Annual Technical Meeting | NMT | New Mexico Tech |
| BAA | Broad Area Announcement | NRA | NASA Research Announcement |
| CA | Cooperative Agreement | PC | Planning Committee |
| CC | Coordinating Committee | PI | Principal Investigator |
| CESTAC | COE CST Advisory Committee | PM | Program Manager |
| CNES | Centre National d'Etudes Spatiales | R&D | Research and Development |
| COE | Center of Excellence | RE&D | Research, Engineering & Development |
| CSA | Canadian Space Agency | RII | Requirements Identification and Integration |
| CST | Commercial Space Transportation | SU | Stanford University |
| CU | University of Colorado at Boulder | UCF | University of Central Florida |
| DOD | Department of Defense | UF | University of Florida |
| EC | Executive Committee | USG | United States Government |
| FAA | Federal Aviation Administration | UTMB | University of Texas Medical Branch at Galveston |
| FIT | Florida Institute of Technology | | |
| FSU | Florida State University | | |
| IDIQ | Indefinite Delivery Indefinite Quantity | | |
| ISR | Internal Solicitation for Research | | |

Introduction

The Federal Aviation Administration (FAA) Office of Commercial Space Transportation (AST) Center of Excellence (COE) for Commercial Space Transportation (CST) Second Annual Administrative Meeting (AAM2) was conducted in the Florida State University (FSU) Innovation Park Aero-Propulsion, Mechatronics and Energy (AME) building in Tallahassee, Florida over a two-day period, on April 25-26, 2012.

It should be noted that the AME Building is a brand-new facility (it had been occupied just under 2 months prior to the AAM2) and our host, Dr. Farrukh Alvi, made the FAA COE CST group feel very welcome and repeatedly provided first-rate support and equipment upon request.

The FAA requires that each COE conduct two meetings, one administrative and one technical, every year (after the initial year). The purpose of the COE CST AAM2 is to convene the COE CST Coordinating Committee, members of the COE CST Advisory Committee (CESTAC), interested Principal Investigators, FAA Technical Monitors and other individuals (e.g. students), to discuss administrative topics of the COE CST

COE CST Principal Investigators, students and administrative personnel in attendance for all or part of the two-day meeting included (in alphabetical order by last name): Jesse ? (FIT student), Farrukh Alvi (FSU PI), Brad Cheetham (CU student), Ken Davidian (FAA COE CST Program Manager), Tristan Fiedler (FIT Administrator), Scott Hubbard (Stanford PI), Pat Hynes (NMSU PI), Jay Kapat (UCF PI), Dan Kirk (FIT PI), Dave Klaus (CU PI), Rajan Kumar (FSU PI), Billie

Oates (FSU PI), Warren Ostergren (NMT Administrator), Jim Vanderploeg (UTMB PI), Nat Villaire (FIT PI) and Joylynn Watkins (NMSU Administrator).

In attendance via telecom (again, in alphabetical order by last name) included: Nick Demidovich (FAA AST technical monitor), Dr. Norm Fitz-Coy (UF PI) and Dr. Patricia Watts (FAA COE Program Director).

Specific logistical details about the AAM2 can be found in the meeting agenda shown in Appendix A.

The agenda of the AAM2 followed the structure of previously held bi-weekly teleconferences conducted by the PM for the PIs. The major topic areas included:

- Administrative Details
- Reporting Requirements
- Meetings
- Events
- R&D Funding Process
- Web Site Updates
- Summary of Action Items and AOB

The following sections give an overview of the AAM2 presentation and provide details about any discussions and conclusions conducted by the group for each presentation topic.

0. ADMINISTRATIVE DETAILS

0.1 Introduction

This presentation was given by Ken Davidian on both meeting days. The agenda for the meeting is presented in Appendix A. The presentation charts are included in Appendix B Section 1.

The content included basic logistical information about the agenda. During this presentation, the FAA recognized and thanked FSU for their generosity for hosting the meeting.

There was no substantive discussion resulting from this presentation and there were no action items associated with this agenda item.

0.2 Group Photo

A photo of the group was taken in the stairwell of the FSU AME Building at the end of meeting day 1. The best of the photos taken is presented in Appendix C.

There was no substantive discussion resulting from this presentation and there were no action items associated with this agenda item.

1. REPORTING REQUIREMENTS

1.1 Year 1 Evaluation Results

This presentation was given by Dr. Patricia Watts, FAA COE Program Director via teleconference during the morning session of both meeting days. The presentation charts are included in Appendix B Section 2.

The three major findings of the Year 1 Evaluation included the following major points:

- CESTAC – There needed to be the development of an industry advisory group that could give input on the research activities being planned and conducted by the COE CST.
 - Industry Participation – There needed to be better communication between the COE CST and industry members.
-

- FAA Leadership – The amount of FAA leadership needed to be increased over levels observed in the first two years of operation.

The next FAA COE Program Office Evaluation will be conducted and completed by the end of COE CST Year 5.

There was no substantive discussion resulting from this presentation and there were no action items associated with this agenda item.

Having Dr. Watts available on the phone line during both days was invaluable, however, and questions that arose during subsequent day 1 discussions were asked and addressed during the day 2 telecon. The whole value of Dr. Watts' input and experience was sorely missed because she was not able to travel to attend this meeting and it is hoped that she will be able to attend future meetings.

1.2 Drafting Survey Questions

This presentation was designed as a group activity/discussion and conducted during the morning session of both meeting days. The presentation charts are included in Appendix B Section 3.

The impetus for this agenda item was in response to the general comments received about the low frequency of the Year 1 Evaluation (as discussed in the previous agenda item, the next time it would be taken is three years from now), the overall generality of the questions and ambiguity of the conclusions that could be derived from the responses.

It was proposed that the COE CST design its own annual survey to help get better information with the goal of improving overall performance on an annual basis.

A discussion of the overall purpose of the annual survey was discussed and the following ideas were generated:

- Enable self-sufficiency.
- Help improve FAA involvement.
- Help distinguish industry educational support (where industry input is limited) from critical path support (where industry input is critical).
- To figure out which projects in industry are most valuable to industry vs. what is most interesting to us that will complement research & outreach. (to drive task selection)
- Providing students on the industry's critical path who then bring back tasks once they get hired.

Under the survey topics of improving COE CST performance, the following questions were asked:

- How well are we executing our current research activities to serve our customers?
- How can we better demonstrate value of our results?
- New approach: we can perform services for industry.
- Timeframes of industry versus those of government and academia. How to ask questions about this topic?
- Where are the process bottlenecks?
 - Short-term, as-needed versus long-term, degree granting.
 - Ask the questions of whether industry needs short-term help? How much? Can they accommodate long-term research?

- Can teaming improve the COE CST product? What are the IP implications of the COE CST activities?

In addition to improving center performance, the question was asked “How can we use the survey as an outreach tool?” It was proposed that the survey could be used to ask potential or current partners how current portfolio of activities could be of interest to them. This might highlight current work of which partners may not have been aware.

There was discussion about the notorious low response rate of surveys in general and it was proposed that to get better response rates from PIs, funding should be tied to survey responsiveness. Concerns were expressed, however, that we don’t overload PIs by creating or requiring too many surveys.

Part of the discussion referred back to the previous agenda item (the results of the Year 1 Evaluation) and the following ideas were proposed to demonstrate how survey results were being used.

- Send summary of responses to respondents
- Maybe present results at the Annual Technical Meeting (ATM) in November or put the results on web site.
- Emphasis process *and* content of the evaluation.
- Tailor questions on survey to be relevant to what we are doing.
- Internal versus external versions of the survey.

There was further discussion by the group about an outreach strategy.

- Between “telling industry what we’re doing” and “designing a new survey” it’s probably more important to work on the former before the latter.
- We need an outreach strategy that is targeted and planned to cover all the major meetings. Spots on panels and paper sessions to talk about COE CST. Recruit PIs (who may already be at the meeting) to give these presentations. The strategy should be developed by both PIs and FAA.

Other thoughts that were expressed during the discussion included the following:

- Can we assume FAA will identify critical research needs to ensure public safety? Or can the survey help identify those needs that can be recommended to the FAA?
- A survey question category is “FAA AST R&D Task Selection”
 - Show how AST tasks are meeting other FAA line of business mission goals.
- Survey done in cooperation with CESTAC.

There were no action items associated with this agenda item.

1.3 Quarterly Reporting - Orion’s MIS

This presentation was conducted during the morning session of both meeting days. The presentation charts are included in Appendix B Section 4.

The Orion Management Information System (OMIS) is an internet-accessible database designed specifically to collect data for FAA COE R&D grant and contract activity designed by Mr. Fred Bowen of Orion America Technology (OAT). OMIS collects all required administrative, financial and status reporting information at the appropriate time intervals.

OMIS is to be used by all FAA COE CST PIs (to input technical, schedule and budget quarterly reports), the COE CST member university finance people (to input quarterly/monthly invoice information and matching funds/in-kind information) and FAA AST Technical Monitors (to review and concur on quarterly reports).

The decision to implement OMIS was taken to promote standardized data reporting structure within COE CST, to simplify generation of the COE Annual Report, to enable COE data collection and reporting of financial information (invoice costs, matching, etc.) and to permit COE reporting by user-specified groupings (e.g. sets of tasks, by university, etc.).

Just as an aside, it is planned that the OMIS will be required of all new FAA COEs that are currently being initiated.

After a live demonstration of the web site, there was some general discussion.

All PIs were reminded that the next deadline for inputting their required quarterly report information was April 30, 2012.

2. MEETINGS

2.1 Next COE CST Meeting

This presentation was given by Dr. Warren Ostergren of NMT during the morning session of meeting day 1. This was the first COE CST meeting that Dr. Ostergren has attended. An abbreviated version of this presentation was given by Ken Davidian during the afternoon of meeting day 2 for those in attendance that missed Dr. Ostergren's presentation the previous day. The presentation charts are included in Appendix B Section 5.

There was general discussion resulting from this presentation and questions about the timing of the agenda were raised. It was noted that November 7 is Election Day and it might not be a good time for the meeting because of that conflict. Also, the question of whether the tour to Spaceport America could be scheduled for the end of the meeting time instead of the start was raised.

Assuming that the overall ATM2 will require 2.5-3 meeting days (two days of presentations and one-half to one full day dedicated to the Spaceport America tour), PIs should identify their preferred set of dates for the late October, early November time frame.

2.2 COE CST Plaque Photos

This presentation was conducted during the morning session of both meeting days. Pictures of the plaques at many of the COE CST member universities have been received and were displayed at the meeting. These pictures are shown in Appendix B Section 6.

There was no substantive discussion resulting from this presentation.

Universities that have not yet provided photographs of their COE CST plaque are tasked with providing this photo as soon as possible.

3. EVENTS

3.1 List of Events: Past, Present and Future

This presentation was conducted during the morning session of both meeting days. Although it was originally listed as "Task Status and List of Events: Past, Present and Future," there was no status update on individual tasks given. The presentation charts are included in Appendix B Section 7.

Lists of recent, current and future events were shown.

The following types of milestones related to COE CST activities were requested by the PIs to be sent periodically to the COE CST PM.

- Papers
- Conference presentations
- Patents
- Experimental testing
- Graduations
- Awards, Honors

There was no substantive discussion resulting from this presentation.

There were no specific action items resulting from this agenda item, but a continuously-open action would be for PIs to send the dates and descriptions for any milestones or events (listed above) that are related to COE CST R&D activities.

4. R&D FUNDING PROCESS

4.1 FAA AST R&D Coordination Plan

This presentation was given by Ken Davidian on both meeting days. The presentation charts are included in Appendix B Section 8.

The histories of the AST R&D Coordination Plan and the COE CST were shown in parallel to emphasize the point that the former was created and has been evolving at the same time that full operation of the latter was initiated. Detailed flow-charts and descriptions of the R&D Requirements Identification & Integration (RII) and Internal Solicitation for Research (ISR) processes were given and discussed. These were important topics to present to the PIs since they are being required to fit into the information and timing flow of these processes.

An observation was made that input from industry needs to be shown at the appropriate places in the RII and ISR processes. Ken Davidian will update the AST R&D Coordination Plan to address this point.

4.2 AST's Strategic Planning Efforts

This presentation was given by Ken Davidian on both meeting days although the presentation on day 2 was a summary version of that given on day 1. The presentation charts are included in Appendix B Section 9.

This presentation began by providing a historic perspective of strategic planning activities and then identified the overall scope of strategic planning research. Primary sources for the historic perspective was "The Management Myth" by Matthew Stewart and "Strategy Safari" by Henry Mintzberg, Joseph Lampel and Bruce Ahlstrand for the scope of research.

Below is a complete list of the near-term, mid-term and long-term strategic goals adopted by AST to guide actions to support the COE CST. These goals are not intended to be "cast in stone" and are open to discussion and revision by the COE CST.

Near-Term Goals

- Goal 1: Finalize Start-Up Activities
 - Evolve COE Administration
 - Implement OMIS, OAT
 - Modify CAs as needed
 - Annual Evaluation Questions: Baseline Industry Information

- Initiate Cooperative Efforts
- University Pairings
- Goal 2: Increased Funding and Support
 - Target 1: FAA
 - Approach 1: Unspent FY12 RE&D Funds
 - Approach 2: Inclusion in Existing Tasks
 - Target 2: Other USG– NASA, DoD
 - Approach 1: Looking Over Our Shoulder
 - Approach 2: Participate in Specific Tasks
 - Approach 3: Funding Specific Tasks
 - Approach 4: Long-Term Sponsorship
 - Target 3: Non-US– CSA, ESA, CNES

Mid-Term Goals

- Goal 1: Increased Funding and Support
 - Target 1: FAA
 - Approach 1: Funding from Existing R&D Programs
 - Approach 2: Targeted Commercial Space RE&D Funding (\$10M)
 - Target 2: Other USG Agencies – NASA, DoD
 - Target 3: Non-Member Universities
- Goal 2: Increased Value
 - Approach 1: COE CST as a New-Market Disruptive Innovation?
 - "Blue Ocean Strategy" Analysis (Kim and Mauborgne, 2005)
 - Entrepreneurial School
 - Approach 2: Increased Cooperative Efforts
 - "Co-opetition" Value Net Analysis (Dixit & Nalebuff, 1991 & 2008), (Brandenburger & Nalebuff, 1996)
 - Positioning School

Long-Term Goal

- Goal: COE CST Self-Sufficiency

Discussion by the group centered on a set of rhetorical questions regarding the COE CST long-range goals, including “What Does Self-Sufficiency Mean?” and “What Will Be the Form, Function and Purpose?”

There were no action items resulting from this agenda item.

4.3 External Opportunities

This presentation was given by Mr. Nick Demidovich of FAA AST Office of the Chief Engineer via telecom during the afternoon session of both meeting days. The presentation charts are included in Appendix B Section 10.

Nick discussed the opportunities for the COE CST provided by external funding sources and competitions. It was noted on multiple occasions that federal agencies would like to fund member universities for COE CST research but did not have the acquisition instrument to facilitate the transfer of funds.

Discussion of this topic led to a conclusion that the COE CST PM should initiate the indefinite delivery, indefinite quantity (IDIQ) contact option with all the member universities.

4.4 COE CST Cooperative Agreement and Management Plan Changes

This presentation was scheduled to be discussed during the afternoon of meeting day 1 but was mistakenly skipped (due to an impromptu facility tour that ran late and graciously hosted by FSU's Dr. Farrukh Alvi) given by Ken Davidian on meeting day 2. The presentation charts are included in Appendix B Section 11.

Changes to the COE CST Cooperative Agreements (CA) and the COE CST Management Plan became necessary when the OMIS was adopted and the administrative functions were transferred from NMSU to OAT.

Proposed Modifications to the COE CST Cooperative Agreements

The first recommended change was to modify the second and third full paragraphs in Attachment 1 of all CAs regarding topics of administrative support and quarterly reporting. There are two versions of these paragraphs.

Version 1 reads as follows:

“New Mexico State University (NMSU) will provide administrative support for the COE CST for the planning and coordination of quarterly meetings and the dissemination of COE CST publications and information and related activities. NMSU will also coordinate and track technical and fiscal reports relevant to COE research and related activities for the Florida Center of Advanced Aero-Propulsion, Florida Institute of Technology, and the New Mexico Institute of Mining and Technology, to satisfy the FAA COE program requirements. The FAA will discuss task requirements with the team members.”

“All universities track their own matching contributions and submit quarterly and semi-annual reports to their lead and to the FAA COE Program Manager and COE Program Director. Reports as required by the FAA for quarterly and semi-annual meetings are submitted to the Administrative Lead for Preparation prior to the meetings and distribution at the meetings.”

Version 2 reads as follows:

“New Mexico State University (NMSU) will provide administrative support for the COE CST for the planning and coordination of quarterly meetings and the dissemination of COE CST publications and information and related activities. Stanford will coordinate and track technical and fiscal reports relevant to COE research and related activities for the University of Texas Medical Branch and the University of Colorado at Boulder, to satisfy the FAA COE program requirements. The FAA will discuss task requirements with the team members.”

“All universities track their own matching contributions and submit quarterly and semi-annual reports to their lead and to the FAA COE Program Manager and COE Program Director. Reports as required by the FAA for quarterly and semi-annual meetings are

submitted to the Administrative Lead for Preparation prior to the meetings and distribution at the meetings.”

The new paragraph to replace both original versions is proposed to read as follows:

“All COE CST member universities are required to submit technical and fiscal reports on a quarterly basis relevant to COE research and related activities to satisfy the FAA COE program requirements. The FAA will discuss task requirements with the team members.”

Issue of modification to all universities to modify the fourth full paragraph in Attachment 1 of all CAs regarding topic of report tracking. The original paragraph currently reads as follows:

“Each University listed above will submit proposals through Grants.gov directed to the FAA COE Program Manager and in response to discussions or announcements. NMSU will track COE activities, awards, and prepare and submit reports as required for the entities listed above. All binding financial terms and conditions will be specified in each awarded task issued as an amendment to this agreement.”

The new paragraph is proposed to read as follows:

“Each University will submit proposals through Grants.gov directed to the FAA COE Program Manager and in response to discussions or announcements. All COE CST member universities will track their COE activities and awards and will prepare and submit their own reports as required. All binding financial terms and conditions will be specified in each awarded task issued as an amendment to this agreement.”

Proposed Modifications to the COE CST Management Plan

Next, proposed modifications were discussed to the COE CST Management Plan based on the same changes discussed above. First, the organizational structure of the COE CST was displayed and the responsibilities of the Planning Committee (PC) were shown. Next the original Coordinating Committee (CC) responsibilities were shown but, due to the current situation, the proposed set of CC responsibilities was then shown. After some discussion, it was noted that the original PC and the proposed new CC were very similar. The next logical step was the proposal that the PC and CC be combined into a single Executive Committee (EC). Below are some first-level details about the idea:

- The EC would be led by FAA AST COE CST PM, Ken Davidian.
- EC meetings would be conducted by telecons on a "once every two-weeks" basis with face-to-face meetings twice a year (at the Annual Administrative and Technical Meetings). The telecons will be normally very short unless there were special outbriefs (for example, updates from the "Terms of Reference" team) or other topics to discuss.
- Each university will designate a principal PIs for the EC.
- Attendance at the EC meetings will be generally inclusive (allowing multiple PIs, student observers and staff as needed to attend from any given university).
- In the event that decisions were not able to be made by consensus in an open session (making necessary a vote or closed session), each member university would have a single vote given to their principal PI, regardless of the number of PIs sitting on the EC.
- CESTAC would be represented at the EC meetings (presumably by the CESTAC Chair, Vice-Chair and/or the COE CST CESTAC Point of Contact) and although they would be a contributing member in discussions leading to consensus, they would not be a voting member.

The COE CST PM will issue changes to the current CAs and Management Plan for all COE CST member universities to enact these changes.

4.5 Strategic Planning Overview

This presentation was given by Dr. Patricia Hynes of NMSU during the afternoon session of meeting day 1. An abbreviated version of this presentation was given by Ken Davidian during the afternoon session of meeting day 2 for those in attendance that missed Dr. Hynes' presentation the previous day. The presentation charts are included in Appendix B Section 12.

After covering the presentation material, Dr. Hynes asked the group to think about the top three benefits of conducting a collaborative strategic planning exercise. The following were the results of the group are given in the table below (listed below in no particular order):

Table 1. Responses to the Question “What are Three Benefits to Collaborative Strategic Planning Exercise?”

| | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Respondent 1: Collaborative strategic planning is beneficial because it provides tools for identifying... <ul style="list-style-type: none"> • Long-term goals • Necessary resources • Division of effort • Respondent 2: <ul style="list-style-type: none"> • Avoid “getting money” as the focus of the COE • Making the COE industry focused and directed (not FAA or university) • Making a COE unnecessary • Respondent 3: <ul style="list-style-type: none"> • Need organizational vision mission, value proposition, strategic plan, operations/business plan • Point all efforts in the same direction • Respondent 4: <ul style="list-style-type: none"> • Roadmap to the future • Q: What do we mean about us vs. others? Who is the “us”? • C: must be a living document • Respondent 5: <ul style="list-style-type: none"> • Stewardship of tax payer \$ • Who else? • Re-focus on core task ... but beware of self-fulfilling prophesy. | <ul style="list-style-type: none"> • Respondent 6: <ul style="list-style-type: none"> • See how we can involve in the community and learn what resources they bring to the table • Learn what resources they ring to the table. • See how the planning community envisions our broad environment • Respondent 7: <ul style="list-style-type: none"> • Strength of collaborative effort in topics identified and capabilities (Same as 9c) • Synergistic learning (see what others think) • Capability to be a power block in getting resources • Respondent 8: <ul style="list-style-type: none"> • I hope we do our own plan • I am excited about a future we create together. We are not only planning our future but also the future of our industry. • Respondent 9: <ul style="list-style-type: none"> • Reduce duplication • Ensures a stable research infrastructure • Provides a cross-fertilization of research talent and resources (Same as 7a) |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

After some discussion, it was determined that responses 7a and 9c were very similar and could be combined into a new benefit: Strength of collaborative effort provides a cross-fertilization of research talent and resources.

Other important points that were highlighted included:

- Membership of planning community is important and must include industry.
- Timing of the process is important.

The overall point was made that this activity could be a proposal for funding in response to a future ISR call that would be a collaboration of all nine COE CST member universities.

There were no action items resulting from this agenda item.

4.6 Letters Writing Campaign

This presentation was designed as a group activity/discussion and conducted during the afternoon session of both meeting days. The presentation charts are included in Appendix B Section 13.

Because Dr. Wilson Felder (Director of the FAA William J. Hughes Technical Center and chairman of the FAA R&D Executive Board) had previously expressed the belief that the AST R&D program could be funded at a \$10M level instead of the \$1M (the current funding level) it was thought that AST could request additional funding by demonstrating an overwhelming amount of potential research that was currently unfunded.

This idea generated a lot of discussion and it was quickly determined that overwhelming the Technical Center Director with a letter-writing campaign was not the best approach to making this request. It was advised by the group that a meeting with AST Associate Administrator Dr. George Nield should be arranged and the request for additional funding should be carefully coordinated and arranged.

COE CST PM was tasked with coordinating and arranging the meeting between Dr. Nield and Dr. Felder to request additional AST R&D funding.

5. WEB SITE UPDATES

5.1 New COE CST web site ideas

This presentation was designed as a group activity/discussion and originally planned to be conducted during the afternoon session of meeting day 2 but was not executed due to time limitations.

6. SUMMARY OF ACTION ITEMS & AOB

1. FAA AST and PIs should develop an outreach strategy that is targeted and planned to cover all the major meetings. Spots on panels and paper sessions to talk about COE CST. Recruit PIs (who may already be at the meeting) to give these presentations. (Section 1.2)
2. All PIs were reminded that the next deadline for inputting their required quarterly report information was April 30, 2012. (Section 1.3)
3. Assuming that the overall ATM2 will require 2.5-3 meeting days (two days of presentations and one-half to one full day dedicated to the Spaceport America tour), PIs should identify their preferred set of dates for the late October, early November time frame. (Section 2.1)
4. Universities that have not yet provided photographs of their COE CST plaque are tasked with providing this photo as soon as possible. (Section 2.2)
5. A continuously-open action would be for PIs to send the dates and descriptions for any milestones or events (listed above) that are related to COE CST R&D activities. (Section 3.1)
6. Ken Davidian will update the AST R&D Coordination Plan to show where input from industry can be inserted into the RII and ISR processes. (Section 4.1)
7. The COE CST PM should initiate the IDIQ contact option with all the member universities. (Section 4.3)

8. The COE CST PM will issue changes to the current Management Plan and CAs to enact changes due to admin function and quarterly reporting changes. (Section 4.4)
9. COE CST PM was tasked with coordinating and arranging the meeting between Dr. Nield and Dr. Felder to request additional AST R&D funding. (Section 4.6)

Appendix A. FAA COE CST AAM2 Agenda

FAA AST COE CST YEAR 2 MEETING 1 AGENDA

- **ATTENDEES:** COE CST Coordinating Committee members, Other interested PIs, CESTAC leadership & interested members and FAA AST Technical Monitors.
- **PURPOSE:** To convene the COE CST Coordinating Committee, other interested Principal Investigators and the CESTAC to discuss administrative topics of the COE CST.
- **WHERE:** COE CST Meetings on both days will be in room 211, Meeting Room B, 2003 AME Building, Levy Avenue, Tallahassee, FL 32310 on the FSU campus (See note [4] below). On Day 1, Breakfast and Lunch are in the AME Building. On Day 2, Breakfast and Lunch are in the Turnbull Conference Center, 555 Pensacola St., Tallahassee, FL 32310 on the FSU campus.

WED, APRIL 25, 2012 (AME BLDG)

| | |
|-------|--------------------------------------------------------------------|
| 08:00 | BREAKFAST (IN AME BUILDING) |
| | 0. ADMINISTRIVIA |
| 09:00 | Introduction [R] |
| | 1. REPORTING REQUIREMENTS |
| 09:15 | Year 1 Evaluation Results (Watts) [R] |
| 09:45 | GROUP ACTIVITY – Part 1: Drafting Survey Questions [Note 1] [R] |
| 10:30 | BREAK |
| 11:00 | Quarterly Reporting - Orion's MIS [R] |
| | 2. MEETINGS |
| 11:30 | Next COE CST Meeting (Ostergren) [R] |
| 11:45 | COE CST Plaque Photos [R] |
| 12:00 | LUNCH (IN AME BUILDING) |
| | 3. EVENTS |
| 13:30 | Task Status and List of Events: Past, Present and Future |
| | 4. R&D FUNDING PROCESS – Part 1 |
| 13:45 | FAA AST R&D Coordination Plan |
| 14:15 | AST's Strategic Planning Efforts |
| 14:45 | External Opportunities (Demidovich) [R][3] |
| 15:15 | COE CST Cooperative Agreement and Management Plan Changes |
| 15:30 | BREAK |
| 16:00 | Strategic Planning Overview (Hynes) |
| 16:30 | GROUP ACTIVITY – Part 1: Letters to Wilson Felder [Note 2] [R] |
| 17:30 | Group Photo |
| 18:00 | Adjourn |
| 18:30 | DINNER |

THURS, APRIL 26, 2012 (AME BLDG)

| | |
|-------|--------------------------------------------------------------------|
| 08:00 | BREAKFAST (AT TURNBULL CENTER) |
| | 0. ADMINISTRIVIA |
| 09:00 | Introduction [R] |
| | 1. REPORTING REQUIREMENTS |
| 09:15 | Year 1 Evaluation Results (Watts) [R] |
| 09:45 | GROUP ACTIVITY – Part 2: Drafting Survey Questions [Note 1] [R] |
| 10:30 | BREAK |
| 11:00 | Quarterly Reporting - Orion's MIS [R] |
| | 2. MEETINGS |
| 11:30 | Next COE CST Meeting (Ostergren) [R] |
| 11:45 | COE CST Plaque Photos [R] |
| 12:00 | LUNCH (AT TURNBULL CENTER) |
| 13:30 | FSU FACILITY TOUR |
| | 4. R&D FUNDING PROCESS – Part 2 |
| 14:45 | External Opportunities (Demidovich) [R] |
| 15:15 | COE CST Philosophies |
| 15:45 | GROUP ACTIVITY – Part 2: Letters to Wilson Felder [Note 2] |
| | 5. WEB SITE UPDATES |
| 16:15 | GROUP ACTIVITY: New COE CST web site ideas. |
| | 6. SUMMARY OF ACTION ITEMS & AOB |
| 16:45 | Open Discussion |
| 17:30 | Adjourn |
| 18:30 | DINNER |

Notes

- [R] denotes Meeting Day 1 material that will be repeated on Meeting Day 2.
- [1] Think of simple evaluation questions for annual survey. Can include multiple choice or ranking (e.g., on a scale of 0-10). Other types?
- [2] Provide written ideas for at least 3-5 future COE CST research tasks, including the following information: Title; Relevance to FAA AST and Commercial Space Industry; Brief Statement of Work.
- [3] Telecon Dial-In #: 712-432-0075, Participant Access Code: 141648#
- [4] The AME building is not on the main FSU campus but in INNOVATION PARK. Since the building is brand new, it does not show up correctly in Google Maps. it is on the corner of

Appendix B. Presentation Slides

1. Introduction

**FAA COE CST
2nd Annual Administrative
Meeting (AAM2)
on the campus of
Florida State University**



Ken Davidian
FAA Office of Commercial Space Transportation
April 25-26, 2012



COE CST AAM2 Logistics: What, When, Why

- **WHAT:** FAA COE CST AAM2 (2nd Annual Administrative Meeting)
- **WHEN:** On April 25-26, 2012
- **PURPOSE:** To convene the COE CST Coordinating Committee, other interested Principal Investigators and the CESTAC to discuss administrative topics of the COE CST.



COE CST AAM2 Logistics: Where

- **Meetings**
 - Room 211, Meeting Room B
2003 AME Building
Levy Ave on the FSU campus
- **Breakfast and Lunch**
 - Turnbull Conference Center
555 Pensacola St on the FSU campus
- **Dinners:** TBD



COE CST AAM2 Logistics: Where

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 - Room 211, Meeting Room B
2003 AME Building
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- **Breakfast and Lunch**
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555 Pensacola St on the FSU campus
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COE CST AAM2 Logistics: Where

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 - Room 211, Meeting Room B
2003 AME Building
Levy Ave on the FSU campus
- **Breakfast and Lunch**
 - Turnbull Conference Center
555 Pensacola St on the FSU campus
- **Dinners:** TBD



ESF AAM2 Day 1 Afternoon Agenda

3. EVENTS

- 13:30 Task Status and List of Events: Past, Present and Future

4. R&D FUNDING PROCESS – Part 1

- 13:45 FAA AST R&D Coordination Plan
- 14:15 AST's Strategic Planning Efforts
- 14:45 External Opportunities (Demidovich by telecon) [R]
- 15:15 COE CST Cooperative Agreement and Mgt Plan Changes
- 15:30 BREAK
- 16:00 Strategic Planning Overview (Hynes)
- 16:30 GROUP ACTIVITY – Part 1: Letters to Wilson Felder [R]
- 17:30 Group Photo
- 18 :00 Adjourn



ESF AAM2 Day 2 Afternoon Agenda

- 13:30 FSU FACILITY TOUR

4. R&D FUNDING PROCESS – Part 2

- 14:45 External Opportunities (Demidovich by telecon) [R]
- 15:15 COE CST Philosophies
- 15:45 GROUP ACTIVITY – Part 2: Letters to Wilson Felder

5. WEB SITE UPDATES

- 16:15 GROUP ACTIVITY: New COE CST web site ideas.

6. SUMMARY OF ACTION ITEMS & AOB

- 16:45 Open Discussion
- 17:30 Adjourn
- 18:30 Dinner



ESF The COE CST is made possible with generous support from...



ESF And last but not least, here's a big "Thank You" to out FSU hosts!



2. Year 1 Evaluation Results

FAA COE CST Year 1 Evaluation Results



Dr. Patricia Watts
FAA Centers of Excellence, Program Director
April 25-26, 2012



ESF FAA COE Evaluations

- COE projects and progress are reassessed every 3-5 years
 - Audit of matching fund
 - Letters to members, etc., re COE performance
 - FAA reviews input, determines future direction
 - Discussions regarding changes
 - Negotiate new Cooperative Agreement
 - Close-out previous Phase
 - Review status of self-sufficiency plans



Year 1 Evaluation Process

- Letter and Evaluation Questionnaire sent to comprehensive COE CST mailing list
- Responses will be rolled up and reviewed with FAA management.
- Responses briefed to COE team members.
 - Input is sanitized to assure anonymity – unless you specifically indicate otherwise when responding to this request.
- Low number of responses received



COE CST Year 1 Review Major Result #1: CESTAC

- Findings
 - For Nov meeting, have CESTAC present their plans and ideas in the program.
 - CESTAC should independently identify needs of industry so they can be incorporated into AST's research road map.
- Responses
 - CESTAC Chair Selected
 - CESTAC Membership in Progress



COE CST Year 1 Review Major Result #2: Industry Participation

- Findings
 - Need to highlight industry participation in the COE CST at the November meeting.
 - We need to increase participation with industry and gain their respect
 - COE CST panel presentations at conferences to meet Information dissemination requirement.
 - Industry is clamoring for more involvement in the COE CST.



COE CST Year 1 Review Major Result #3: FAA Leadership

- Wide Range of Responses
 - From “Too Much FAA Micromangement” to “Need More FAA Leadership”
 - Vast Majority at “Need More FAA Leadership”
- Resulting Actions
 - Increased FAA PM Involvement in Telecons
 - More FAA Control/Standardization of Administrative Functions (across ALL COEs)
 - Supports Findings of FAA Internal Controls Investigation



Coming Soon (Part 1): Year 5 Evaluation Process

- FAA COE Program Director and Center Program Manager review initial:
 - Justification to establish
 - Solicitation
 - Selected proposals
- Five-Year symposium/“Showcase” to highlight research results
- COE PD/Sponsor prepare report: Results/Issues/Benefits of COE
 - (Bigger than a normal ATM –KD)
- Determine Costs to Manage Center



Coming Soon (Part 2): Year 5 Evaluation Process

- Organizational Changes impacting future direction
- Sponsor identifies FAA current and future needs
- Announcement re results of evaluation progress and final plans
- If continuing without competition prepare new Cooperative Agreements
 - Sponsor justifies need to continue and anticipated funding
 - Define new Role of Center, other changes





Summary

- 3 Major Findings
 - CESTAC
 - Industry Participation
 - FAA Leadership
- Next FAA COE Program Office Evaluation by the End of Year 5
- FAA COE PD Supports COE CST Annual Self-Evaluation Efforts



3. Drafting Survey Questions

Group Activity FAA COE CST Annual Survey Questionnaire Development



Ken Davidian
FAA Office of Commercial Space Transportation
April 25-26, 2012



AAM2 Logistics: What, When, Why

- WHAT: Draft annual evaluation survey questions.
- WHEN: Annual Survey Release in November.
- WHY: Enable annual improvement of COE CST through input solicitation with clear questions that encourage actionable answers.
- WHO: Who provides the results to who?
 - FAA AST to COE CST Coord Committee?
 - COE CST Coord Committee to FAA AST?



Categories of Questions

- FAA Survey Categories
 - Quality of Service - Technical
 - Value Received
 - Overall assessment of the Center
- Other?
 - COE CST Management
 - Industry Involvement
 - Quality of Research Results



End-Users of Survey Results

- FAA
- COE CST members
- Industry sponsors
- Media
- Other federal agencies
- International Partners, Industry



4. Quarterly Reporting - Orion's MIS

Overview of the FAA COE CST Quarterly Reporting in Orion Management Information System (OMIS)



Ken Davidian
FAA Office of Commercial Space Transportation
April 25-26, 2012



OMIS Overview Agenda

- What is OMIS?
- Who Needs to Use It? How & When Is it Used?
- Why Is OMIS Being Used?
- Where is OMIS on the Web?
 - Let's See It! (Live Web Demo)



What is OMIS?

- The Orion Management Information System (OMIS) is an internet-accessible database designed specifically to collect data for FAA COE R&D grant and contract activity.
- Designed by Mr. Fred Bowen of Orion America Technology (OAT), it collects all required administrative, financial and status reporting information at the appropriate time intervals.



Who Needs to Use OMIS? How & When Is OMIS Used?

- All FAA COE CST Principal Investigators
 - Input of Technical, Schedule and Budget Quarterly Reports
- COE CST Member University Finance People
 - Input of Quarterly/Monthly Invoice Information
 - Input of Matching Funds/In-Kind Information
- FAA AST Technical Monitors
 - Review and Concurrence of Quarterly Reports



Why Is OMIS Being Used?

- Promotes standardized data reporting structure within COE CST.
- Simplifies generation of COE Annual Report.
- Enables COE data collection and reporting of financial information (invoice costs, matching, etc.).
- Permits COE reporting by user-specified groupings (e.g. sets of tasks, by university, etc.).
- Will be required of all new FAA COEs.



Where is OMIS on the Web?

- Live Demo at <https://omis.orionat.com/>



5. Next COE CST Meeting



New Mexico Tech

FAA COE Business Meeting
April 25, 2012
FSU Tallahassee, FL

W.J. Ostergren

CONTENTS

- ✦ New Mexico Tech Research & Economic Development Overview
- ✦ FAA COE November Technical Meeting at New Mexico Tech

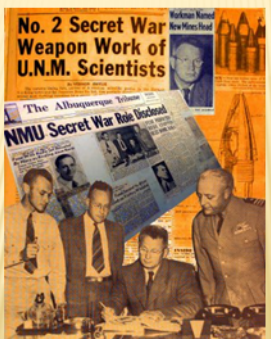
Undergraduate Degree Offerings

| | |
|----------------------------|---------------------------------------|
| BACHELOR OF SCIENCE | Materials Engineering |
| Basic Sciences | Mathematics |
| Biology | Mechanical Engineering |
| Chemical Engineering | Mineral Engineering |
| Chemistry | Petroleum and Natural Gas Engineering |
| Civil Engineering | Physics |
| Computer Science | Psychology |
| Earth Sciences | Technical Communication |
| Electrical Engineering | |
| Environmental Engineering | BACHELOR OF GENERAL STUDIES |
| Environmental Science | |
| Information Technology | ASSOCIATE DEGREES |
| Management | Associate of General Studies |
| Management of Technology | Associate of Science in Business |

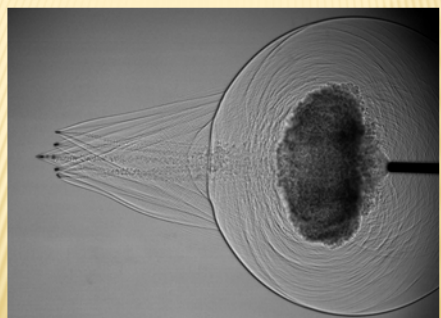
Graduate Degree Offerings

| | |
|----------------------------------------------|------------------------------------|
| MASTER OF SCIENCE | DOCTOR OF PHILOSOPHY |
| Biochemistry | Chemistry |
| Biology | Atmospheric |
| Chemistry | Environmental |
| Computer Science/Information Technology | Explosive |
| Electrical Engineering | Oil Recovery |
| Engineering Management | Computer Science |
| Mechanical Engineering (includes Explosives) | Earth & Environment Science |
| Engineering Science (Mechanics) | Geochemistry |
| Environmental Engineering | Geology |
| Geochemistry | Geophysics |
| Geology | Hydrology |
| Geophysics | Industrial and Applied Mathematics |
| Hydrology | Materials Engineering |
| Materials Engineering | Petroleum Engineering |
| Mathematics | Physics |
| Mineral Engineering | Astrophysics |
| Petroleum Engineering | Atmospheric Physics |
| Physics | Mathematical Physics |
| | |
| MASTER OF SCIENCE FOR TEACHERS | |

Proximity Fuse Development – Homeland Security & EMRTC Beginning



EMRTC Shock Wave Testing



George Washington Bridge – An EMRTC Application



BUILDING THE BRIDGE FROM FOSSIL TO RENEWABLE ENERGY



Petroleum Recovery Research Center (PRRC)-Sequestration of CO₂ in a Depleted Oil Reservoir

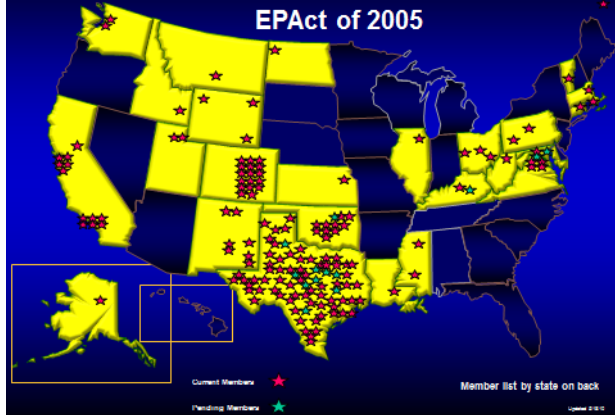
This project employs advanced reservoir modeling and computer simulation tools, laboratory tests, field measurements and monitoring efforts to understand, predict and monitor the coupled geomechanical and hydrogeologic processes associated with down-hole injection of CO₂ at a micro-pilot scale field experiment (pump-in /pump-out scheme) into a pressure-depleted oil reservoir.

Ultimately, the models and data will be used to predict storage capacity as well as, physical and chemical changes in reservoir properties, such as fluid composition, porosity, permeability, and phase relations. In addition, a better understanding of CO₂ reservoir interactions resulting from this project will improve industrial EOR flooding practices. These studies also provide a method to quantify the impact of reservoir depth, pressure and temperature, host rock permeability and porosity distributions, and mineral and fluid compositions on the migration, distribution and fate of CO₂ in the reservoir.

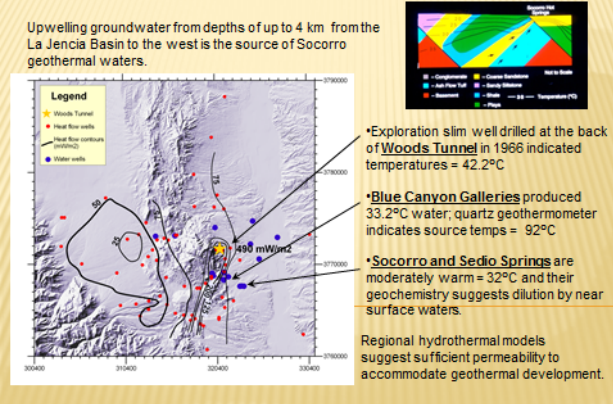
Principal Investigators:

- New Mexico Tech
- PRRC
- Sandia National Laboratories
- Los Alamos National Laboratory
- Enchilada Petroleum Services
- Dave Martin & Associates, Inc.
- Pecos Petroleum Engineering, Inc.


Oil & Gas Consortium EAct of 2005



Socorro Geothermal Resources



New Mexico Bureau of Mines (Geology and Mineral Resources)



New Mexico Tech




Hydrology

Sustainability of semi-Arid Hydrology and Riparian Areas (SAHRA)-
The vision of SAHRA is to develop an integrated, multidisciplinary understanding of the hydrology of semi-arid regions, and to build partnerships with a broad spectrum of stakeholders (both public agencies and private organizations) so that this understanding is effectively applied to the management of water resources and to the rational implementation of public policy.

SAHRA's purpose is to inform and support such water professionals by conducting stakeholder-relevant research, education, and knowledge transfer activities.

SAHRA's Partner Institutions

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SAHRA's geographical focus: Dark blue signifies the San Pedro, Salt Verde basins and Red signifies the Rio Grande, Rio Conchos basins.



Institute for Complex Additive Systems Analysis

“Protecting our national security and critical infrastructure”

Focus on management, computer science and engineering



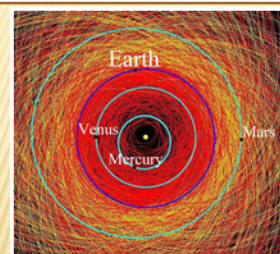
Astrophysics

National Radio Astronomy Observatory (NRAO) & National Optical Astronomy Observatory (NOAO)

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| | |

New Mexico Tech

Congress directed NASA to discover 90% of all near-Earth asteroids 140m and larger by 2028.

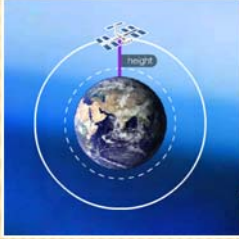



The MRO 2.4m telescope is capable of observing hazardous asteroids as small as 140m, and even as small as 1m if passing close enough to the Earth.

KNOWN ORBITS OF NEAS (JANUARY 2000). MORE THAN 70% OF SMALLER ASTEROIDS REMAIN UNDISCOVERED.

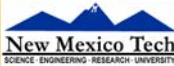
New Mexico Tech
SCIENCE - ENGINEERING - RESEARCH - UNIVERSITY

TRACKING LOW-EARTH ORBIT (LEO) OBJECTS

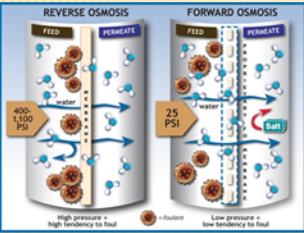


International Space Station

Observation of the ISS (at ~124 miles above the Earth) taken with the 2.4m telescope on July 14, 2007





Produced Water-Forward Osmosis Project

New Mexico Tech and Lea County are partnering on a ground-breaking Department of Energy grant to develop a multi-step system to desalinate, clean, and recycle produced water from the oilfields of southeastern New Mexico. Tech scientists will examine several methods of reducing the particulate matter in brackish water so it can be used for irrigation and wildlife, among other things. The proposal includes two distinct processes: pre-treatment and treatment. Pre-treatment will remove oil and grease, while the treatment process will remove other elements, like salt, chloride, and calcium. Grant funding will be used to establishing a vocational training program at New Mexico Junior College in Hobbs. Tech will work with the junior college instructors to develop a curriculum to train the technicians who can install, operate and maintain the systems once they become operational.

National Cave and Karst Research Institute



George Veni, Ph.D.
Executive Director

From Veni et al. 2001, American Geological Institute



Novel Metalworking Technology (NMT) Initiative

- Is a collaboration between Universities, the Army Research Laboratory, and US industry that will support manufacturing growth throughout the US by providing access to state-of-the-art modeling capability to design and advanced materials processing techniques for lightweight metals, composites, hybrid materials, advanced steels, and new alloys.
- The NMT Initiative is unique because of the capability to produce materials and parts at a large size scale (up to several tons) at one time, permitting rapid technology transfer to industry.

Partner Institutions



Success Stories:



1/4 in. dia. x 1 in. ht. forged to true strain of ~1.2.



XC1670: 1.6' thick x 26" dia. Representing one of the largest Products containing a majority of nanosize grains (~60 nm).

Industry Partnership- Reduced Scrap Rate and Lead Times for Seal Rings for Track Driven Vehicles



Cast Aluminum-Fly Ash Composites and Synthetic foams for Automotive Applications



Intake Manifold cast from A356-10 w/9% fly ash composite.

IRIS Consortium and the PASSCAL Programs at New Mexico Tech

The Incorporated Research Institutions for Seismology (IRIS) Program for Array Seismic Studies of the Continental Lithosphere (PASSCAL) Instrument Center is a consortium of over 100 U.S. universities dedicated to the operation of science facilities in support of cutting-edge seismological research. The IRIS PASSCAL programs contribute to scholarly research and education through the Earth Scope program which gains support from the National Science Foundation (NSF) to deploy numerous seismic, GPS, and other instruments to study the processes that cause earthquakes and volcanic eruptions.

The Earth Scope program is an exploration of the 4-dimensional structure of the Earth. The USAArray is an integral part of the Earth Scope program, that consists of four interrelated parts that together make up the 15-year program to place a dense network of permanent and portable seismographs across the U.S.

The four parts of the USAArray are:

1. Transportable Array
2. Flexible Array
3. Reference Network
4. Magnetotelluric Facility

POPULAR SCIENCE SUPERSIZED

THE 10 MOST AWESOME-INSPIRING PROJECTS IN THE UNIVERSE

BEHEMOTHS OF THE HIGH SEAS

Annual budget: \$175,000,000
Construction cost: \$177,000,000
Staff: 110
Physical size: 3.8 million square miles
Scientific ability: 10
MRF: 10
New factor: 10

TOP 10 STATE UNIVERSITIES BY SALARY POTENTIAL AS DETERMINED BY Payscale.com

| University | Starting Median Salary | Mid-Career Median Salary |
|-----------------------------------------------------------------|------------------------|--------------------------|
| State University of New York (SUNY) Maritime College | \$25,000 | \$45,000 |
| Colorado School of Mines | \$25,000 | \$45,000 |
| New Mexico Institute of Mining and Technology (New Mexico Tech) | \$25,000 | \$45,000 |
| New Jersey Institute of Technology (NJIT) | \$25,000 | \$45,000 |
| University of California, Berkeley | \$25,000 | \$45,000 |
| Georgia Institute of Technology | \$25,000 | \$45,000 |
| Massachusetts Maritime Academy | \$25,000 | \$45,000 |
| University of California, San Diego (UCSD) | \$25,000 | \$45,000 |
| The College of William and Mary | \$25,000 | \$45,000 |
| South Dakota School of Mines & Technology | \$25,000 | \$45,000 |

Methodology: Annual pay for Bachelors graduates without higher degrees. Typical starting graduates have 2 years of experience; mid-career have 15 years.

FAA COE NOVEMBER 2012 TECHNICAL MEETING AT NMT

- ✘ Proposed Dates
 - + November 6th
 - ✘ Spaceport America tour (day)
 - + November 7th
 - ✘ Technical meeting (day) and MRO tour (evening)
 - + November 8th
 - ✘ Technical meeting and EMRTC demonstration (day)

FAA COE NOVEMBER 2012 TECHNICAL MEETING AT NMT

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 - ✘ Technical meeting (day) and MRO tour (evening)
 - + November 8th
 - ✘ Technical meeting and EMRTC demonstration (day)

6. COE CST Plaque Photos





This space reserved for NMSU plaque picture.

7. List of Events: Past, Present and Future

**FAA COE CST
Task Status and
List of Events:
Recent, Current &
Upcoming**



Ken Davidian
FAA Office of Commercial Space Transportation
April 25, 2012



Desired List of Events

- Papers
- Conference presentations
- Patents
- Experimental testing
- Graduations
- Awards, Honors



List of Recent, Current Events

- **3.1 Recent & Current COE CST Events**
- 26-27 March: Emerging Space Industry Leaders Workshop (ESIL-02), Washington DC. Information about the workshop can be seen at <http://bit.ly/ESIL-02>.
- 25-26 April: COE CST Year 2 Meeting 1, on the campus of FSU, Tallahassee, FL.

List of Upcoming Events

- 1 May: COE CST Presentation to NASA Advisory Council Commercial Space Committee, NASA GRC, Cleveland, OH.
- 11 May: Jim Vanderploeg and Richard Jennings (UTMB), Committee on Aerospace Medicine and the Medicine of Extreme Environments, NASA JSC, related to Task 183.
- 13-17 May: Jim Vanderploeg (UTMB), "Data Accessibility for Occupational Surveillance and Life Science Research" panel at the 83rd Annual Meeting of the Aerospace Medical Association in Atlanta related to Task 181.
- May 22-24: Jonah Zimmerman (SU) "COE CST Research Roadmap" paper presentation, IAF/AIAA Global Space Exploration Conference, Washington, DC, related to Task 193.
- TBD Nov: COE CST Year 2 Meeting 2, on the campus of NMT, Socorro, NM.



8. FAA AST R&D Coordination Plan

FAA AST R&D Coordination Plan



Ken Davidian
FAA Office of Commercial Space Transportation
April 25, 2012

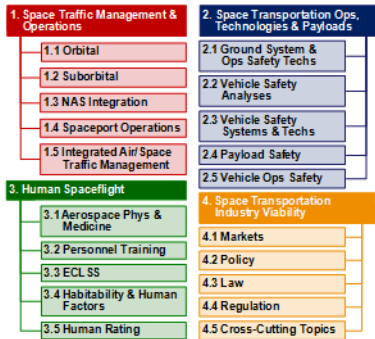


Comparative Histories: COE CST & R&D Coord Plan

- Aug 2009: FAA Decides to Create COE CST
- Dec 2010: Release of Draft COE CST RFP
- Feb 2010: COE CST Public Meetings
- Mar 2010: COE CST Proposals Due
- April 2010: Initiated R&D Coord Plan
- May 2010: v1.0 Released to AST (RDAB & SSC)
- Aug 2010: COE CST Selection Announcement
- Jan-Feb 2011: FY10 Tasks Selected
- July 2011: Major Input from AST Sr Mgt (Rll & ISR Processes)
- Aug 2011: Initiation of Rll Process
- Sept 2011: FY11 Tasks Selected
- Nov 2011: ATM1 in Boulder, CO
- Dec 2011: FY12-Stop Gap Tasks Selected
- Jan-Mar 2012: Release of ISR Document Starts ISR Process
- Apr 2012: FY12-ISR Tasks Selected



4 Research Areas

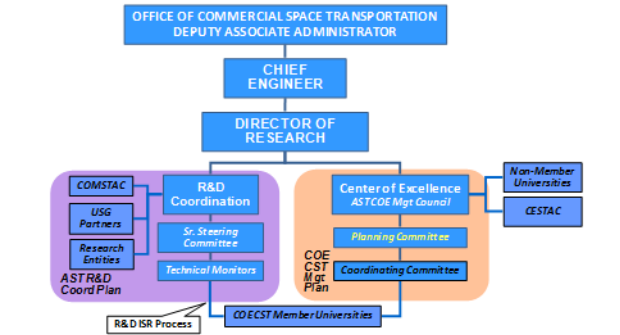


Definition of AST R&D Goals

- **Research Area 1 Goal:** Safe Integration of Air & Space Traffic Management, to effectively answer those topics related to the development and optimization of technical and regulatory provisions and processes used to oversee, coordinate, regulate, and promote safe and responsible space all activities between space and Earth (including access to, operations in and return from space to Earth) to avoid physical and/or electromagnetic interference.
- **Research Area 2 Goal:** Improved vehicle safety and risk management, including knowledge of all safety-critical components and systems of the space vehicles and their operations, so as to better identify potential hazards and to better identify, apply and verify hazard controls.
- **Research Area 3 Goal:** Ensure human safety of those onboard during space vehicle operation and those involved with spaceport operations.
- **Research Area 4 Goal:** Increase industry viability, including economic, legal, legislative, regulatory, and market analysis & modeling.



Updated AST R&D Context

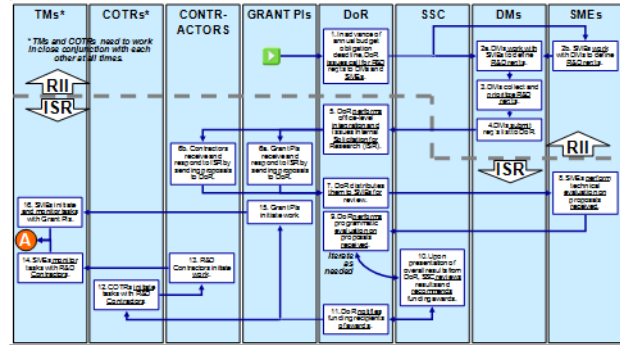


3 R&D Coordination Functions

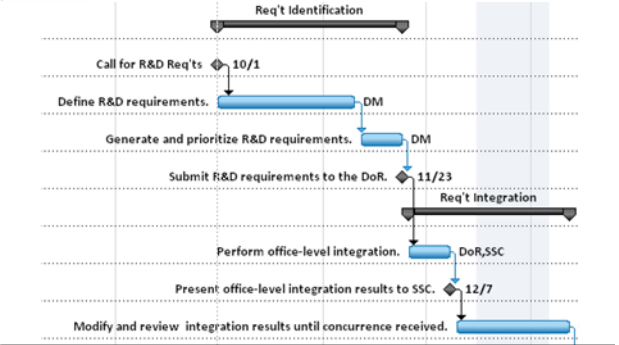
- 1. Requirements Identification & Integration (RII) Process**
 - Identify and document research requirements. Create R&D Plans.
 - Evaluate and prioritize requirements.
- 2. AST R&D Internal Solicitation for Research (ISR) Process**
 - Issue the Internal Solicitation for Research (ISR) document.
 - Review proposed R&D tasks.
 - Leverage available research resources.
- 3. AST R&D Technical Monitoring**
 - Create visibility/transparency.
 - Periodically assess activities for relevance and quality.
 - Track performance and net benefits.
 - Review and manage tasks.
 - Promote best practices in R&D performance and technology transfer.



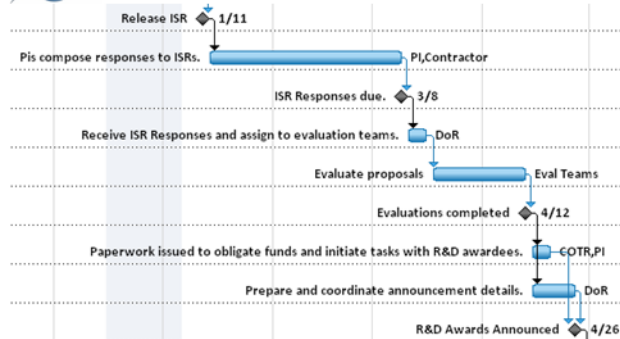
RII & ISR Processes



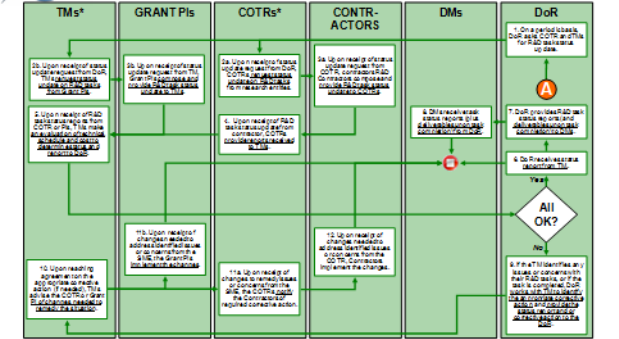
RII Process Gantt Chart



ISR Process Gantt Chart



Technical Monitoring Process



9. AST's Strategic Planning Efforts

FAA AST's Strategic Planning Efforts

Ken Davidson
FAA Office of Commercial Space Transportation
April 25, 2012

Agenda

- Strategic Planning
 - History (Stewart, 2009)
 - Perspectives (Mintzberg, 1998)
- AST's Strategic Planning for COE CST
 - Near-Term, Mid-Term, Long-Term Goals
 - Goals, Targets, Approaches, Analyses



Mixed Feelings on Strategy

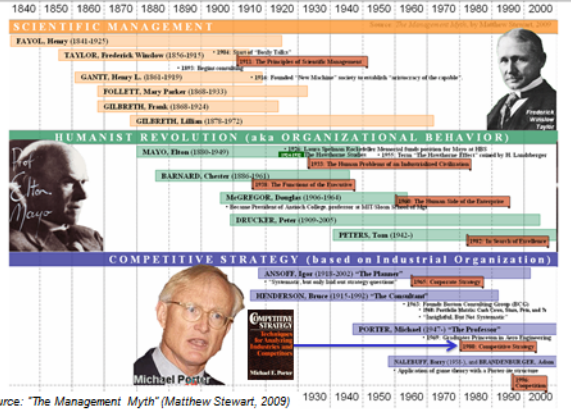
THE MANAGEMENT MYTH: DEBUNKING MODERN BUSINESS PHILOSOPHY by MATTHEW STEWART

COMPETITIVE STRATEGY: Techniques for Analyzing Industries and Competitors by Michael E. Porter

vs.



History of Strategic Management



10 Schools of Strategic Planning

| SCHOOL | Key Figures | Key Works |
|----------------------------------------------------------------------------------|------------------------------------------|---------------------------------------------------------------------------------------|
| 1. THE DESIGN SCHOOL (No dominant academic source) | SILVANCE, Philip (1919 - 2009) | 1985 "Contributions to Management: Divergent Conceptions, Not True - End Engineering" |
| 2. THE PLANNING SCHOOL (Urban planning, systems theory) | ANDREWS, Kenneth R. (1918 - 2007) | 1952 "Strategy and Structure: Establishing Logical Relationships and Objectives" |
| 3. THE POSITIONING SCHOOL (Industrial organization, economics, military history) | SCHMIDT, Dan (1914 -), BATTEN, Ken (7 -) | 1985 "Strategic Positioning: A Framework for Strategic Planning" |
| 4. THE ENTREPRENEURIAL SCHOOL (No dominant academic source) | SCHEINER, Joseph A. (1911 - 1975) | 1965 "Creative Entrepreneurship: A New Paradigm for Business" |
| 5. THE COGNITIVE SCHOOL (Psychology) | MINZBERG, Henry (1939 - 2002) | 1979 "Strategic Decision Making in Three Modes" |
| 6. THE LEARNING SCHOOL (Math, chaos theory) | ANDREWS, Kenneth R. (1918 - 2007) | 1952 "Strategy and Structure: Establishing Logical Relationships and Objectives" |
| 7. THE POWER SCHOOL (Political science) | ANDREWS, Kenneth R. (1918 - 2007) | 1952 "Strategy and Structure: Establishing Logical Relationships and Objectives" |
| 8. THE CULTURAL SCHOOL (Anthropology) | ANDREWS, Kenneth R. (1918 - 2007) | 1952 "Strategy and Structure: Establishing Logical Relationships and Objectives" |
| 9. THE ENVIRONMENTAL SCHOOL (Biology, political sociology) | ANDREWS, Kenneth R. (1918 - 2007) | 1952 "Strategy and Structure: Establishing Logical Relationships and Objectives" |
| 10. THE CONFIGURATION SCHOOL (History) | ANDREWS, Kenneth R. (1918 - 2007) | 1952 "Strategy and Structure: Establishing Logical Relationships and Objectives" |

Source: "Strategy Safari" (Henry Mintzberg, 1998)

Near Term Goal 1: Finalize Start-Up Activities

- Approaches
 - Evolve COE Administration
 - Implement OAT OMIS
 - Modify CAs as needed
 - Annual Evaluation Questions: Baseline Industry Information
 - Initiate Cooperative Efforts
 - University Pairings



 **Near-Term Goal 2:
Increased Funding and Support**

- Target 1: FAA
 - Approach 1: Unspent FY12 RE&D Funds
 - Approach 2: Inclusion in Existing Tasks
- Target 2: Other USG: NASA, DoD, etc.
 - Approach 1: Looking Over Our Shoulder
 - Approach 2: Participate in Specific Tasks
 - Approach 3: Funding Specific Tasks
 - Approach 4: Long-Term Sponsorship
- Target 3: Non-US– CSA, ESA, CNES



 **Mid-Term Goal 1:
Increased Funding and Support**

- Target 1: FAA
 - Approach 1: Funding from Existing R&D Programs
 - Approach 2: Targeted Commercial Space RE&D Funding (\$10M)
- Target 2: Other USG Agencies – NASA, DoD
- Target 3: Non-Member Universities



 **Mid-Term Goal 2: Increased Value**

- Approach 1: COE CST as a New-Market Disruptive Innovation?
 - "Blue Ocean Strategy" Analysis (Kim and Mauborgne, 2005)
 - Entrepreneurial School
- Approach 2: Increased Cooperative Efforts
 - "Co-opetition" Value Net Analysis (Dixit & Nalebuff, 1991 & 2008) (Brandenburger & Nalebuff, 1996)
 - Positioning School



 **COE CST Long-Term Goal:
Self-Sufficiency**

- Rhetorical Questions... for now...
 - What Does Self-Sufficiency Mean?
 - What Will Be the Form, Function and Purpose?
 - More...



10. External Opportunities

**External Opportunities for
COE Participation**

Nick Demidovich

**External Opportunities for COE
Participation**

- Discuss potential leverage for AST COE mission with funding from external federal entities on relevant tasks
- Task must have:
 - Potential to enhance/improve safety commercial space transportation
 - Potential to encourage facilitate promote commercial space transportation

External Opportunities for COE Participation

- FAA/AST has MOU with NASA and USAF
- Many current tasks have relevance to NASA/AF interests
- Many NASA BAAs and NRAs have potential relevance to commercial space
 - Technology maturation
 - Basic research
 - Safety related technology or studies
- Some USAF BAAs do as well
- A COE university may have unique capability of interest to NASA, USAF or other FAA LOB
- COE university must pursue/arrange cost match
 - Proposal strength

External Opportunities for COE Participation

- Inform FAA/AST of COE intention to bid or pursue opportunity and of relevance to AST mission
- Once selected by other agency
 - Agency executes agreement with COE CST member university
 - Agency transfers funds to FAA or university to add to COE Cooperative Agreement
 - Add task to MOU with FAA/AST
 - USAF
 - NASA
 - Or develop MOU on task with other FAA organization
 - AST can explore MOUs with DARPA, MDA, NRL, NOAA and NSF if COE community is interested

11. COE CST Cooperative Agreement & Management Plan Changes

FAA COE CST Cooperative Agreement & Management Plan Proposed Changes



Ken Davidian
FAA Office of Commercial Space Transportation
April 25, 2012



Why Change the CA & Mgt Plan?

- Transition from NMSU to Orion America Technologies (OAT) for Administrative functions.
- Transition from NMSU/Stanford responsibilities regarding quarterly reports.
- Assignment of new Coordinating Committee responsibilities.



CA Proposed Change #1

- Issue of modification to all universities to modify the second full paragraph in Attachment 1 of all CAs regarding topics of administrative support and quarterly reporting. There are two versions of this paragraph.
 - Refer to handout for exact wording of these paragraphs.
- The new paragraph to replace both original version is proposed to read as follows:
 - *"All COE CST member universities are required to submit technical and fiscal reports on a quarterly basis relevant to COE research and related activities to satisfy the FAA COE program requirements. The FAA will discuss task requirements with the team members."*

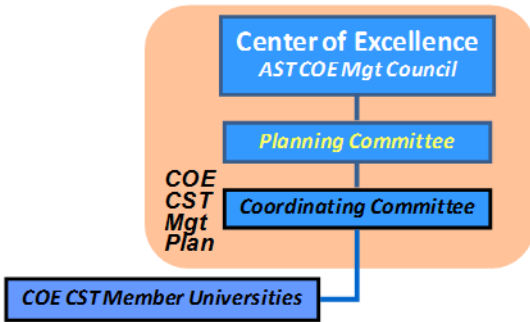


CA Proposed Change #2

- Issue of modification to all universities to modify the fourth full paragraph in Attachment 1 of all CAs regarding topic of report tracking. The original paragraph currently reads as follows:
 - *"Each University listed above will submit proposals through Grants.gov directed to the FAA COE Program Manager and in response to discussions or announcements. NMSU will track COE activities, awards, and prepare and submit reports as required for the entities listed above. All binding financial terms and conditions will be specified in each awarded task issued as an amendment to this agreement."*
- The new paragraph is proposed to read as follows:
 - *"Each University will submit proposals through Grants.gov directed to the FAA COE Program Manager and in response to discussions or announcements. All COE CST member universities will track their COE activities and awards and will prepare and submit their own reports as required. All binding financial terms and conditions will be specified in each awarded task issued as an amendment to this agreement."*



COE CST Mgt Plan Entities



Planning Committee Responsibilities

- **Strategic planning of COE CST activities**, to better positioning it with respect to the FAA, the commercial space transportation industry and other COEs.
- **Coordination of COE CST governance**, to align the day-to-day operations with the long-range strategic planning.
- **Coordination of organizational integration** with internal and external entities, to maximize collaboration between COE CST member universities and external university and industry members.
- **Recommendation of opportunity and issue resolution**, to ensure efficient operation during the normal course of COE CST activities.



Coordinating Committee Responsibilities (Original)

- Designing, planning, coordinating and executing internal administrative functions (including planning and coordination of meetings and the dissemination of COE CST publications and information) with the minimal goal of fulfilling the terms of the COE CST Cooperative Agreements.
- Education and public outreach activities, including web site development and creation and publication of the COE CST Journal with the goal of meeting COE program goals above the minimal terms of the COE CST Cooperative Agreements.
- Other functions as deemed appropriate by the ACMC and as agreed upon by the Coordinating Committee Chair and the COE CST member universities.



Coordinating Committee Responsibilities (Modified, Rough Draft Ideas)

- **Develop a set of self-governance documents.** Beginning with a Coordinating Committee Terms of Reference doc, working through the second step of a CC Management Plan of its own, and finishing with a CC Constitution that will be iteratively refined over multiple years, this will become the foundational document for the COE CST entering its self-sustaining phase after 10 years.
- **Foster cooperative efforts among the COE CST member universities.** To respond not only to FAA funding solicitations but also to external funding solicitations, cooperative efforts will require some modified posturing. The intent is to send the message that being a member of the COE CST and partnering with other member universities actually enhances the chances of winning funding for related research tasks.
- **Begin conducting strategic planning analyses.** These will be very valuable to the COE CST and can provide the basis for sustained, meaningful activities among the participating members. The long-term goal is self-sustenance after 10 years and the results of many structured analyses will be essential to painting a more complete picture of how it can best be achieved.



12. Strategic Planning Overview

Strategic Planning for COE CST



Dr. Pat Hynes
NMSU
April 25, 2012



Overview

- Is it worth our time and treasure?
- What is a good strategic plan?
- Who should develop it?
- Who will use it?



 **Strategic Planning Question**

- “What is the desirable future for the FAA Center of Excellence for Commercial Space Transportation by the year 2017?”
- Why 5 years?
 - Strategic planning five years out in a complex environment is dependent not only on environmental forces and resources but also on the ability of the human resources to adapt to the future.



 **Time and Treasure**

- Is it worth our time and treasure to create a strategic plan in collaboration with a planning community?



 **The Planning Community**

- Who do we invite and why?
- 30 people
- What criterion do we use?
- Suborbital; orbital
- Government; private
- International
- Who else?



 **What are the Top 3 Benefits of Creating a Collaboratively Designed Strategic Plan**

- Take 5 minutes
 - Individually write down top 3 benefits
 - Post them on flip chart on the wall
 - Integration



 **Options**

- We develop the plan collaboratively
- Or we task someone with writing it
- Question- Which one will get more buy in from people in the system? Which one will be more likely to impact the future we create for the center and for the industry?



 **Next Steps**

- Internal planning committee
- Two day event, 18 hours
- 30 people, face to face



13. Letters Writing Campaign

**GROUP ACTIVITY:
Letters to Wilson Felder**



Mr. Ken Davidian
FAA Office of Commercial Space Transportation
April 25, 2012



Agenda

- Who is Wilson Felder?
- Original Idea
- Current Questions
- Plan of Action



Who Is Wilson Felder?

- 15th Director of the FAA
William J. Hughes
Technical Center at ATY
- Chair of the FAA R&D
Executive Board
 - Oversees the distribution
of FAA's annual "RE&D"
budget of ~\$180M



Original Idea Genesis

- Problem: FAA AST is not allowed to do anything that could be construed as "lobbying Congress" for additional R&D funding, but AST *can* request additional inside the FAA.
- Opportunity: Dr. Felder has expressed the belief that AST's R&D budget could be \$10M instead of \$1M.



The Idea

- Overwhelm Dr. Felder with an abundance of outstanding R&D ideas, the execution of which only being possible with an increase in AST's R&D budget.
- Q: How to Generate the "abundance of outstanding R&D ideas"?
- A: Conduct this group activity.



But Wait...

- Questions about protecting ideas from being copied or mimicked arose immediately from multiple sources almost.
 - Any ideas to address this concern?
- Any other topics of questions about carrying out this idea?



Appendix C. COE CST AAM2 Group Photo

Below is the photo of the attendees at meeting day 1 of the FAA COE CST 2nd Annual Administrative Meeting.

Pictured from left to right: Ms. Joylynn Watkins (NMSU), Dr. Jay Kapat (UCF), Dr. Dan Kirk (FIT), Jesse Feltus (FIT Student), Mr. Ken Davidian (stooping, FAA AST), Dr. Farrukh Alvi (FSU), Dr. Nat Villaire (FIT), Mr. Brad Cheetham (CU Student), Dr. Jim Vanderploeg (UTMB), Prof. Scott Hubbard (Stanford), Dr. Warren Ostergren (NMT), Dr. Pat Hynes (NMSU), Dr. Rajan Khumar (FSU).



Attendees (in person or via telecom) not shown: Mr. Nick Demidovich (FAA AST), Dr. Patricia Watts (FAA COE Program Director), Dr. Tristan Fiedler (FIT), Dr. Dave Klaus (CU), Dr. Norm Fitz-Coy (UF).

**The FAA COE CST AAM2 was made possible by the generous contributions and efforts of our good friends at FSU.
Thank You Very Much!**

