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For Aviation Operations Research

Program Review and Steering Committee Meeting

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Program Manager and Research
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March 15, 2006

NEXTOR Program Review and Steering Committee Agenda



- Vision and strategic goals
- NEXTOR's program summary for 2005
 - Research
 - Knowledge exchange
 - Training and education
 - Program issues
- NEXTOR's next steps for 2006
- Discussion

NEXTOR Vision and Strategic Goals



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- Vision: To lead the aviation community by advancing new ideas and paradigms for aviation operations, promoting knowledge exchange among industry, government, and academic leaders, and educating and training aviation professionals
 - Strategic Goals
 - Continue to build on our strong base of collaborative research and innovative thinking that will address critical needs in the NAS
 - Conduct frequent conferences and seminars among senior leadership of the aviation industry, government, and academia
 - Increase the breadth of aviation operations research knowledge through short courses and degree programs at each of the NEXTOR Universities

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Program Summary - 2005

NEXTOR's next steps 2005 - reprise




Programs

- Research program
- Knowledge exchange
- Training and education

Program office

Reprise of NEXTOR's Next Steps for 2005 (Research, Education, Knowledge Exchange)






- | | Status |
|--|---|
| <ul style="list-style-type: none">• NEXTOR Research, Education, and Knowledge Exchange<ul style="list-style-type: none">– Continue to explore new opportunities for research, both within and outside the FAA while maintaining legacy research efforts<ul style="list-style-type: none">• Maintain or build on current levels of research in Strategy Simulator and Collaborative Decision Making areas• Continue to broaden the research sponsorship base across the NEXTOR universities• Increase participation in JPDO programs and projects |  |
| <ul style="list-style-type: none">• Complete the delayed roll-out of the Virginia Tech - George Mason University Master's degree programs and pursue potential funding programs for FAA employees who desire to attend NEXTOR universities |  |
| <ul style="list-style-type: none">• Maintain the 2005 conference and short course programs through a “boot strap” conference and short course and some type of Congestion Management interchange<ul style="list-style-type: none">– NEXTOR- UC Berkeley conference on infrastructure management– Conferences or other activities related to Congestion Pricing– Desire to participate in discussions relating to FAA revenue generation activities |  |

Reprise of NEXTOR's Next Steps for 2005 (Program Office)



- NEXTOR Program Office

Status

- Provide management support to and facilitate interaction between NEXTOR researchers and project sponsors 
- Ensure successful transition to new grant agreements and contract options 
- Continue self-sustainment with goal of attaining 100% of funding, or \$350,000 in program office support based on current budget, achieved through a combination of 
 - Program office assessments, including potential re-adjustment of assessment rates
 - More effective management and growth in the industry partner program
 - Look for potential cost reductions to be gained from potential contract changes

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Program Summary - 2005

Research program

- Summary of 2005 research projects
- 2006 research pipeline
- Research program summary

2005 New research



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- Methodology development for assessments of unstaffed facilities in the NAS
 - Methodology for Estimating Airport Capacity & Throughput Using PDARS
 - UC Berkeley – Dr. Jasenka Rakas
 - Analysis of Benefits Provided by Traffic Management Advisor –
 - Using ACES for Near-Term Decision Making
 - UC Berkeley – Dr. Mark Hansen
 - Framing the JPDO Policy Agenda
 - MIT – Dr. Annalisa Weigel
 - Air Traffic Flow Management Under Uncertainty & Dynamic Conditions
 - MIT
 - Development of Criteria for Center Boundary Generation
 - Peer review of Fuel Tank Flammability Studies
 - George Mason University – Dr. Lance Sherry

2005 Continuing research



-
- Congestion Management and Congestion Management Seminars
 - George Mason University (Dr. George Donohue and Dr. Karla Hoffman)
 - University of Maryland (Dr. Mike Ball)
 - Other NEXTOR universities and affiliates
 - Strategic Decision Support System Project Phase III (Strategy Simulator)
 - All universities
 - Collaborative Decision Making Research
 - All Universities
 - Advanced Facilities Concepts
 - George Mason University (Dr. George Donohue, Dr. Sasha Klein)
 - Significant sub-contract work with San Jose State University
 - Methodology for En Route Sector Performance
 - UC Berkeley (Dr. Jasenka Rakas)

2005 Continuing research



-
- Methodology for En Route Sector Performance *Continued*
 - UC Berkeley (Dr. Jasenka Rakas)
 - Human Factors Considerations in Future Oceanic Air Transportation Systems Structures
 - MIT – Dr. John Hansman
 - Development of an Air Passenger Survey Model
 - UC Berkeley – Dr. Mark Hansen
 - Methodology for En-Route Sector Performance Assessment
 - UC Berkeley – Dr. Jasenka Rakas
 - Special topics in research with the Joint Planning and Development Office
 - UMD – Dr. Avijit Mukherjee
 - Controller Display Complexity for the FAA Civil Aviation Medical Institute
 - MIT – (Dr. Mary Cummings)

2005 Completed research



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- State of Health of an Air Carrier from the Perspective of Safety
 - MIT – Dr. Arnie Barnett
 - Oversight System Evaluation
 - UC Berkeley – Dr. Mark Hansen

2005 Research Funding (not including sub-contracts)

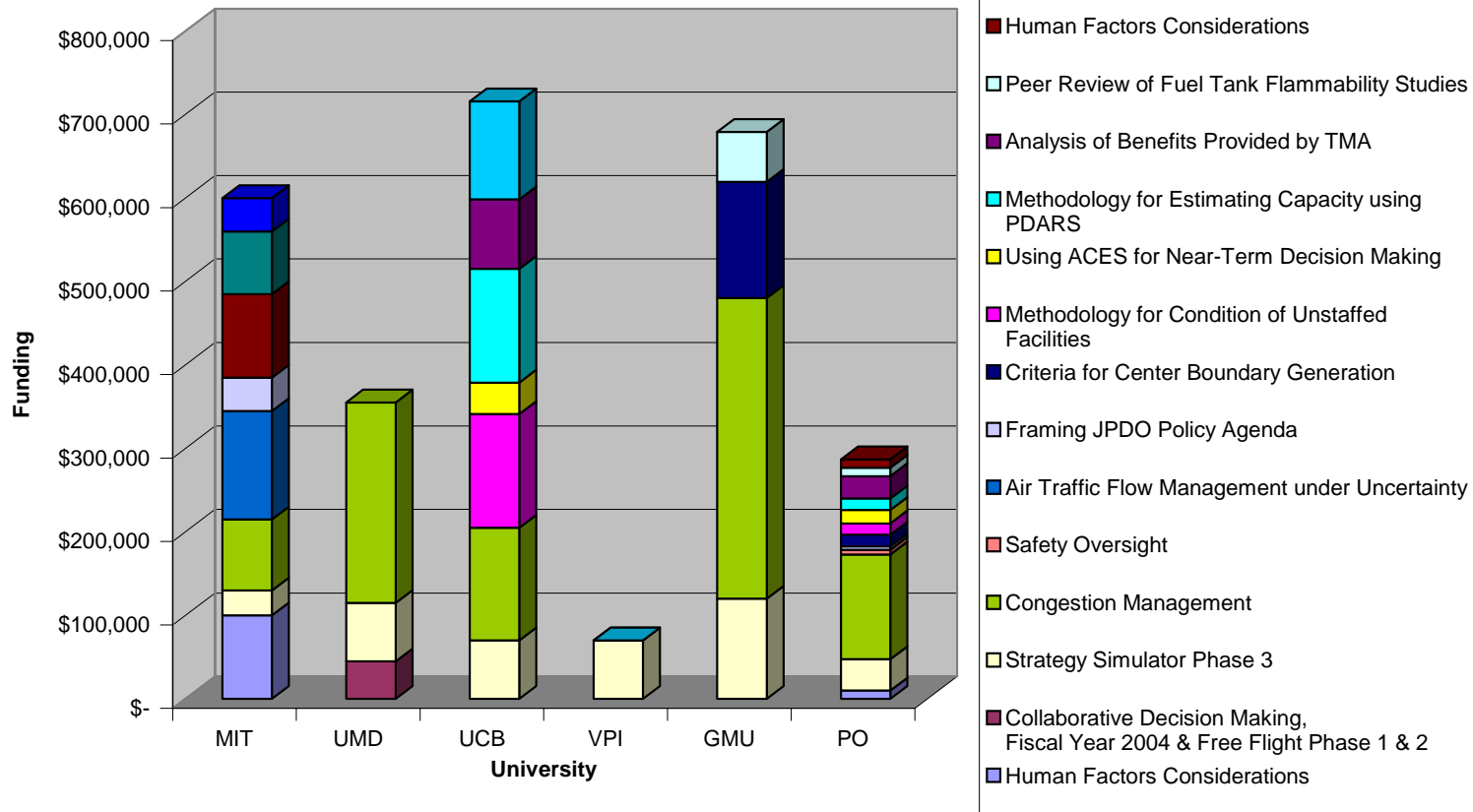


Nextor Funding by Project	MIT	UMD	UCB	VPI	GMU	PO	TOTALS
Collaborative Decision Making, Fiscal Year 2004 & Free Flight Phase 1 & 2		\$ 45,000					\$ 45,000
Strategy Simulator Phase 3	\$ 30,000	\$ 70,000	\$ 70,000	\$ 70,000	\$ 120,000	\$ 37,500	\$ 397,500
Congestion Management	\$ 84,761	\$ 240,002	\$ 135,011		\$ 360,112	\$ 125,215	\$ 945,101
Safety Oversight	\$ -					\$ 6,000	\$ 6,000
Air Traffic Flow Management under Uncertainty	\$ 130,000						\$ 130,000
Framing JPDO Policy Agenda	\$ 40,000					\$ 4,000	\$ 44,000
Criteria for Center Boundary Generation					\$ 139,000	\$ 13,900	\$ 152,900
Methodology for Condition of Unstaffed Facilities			\$ 136,036			\$ 13,606	\$ 149,642
Using ACES for Near-Term Decision Making			\$ 37,786			\$ 16,000	\$ 53,786
Methodology for Estimating Capacity using PDARS			\$ 136,361			\$ 13,636	\$ 149,997
Analysis of Benefits Provided by TMA			\$ 82,973			\$ 27,027	\$ 110,000
Peer Review of Fuel Tank Flammability Studies					\$ 60,000	\$ 10,000	\$ 70,000
Human Factors Considerations	\$ 100,000					\$ 10,000	\$ 110,000
Using Real Options to Evaluate Bond Issues	\$ 75,000						\$ 75,000
On-site Research Support of the JPDO	\$ 40,000						\$ 40,000
Sector Performance			\$ 117,500				\$ 117,500
Total Funding For Each University	\$ 499,761	\$ 355,002	\$ 715,667	\$ 70,000	\$ 679,112	\$ 276,884	\$ 2,596,426

2005 Research Funding (no sub-contracts)



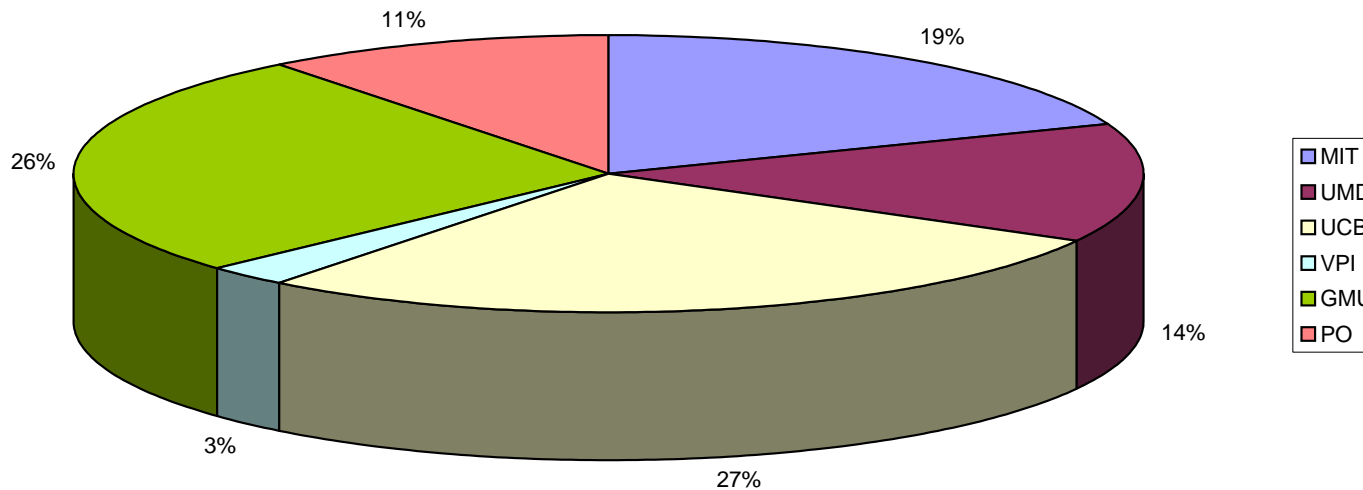
Funding by University CY 05



2005 Research Funding (no sub-contracts)



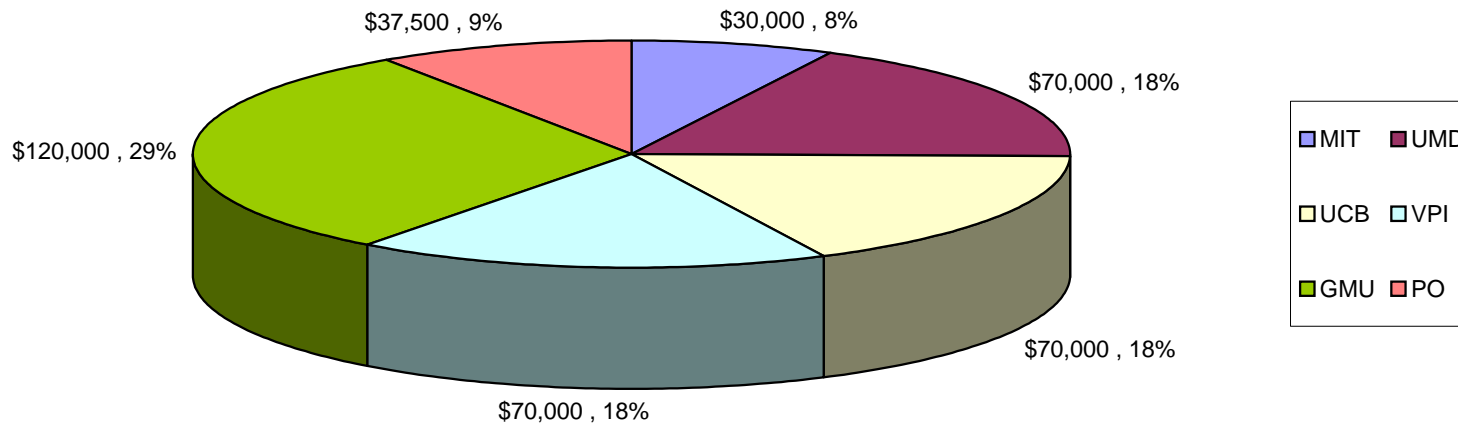
Funding Allocation by University CY 05



2005 Research Funding (no sub-contracts)



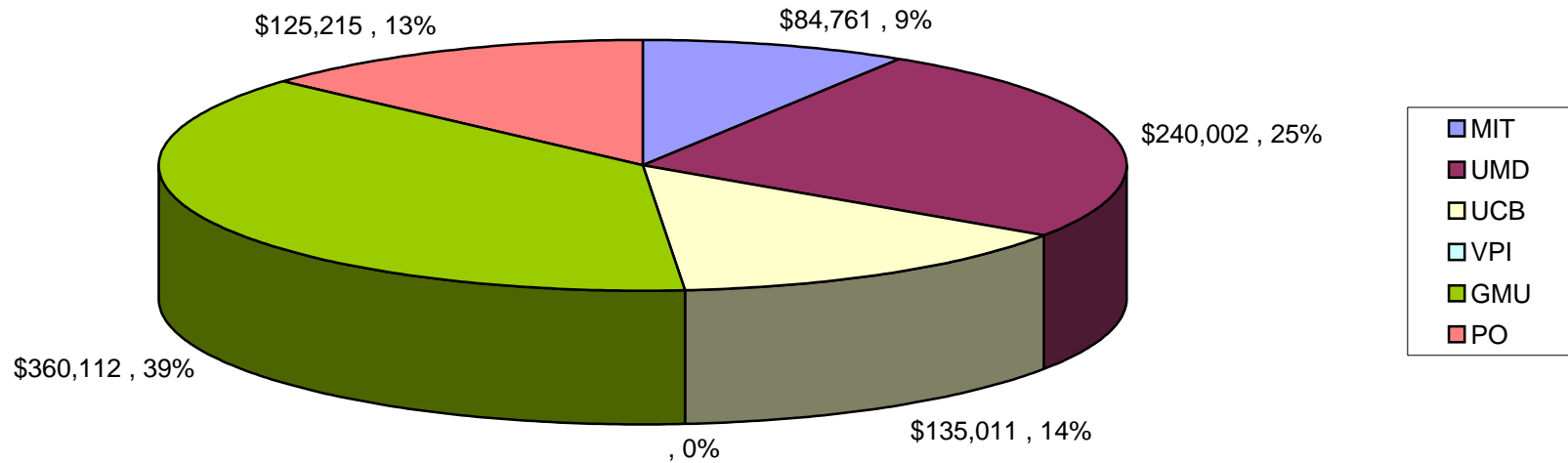
Strategy Simulator Phase III Funding By School CY 05



2005 Research Funding (no sub-contracts)



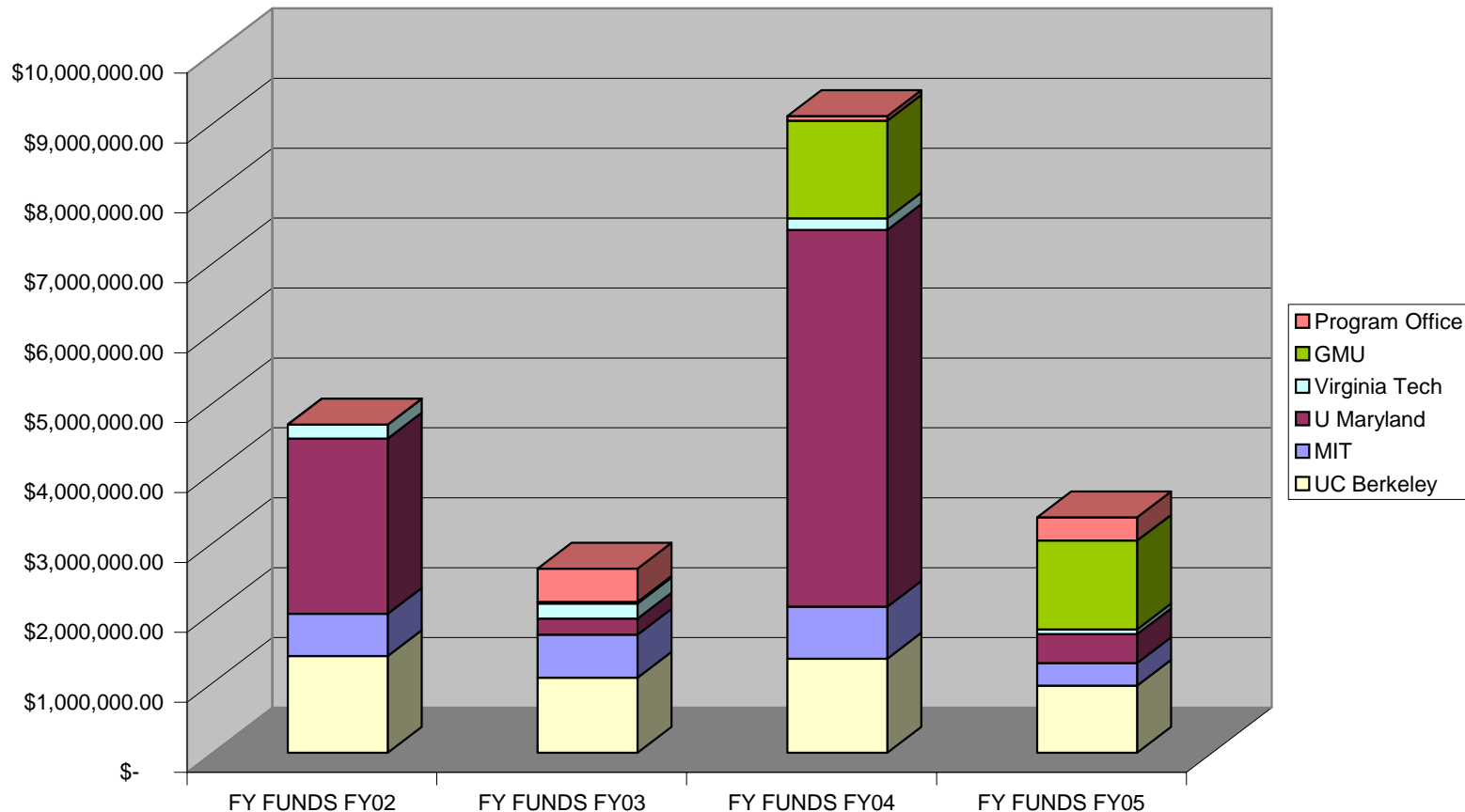
Congestion Management Funding by School CY 05



Historical Funding of NEXTOR research (Phase II Only)



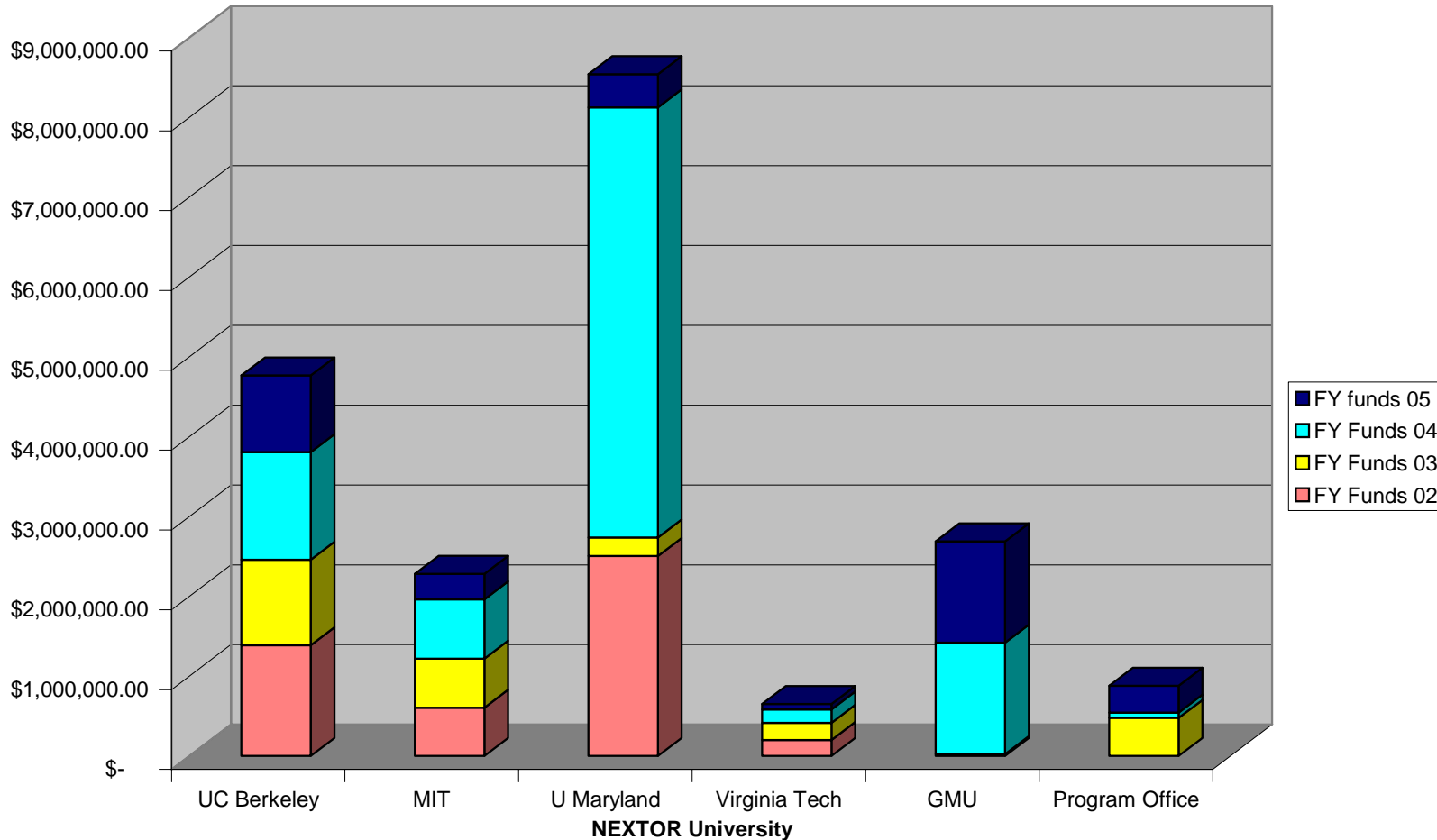
FY Funds 02-05



Historical breakout of funding per university Phase II Only (including program office)



Calendar Year Fund Totals per School



2006 research pipeline



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- Additional work on Strategy Simulator – All universities
 - Technology portfolio optimization – MIT
 - Continuing work on congestion management issues - UMD
 - Development of an AIXM editor – UMD
 - La Guardia Airport benefits and cost analysis – George Mason University
 - Continuing support to the Collaborative Decision Making Program – Maryland, UC Berkeley, George Mason University
 - Potential work with NASA Ames and potential industry partner
 - Program assessment for Safe Skies for Africa program – GMU, MIT, UC Berkeley, Virginia Tech
 - Potential education and training activities with Department of Transportation – All Universities
 - Potential additional work with the JPDO
 - Internships for NEXTOR researchers at the FAA and industry partners

NEXTOR Research Program 2005 Summary, 2006 Outlook and Next Steps



- 2005 Summary
 - Continued to support the FAA through a broad-based research program
 - Neared completion on the Congestion Management project
 - Continued providing research on base programs – Strategy Simulator and CDM support
 - Continued activities on several aviation operations research topics
 - Branched into several human factors and infrastructure management research areas
 - Concluded safety-related research in support of the SASO program office
- 2006 Outlook
 - Loss of significant portion of CDM project funding will have adverse impact on planned research for 2006
 - Expected approximately \$700K for university research but received \$250K
- 2006 Next steps for NEXTOR Research Program
 - Continue to explore new opportunities for research, both within and outside the FAA while working to maintain and build on legacy research efforts
 - Continue work in Strategy Simulator and Collaborative Decision Making areas
 - Aggressively pursue opportunities to expand scope of NASA and DOT research to broaden the research sponsorship base across the NEXTOR universities
 - Increase participation in JPDO programs and projects

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Program Summary - 2005

Knowledge exchange program

- NEXTOR Conference series
- Participation in the academic community
- Training and education program

NEXTOR 2005 Education and Training and Knowledge Exchange Program



- NEXTOR Congestion Management Project: Mock Auction, University of Maryland Conference Center, February 24-25, 2005
 - Familiarized the relevant industry and government communities with auction processes and the specifics of the NEXTOR slot auction design;
 - Solicited comment from industry and government on the proposed auction design and on the overall policy and process of using auctions to allocate airport arrival and departure capacity.
- National Airspace System Infrastructure Management Conference, Washington D.C., September 9, 2005
 - Presented Research on optimizing management of NAS Infrastructure
 - Discussed existing NAS infrastructure systems
 - Improved awareness of NAS management within the aviation community
 - Offered innovative infrastructure management decision support tools and strategies used in the non-aviation sector

2006 NEXTOR Education and Knowledge Transfer next steps



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- Continue to arrange and conduct conferences as part of the NEXTOR Conference programs
 - NAS Airspace System Performance Conference, March 14-17, 2006
 - Congestion management related conferences, Summer 2006
 - Infrastructure management industry conference, Spring 2006
 - Produce at least one, possibly two 2006 NEXTOR short courses
 - Develop short course related to congestion management
 - Deliver aviation system analysis short course
 - Develop an internal FAA champion for the Virginia Tech - George Mason University Master's degree programs
 - Pursue potential funding programs for FAA employees who desire to attend NEXTOR universities

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Program Summary - 2005

Program Management Issues

- NEXTOR grant and contract issues
- Program office funding and issues
- Industry Partner Program

Grant renewals for NEXTOR universities



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- NEXTOR Phase II Grant Agreements between the FAA and all universities will expire on December 31, 2006
 - Replacement of Grant Agreements is pending discussion of future NEXTOR contract/grant relationship with FAA
 - Met or exceeded 50-50 matching requirement
 - Proposed sunset of grant agreements and shift of all NEXTOR work to contract vehicle
 - Pending discussion to take place over the next several months with FAA

Contract status for all NEXTOR IDIQ contracts



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- Contracts are independent of grants and will extend through approximately February 2008 for all universities except GMU (through 2010)
 - Will need to begin negotiations for new IDIQ contracts
 - Expect to include GMU in joint contract negotiations
 - Split program office from University of California IDIQ contract
 - Allows for move of program office off campus to NASA Ames
 - Decreases program office overhead charges – will save approximately \$60-70K per year
 - Explore structure of new contracts that will allow for better administration of research, education and training, and knowledge exchange programs

NEXTOR Program Office at the University of California, Berkeley



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- Provides program office support to the five universities that comprise the NEXTOR consortium
 - Includes organizational structure, management and operations for NEXTOR
 - Provides “single face to the customer” for all NEXTOR administrative and operational issues
 - Enhances outreach efforts from NEXTOR to the aviation operations and research community
 - Generates interest in aviation operations research among university students and researchers
 - Facilitates communication between researchers, project sponsors, and government and university staff for all five NEXTOR universities

NEXTOR Program Office funding



- Sustained through a combination of program office assessments on FAA contracts and industry partner contributions
 - Current program structure and industry partner contributions require FAA research funding of approximately \$3,500,000 per year, yielding program assessment of approximately \$350,000 per year
 - Current funding is not at that level and program office funding will run out in June 2006
 - Full funding of existing pipeline will ensure program office funding through November 2006
 - Burden of university overhead (52%) on all program office activities is a key strain on the ability to maintain operations (~\$120,000 of program office budget is university overhead)
 - Allocation of industry partner base contributions not always to program office and management of base contribution payments has been weak
- Requirement for action this year to ensure sustainability of the program office
 - Program Office Long-Term Sustainment Plan
 - Continue work to build project pipeline and integrate DOT, NASA activities into program
 - Negotiate and implement new program office contract or delivery order that will move Program Office off UC Berkeley campus
 - Build commitment of industry partners to base program plan level

NEXTOR Program Office Long-term Sustainment Plan



- Build project pipeline and integrate DOT, NASA activities into program
 - Ensure that program obtains a minimum of \$2.5 Million per year in research funding across all government sponsors
 - Allows for approximately \$250K funding for program office through program assessments
 - Establish program goal of \$350K funding for program office to allow for program growth and build-up of funding buffer
 - Research funding levels are reasonable goals and should be a measure of success of the program office in executing the program
- Negotiate and implement new program office contract or delivery order that will move Program Office off UC Berkeley campus
 - Allows reduction in university overhead charge from 52% of federal funds received to 26%
 - Estimated annual savings of \$60-65K without any impact to program
- Build commitment of industry partners to base participation level
 - Will provide base funding and some level of security for the program office given wide variation in available funding from program assessments
 - Gift status of funds further reduces university overhead to 10% versus 26-52%
 - Funding can be reviewed annually by the Steering Committee and recommendations can be made regarding the disposition of gift funds

NEXTOR Program Office Long-term Sustainment Plan – Sample budgets



Lean Year

Program Assessment	\$	250,000
Industry partner contribution	\$	45,000

	On Campus	Off Campus
Without industry partner contributions	(\$103,856)	\$ (50,888)
With Industry partner contributions	\$ (27,826)	\$ 113

Strong year

Program assessment	\$	350,000
Industry partner contribution	\$	45,000

	On Campus	Off campus
Without industry partner contributions	\$ (3,856)	\$ 49,112
With Industry partner contributions	\$ 36,644	\$ 89,612

Industry partner program description



- Envisioned as the industry piece of the government, academia and industry triumvirate that drives the transition of research to an operational environment
 - Streamline technology transfer between research and operations
 - Maintain research activities in line with industry partner research needs
 - Allow for the establishment of a pipeline of students for industry partners
- Expectation by FAA that industry partners would provide sub-contracts, and grants to universities to match FAA grant awards
 - Evolved into in-kind support with limited sponsorship of projects
 - Largest flow of funds was from FAA through NEXTOR universities to industry partners
 - Inconsistent industry partner program financial contributions
 - Interchange with industry partners was not always well maintained
- Recent improvements in industry partnerships noted
 - Improved participation rate in industry partner contributions
 - Increased interaction with industry partners in internship development
 - Increased participation in joint efforts, proposals, and other interactions
- Strong efforts will be made over the next year to further strengthen ties to industry partners

Program Office next steps for 2006



-
- Ensure successful transition to new contract and grant agreements with the FAA
 - Provide management support to and facilitate interaction between NEXTOR researchers and project sponsors
 - Transition to new contract arrangement for program office support
 - Structure agreement to move program office from UC Berkeley campus and broaden scope to allow for NASA participation and contribution
 - Discussion of how industry partnerships might be re-structured to ensure program continuity during periods of limited FAA funding
 - Continue self-sustainment with goal of attaining 100% of funding, achieved through a combination of
 - Program office assessments on FAA projects
 - More effective management and growth in the industry partner program
 - Potential cost reductions to be gained from potential contract changes

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Program Summary and NEXTOR's Next Steps for Calendar Year 2006

NEXTOR Program review summary



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- NEXTOR continues to execute a robust research program with many ongoing projects across the aviation operations research domain
 - Supported broad range of programs and offices across the ATO and FAA
 - Maintained education and knowledge exchange programs despite budget challenges
 - Continuing efforts to firm up pipeline of research projects and initiatives for 2006
 - Preparing for changes in contract and grant structure
 - Changes pending 10 year evaluation results and FAA recommendations
 - Developing long term sustainment plan for the NEXTOR program
 - Ensure program office can be sustained in periods of lean funding
 - Set the stage for growth in research program in the future

NEXTOR's Next Steps for 2006 (Research, Education, and Knowledge Exchange)



-
- NEXTOR Research, Education, and Knowledge Exchange
 - Continue to explore new opportunities for research, both within and outside the FAA while maintaining legacy research efforts
 - Maintain or build on current levels of research in Strategy Simulator and Collaborative Decision Making areas
 - Continue to broaden the research sponsorship base across the NEXTOR universities
 - Increase participation in JPDO programs and projects
 - Maintain the NEXTOR conference and short course programs through conferences and short courses in metrics and performance measurement and some type of Congestion Management interchange
 - NEXTOR- UC Berkeley conference on infrastructure management
 - Conferences or other activities related to Congestion Pricing
 - Desire to participate in discussions relating to FAA revenue generation activities

NEXTOR's Next Steps for 2006 (Program Office)



-
- Ensure successful transition to new contract and grant agreements with the FAA
 - Provide management support to and facilitate interaction between NEXTOR researchers and project sponsors
 - Transition to new contract agreement for program office support
 - Structure agreement to remove program office from UC Berkeley research contract and broaden scope to allow for NASA participation and contribution
 - Discussion of how industry partnerships might be re-structured to ensure program continuity during periods of limited FAA funding
 - Continue self-sustainment with goal of attaining 100% of funding, achieved through a combination of
 - Program office assessments on FAA projects
 - More effective management and growth in the industry partner program
 - Potential cost reductions to be gained from potential contract changes

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Program Manager and Research
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March 15, 2006

Discussion items



-
- NEXTOR Future Strategic Direction
 - What about the idea of “Alliance of COEs”?
 - Should we establish an industry partner advisory team to recommend potential alternatives NEXTOR structure?
 - How should NEXTOR interact with DOT/FAA and other Government Agencies and Industry Partners?
 - What is the best contractual vehicle for continuing work with NEXTOR?
 - Blanket Purchase Order Agreement?
 - Common contract?
 - Other alternatives?