Independent Review

Multi State Science Assessment Project (MSSA)

For the
State of Vermont Agency of Education (AOE) and
Agency of Digital Services (ADS)

Submitted to the
State of Vermont, Office of the CIO

By
Strategic Technology Services, Inc.

6/21/2017

Attachments:

1. Project Costing Spreadsheet (FINAL-REVIEW-SOV-AOE-MSSA-IndependentReview-STS_Cost_Detail_FINAL.xlsx)
2. Risk Register (FINAL-REVIEW-SOV-AOE-MSSA-IndependentReview-STS_Risk_Register_FINAL.pdf)

Table of Contents

1. Executive Summary

Provide an introduction that includes a brief overview of the technology project and selected vendor(s).

Project Summary

1. **Parties**:
    a. The proposed engagement is between State of Vermont Agency of Education (AOE) and American Institutes for Research (AIR) of Washington, DC.

2. **Term**:
    a. The term of this project is expected to be 48 months (proposed as 7/2017-6/2021) as follows:
        i. Implementation: Completion of Field Test: 10 months (July, 2017 - May, 2018)
        ii. Operations: Completion of 3 Annual Science Tests: 38 months (May, 2018 - June, 2021)
    b. Contract terms have not yet been finalized at the time of the writing of this Independent Review report.

3. **Solution and Cost**: The cost analysis covers a 4 year period to support the minimum expected life-cycle of the solution. See Section 1.1 for detailed cost breakdown.
    a. Total Costs (4 years): $3.2M
        i. Implementation: $610K
        ii. Operations: $2.6M

4. **Approach**:
    a. This is a services contract to provide testing services, test item development, and administration (reporting, training, etc.) to support the assessment of the Next Generation Science Standards (NGSS) for Grades 5, 8 and 11 in Vermont in support of ESSA (Every Student Succeeds Act) objectives.
    b. The proposed solution uses the same underlying technology as that implemented by AIR and AOE during the Smarter Balance Assessment Consortium (SBAC) project of 2014. The Independent Review of that project was also conducted by Strategic Technology Services, Inc.
    c. Internal AOE staff supporting the project.

	BEFORE	**AFTER**
Application(s)	*Paper and Pencil Tests and manual human scoring*	*Online NGSS tests and Machine (Artificial Intelligence) scoring*
Hosting	*None*	*External Hosting at Rackspace*
Sys Admin	*None*	*AOE and AIR*
Application Management	*None*	*AIR*

5. **Management:** Senior Business Leadership and Subject Matter Expertise are aligned to complete solution implementation.

Vendor Profile

1. **American Institutes for Research (AIR)**
    a. **American Institutes for Research (AIR)** was founded in 1946 and is based in Washington, DC. AIR is a not-for-profit organization pursuing its mission to use the best social and behavioral sciences to improve people's lives. AIR employs more than 1,800 people working in the areas of assessment, education research and technical assistance, health, human development, and international development.
    b. See http://www.air.org/ for more information.

1.1 Cost Summary

IT Activity Lifecycle:	4 Years
Total Lifecycle Costs:	**$3.2M**
PROJECT COSTS:	***$610K***
Software Costs:	***$0***
Professional Services:	***$463K***
Internal Staffing:	***$114K***
Hosting:	***$0***
Other (ADS EA, IR):	***$33K***
OPERATING COSTS:	***$2.6M***
Software Costs:	***$0***
Professional Services:	***$2.4M***
Internal Staffing:	***$200K***
Hosting:	***$0***
CURRENT OPERATING COSTS:	**$2.5M**
Difference Between Current and New Operating Costs:	**$100K increase**
Funding Source(s) and Percentage Breakdown if Multiple Sources:	Federally funded. See table below.

Funding Source(s) and Percentage Breakdown if Multiple Sources:

FUNDING SOURCE	% of TOTAL	FUNDING SOURCE DESCRIPTION	FUNDING APPLIED TO (Implementation or Operations)	FUNDING AMOUNT
STATE FUNDING: Implementation: Operating Budget	0%		Implementation	$0
STATE FUNDING: Operations: Operating Budget	0%		Operations	$0
Grant Funding: Implementation	0%		Implementation	$0
Grant Funding: Operations	0%		Operations	$0
FEDERAL FUNDING: Implementation	18.32%	US DOE Funding Sources: SARA (State Assessment and Related Activities) Funds from Title VI of Elementary and Secondary Education Act to administer assessments plus Funds from Title I for Improving Academic Achievement of the Disadvantaged	Implementation	$587,011
FEDERAL FUNDING: Implementation	.71%	IDEA (Individuals with Disabilities Education Act) Part B	Implementation	$22,880
FEDERAL FUNDING: Operations	79.89%	US DOE Funding Sources: SARA (State Assessment and Related Activities) Funds from Title VI of Elementary and Secondary Education Act to administer assessments plus Funds from Title I for Improving Academic Achievement of the Disadvantaged	Operations	$2,559,830
FEDERAL FUNDING: Operations	1.07%	IDEA (Individuals with Disabilities Education Act) Part B	Operations	$34,320
TOTAL:	**100.00%**			**$3,204,041**

1.2 Disposition of Independent Review Deliverables

Deliverable	Highlights from the Review *Include explanations of any significant concerns*
Acquisition Cost Assessment	Derived hourly rates are high. Comparisons to projects of similar scope are high. Comparison to other bids show comparable pricing. See *Cost Comparison* **(Section 5.2)** for details.
Technology Architecture Review	The underlying Technology Architecture is sound. See *Technology Architecture* **(Section 6)** for details.
Implementation Plan Assessment	The approach to solution implementation appears sound. See *Assessment of Implementation Plan* **(Section 7)** for details.
Cost Analysis and Model for Benefit Analysis	Cost analysis provides accurate annual cost. No monetary benefits defined. See **Cost Benefit (Section 8)** for details.
Impact Analysis on Net Operating Costs	Overall increase in Operating Costs, and as all Federally funded, a resulting increase in Federal Operating Costs per attached Project Cost spreadsheet.

1.3 Identified High Impact &/or High Likelihood of Occurrence Risks

Risk Description	State's Planned Risk Response	Reviewer's Assessment of Planned Response
See Risk Register		

1.4 Other Key Issues

Recap any key issues or concerns identified in the body of the report.

1. No other issues identified.

1.5 Recommendation

Provide your independent review recommendation on whether or not to proceed with this technology project and vendor(s).

The following recommendations are made relative to this pending project:

1. Address remaining Risk Register items in parallel with drafting of contract.
2. Complete contract drafting and then proceed with project unless contract terms and conditions not favorable.
3. Proceed with project initiation after above items completed.

1.6 Certification

I certify that this Independent Review Report is an independent and unbiased assessment of the proposed solution's acquisition costs, technical architecture, implementation plan, cost-benefit analysis, and impact on net operating costs, based on the information made available to me by the State.

e-Signed by David Gadway
on 2017-07-07 09:10:17 GMT
_____
Signature

July 07, 2017
_____
Date

1.7 Report Acceptance

The electronic signatures below represent the acceptance of this document as the final completed Independent Review Report.

e-Signed by Barbara Cormier
on 2017-07-06 18:19:44 GMT
_____
ADS Oversight Project Manager

July 06, 2017
_____
Date

e-Signed by John Quinn
on 2017-07-19 14:36:41 GMT
_____
State of Vermont Chief Information Officer

July 19, 2017
_____
Date

2. Scope of this Independent Review

Add or change this section as applicable.

2.1 In-Scope

The scope of this document is fulfilling the requirements of Vermont Statute, Title 3, Chapter 45, §2222(g):

The Secretary of Administration shall obtain independent expert review of any recommendation for any information technology initiated after July 1, 1996, as information technology activity is defined by subdivision (a)(10), when its total cost is $1,000,000 or greater or when required by the State Chief Information Officer.

The independent review report includes:

- An acquisition cost assessment
- A technology architecture review
- An implementation plan assessment
- A cost analysis and model for benefit analysis
- An impact analysis on net operating costs for the agency carrying out the activity
- A procurement negotiation advisory services contract (as needed)

2.2 Out-of-Scope

If applicable, describe any limits of this review and any area of the project or proposal that you did not review.

- Procurement Advisory Services.

3. Sources of Information

3.1 Independent Review Participants

List the individuals that participated in this Independent Review.

Name	Employer and Title	Participation Topic(s)
Amy Fowler	AOE Project Sponsor	Reviewed project budget, staffing and desired outcomes
Brian Townsend	AOE Director of Digital Services	Discussed project budget, data sources and desired outcomes
Michael Hock	AOE Director of Educational Assessment, and Project Manager for this project	Discussed project scope, project team, project approach, and desired outcomes
Jon Strazza	AOE State Assessment Coordinator	Discussed project scope and desired outcomes
Glenn Bailey	AOE Education Analysis & Data Management Director	Discussed data sources
Barb Cormier	ADS Oversight Project Manager	Project Management Oversight
Amber DeVoss	ADS Enterprise Architect	Discussed technology architecture
Glenn Schoonover	ADS Security Officer	Reviewed solution security
Barry Levine	Finance Officer, AIR	Discussed roles, responsibilities, pricing model, comparable projects, ability to meet security requirements, technical architecture, PM Approach, Implementation Approach, Risk Management Approach

3.2 Independent Review Documentation

Complete the chart below to list the documentation utilized to compile this independent review.

*All document sources are the Project SharePoint site unless otherwise noted

Document Name	Description	Source*
MSSA RFP Final.pdf	MSSA RFP issued by AOE/BGS	BGS
MSSA RFP bid summary.docx	Bid comparison among finalists	
eSignedAOE_Science_Assessment_IT_ABC_ Form 20170202Final.pdf	IT ABC Form	
MSSA_NGSS_Bid reviewer_Score sheet_breakdown.docx	Summary of Finalist scoring by Reviewer	AOE
AIR Cost Proposal_Vermont MSSA.pdf	AIR Cost Proposal	
AIR Technical Proposal_Vermont MSSA.pdf	AIR Technical Proposal	
MSSA NGSS Year 1 Schedule (VT).mpp	AIR Proposed Project Schedule for Year 1	AIR
MSSA NGSS Year 2 Schedule (VT).mpp	AIR Proposed Project Schedule for Year 2	AIR
SOV_AOE_MSSA_KickoffMeeting.docx	Agenda for Kickoff Meeting	
Multi-State Science Assessment_VT_Measured_Progress_ Response_Searchable_PDF.pdf	Finalist #2 Technical Proposal	
Multi-State_Science_Assessment_VT_ Measured_Progress_Cost_Proposal.pdf	Finalist #2 Cost Proposal	
VT MSSA Cost Proposal - CD.pdf	Finalist #3 Technical Proposal	
VT MSSA Technical Proposal - CD.pdf	Finalist #3 Cost Proposal	
VT MSSA Technical Redacted - CD.pdf	Finalist #2 Redacted Technical Proposal	

4. Project Information

4.1 Historical Background

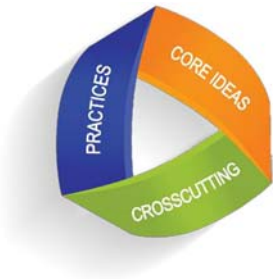
Provide any relevant background that has resulted in this project.

The State of Vermont Agency of Education has adopted the Next Generation Science Standards (NGSS), and therefore must assess student achievement against those NGSS standards in order to meet assessment requirements set forth in the US Department of Education Every Student Succeeds Act (ESSA).

The current assessment solution used by AOE, known as New England Common Assessment Program (NECAP), does not assess NGSS. As such, Vermont and Rhode Island have teamed up to seek an assessment contractor to assist with the design, development, and administration of **Science Tests** to be **administered annually** to **students at grades 5, 8, and 11**. This team is called **Multi State Science Assessment (MSSA)**.

NEXT GENERATION SCIENCE STANDARDS (NGSS)

Each of the MSSA states have either adopted the Next Generation Science Standards (NGSS) or adopted a set of state science standards that are tightly aligned with the NGSS. The states believe in the three-dimensional view of science learning expressed and demonstrated in the NGSS. Within the Next Generation Science Standards, there are three distinct and equally important dimensions to learning science. These dimensions are combined to form each standard – or performance expectations – and each dimension works with the other two to help students build a cohesive understanding of science over time. The Three Dimensions of Science Learning are represented by the graphic below:



Crosscutting Concepts
Crosscutting Concepts help students explore connections across the four domains of science, including Physical Science, Life Science, Earth and Space Science, and Engineering Design. When these concepts, such as “cause and effect”, are made explicit for students, they can help students develop a coherent and scientifically-based view of the world around them.

Science and Engineering Practices
Science and Engineering Practices describe what scientists do to investigate the natural world and what engineers do to design and build systems. The practices better explain and extend what is meant by “inquiry” in science and the range of cognitive, social, and physical practices that it requires. Students engage in practices to build, deepen, and apply their knowledge of core ideas and crosscutting concepts.

Disciplinary Core Ideas
Disciplinary Core Ideas (DCIs) are the key ideas in science that have broad importance within or across multiple science or engineering disciplines. These core ideas build on each other as students’ progress through grade levels and are grouped into the following four domains: Physical Science, Life Science, Earth and Space Science, and Engineering.

4.2 Project Goal

Explain why the project is being undertaken.

The primary goals of the project include:

1. Align science assessment with science standards being taught in Vermont schools.
2. Ability for test results to be machine-scored.
3. Increase quality and usefulness of assessment results.
4. Reduce time to score assessments.
5. Reduce costs over time through the user of computer-based testing vs. paper-based testing.

4.3 Project Scope

Describe the project scope and list the major deliverables. Add or delete lines as needed.

The primary outcome of the project is for the states of Vermont and Rhode Island to partner with an assessment contractor to assist with the design, development, and administration of **Science Tests** to be **administered annually** to **students at grades 5, 8, and 11**. The content and process types of questions on the Science Tests aligned to the **Next Generation Science Standards** (NGSS) as noted above.

It is expected that the contract period for the Science Tests described in this RFP will begin no later than **July 2017** and the contract period will continue **through December 2021**. The contract period will include the administration of a field test in **spring 2018** and three annual administrations of operational tests in **spring 2019, 2020, and 2021**. Specific scope of work items include:

1. Project Management
    a. PM Team
    b. Project Plan and Schedule
    c. PM Meetings
    d. Project Communication
2. Test Item Development
3. Test Construction
4. Test Design
5. Accessibility and Fairness
6. Scoring
7. Reporting
    a. Student
    b. School
    c. District
    d. State
8. Test Administration
9. Technology
    a. Secure
    b. Robust
    c. Redundant
    d. Reliable
10. Training
11. Technical Support Center

Additionally, the following **Non-Functional Requirements** have been discussed with AIR, but commitment to meeting these NFRs has not yet been confirmed. This is highlighted in the Risk Register.

Hosting

ID #	Non-Functional Requirement Description
H1	Any technical solution must be hosted in a data center.
H2	Any hosting provider must provide for back-up and disaster recovery models and plans as needed for the solution.
H3	Any hosting provider will abide by ITIL best practices for change requests, incident management, problem management and service desk.

Application Solution

ID #	Non-Functional Requirement Description
A1	Any solutions vendor must provide for the backup/recover, data retention and disaster recovery of a contracted/hosted application solution.
A1	Any solutions vendor must provide for the backup/recover, data retention and disaster recovery of a contracted/hosted application solution.
A2	Any solutions vendor must provide for application management and design standard of all technology platforms and environments for the application solution (Development, Staging, Productions, DR, etc.)
A3	Any solutions vendor must engage the State of Vermont using Service Level Agreements for system and application performance, incident reporting and maintenance.
A4	The State owns any data they enter, migrate, or transmit into the solution and the vendor shall allow the State to pull or copy this data at any time free of charge.

Security

ID #	Non-Functional Requirement Description
S1	Input validation
S2	Output encoding
S3	Authentication and password management
S4	Session management
S5	Access control
S6	Cryptographic practices
S7	Error handling and logging
S8	Data protection from unauthorized use, modification, disclosure or destruction (accidental or intentional).
S9	Communication security
S10	System configuration
S11	Database security
S12	File management
S13	Memory management
S14	Fraud detection
S15	General coding practices
S16	POA&M management
S17	Risk Assessment Practices including but not limited to vulnerability assessment and pen testing
S18	Incident response planning and testing
S19	System Security Plan delivery

4.3.1 Major Deliverables

See **Section 4.4** for a listing of Deliverables tied to Phase and Date.

4.4 Project Phases, Milestones and Schedule

Provide a list of the major project phases, milestones and high level schedule. You may elect to include it as an attachment to the report instead of within the body.

The **proposed** milestones/deliverables of the project are summarized in the table below. **The actual dates are not yet finalized at the time of the writing of this IR report.**

Please see **Assessment of Implementation Plan** (**Section 7**) for details on how the project is expected to be carried out.

Activity/Task within the Phase	Deliverables	Schedule	Acceptance Criteria
In-Person Meetings	Kick-off Meeting	7/18/17	Acceptance of Meeting Minutes
In-Person Meetings	Item Review Meeting	8/28/17	Acceptance of Meeting Minutes
In-Person Meetings	Bias and Sensitivity Meeting	8/31/17	Acceptance of Meeting Minutes
In-Person Meetings	TAC Meeting	10/16/17	Completion of Meeting
Training	On-Site Regional Training	10/31/17-11/3/17	Completion of Trainings
Online Systems	TIDE Go Live	11/14/17	Approval to open TIDE (after UAT)
Test Delivery System	MSSA Practice and Training Test Goes Live	12/4/17	Approval to open Practice Test (after UAT)
Test Delivery System	MSSA Field Test Goes Live	4/2/18	Approval to open test window (after UAT)

5. Acquisition Cost Assessment

List all acquisition costs in the table below (i.e. the comprehensive list of the one-time costs to acquire the proposed system/service). Do not include any costs that reoccur during the system/service lifecycle. Add or delete lines as appropriate. Based on your assessment of Acquisition Costs, please answer the questions listed below in this section.

The following chart represents the Acquisition Costs for the stated project period. Detailed composition of these numbers are found in the attached project cost spreadsheet.

IT Activity Lifecycle:	4 Years
Total Lifecycle Costs:	**$3.2M**
PROJECT COSTS:	***$610K***
Software Costs:	***$0***
Professional Services:	***$463K***
Internal Staffing:	***$114K***
Hosting:	***$0***
Other (ADS EA, IR):	***$33K***
OPERATING COSTS:	***$2.6M***
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Funding Source(s) and Percentage Breakdown if Multiple Sources:	Federally funded. See table below.

Funding Source(s) and Percentage Breakdown if Multiple Sources:

FUNDING SOURCE	% of TOTAL	FUNDING SOURCE DESCRIPTION	FUNDING APPLIED TO (Implementation or Operations)	FUNDING AMOUNT
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FEDERAL FUNDING: Implementation	.71%	IDEA (Individuals with Disabilities Education Act) Part B	Implementation	$22,880
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FEDERAL FUNDING: Operations	1.07%	IDEA (Individuals with Disabilities Education Act) Part B	Operations	$34,320
TOTAL:	**100.00%**			**$3,204,041**

5.1 Cost Validation

Describe how you validated the Acquisition Costs.

The Acquisition Costs were validated through the following methods:

1. Comparison of Hourly Rates of Similar Services
2. Comparison with Projects of Similar Scope
3. Comparison with Other Bidders

1. Comparison of Hourly Rates of Similar Services:

We assessed hourly rates for the Project Management role. With a total cost of $1,107,388 (including travel and related expenses) and stated hours of 1,640 for this role, the hourly rate calculates to $675. We also calculated the rate by reducing the fee by estimating $200K for travel and related expenses, with that hourly rate calculated at $553.

In either case, those rates are **high** compared to typical hourly rates for Project Management in this region, which range from $125-$250.

2. Comparison with Projects of Similar Scope:

Vendor was asked to name projects they've worked on which are similar in scope and budget, to which they provided the following:

> *We are currently developing and administering the NGSS science assessments for states including Connecticut, Hawaii, Utah, and West Virginia. In 2017 we successfully delivered the NGSS Field Test for Connecticut and West Virginia.*

While these projects are comparable in terms of Science content scope, there is not a good price comparison as Vendor does not have a standalone contract for Science assessment only.

We also assessed the cost of this MSSA project to the past SBAC project, as both projects assess certain topics. MSSA assesses Science, while SBAC assesses two topics, Language Arts and Math.

As highlighted in the chart below, the cost per test is **higher** with MSSA than with SBAC.

Much of the higher price can be attributed to two key factors:

1. The SBAC consortium is comprised of 3 members (VT, CT, NH) while the MSSA consortium is comprised of 2 members (VT, RI). As such, MSSA has a narrower base over which to spread costs.
2. The MSSA consortium has additional costs associated with developing their own items in order to meet state-specific science objectives, whereas the SBAC project uses the AIR-developed items.

	SBAC	MSSA
Annual Operating Costs:	$1,786,092	$648,538
Student Test Counts (SBAC student count comes from the 2016 SBAC ELA and Math tests which had students in Grades 3, 4, 5, 6, 7, 8, 11, while the MSSA student count comes from the 2016 NECAP Science tests for grades 4, 8, 11; MSSA tests will be for Grades 5, 8, 11)*:	83,125	17,677
Cost/Test:	$21	$37
Cost Difference as a Percentage:		71%

* Student test counts derived from the data in the following chart:

2016 NECAP Science Test Counts	**Student Count**
NECAP Science Grade 04	5,898
NECAP Science Grade 08	5,926
NECAP Science Grade 11	5,853
Total Science Tests	**17,677**
2016 SBAC English Language Arts Test Counts	**Student Count**
SB English Language Arts Grade 03	6,090
SB English Language Arts Grade 04	5,867
SB English Language Arts Grade 05	6,044
SB English Language Arts Grade 06	5,952
SB English Language Arts Grade 07	5,835
SB English Language Arts Grade 08	5,916
SB English Language Arts Grade 11	5,825
2016 SBAC Math Test Counts	**Student Count**
SB Math Grade 03	6,107
SB Math Grade 04	5,867
SB Math Grade 05	6,066
SB Math Grade 06	5,969
SB Math Grade 07	5,845
SB Math Grade 08	5,913
SB Math Grade 11	5,829
Total ELA and Math Tests	**83,125**

3. **Comparison with Other Bidders:**

Three finalist bids were evaluated, and as the table below shows, AIR is in the middle of the pack given the selected option AOE wishes to pursue (AIR Model #2). The figures represent total cost, with AOE costs expected to be 50% of the costs shown, with Rhode Island sharing the other 50% of those costs.

	17-18	18-19	19-20	20-21	Total
AIR Model 1[1]	$1,569,900	$1,491,296	$1,209,458	$1,209,458	$5,480,112
AIR Model 2[2]	$1,706,864	$1,628,260	$1,346,422	$1,346,422	$6,027,967
AIR Model 3[3]	$2,433,339	$2,354,735	$2,072,897	$2,072,897	$8,933,867
Vendor 2	$1,889,686	$1,959,587	$1,837,330	$1,829,073	$7,808,132
Vendor 3 Model 1[4]	$1,515,374	$1,614,233	$1,359,772	$1,480,329	$5,969,708
Vendor 3 Model 2[5]	$1,744,700	$1,734,682	$1,483,117	$1,633,110	$6,595,609

[1]Base price using AIR's proprietary item banks. AIR maintains ownership of the items.
[2]Base price plus $547,855 using item banks developed by a multi-state collaborative. Cost covers MSSA's contribution to the item banks. Collaborative states share ownership of the items. MSSA favors this option.
[3]Total cost of the contract if MSSA chooses to develop its own item banks. Vermont and Rhode Island maintain ownership of the items.
[4]Three Matrix Forms (administered in session 1) = Basic reporting.
[5]Six Matrix Forms (administered in session2) = Advanced reporting including linking of subscales across years and advanced analysis options002E

In summary, the VT project costs are **within a reasonable range** with other bidders on this project.

5.2 Cost Comparison

How do the above Acquisition Costs compare with others who have purchased similar solutions (i.e., is the State paying more, less or about the same)?

Point of Comparison	Measure
Hourly Rates:	Hourly rates are **high** compared to market rates.
Similarly Scoped Projects:	Cost comparison to other similarly scoped projects is **high**.
Comparison with other bidders:	Costs are **comparable** to other bids.

5.3 Cost Assessment

Are the Acquisition Costs valid and appropriate in your professional opinion? List any concerns or issues with the costs.

As outlined in the Cost Comparison **Section 5.2** above, in summary, project costs are **comparable** to other bidders, but the hourly rates and comparison to similarly scoped projects are **high**.

Additional Comments on Acquisition Costs:

None.

6. Technology Architecture Review

After performing an independent technology architecture review of the proposed solution, please respond to the following.

SUMMARY:

1. Design, development, and administration of Science Tests to be administered annually to students at grades 5, 8, and 11 to support ESSA (Every Student Succeeds Act) science assessment objectives.
2. Hosting environment provided Rackspace.
3. Internal Project Management, Subject Matter, and Data Analyst staff supporting the project.
4. See **Appendix 4** for detailed technology specifications.

1. State's IT Strategic Plan: Describe how the proposed solution aligns with each of the State's IT Strategic Principles:

i. Leverage successes of others, learning best practices from outside Vermont.
ii. Leverage shared services and cloud-based IT, taking advantage of IT economies of scale.
iii. Adapt the Vermont workforce to the evolving needs of state government.
iv. Apply enterprise architecture principles to drive digital transformation based on business needs.
v. Couple IT with business process optimization, to improve overall productivity and customer service.
vi. Optimize IT investments via sound Project Management.
vii. Manage data commensurate with risk.
viii. Incorporate metrics to measure outcomes.

b. The following describes how this project exploits these principles:

i. Leverage successes of others, learning best practices from outside Vermont.
   1. *The proposed solution is currently in use by several states, including Vermont. The only difference between the proposed solution and the current SBAC solution used by Vermont is the subject. The same exam "wrapper" will be used for Science, as it is now used with the SBAC Language Arts and Math exams.*

ii. Leverage shared services and cloud-based IT, taking advantage of IT economies of scale.
   1. *The solution is expected to be installed in an external data center (Rackspace).*

iii. Adapt the Vermont workforce to the evolving needs of state government.
   1. *The AOE workforce is already adept at using the proposed solution as noted above. Additionally, the data from the proposed solution will also be used by data consumers outside of AOE (teachers, students, Principals, SU/SD and public) through the existing data reporting portal on the AOE web site.*

iv. Apply enterprise architecture principles to drive digital transformation based on business needs.
   1. *If Enterprise Architecture is defined as "alignment between IT and business concerns: to guide the process of planning and design the IT capabilities of an enterprise in order to meet desired organizational objectives", then this project deploys such principles to drive digital transformation of business needs by*

utilizing computer-based testing vs. pencil and paper testing, as well as machine (computer) scoring. Additionally, the scoring method is expected to improve data accuracy and as a result, data usefulness.

v. Couple IT with business process optimization, to improve overall productivity and customer service.
   1. *There are expected to be improvements in productivity through administering computer-based testing vs. pencil/paper testing. There are expected to be improvements is scoring quality due machine scoring vs. human scoring. There are no obvious customer service improvements.*

vi. Optimize IT investments via sound Project Management.
   1. *Both the vendor and SOV are expecting to provide sound Project Management services on this initiative.*

vii. Manage data commensurate with risk.
   1. *The approach to data security is sound. See the SECURITY section below.*

viii. Incorporate metrics to measure outcomes.
   1. *The very purpose of this project is measuring outcomes… of science knowledge.*

2. **Service Level(s):** What is the desired service level for the proposed solution and is the technical architecture appropriate to meet it?

   See Service Level Agreement section. Proposed SLAs demonstrate gaps.

3. **Sustainability:** Comment on the sustainability of the solution's technical architecture (i.e., is it sustainable?).

   The proposed solution is to be built on Microsoft platform (.NET development toolset and Microsoft SQL Server Standard database). Solution is expected to be sustainable.

4. **License Model:** What is the license model (e.g., perpetual license, etc.)?

   Not applicable, as no software or hardware is being licensed.

5. **Security:** Does the proposed solution have the appropriate level of security for the proposed activity it will perform (including any applicable State or Federal standards)? Please describe.

   The overall Application and Data Security Model is very strong. See details below.

   Security Architecture and Design: *Describe the Vendor's proposed approach to support technical controls and technology solutions that must be secured to ensure the overall security of the System.*

   a. **Application Security**: Applications are password protected and password complexity requirements are enforced, periodically audited, and require periodic revision. Role-based permissions restrict authorized users' access to functionality and data. The systems also restrict district and school user access by jurisdiction, allowing access only to those students over whom the user has legitimate educational jurisdiction.

      AIR systems use role-based security models that ensure that users access only the data to

which they are entitled and that limit their ability to change that data according to their rights. User rights have two dimensions: (1) the user's role and (2) the user's data access rights (his or her jurisdiction). The user's role determines what actions a user can take, which types of reports he or she can view, and similar functional limitations. Data access rights tell, for example, which principal can view which teacher and student data. Data access rights are governed by relationships among entities in the Roster Tracking System (RTS), along with a configurable set of business rules.

AIR has chosen OpenAM as the single sign-on system. OpenAM is an open-source access management solution and a federation server platform.

The secure browser locks down the computer, preventing the student from navigating away from the test or starting other software. It also disables keystrokes that can threaten the security of the test. For example, the secure browser disables screenshots and navigation and prevents test-takers from viewing the source and opening the "taskbar." It continuously monitors other activity on the computer for possible threats and terminates testing if a threat is detected.

b. **Data Security:** Vendor indicates that their systems protect individual privacy and confidentiality in a manner consistent with state privacy laws, Family Educational Rights and Privacy Act (FERPA), and other federal laws. All sensitive data are encrypted using strong ciphers that meet FIPS-140 guidelines. All student PII is encrypted both at rest and in transit. For data exchanges between systems, secure data transfer systems are used and/or data is digitally signed using FIPS-140 compliant hashes for non-repudiation. When data gets stored, it resides securely on database servers behind multiple firewalls and is secured through an encrypted connection.

   Vendor implements a two-part procedure to prevent access to student personally identifiable information (PII) even in the unlikely event of a breach. The strategy is to (1) limit exposure of the identifying information and (2) encrypt that data where it absolutely must appear. Most systems carry only an AIR-assigned, arbitrary student identifier for each student. Only a single system links that data to the student's statewide ID and name, and that system encrypts those fields. Systems needing this information request the encrypted data. The key needed to decrypt these data is stored on a server without any external access and is only accessible to the servers running AIR systems.

   All student PII is stored in 3DES encrypted form in the demographics databases. For each student imported through the Test Information Distribution Engine (TIDE), an internal unique key for the student is generated. This surrogate key is used within AIR systems to track students' test progress and testing history. This ensures that student demographic data is never duplicated into any other system databases and remains centralized in the demographics servers. The keys used to encrypt/decrypt the demographic data are themselves secured and stored on a different set of dedicated servers and can be accessed only through a secure interface.

c. **Physical Security**: Data will reside on servers at **Rackspace**, the proposed hosting provider. Rackspace maintains 24-hour surveillance of both the interior and exterior of its facilities. Physical security at Rackspace is summarized as follows:
   a. Data center access limited to authorized Rackspace data center personnel Keycard protocols;
   b. Thorough background security checks for every data center employee;

c. Biometric scanning for controlled data center access;
d. Security camera monitoring at all data center locations; around-the-clock interior and exterior surveillance;
e. 24/7 onsite staff provides additional protection against unauthorized entry;
f. Unmarked facilities help maintain low profile;
g. Physical security includes locking down and logging all physical access to servers at the data center;
h. Physical security audited by an independent firm.

Additionally, every AIR location has card-controlled access. In the main office, card entry is not required for the building during business hours, but is required for entry onto any of the floors where work is done. The entry is monitored by a guard at all times when the exterior doors are not locked.

d. **Network Security**: Hardware firewalls protect networks from intrusion. They are installed and configured to prevent access for services other than hypertext transfer protocol secure (HTTPS) for secure sites. Firewalls provide a first level of defense against intrusion, backed up by a capable second line: hardware and software intrusion detection and remediation. All secure data transmitted across the public Internet are encrypted using secure shell (SSH) advanced encryption standard (AES) or an Internet protocol security (IPSec) virtual private network (VPN). Secure websites encrypt data using 128bit secure sockets layer (SSL) public key encryption. The intrusion detection systems constantly monitor network traffic and raise alerts for suspicious or unusual network traffic. The systems maintain security and access logs that are regularly audited for login failures, which may indicate intrusion attempts. Suspicious log entries are investigated and resolved. The hosting environment is protected by an AlertLogic Threat Manager Intrusion Prevention System (IPS) appliance at the perimeter and by Symantec Antivirus Corporate Edition on each individual server. The AlertLogic IPS appliance combines intrusion protection and vulnerability management technology into a single integrated solution that offers both proactive and reactive protection from the latest threats. Symantec Antivirus offers real-time virus and malware protection for the servers along with centralized management and administration capabilities.

e. **Personnel**: AIR personnel undergo background checks and participate in extensive security training, which is updated and revisited periodically. At the time of onboarding, all AIR personnel are required to take the AIR Security Awareness Training, which presents the risks most likely associated with AIR information systems and provides guidelines to protect against those risks. They are required to read and sign the AIR Information and Communication Technologies Policy, which covers the use of information and communication technologies in all forms, including use of information and communication equipment, devices, networks, software, and the communication and management of information. Additionally, all AIR Assessment staff are required to take the AIR Assessment Confidentiality and Security Presentation, which includes separate state-specific privacy policy documents.

Security position relative to NIST 800-53 V4:
AIR follows the 20 NIST CIS critical controls, which maps to these priority controls. AIR regularly audits their stance and makes improvements to address weaknesses in security controls.

Incident Response
Vendor contracts with Mandiant to provide incident response and digital forensics support when needed (to augment AIR internal capabilities).

1. Incident response: Respond with incident response support that may entail onsite response. This includes identification of malware, containment, eradication, and recovery (in coordination with AIR internal resources).
2. Digital forensics: Perform digital forensics to try to determine source, method, motive (if possible), exfiltration analysis, and scope of attack. This may involve host level, hard drive, memory, and network forensic methods.

Static Code Review Findings:
No results provided.

Penetration Test Findings:
Vendor does regular penetration testing with internal staff and third-party organizations. Vendor is willing to discuss those results with AOE on a fee basis. Vendor also willing to have AOE pay to have penetration tests done on their own behalf.

6. **Hosting Environment**
    a. Application is hosted at Rackspace Data Center.
    b. See the **HOSTING** section in **Appendix 4** for details.

7. **Compliance with the Section 508 Amendment to the Rehabilitation Act of 1973, as amended in 1998:** Comment on the solution's compliance with accessibility standards as outlined in this amendment. Reference: http://www.section508.gov/content/learn

   The solution is expected to comply with Section 508 Amendment to the Rehabilitation Act of 1973, as amended in 1998 through AIR's WCAG 2.0 AA certification (Web Content Accessibility Guidelines).

8. **Disaster Recovery:** What is your assessment of the proposed solution's disaster recovery plan; do you think it is adequate? How might it be improved? Are there specific actions that you would recommend to improve the plan?

   Please see Disaster Recovery/Business Continuity (DR/BC) section described in **Appendix 4**.

   In summary, the DR/BC plan does not appear adequate and is noted in the Risk Register.

9. **Data Retention:** Describe the relevant data retention needs and how they will be satisfied for or by the proposed solution.

   Please see Backup/Recovery section described in **Appendix 4**.

   In summary, the Data Retention plan adequately addresses the needs of AOE.

10. **Service Level Agreement:** What is your assessment of the service level agreement provisions that the proposed vendor will provide? Are they appropriate and adequate in your judgment?

    In summary, the SLAs proposed and methods of support proposed by Vendor are the same as those currently in place through the SBAC project. Details are described below.

SUMMARY OF SLAs provided by Vendor:

HELP DESK SUPPORT - SERVICE LEVEL AGREEMENT:

Customer Service Window meets the RFP requirement of e-mail, chat, and help desk **Monday through Friday from 7:00 a.m. EST/EDT through 4:00 p.m. EST/EDT**.

Customer Service Help Desk support is provided as described below:

Tier 1: Support consists of scripted answers and the resolution of routine queries by help desk agents. Typical cases at this level include the following:

1. Answering password reset requests;
2. Adding and/or deleting students;
3. Adding and/or deleting users;
4. Performing testing restarts or invalidations;
5. Answering testing policy questions such as setting accommodations.

Tier 2: Inquiries of a technical nature and specific to AIR's systems that require more involved technical support are escalated to be resolved by staff with relevant degrees (e.g., computer science, information systems) and networking experience. Typical cases at this level include the following:

1. Resolving a test session interruption;
2. Responding to requests to restart a test;
3. Answering questions about data;
4. Supporting text-to-speech functionality;
5. Performing test invalidations.

Tier 3: Unresolved issues are escalated to be resolved by senior subject matter experts. Typical cases at this level include the following:

1. Answering item content questions;
2. Performing software enhancement requests;
3. Resolving a software bug.

SYSTEM RESPONSE TIME - SERVICE LEVEL AGREEMENT:

1. No SLA defined. This is highlighted in the Risk Register.

SYSTEM AVAILABILITY - SERVICE LEVEL AGREEMENT (3 9s, 4 9s?):

1. AIR proposes 99% up time (14m, 24 s downtime/day). However, during the SBAC project, AOE requested 99.5% (7m, 12s downtime/day).
2. So long as AOE accepts the 99% up time, the solution meets AOE needs. Should AOE want 99.5% up time, the contract should reflect that requirement. This is highlighted in the Risk Register.

BUG FIX – SERVICE LEVEL AGREEMENT:

1. No SLA defined. This is highlighted in the Risk Register.

HOSTING SERVICE LEVEL AGREEMENT:

1. No SLA defined. This is highlighted in the Risk Register.

DR/BC DESCRIPTION AND SERVICE LEVEL AGREEMENT:

1. Primary data center is located at Rackspace.
2. No failover data center. This is highlighted in the Risk Register.
3. RPO (recovery point objective): Measured in seconds and not more than minutes.
4. RTO (recovery time objective): Approximately 1 week. This is highlighted in the Risk Register.

11. **System Integration:** Is the data export/reporting capability of the proposed solution consumable by the State? What data is exchanged and what systems will the solution integrate/interface with*?* ***Please create a visual depiction*** and include as **Appendix 1A** of this report. Will the solution be able to integrate with the State's Vision and financial systems (if applicable)?

    System integration is adequate for this project. See **Appendix 1A** for details.

Additional Comments on Architecture:

None.

7. Assessment of Implementation Plan

7.1 Implementation Readiness

After assessing the Implementation Plan, please comment on each of the following.

1. **The reality of the implementation timetable**
    a. Implementation: 10 months (July, 2017 - May, 2018)
    b. Operations: 38 months (May, 2018 – June, 2021)
    c. See **Section 4.4** for Deliverables/Milestones schedule.

    This is a reasonable schedule given the vendor experience with other similar projects.

2. **Training of users in preparation for the implementation**

    The vendor approach to training, described below, appears sound, and has worked well with Vendor's other clients. This training approach appears adequate.

    Types of Training

    1. Certifying school and Local Education Agency (LEA) staff to serve as test administrators through an online Test Administrator Certification Course;
    2. Providing annual, face-to-face training for LEA assessment directors on all components of the online system and the new assessments for the first two years;
    3. Providing AIR project staff to work with states to conduct annual test administration and security training for school and LEA staff;
    4. Providing self-paced, online modules covering specific topics;
    5. Providing user guides for each component of the online system to support trainings for schools and LEAs.

    Approach to Training

    Vendor proposes a training plan for LEA assessment directors, school administrators, and technology coordinators, as well as teachers and test administrators. Existing Vendor systems training modules will provide the foundation for training, along with other training materials as required by the State.
    The proposed plan includes four on-site training sessions annually for the first two years, and a series of webinars, presentations, and self-guided and self-paced tutorials on each of the online systems to support the on-site trainings and annual assessment administrations. The web-based trainings are available to users at any time on the portal and will serve as stand-alone trainings for all years of the contract. The training materials are designed to teach both sophisticated technology users and users new to the systems their roles and responsibilities in the context of the new online systems. While sophisticated users may not need instruction on all steps of a specific function and can progress to the point in the training they find useful, new system users typically find it useful to have instruction at a very detailed level.

    The on-site training assumes four half-day regional trainings during the first two years of the program. Vendor proposes to replace these webinars or self-paced, online training in subsequent years.

A detailed description of proposed training presentations and materials is shown in the table below, and explained following the table:

Presentation Title and Primary Audience	Proposed Training Topics	Proposed Training Formats
Training Phase I: Preparing for Online Testing		
User Roles: Teachers, Assessment Directors, Test Administrators, Technology Coordinators, School Administrators	User roles: Who does what and in which system?	1. User role chart 2. Will be a component of each webinar and on-site training
Technology Requirements For Online Testing: Technology Coordinators	Steps for secure browser installation and minimum hardware requirements.	1. Webinar presentation 2. Instructions on portal
TIDE: Registering Users and Modifying Student Settings	Learn how to register users in the Test Information Distribution Engine (TIDE), update student test settings and restrictions.	1. Webinar presentation 2. On-site training 3. Online module
Training Phase II: Administering Online Tests		
Online Test Administrator Certification Course: Test Administrators, Proctors, Teachers	Learn how to use the new online testing system, set up a test session, manage and monitor testing, assist students with online tools, and understand accessibility and accommodations. Certification earned only through passing mandatory quiz.	1. Online test administration certification course
Online Practice Tests: Test Administrators, Educators	Practice setting up, pausing, resuming, and ending live test sessions, and setting accommodations, using the same functionality as the operational test administrator site.	1. Online practice tests
Online Practice Tests and Training Tests: Students, Parents, Educators	Practice signing in to a live test session, using the same functionality as the operational student testing site, including using text-to-speech, zoom, highlighter, and strike-through, and answering all item types.	1. Online practice tests
How to Start and Monitor Online Testing and Modify Test Settings: Test Administrators, Teachers	Learn how to set up a test session, modify test settings, and monitor participation in multi-opportunity testing. Additionally, learn how to reset and invalidate tests.	1. Webinar presentation 2. On-site training 3. Online tutorial
Training Phase III: Post-Testing		
How to Use the Online Reporting System: Teachers, School Administrators, Assessment Directors	Learn how to access student scores, create class rosters, and drill down from district and school results.	1. Webinar presentation 2. On-site training 3. Online tutorial
Data Analysis Webinar: How to Use the Data in the ORS: Teachers, Principals, Assessment Directors	Learn how to use the data in the online reporting system (ORS) to understand incoming students, monitor their progress throughout the year and reflect on teaching practices. Also learn how to analyze class data to identify instructional strengths and weaknesses, measure growth, and identify trends across years.	1. Three Webinar presentations

User Role Chart. This reference document indicates, at a glance, the access each user role is permitted in each online system. System access for each user role will be reviewed in each webinar, as appropriate. The user role chart will be posted on the portal and will be available in the manuals and form part of the online, self-guided tutorials as determined in collaboration with the State.

Technology Requirements for Online Testing. This training includes information for school and district network administrators, provides guidelines for varied technical setup, and lists technical support available at the schools. Technical setups include multiple secure browser installation methods such as manual installation on individual machines, installation on machines through a network, access from a shared network drive, and thin-client setup. Minimum hardware requirements will also be reviewed in detail.

How to Use TIDE. This training includes instructions on how to add users at the district and school level so they can access appropriate online systems. The training will also cover other TIDE functionality including updating student test settings and using the test management reports. This content will be delivered in a webinar and module format and also during the on-site trainings.

Online Test Administrator Certification Course. This self-paced course includes detailed instruction on creating and managing test sessions, monitoring student activity, setting accommodations, and implementing test security measures. The course is designed to familiarize test administrators with the student interface, the approval process, and the tools students will use during testing. To ensure course-takers have learned the skills necessary to proctor tests using the new online system, each user must complete the course, including quiz, and sign a test security agreement form before being permitted to sign in to the online testing system. Users who need to refresh their memory of course content can retake the course as many times as needed. For on-site trainings and certification, the test security agreement (compliance form) will be made available on paper for test administrators to sign.

Online Practice Tests. Online practice tests for all assessments will be available prior to the opening of the test window. Each practice test will be composed of approximately 20 items that are a subset of the blueprint for the operational test, thus providing users with exposure to all item types. The online practice test site uses the same applications as the operational test site, such as the test administrator interface, the student interface, and the test management reports. This design ensures that students, educators, and teachers become familiar with the online testing system before operational testing begins. In addition, user guides and systems documentation will be made available when the online practice tests open to help educators prepare their materials prior to testing. The online practice tests will be available throughout the test window.

Webinar for Test Administrators: How to Start and Monitor Testing and Modify Test Settings. This training includes the same content as the online Test Administrator Certification Course but will also be delivered in a webinar and during the on-site trainings.

Webinar on How to Use the Online Reporting System. This training teaches authorized users how to access and correctly interpret performance reports. Users learn how to view district, institution, personnel, roster, and individual student reports in table and graph format; access and use longitudinal reports for their diagnostic need; aggregate or disaggregate scores; filter performance reports by student subgroup (i.e., gender, ethnicity, English language learner); and manage online rosters (groups).

Data Analysis Webinar. How to Use the Data in the Online Reporting System. Users will also be trained on how to interpret the information in ORS for use in the classroom and be able to explain the reports and scores to parents and guardians. This training will include information on the following topics: standard error, how to use the vertical scale to identify criterion-referenced measure of growth, how to identify instructional strengths and weaknesses in schools and districts, interpreting grade-to-grade gain scores,

and limitations on growth inferences across multiple grades. Along with training on the ORS during on-site trainings, there are three live webinar trainings to support the on-site trainings and the delivery of performance reports. A module of this content will also be made available.

Each year, Vendor will collaborate closely with the State to update the set of webinar presentations and online tutorials as needed. In the first year, Vendor focuses all presentations on the basics of the program and the features of the online systems. In subsequent years, Vendor focuses on the updates to each system and provide basic refresher training on each system. Vendor will present a training plan to the State on May 1 of each year.

3. Do the milestones and deliverables proposed by the vendor provide enough detail to hold them accountable for meeting the Business needs in these areas:

A. Project Management
B. Design and Development
C. Testing
D. Change Management
E. Conversion/Migration
F. Implementation
G. Training (see above)

Please see Deliverables/Milestones Section (**Section 4.4**) for detail on Milestones and Deliverables.

There is sufficient detail where the Vendor can be held accountable for the items listed above.

4. Does the State have a resource lined up to be the Project Manager on the project? If so, does this person possess the skills and experience to be successful in this role in your judgement? Please explain.

a. AOE has assigned Michael Hock as Project Manager to this effort. Mr. Hock is expected to allocate up to 30% of his time to this effort during implementation, and 20% of his time during operations. Mr. Hock successfully Project Managed the implementation of the SBAC solution for AOE in 2014.
b. Vendor has one staff member assigned to this effort for PM services, as described below.
c. In summary, Project Management approach, resources, time allocation and skill set, are adequate.

5. Readiness of impacted divisions/departments to participate in this solution/project

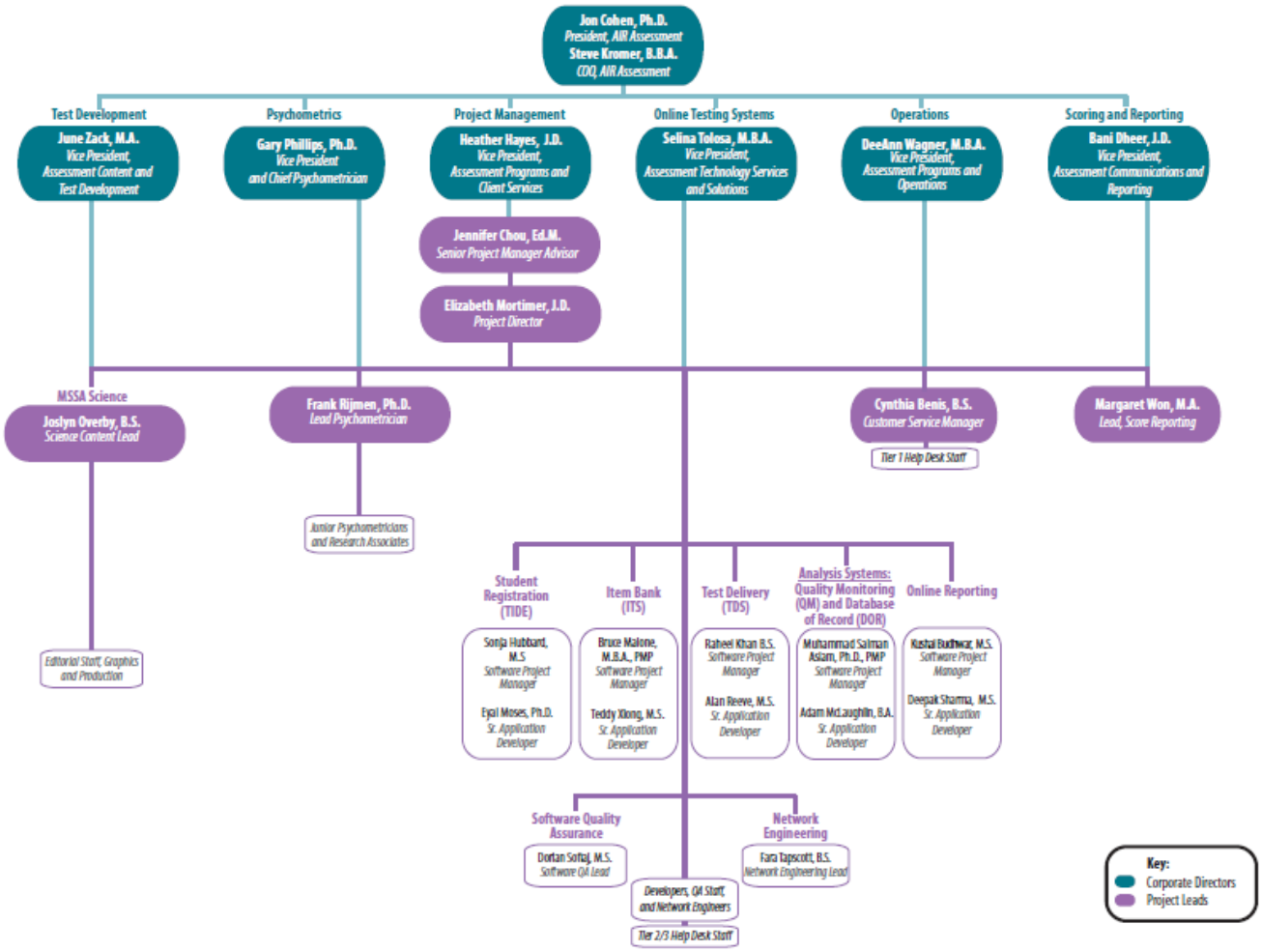
a. AOE has assembled the following team for this project:

i. Executive Project Sponsor, Secretary: Rebecca Holcombe
ii. Project Sponsor, Deputy Secretary: Amy Fowler
iii. Project Manager, Director of Educational Assessment**:** Michael Hock
iv. IT Director: Brian Townsend
v. State Assessment Coordinator: Jon Strazza
vi. ADS Oversight Project Manager: Barbara Cormier
vii. ADS EA Architect: Amber DeVoss
viii. ADS Security Officer: Glenn Schoonover

b. Vendor Project Team and time allocation:

i. Project Director: Elizabeth Mortimer, 70-80%
ii. Science Content Lead: Joslyn Overby, B.S., 15%
iii. Psychometrician: Frank Rijmen, Ph.D., 25-35% in Year 1, 25% in Year 2 and 20% in future years

c. Vendor Project Organization Chart:



Based on our experience conducting IRs, when comparing this project to other technology projects, both the vendor and department staff appear to be fully prepared to undertake a project of this scope.

Additionally, Vendor has delivered on a project of this scope with AOE in 2014, and the proposed solution and methodology are the same as that project.

6. Adequacy of project management, design and development, testing, change management, conversion/migration, and implementation plans

This section describes Vendor's approach to **Project Management**.

Vendor's approach to Project Management is centered on standardized processes and documents, which produce the following suite of documents:

1. **Schedules**. Schedules are produced at the Program, Team, and Task level.
2. **Planning Documents.** These documents help staff to plan complex activities by outlining the general approach, assigning responsibilities, and establishing milestones.
3. **Tracking Documents.** Project managers create tracking documents to monitor project status, coordinate work among internal teams, and communicate progress toward milestones.
4. **Specification Documents.** Each of the systems and processes is guided by a specification document that has formal review and sign-off procedures. All specification documents are subject to project change request (PCR) process.

SCHEDULES

Schedules are produced on three levels:

Program Level: The Vendor produces the overall Project schedule. The project schedule documents all work-start and completion/delivery dates for key activities, milestones, and deliverables, using Microsoft Project.

Team Level: Development of Team schedules. The Test Development team will work with key content personnel at the State to develop detailed committee meeting schedules and batch delivery schedules that document when batches of items will be delivered for review. The Psychometrics and Statistics team will develop an analysis schedule that identifies milestones in the data receipt, analysis, and delivery schedules. Some of these schedules are entirely internal, designed to enable team to meet the milestones on time according to the project schedule.

Task Level: Development of Task-specific Schedules, such as the quality control of scoring data, which includes tasks that require interaction with the State. These schedules will be developed in collaboration with the appropriate State staff.

PLANNING DOCUMENTS

Planning documents kick off complex activities. They outline the general approach to the activity, assign responsibilities, and establish milestones. Some of these milestones may be further specification documents or elements needed to complete the plan. For example, the project director produces a summary for each administration, outlining the basic information about the administration, including characteristics such as the grades and subjects available for testing, the number of opportunities offered for each, the number of field-test items to be included, and the start and end dates of the testing window. The Test Development team uses this document as a starting point for the item development plan, and the Psychometrics and Statistics team uses this document to begin developing the field-test plan and analysis schedule.

TRACKING DOCUMENTS

The Project Management team relies on several tracking documents to monitor project status, coordinate work among internal teams, and communicate progress toward milestones. For example, to coordinate the many deliverables exchanged between Vendor and clients, the operations lead maintains (and shares with clients) a priority list of deliverables that are currently in play (e.g., blackline 1 of the Test Coordinator Manual). The priority list identifies the document name, the responsible party, the date the document is due to be

returned, and the date the document is due to be finalized. This document also assigns a priority level to help clients manage and prioritize work during busier times in the schedule.

SPECIFICATION DOCUMENTS
The team leads work with clients to develop detailed specification documents. Specification documents function as the detailed requirements documents for each phase of the program. For example, the Communications and Reporting team will work with the State staff to develop a detailed reporting specification document that includes lists of reports to be produced, descriptions of report recipients, packaging specifications for paper reports, calculation rules for each data element, and other details of the reporting system. This document will usually be created in collaboration with the lead psychometrician and the technical, content, and leadership staff at the State. Each document has an owner and a list of stakeholders. The owner is the person responsible for keeping the document up to date and ensuring that all stakeholders sign off on any changes to the document

This section describes vendor's approach to **Design and Development**.

Traditional solution **Design and Development** is not applicable for this project as the Vendor solution is already built. However, teams comprised of members from VT and RI will participate with Vendor in developing test items. The approach outlined by AIR in the proposal, both in science as well as other content areas such as math and English language, have proven successful. See Vendor proposal for additional detail.

This section describes vendor's approach to **Testing**.

Software Quality Assurance (QA)
Vendor QA process involves everyone from the senior project director through the developers and QA engineers and leads. The QA process begins with requirements definition. As requirements for a system or modification are developed, the Software Project Manager (SPM) works with the QA engineer and lead to begin development of the QA design. Once requirements are complete, the SPM, QA lead, QA engineer, and lead developers work together to produce a multifaceted QA plan, which is then implemented during development (unit testing) and after development (integration testing).

User Acceptance Testing (UAT)
Vendor uses a tracking spreadsheet to document and track issues discovered in UAT and their resolution. Any issues discovered during UAT is then logged into the JIRA system where it is assigned to a developer and electronically monitored.

Each system has a UAT document that contains a list of test cases. The following is an example from the TIDE UAT document:

Upload Users Test Cases

Action	Expected Result	Pass/Fail
Open the **Users** accordion and click **Upload Users**.	The Upload Users page appears.	
Click **Download Templates** and select **Excel** or **CSV**.	The browser downloads or opens the file.	
Review the headings in the downloaded file.	The headings match those in the specs or in the user guide.	
If downloaded an Excel file and if the Excel file has validations, display those validations by clicking with the mouse.	The validations match the valid values listed in the specs or in the user guide.	
Compose the upload file.	N/A	
Click **Browse** and navigate to the upload file.	N/A	
Click Next.	A preview page appears listing the values.	
Click Next.	A validation report appears.	
Click **Continue with Upload**.	A confirmation report appears indicating records that were committed.	
Using the test View and Export Users, retrieve one of the users included in the upload file.	Uploaded record appears in the retrieval.	

This section describes Vendor's approach to **Change Management**.

The purpose of change management is to ensure that requested changes to project deliverables are communicated, managed, and controlled in a manner that avoids incorrect implementation or misunderstandings that would unduly impact users in the field.

This is accomplished by working with the Department to clearly define the change control processes during the planning stage so that when change requests surface, there will be no confusion about roles, responsibilities, and process requirements. Uncontrolled change management can negatively impact budget, scope, schedules, and project quality. Using industry recognized project management approaches to change management, Vendor pledges to manage project tasks in a thoughtful and forthright manner that outlines all possible avenues of achieving the desired objective while being duly conscious of project scope and budget.

As plans and objectives can evolve and change frequently, having a structured process for gathering, tracking, and disseminating changes to project specifications is critical. Vendor uses Accompa to manage program business and functional requirements, track use cases and UAT outcomes, submit project change requests, and export this information in useful reports that can be used to track adherence to the project implementation plan. The information can be reviewed via regular planning meetings, weekly project update meetings, project issue logs, and progress reports. The Vendor program manager will produce weekly reports for the Department that will include status of items such as deliverables, key accomplishments, upcoming activities, any changes to the schedule, or any issues. Decisions are documented in the meeting minutes and in the issues log, which is updated weekly and tracks issues and near-term deliverables.

A potential change will be identified and documented on a change request form and sent to the program manager. The program manager will log all change requests into the change control log and then assign a

subject matter expert (SME) to analyze the impact of the change request on the scope/deliverables, schedule, budget, and overall project quality. The SME analyzes the request and documents the impact including the feasibility of making the change and any impacts and risks associated with the change. In some instances, it may be necessary to define the impact if the change is not made. The program manager will review the analysis and provide it to the key stakeholders, including the Department, to either authorize or reject the change. Whether the change is approved or rejected, the program manager will update the change control log to reflect the updated status.

Changes are reflected in the appropriate communication documents through a coordinated process. The program manager is responsible for communicating the changes to the document owner, who reviews the changes and amends the document. The document is then routed to each stakeholder who has subscribed to the document. Changes to the document are not final until they receive signoff from each stakeholder. The document owner is responsible for ensuring that the changes are accurately drafted, reviewed, and accepted by each stakeholder, including the Department.

This section describes vendor's approach to **Conversion/Migration**.

Conversion/Migration is not part of the scope of work for this project.

This section describes vendor's approach to **Implementation**.

The traditional definition of "Implementation" is not a term that applies to this project, as the critical deliverable is annual Student Test Delivery, using the proposed solution as the "wrapper" around the Test Items (test questions). In short, this is a services contract vs. delivery of a software product going into production.

As such, "Implementation" is described through the support process outlined below, which is put into action at the time of annual Student Test Delivery each May:

> Vendor Customer Service Center provides support across all technology environments to ensure successful online testing. Vendor customer support agents are available well in advance of the test administration to ensure successful set up. Schools can call the toll-free customer support number during support hours several weeks before testing begins. Agents will be available to walk technology coordinators and other callers through all preliminary setup issues that may arise and are trained in setup procedures for all of the technology environments Vendor has encountered across the many states in which they work. For example, the secure browser installation manual explains installation procedures for a wide range of technology platforms including Windows, Max, Linux, and mobile devices such as Chromebooks. The customer support agents are intimately familiar with installing the secure browser on different platforms and operating systems. The agents are also trained to provide support for enabling text-to-speech in various technology environments.
>
> Vendor's help desk is structured around three tiers staffed with team members who are well-trained and knowledgeable about policies and procedures that are specific to each state. See the Service Level Agreement in **Section 6** above for a detailed description of the tiered structure of the help desk.

In summary, the **Implementation** approach appears sound and adequate.

7. Adequacy of agency and partner staff resources to provide management of the project and related contracts (i.e. vendor management capabilities)

Both Vendor and AOE demonstrate adequate support in this area. See section above regarding Project Management assignments from both Vendor and AOE.

8. General acceptance/readiness of staff

The overall Acceptance and Readiness of staff is strong, particularly as the proposed solution is in place through the SBAC project, and as such, both the solution and Vendor are known quantities.

Additional Comments on Implementation Plan:

None.

7.2 Risk Assessment & Risk Register

*After performing a Risk assessment in conjunction with the Business, please create a **Risk Register** as an **Appendix 2** to this report that includes the following:*

1. ***Source of Risk**: Project, Proposed Solution, Vendor or Other*
2. ***Risk Description**: Provide a description of what the risk entails*
3. ***Risk ratings to indicate**: Likelihood and probability of risk occurrence; Impact should risk occur; and Overall risk rating (high, medium or low priority)*
4. ***State's Planned Risk Strategy**: Avoid, Mitigate, Transfer or Accept*
5. ***State's Planned Risk Response**: Describe what the State plans to do (if anything) to address the risk*
6. ***Timing of Risk Response**: Describe the planned timing for carrying out the risk response (e.g. prior to the start of the project, during the Planning Phase, prior to implementation, etc.)*
7. ***Reviewer's Assessment of State's Planned Response**: Indicate if the planned response is adequate/appropriate in your judgment and if not what would you recommend.*

See **Appendix 2.**

Additional Comments on Risks:

Items identified in Risk Register should be reduced to medium or low risk.

8. Cost Benefit Analysis

This section involves four tasks:

1) *Perform an independent Cost Benefit Analysis.*

2) ***Create a Lifecycle Cost Benefit Analysis spreadsheet*** *as an* ***Appendix 3*** *to this report. A sample format is provided.*

a) The cost component of the cost/benefit analysis will include all one-time acquisition costs, on-going operational costs (licensing, maintenance, refresh, etc.) plus internal costs of staffing and "other costs". "Other costs" include the cost of personnel or Vendors required for this solution, enhancements/upgrades planned for the lifecycle, consumables, costs associated with system interfaces, and any costs of upgrading the current environment to accept the proposed solution (new facilities, etc.).

b) The benefit side of the cost/benefit will include: 1. Intangible items for which an actual cost cannot be attributed. 2. Tangible savings/benefit such as actual savings in personnel, Vendors or operating expense associated with existing methods of accomplishing the work which will be performed by the proposed solution. Tangible benefits also include additional revenue which may result from the proposed solution

c) The cost benefit analysis will be for the IT activity's lifecycle.

d) The format will be a column spreadsheet with one column for each year in the lifecycle. The rows will contain the itemized costs with totals followed by the itemized benefits with totals.

e) Identify the source of funds (federal, state, one-time vs. ongoing). For example, implementation may be covered by federal dollars but operations will be paid by State funds.

3) *Perform an analysis of the IT ABC form (Business Case/Cost Analysis) completed by the Business.*

4) *Respond to the questions/items listed below.*

1. **Analysis Description:** Provide a narrative summary of the cost benefit analysis conducted: The approach used was to gather all costs associated with project for a **5 year period**, identify revenue sources for the project, and identify tangible and intangible benefits that might also be used as revenue sources or expense reductions.

    a. COST COMPONENT: See the attached spreadsheet referenced in **Appendix 3** to gain an understanding of:
        i. Source of Funds
        ii. Use of Funds
        iii. Change in Operating Costs

    b. BENEFIT COMPONENT:
        i. See the Tangible and Intangible Benefits described below.

2. **Assumptions:** List any assumptions made in your analysis.
    a. Staff reductions are not expected or contemplated through the implementation of this solution.
    b. There is no revenue recovery anticipated.
    c. Costs are segmented into **Project Costs** and **Operational Costs**.

3. **Funding:** Provide the funding source(s). If multiple sources, indicate the percentage of each source for both Acquisition Costs and on-going Operational costs over the duration of the system/service lifecycle.
    a. The primary source of funds include the following, the detailed amount from which are specified in the attached Project Cost spreadsheet referenced in **Appendix 3**:

Funding Source(s) and Percentage Breakdown if Multiple Sources:

FUNDING SOURCE	% of TOTAL	FUNDING SOURCE DESCRIPTION	FUNDING APPLIED TO (Implementation or Operations)	FUNDING AMOUNT
STATE FUNDING: Implementation: Operating Budget	0%		Implementation	$0
STATE FUNDING: Operations: Operating Budget	0%		Operations	$0
Grant Funding: Implementation	0%		Implementation	$0
Grant Funding: Operations	0%		Operations	$0
FEDERAL FUNDING: Implementation	18.32%	US DOE Funding Sources: SARA (State Assessment and Related Activities) Funds from Title VI of Elementary and Secondary Education Act to administer assessments plus Funds from Title I for Improving Academic Achievement of the Disadvantaged	Implementation	$587,011
FEDERAL FUNDING: Implementation	.71%	IDEA (Individuals with Disabilities Education Act) Part B	Implementation	$22,880
FEDERAL FUNDING: Operations	79.89%	US DOE Funding Sources: SARA (State Assessment and Related Activities) Funds from Title VI of Elementary and Secondary Education Act to administer assessments plus Funds from Title I for Improving Academic Achievement of the Disadvantaged	Operations	$2,559,830
FEDERAL FUNDING: Operations	1.07%	IDEA (Individuals with Disabilities Education Act) Part B	Operations	$34,320
TOTAL:	**100.00%**			**$3,204,041**

Implementation Costs and Funding:	**$609,891**
Operational Costs and Funding:	**$2,594,150**

4. **Tangible Benefits:** Provide a list and description of the tangible benefits of this project. Tangible benefits include specific dollar value that can be measured (examples include a reduction in expenses or reducing inventory, with supporting details).
    a. There are no tangible benefits that can be monetized through this project.

5. **Intangible Benefits:** Provide a list and description of the intangible benefits of this project. Intangible benefits include cost avoidance, the value of benefits provided to other programs, the value of improved decision making, public benefit, and other factors that become known during the process of analysis. Intangible benefits must include a statement of the methodology or justification used to determine the value of the intangible benefit.
    a. Deployment of Science Assessment exams on the same systems at ELA and Math assessment exams will streamline test administration for the schools.

b. Deployment of Science Assessment exams on the same systems at ELA and Math assessment exams will improve adoption by student as students are already familiar with the test platform through the SBAC exams.
c. Improvements is scoring quality due machine scoring vs. human scoring.

6. **Costs vs. Benefits:** Do the benefits of this project (consider both tangible and intangible) outweigh the costs in your opinion? Please elaborate on your response.
    a. There are no tangible dollar benefits with this project.
    b. There is no monetary value assigned to the intangible benefits.
    c. Given current operating costs of $2.5M and the new expected operating costs of $2.6M, we expect operating cost to increase by $100K over the project lifecycle, with a $610K implementation cost to achieve that, all funded through federal funding sources. This $710K total cost increase over the current solution is a low cost given the intangible benefits described above.
    d. Monetary benefits do not outweigh the costs. Monetary benefits should not be the reason to pursue this project.

7. **IT ABC Form Review:** Review the IT ABC form (Business Case/Cost Analysis) created by the Business for this project. Is the information consistent with your independent review and analysis? If not, please describe.
    a. Reviewed the IT ABC Form for this project vs. the Project Cost spreadsheet attached to this IR Report.
    b. Both the Implementation and Operational cost totals of the IT ABC Form were compared to the IR Project Cost spreadsheet.
    c. The Implementation Costs are comparable between the IT ABC Form were compared to the IR Project Cost spreadsheet.
    d. The Operational Costs are significantly higher in the Project Cost spreadsheet. Much of the $2.2M difference are attributable to the following line items:
        i. There were no dollars allocated to professional services on the IT ABC Form. As this project turned out to be services vs. software, there is a $2.4M cost allocated to said services.
        ii. There was no State Labor allocated to Operations. This is $129K.
        iii. There was no State Labor allocated to Project Management. This is $69K.
    e. See detail in the charts below.

IMPLEMENTATION COSTS – IT ABC Form vs. Project Cost Spreadsheet:

	IT ABC Form	Project Cost Spreadsheet	Delta: Implementation Costs
	Implementation Costs	Implementation Costs	IT ABC Form/(Project Cost Spreadsheet)
Configuration/Installation/Implementation	$0		
Contracted Services for Project Management	$60,000	$0	$60,000
Other Contracted Professional Services for Implementation	$276,000	$463,165	-$187,165
State Labor for Project Management	$150,000	$34,320	$115,680
Other State Labor to Implement the Solution	$0	$80,080	-$80,080
Software/Licenses	$15,000		$15,000
Hosting Provider	$25,000	$0	$25,000
Hardware	$0		$0
Equipment or Supplies	$0		$0
Vendor Annual Maintenance/Service Costs	$0		$0
State Labor to Operate & Maintain the Solution	$0		$0
Other Costs (indirect costs for facilities):	$25,000		$25,000
Sub-total:	**$551,000**	**$577,565**	**-$26,565**
ADS OPM	$16,530	$17,327	-$797
Independent Review	$0	$15,000	-$15,000
IMPLEMENTATION COST TOTALS:	**$567,530**	**$609,891**	**-$42,361**
plus OPERATING COST TOTALS (from table below):	**$345,000**	**$2,594,150**	
TOTAL PROJECT COSTS (Impl. plus Ops):	**$912,530**	**$3,204,041**	
TOTAL PROJECT COST DELTA: IT ABC Form/(Project Cost Spreadsheet):		**-$2,291,511**	

OPERATING COSTS – IT ABC Form vs. Project Cost Spreadsheet:

	IT ABC Form	Project Cost Spreadsheet	Delta: Operating Costs
	Annual Operating Costs	Annual Operating Costs	IT ABC Form/(Project Cost Spreadsheet)
Configuration/Installation/Implementation	$0		
Contracted Services for Project Management	$0		
Other Contracted Professional Services for Implementation	$0	$2,396,810	
State Labor for Project Management	$0	$68,640	
Other State Labor to Implement the Solution	$0		
Software/Licenses	$15,000	$0	
Hosting Provider	$75,000	$0	
Hardware	$0		
Equipment or Supplies	$0		
Vendor Annual Maintenance/Service Costs	$0		
State Labor to Operate & Maintain the Solution	$0	$128,700	
Other Costs (indirect costs for facilities):	$25,000		
Sub-total:	**$115,000**		
	3 years		
OPERATING COST TOTALS:	**$345,000**	**$2,594,150**	**-$2,249,150**

Additional Comments on the Cost Benefit Analysis:

No additional comments.

9. Impact Analysis on Net Operating Costs

1.) Perform a lifecycle cost impact analysis on net operating costs for the agency carrying out the activity, minimally including the following:
a) Estimated future-state ongoing annual operating costs, and estimated lifecycle operating costs. Consider also if the project will yield additional revenue generation that may offset any increase in operating costs.
b) Current-state annual operating costs; assess total current costs over span of new IT activity lifecycle
c) Provide a breakdown of funding sources (federal, state, one-time vs. ongoing)
2.) Create a table to illustrate the net operating cost impact.
3.) Respond to the items below.

As noted in **Section 1.1** above, the Cost Summary for this project is:

IT Activity Lifecycle:	4 Years
Total Lifecycle Costs:	**$3.2M**
PROJECT COSTS:	***$610K***
Software Costs:	***$0***
Professional Services:	***$463K***
Internal Staffing:	***$114K***
Hosting:	***$0***
Other (ADS EA, IR):	***$33K***
OPERATING COSTS:	***$2.6M***
Software Costs:	***$0***
Professional Services:	***$2.4M***
Internal Staffing:	***$200K***
Hosting:	***$0***
CURRENT OPERATING COSTS:	**$2.5M**
Difference Between Current and New Operating Costs:	**$100K increase**
Funding Source(s) and Percentage Breakdown if Multiple Sources:	Federally funded. See table below.

Funding Source(s) and Percentage Breakdown if Multiple Sources:

FUNDING SOURCE	% of TOTAL	FUNDING SOURCE DESCRIPTION	FUNDING APPLIED TO (Implementation or Operations)	FUNDING AMOUNT
STATE FUNDING: Implementation: Operating Budget	0%		Implementation	$0
STATE FUNDING: Operations: Operating Budget	0%		Operations	$0
Grant Funding: Implementation	0%		Implementation	$0
Grant Funding: Operations	0%		Operations	$0
FEDERAL FUNDING: Implementation	18.32%	US DOE Funding Sources: SARA (State Assessment and Related Activities) Funds from Title VI of Elementary and Secondary Education Act to administer assessments plus Funds from Title I for Improving Academic Achievement of the Disadvantaged	Implementation	$587,011
FEDERAL FUNDING: Implementation	.71%	IDEA (Individuals with Disabilities Education Act) Part B	Implementation	$22,880
FEDERAL FUNDING: Operations	79.89%	US DOE Funding Sources: SARA (State Assessment and Related Activities) Funds from Title VI of Elementary and Secondary Education Act to administer assessments plus Funds from Title I for Improving Academic Achievement of the Disadvantaged	Operations	$2,559,830
FEDERAL FUNDING: Operations	1.07%	IDEA (Individuals with Disabilities Education Act) Part B	Operations	$34,320
TOTAL:	**100.00%**			**$3,204,041**

1. See the spreadsheet attached in **Appendix 3** to review impact to Operating Costs.
2. Provide a narrative summary of the analysis conducted and include a list of any assumptions.
    a. The detailed spreadsheet provided with this analysis breaks out costs as follows:
        i. Implementation (Project) Costs: Costs tied specifically to the Vendor. In other words, those costs that are incurred because we are undertaking the project.
        ii. Operating Costs: Internal costs, consisting of staffing and telecommunication costs, and external costs consisting of contracted services and on-going use of the software and related hosting.
        iii. Total Costs: Project Costs plus Operating Costs.
    b. The TOTAL COSTS are broken out as **IMPLEMENTATION (Project) COSTS** and **OPERATING COSTS**.
3. Explain any net operating increases that will be covered by federal funding. Will this funding cover the entire lifecycle? If not, please provide the breakouts by year.
    a. Given current operating costs of **$2.49M** and the new expected operating costs of **$2.59M**, we expect operating cost changes to **increase by $100K** over the project lifecycle, with a $610K implementation cost to achieve that. The entire project is funded with federal funding sources.
        i. See the attached Project Cost Detail spreadsheet for additional details.
4. What is the break-even point for this IT Activity (considering implementation and on-going operating costs)?
    a. With an implementation cost of $610K and a $100K increase in operating costs over the project lifecycle, there is no breakeven point.

Appendix 1A - System Integration

SYSTEM INTEGRATION/INTERFACES

NOTE: The System Integration/Interfaces contemplated for this MSSA project are the same as those used for the Smarter Balanced Assessment Consortium (SBAC) project.

AIR's Test Information Distribution Engine (TIDE) provides an integrated system for:

1. Gathering and managing student enrollment and Pre-ID labels;
2. Adding, editing, and deleting users; assigning different authorization levels based on roles;
3. Provisioning role-based access for adding and editing student accommodation data, test assignments, form assignments, and class rosters.

TIDE will be the key integration conduit for this project for uploading Student Census data.

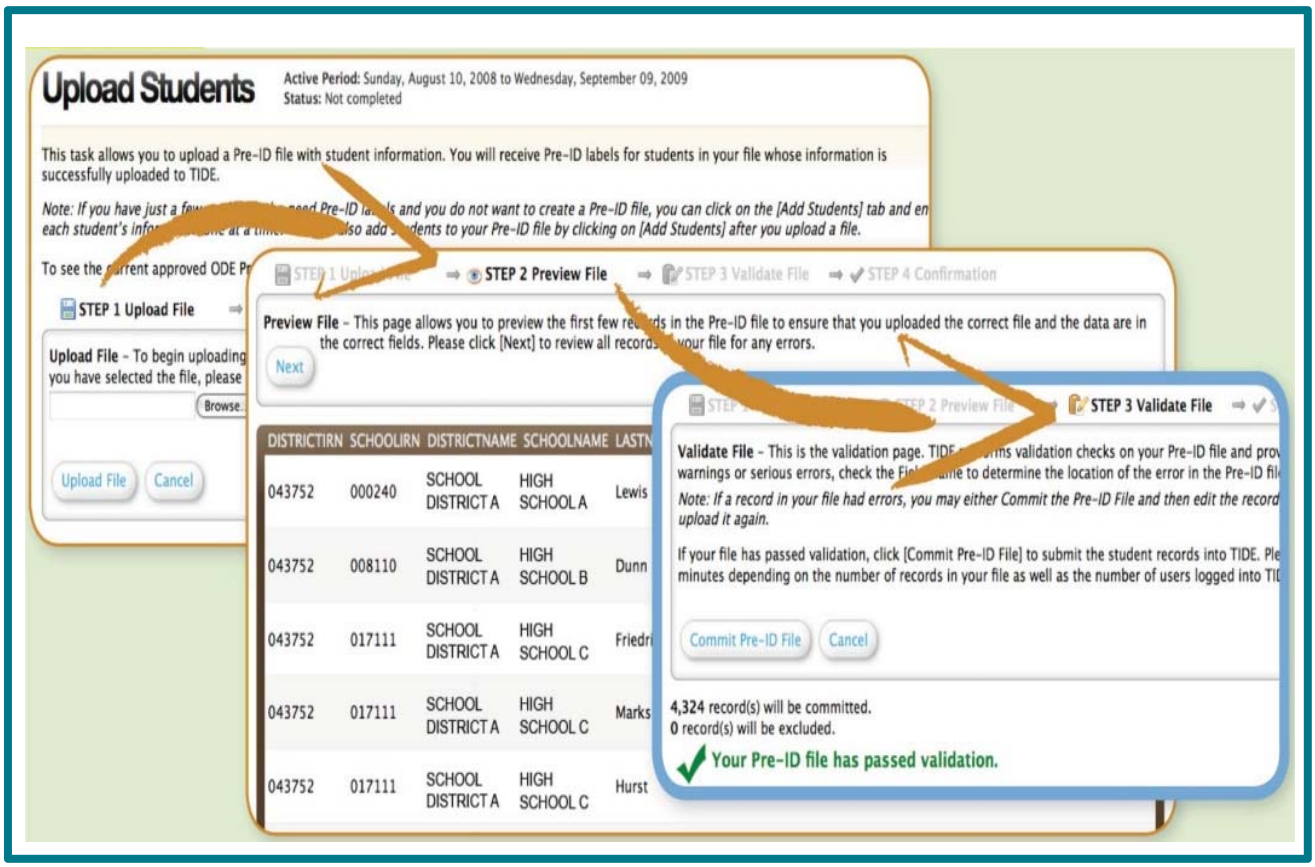
Files are typically deposited by the state systems to a monitored secure file transfer protocol (SFTP) location. TIDE can automatically import student files provided by the state systems from that SFTP location. TIDE services will validate the file present in the folder and import records from the file. TIDE can be configured to provide import summary with validation and error logs and frequency distribution of the imported data.

Should state staff decide to upload student information directly into TIDE, the TIDE website has a step-by-step interface that walks the user through the process of securely uploading student information. TIDE allows users to identify a file on their computer or network that is in the agreed-on format. Once the file is identified, the system scans it to ensure that the data match the format and allow the user to preview a few records of the file that is being uploaded. The file then goes through validation in the next step to ensure that the data in the file conform to the business rules that have been set in place in TIDE. Any data format or validation errors are reported back to the user in real time. Validations of the files are accomplished through configurable business rules. Project staff will collaborate with AOE to define the validation business rules.

These rules can trigger one of three outcomes:

1. Rejecting the entire file;
2. Rejecting only the offending records;
3. Issuing a warning.

In the last step, the user commits the file to the database and TIDE provides a list of any errors that occurred during the upload in a real-time fashion. The optional, manual process of uploading student information is shown below.



Data Imports between AIR and State Data Systems: TIDE supports a variety of file import formats and interfaces. The state SIS systems can send AIR flat files that are either delimited (e.g., CSV), fixed width, SIF, IMS, or custom XML formats. TIDE imports have built in a level of efficiency that allows import of incremental or complete data files every day or any other desired import frequency. Files are typically deposited by the state systems to a monitored secure file transfer protocol (SFTP) location. In addition to the typical authentication requirement, access to this location is restricted to a limited number of IP addresses. Every import can be configured with its own set of validation and processing rules. After each import, import summaries, validation messages, and errors can be sent to a set of users. Before any file is processed, it goes through a data validator that identifies any validations/errors with any of the records. A failsafe can be configured to reject a file if the number of errors/updates/deletes exceeds a threshold. TIDE supports importing of data on institutions, students, users, test settings, class groups/rosters, and test assignments.

Appendix 1B – Data Migration

Data migration services are not expected nor requested of the Vendor.

Appendix 2 - Risk Register

See attached document: FINAL-REVIEW-SOV-AOE-MSSA-IndependentReview-STS_Risk_Register_FINAL.pdf

Appendix 3 – Lifecycle Costs and Change in Operating Costs

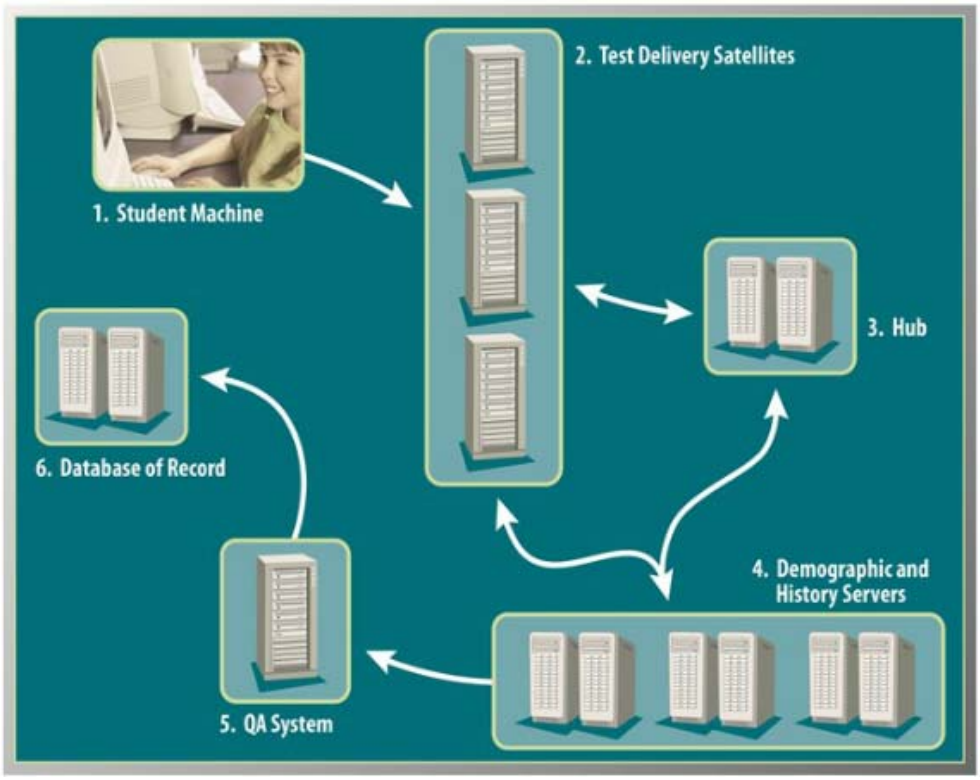
See attached document: FINAL-REVIEW-SOV-AOE-MSSA-IndependentReview-STS_Cost_Detail_FINAL.xlsx

Appendix 4 – Technology Infrastructure

Please note: This section is provided for purposes of addressing the Technology Infrastructure component of the Independent Review content requirement. AIR indicates this information is proprietary.

NOTE: The Technology Infrastructure contemplated for this MSSA project are the same as those used for the Smarter Balanced Assessment Consortium (SBAC) project.

a. AIR leases dedicated hardware from Rackspace - Hardware can serve multiple clients (data is separated);
b. Each Test Delivery Satellite consists of 3 web servers and a database server; 4 satellites comprise a pod; Each hub connects to a pod to poll data;
c. There is a login server that users log into; First student logs in, all students from that group then connect to that Satellite;
d. Underlying technology is .NET (C++) and SQL Server;
e. Student machine device uses proprietary browser (for security reasons);
f. Every system is backed up nightly. Industry standard backup and recovery procedures are in place to ensure safety, security, and integrity of all data. This set of systems and processes is designed to provide complete data integrity and prevent loss of student data. Redundant systems at every point, real-time data integrity protection and checks, and real-time backup processes prevent loss of student data, even in the unlikely event of system failure.
g. AIR's hosting provider (Rackspace) has redundant power generators that can continue to operate for up to 60 hours without refueling. With the multiple refueling contracts that are in place, these generators can operate indefinitely. They each maintain an n+1 configuration of 16 diesel generators that, at maximum capacity, can supply up to 2.0 megawatts. AIR's hosting provider has multiple redundancies in the flow of information to and from the data centers by partnering with nine different network providers. Each fiber carrier must enter the data center at separate physical points, protecting the data center from a complete service failure caused by an unlikely network cable cut.



a. Every time a student answers a question, the response is saved to AIR servers. Results from 2013 show that the typical student waited less than half a second after finishing one item before the next item was fully displayed on his or her screen. For longer responses, such as essays, the system can be configured to save periodically (say, every minute) or whenever the student presses the Save button. If the system is unable to reach the server, the student is stopped from testing, so no work is lost. Data loss is prevented by saving responses in real time to AIR servers. The safe, asynchronous writing system reports the successful save back to the browser. If the browser does not receive the response after a configurable amount of time (usually 30–90 seconds), the system stops the student from testing until connectivity is restored.

   The system is designed to make multiple attempts to reach the server, so even if connectivity is temporarily lost, no work is lost. Often, the connection will be reestablished without the student being aware that it was ever lost. Caching occurs on the students' machines (in memory, not on disk) in real time. This ensures a seamless testing experience in which students typically see no delays between items. This same process protects data in case of power outage. Responses are submitted immediately upon student response or automatically and frequently during longer responses. If the power goes out, the student responses prior to the outage are already at AIR servers.

   Students wait an average of less than half a second after they press the Next button before the next item is logged on the screen. This fact is known due to AIR logging this information. This information helps AIR to accurately report information about the student testing experience; plan capacity to make sure servers are never overworked; and identify schools that may be having local delivery problems. The last point is particularly powerful. AIR has contacted schools to help troubleshoot before they were even aware that they were having a problem. Imagine a help desk that responds before the user even notices a problem. AIR believes that this level of information and transparency is unique within the industry, and AIR encourages

reviewers to seek item-by-item latency (delay) data from other offerors who claim that their systems are responsive and scalable. In addition, the system records an audit trail that tracks every time a student changes an answer or revisits a question.

AIR's Test Delivery System (TDS) also has an infinitely scalable architecture. AIR's system is based on a private-cloud design that allows every function to be distributed across many database and application servers, while maintaining responsiveness. In preparation for the Smarter Balanced field test, AIR conducted a 500,000-simultaneoususer load test in March 2014 (i.e., 500,000 students logging in within 15 minutes of each other and all testing at the same time). Operationally, AIR has approached maximum loads of approximately 200,000 simultaneous users and expect peak loads to reach between 250,000 and 300,000 before the field test concludes.

The test delivery has two critical user interfaces: 1. The Test Administrator (TA) Interface, including how to create a test session, review and approve test settings, and monitor students 2. The Student Interface, including the Student Interface layout, tools, features, accommodations, and embedded supports.

i. **Test Administrator Interface**: Test Administrators use the TA Interface to create and manage test sessions. The interface allows authorized TAs to administer test sessions, monitor activity, and respond to test related issues in one convenient location. The secure interface helps ensure that the right student is taking the right test and lets the administrator focus on test administration. As with paper tests, the TA's primary role with online tests is to ensure the security of the test and make sure that students have a quiet environment, free of distraction, in which to take the test.

ii. **Student Interface**: Students take tests through the Student Interface, which is essentially a secure website accessed through AIR's secure browser. This browser is the only software needed to take a secure test, and it is simply a secure build of the Mozilla (Firefox) browser or a secure testing app for tablets and other platforms. Non-secure tests, such as practice tests and some formative tests, can be accessed with ordinary browsers. AIR's secure browser operates in a full-screen mode, disables access to other applications, and prohibits navigation outside the test. The browser is designed to intercept all operating system hot-key combinations and print capabilities; it enables keyboard combinations specifically designed for test navigation. The system verifies that the test is being launched in AIR's secure browser and prevents the test-taker from continuing if the test is launched in a normal browser window.

CLIENT

Supported Operating Systems and Minimum Requirements

Supported Technology	Minimum System Requirements
Windows Operating Systems	Vista, 7, 8.0 Pro, 8.0 RT, 8.1, 10 (Educational and Pro) Server 2008, 2012
Macintosh Operating Systems	10.7–10.12
Linux Operating Systems	Fedora 23–25, openSUSE 13.1, 13.2, Red Hat Enterprise 6.5, Ubuntu (LTS) 12.04, 14.04, 16.04
Chrome Operating Systems	51+
Thin Clients	Win2003 and 2008 terminal servers, NComputing vSpace 6.6.2.3 with a host OS of Win 7
Browsers	Internet Explorer 11 Edge, Chrome 48+, Firefox 43+, Safari 6–9
Processor	Intel Pentium 4 or newer processor that supports SSE2 (Windows), Intel x86 processor (Mac OS X and Linux)
Memory	512 MB
Disk Space	200 MB
Monitor	10”
Screen Resolution	1024 x 768 or larger
Peripherals	Headsets/earbuds and mice strongly suggested but not required
Connection	Wired or wireless supported

Supported Operating Systems for New Devices

Supported Technology	Minimum System Requirements	Examples of Devices
Windows Tablets	8.0 (Pro), 8.1, 10 (Educational and Professional)	Surface Pro, Surface Pro 3, Asus Transformer, Dell Venue
iOS Tablets	8.0–8.2, 9.2, 9.3, 10.2	iPad 2, iPad 3, 4th Generation (Retina Display), iPad Air, iPad Air 2
Android Tablets	4.4, 5.0, 5.1, 6.0	Google Nexus 10, Motorola Xoom, Samsung Galaxy Note (2014 edition), Samsung Galaxy Tab (3 and 4), LearnPad Quarto
Screen Size	10”	
Screen Resolution	1024 x 768 or larger	
Peripherals	Headsets/earbuds and mice strongly suggested but not required.	
Connection	Wired or wireless supported	

Available Tools

Tools	Description	AIR System Capability and Comments
Calculator	Available calculators include basic, scientific, graphing, regression, and matrices.	Currently Available
Reference Sheet	Students can access a formula sheet and periodic table for mathematics or science tests.	Currently Available
Ruler	Students can access a pop-up ruler.	Currently Available
Straight Edge	Students can access a pop-up straight edge.	Currently Available
Option Eliminator	Students can eliminate any multiple-choice option, whether it's in text or in a graphic. This capability persists throughout the test.	Currently Available
Bookmark	Bookmark capability allows students to flag an item so they can review it.	Currently Available
Highlighter	Students can select any text to highlight. This capability persists throughout the test.	Currently Available
Notes	Item notes allow students to jot down ideas about items or passages.	Currently Available
Footnote Pop-Up	Our word list feature supports footnote pop-ups.	Currently Available
Student Tutorials/ Practice Sessions	A reference feature, practice tests, and tutorials familiarize students with the online testing system. Our tutorials can vary by item, so items of each type share a tutorial.	Currently Available
Spell Check	The spell check tool identifies words in the response field that may be misspelled and provides suggestions for each.	Currently Available
Response Field Tools	The response field tools allow students to apply styling to text (e.g., bold, italics, underline) and use standard word-processing features such as moving and indenting text, cut, redo, and paste.	Currently Available
Embedded Dictionary and Thesaurus	Students can open the Merriam-Webster dictionary and thesaurus within the test. This tool is available during the second segment of ELA performance task tests.	Currently Available
Global Notes	Students can access a notepad throughout the test. This notepad allows students to enter notes for themselves and is not item specific.	Currently Available
American Sign Language (ASL)	This capability consists of recorded videos on sign language.	Currently Available
Refreshable Braille/ Tactile with External Embosser Printer	Items can be rendered to desktop embossers that can integrate Braille and tactile graphics. The items will be simultaneously rendered on a reader-accessible screen, and the student will be able to navigate to response spaces to provide answers.	Currently Available

HOSTING

The application is expected to be hosted at Rackspace in continental US. No failover site noted.

SYSTEM MONITORING

Vendor's systems monitor the network and all attached devices. Vendor has monitoring at the network level, server level, and software level. The system sends alerts to two network operations centers: Rackspace, and Vendor's Network Operation Center. When alerts hit specified levels, Vendor NOC activates an emergency notification system, which assembles a team of engineers, managers, and leadership to respond. Usually, problems are resolved before they impact the field.

In addition to traditional monitoring, Vendor has developed a predictive monitoring system that integrates information from all of the server sensors, as well as data on software latencies. These data feed a sophisticated model that identifies servers that are behaving differently than they have in the recent past or different than other servers performing the same roles. Servers that exhibit anomalous behavior are audited. Such audits have found disks with bad clusters (but still working), poorly optimized but rarely called procedures, and other problems before they have any impact on system performance.

DISASTER RECOVERY/BUSINESS CONTINUITY

1. Vendor has disaster recovery plans in place that can recover data from most failures. Data from a catastrophic failure of an entire data center *will not be recovered immediately*. It will be possible to recover the data to another data center, although this will require manual processes that take more time. If any component fails, it can recover automatically.
2. Vendor has designed their system to be extremely fault tolerant. The system can withstand failure of any component with little or no interruption of service, via robustness through redundancy, as follows:
    a. Rackspace has redundant power generators that can continue to operate for up to 60 hours without refueling. With the multiple refueling contracts that are in place, these generators can operate indefinitely. They each maintain an n+1 configuration of 16 diesel generators that, at maximum capacity, can supply up to 2.0 megawatts.
    b. Rackspace has multiple redundancies in the flow of information to and from their data centers by partnering with nine different network providers. Each fiber carrier must enter the data center at separate physical points, protecting the data center from a complete service failure caused by an unlikely network cable cut. The server backup agents send alerts to notify system administration staff in the event of a backup error, at which time they will inspect the error to determine whether the backup was successful or they will need to rerun the backup.
3. Data Center Redundancy: None. This is highlighted in the Risk Register.
4. Recovery Point Objective (RPO):
    a. RPO is the point at which the student was stopped from testing. Students pick up exactly where they left off. This is provided through data replication to an off-site facility.
5. Recovery Time Objective (RTO):
    a. For most failures: Measured in seconds and not more than minutes.
    b. For data center failure: This will require manual processes. For 2017-18, when testing would start in Vermont, AIR is aiming for a data center RTO of less than a week, or perhaps shorter. This is highlighted in the Risk Register.

DATA BACKUP/RESTORE

Backup Plan:

1. Backups:
    a. Daily: Every 2 hours, instantaneous replication to off-site disk
    b. Nightly: Incremental
    c. Weekly: Full
    d. Transaction Logging: Full, allowing for restoration to its state immediately prior to a catastrophic event
2. Retention:
    a. Data is retained for the entire school year/testing cycle. For 2017-18, when testing will start in Vermont, the offsite backup storage location will be in an identified, second Rackspace data center. This is discussed in the Risk Register.

Restore Plan:

1. Restore transactions/file/files from appropriate device/backup library as needed.

AGENCY OF EDUCATION: Multi State Science Assessment Project
RISK REGISTER DESCRIPTION:

1. Risk Description: Provide a description of what the risk entails
2. Source of Risk: Project, Proposed Solution, Vendor or Other
3. Risk Rating: Risk ratings to indicate: Likelihood and probability of risk occurrence; Impact should risk occur; and Overall risk rating (high, medium or low priority)
4. Risk Strategy: State's Planned Risk Strategy: **Avoid, Mitigate, Transfer or Accept**
    a. Avoid: Avoid the activity; activities with a high likelihood of loss and large impact.
    b. Mitigate: Develop a plan to reduce risk to reduce the risk of potential loss; activities with a high likelihood of occurring, but impact is small.
    c. Transfer: Outsource risk (or a portion of the risk - Share risk) to third party or parties that can manage the outcome; activities with low probability of occurring, but with a large impact. Often times this is transferred back to vendor.
    d. Accept: Take the chance of negative impact, eventually budget the cost (i.e. a contingency budget line); activities where cost-benefit analysis determines the cost to mitigate risk is higher than cost to bear the risk, then the best response is to accept and continually monitor the risk.
5. Timing of Risk Response: Describes the suggested timing for carrying out the risk response (e.g. prior to the start of the project, during the Planning Phase, prior to implementation, etc.)
6. State's Planned Risk Response: Describe what the State plans to do (if anything) to address the risk (See Risk Response table)
7. Reviewer's Assessment of State's Planned Response: Indicate if the planned response is adequate/appropriate in your judgment and if not what would you recommend.

Department Action Step: Respond to the sections highlighted in yellow (Risk Strategy, State's Planned Risk Response) and send copy back to David Gadway for review

NOTE: Hyperlinks are used on the Risk ID. From the Risk Register, CTL-CLICK on a link to see the Risk Response, or from the Risk Response, CTL-CLICK on a link to go back to the Risk Register.

RISK REGISTER:

Risk #:	Risk Description	Source of Risk	Risk Rating: Impact	Risk Rating: Probability	Risk Rating: Overall Risk	State Risk Strategy Summary (Avoid, Mitigate, Transfer, Accept)	Timing of Response	Reviewer Assessment of Response
1a	Budget/Funding: No risks. Project funding is secure. Scope of work is fixed price.							
2a	Contract: The following are contract-related items that warrant noting: 1. Define Deliverables Acceptance criteria and assign payment amounts to those deliverables. See Section 4.4 of the Independent Review Report which contains a table listing activities, deliverables, dates, and a "start" at acceptance criteria. More detail as to what defines meeting that acceptance criteria is recommended. 2. Define Non-Functional Requirements the solution must meet (see #8b below). 3. State in the contract that the solution and data reside in continental US. 4. Suggest AOE include in the contract, language indicating the data retention and off site backup storage location (see to #7a below). 5. AOE review AIR's penetration tests at least annually (see #11a below).	Project	Medium	Medium	Medium	Mitigate and Accept - See detailed response	Prior to contract execution	Risk strategy accepted
3a	Vendor Risk: No risk noted.							
4a	SOV Service Level/Staffing: No risk noted. Adequate resources allocated to complete project							
5a	Project Management Staffing: No risk noted. Adequate Project Management staffing identified for project from both AOE and Vendor.							

6a	Project Schedule: No risk noted. Adequate time allocated to complete project.							
7a	Infrastructure: Backup/Restore Platform: No data retention defined. While backups occur weekly (full) and nightly (incremental), there is no definition for how long that data is retained.	Project	Medium	Medium	Medium	Accept	Prior to contract execution	Risk strategy accepted
7b	Infrastructure: Hardware Platform Availability: AIR proposes 99% up time (14m, 24 s downtime/day). During the past work with this Vendor during the SBAC project, AOE requested 99.5% (7m, 12s downtime/day).	Project	Medium	Medium	Medium	Accept	Prior to contract execution	Risk strategy accepted
7c	Infrastructure: Business Continuity/Disaster Recovery: There is no clearly defined BC/DR plan. Of specific concern are the following: 1. No alternative data center hot site should the primary data center site fail. 2. Recovery Time Objective of approximately 1 week in the event of a data center failure.	Project	Medium	Medium	Medium	Accept	Prior to contract execution	Risk strategy accepted
7d	Infrastructure: System Response Time: There is no clearly defined System Response Time plan. This would guarantee a user timely response on the system (i.e. the system responds within 2 seconds of hitting the ENTER key).	Project	Medium	Medium	Medium	Accept	Prior to contract execution	Risk strategy accepted
7e	Infrastructure: Application Bug Fix: There is no clearly defined Application Bug Fix plan. This would provide assurance that the Vendor guarantees a bug fix within x hours or y days.	Project	Medium	Low	Low	Accept	Prior to contract execution	Risk strategy accepted

8a	Scope/Functional Requirements: A key success factor of this project is the development of the Test Items (i.e. test questions). This work is being shared by Vermont and Rhode Island, and is being directed by Vendor. There may be Test Items included from other States as well. As the success of the project is based on the successful completion of this task, and as this work will be shared across many teachers across at least two States with coordination from Vendor, there is at least moderate risk that this high level of coordination may prove difficult to complete within the schedule and with the quality outcomes expected.	Project	Medium	Medium	Medium	Accept	Prior to contract execution and during project	Risk strategy accepted
8b	Scope/Non-Functional Requirements: Define Non-Functional Requirements the solution must meet. Also noted in Risk 2a, #2 above.	Project	Medium	Medium	Medium	Mitigate	Prior to contract execution	Risk strategy accepted
9a	Interoperability: No risk noted.							
10a	Compliance/Regulatory: No risk noted.							
11a	Security: 1. AIR security plan addresses physical security at Rackspace, but does not directly address about logical security? Specifically, will Rackspace employees have any logical access to these servers and if so, how is that monitored/controlled? 2. As noted in AIR's response to security approach, why are the vulnerability results on a "fee basis?" If they are already paying a vendor to run a vulnerability test, why are they asking AOE to pay a fee to see what they already have?	Project	Medium	Low	Low	Accept	Prior to contract execution	Risk strategy accepted
12a	Other: No Risk Noted.							

RISK RESPONSE:

Risk #:	State's Planned Risk Response and Reviewer's Assessment of State's Risk Response
1a	**STATE'S RISK RESPONSE:** N/A. No risk noted.
2a	**STATE'S RISK RESPONSE:** 1, 2 and 5: AOE will MITIGATE these risks through contract language. 3 and 4: AOE ACCEPTS these risks, noting that AIR's proposal for the ELA/Math assessment contract includes a more detailed section on their IT systems and functions, including detail on data storage (it is in the continental US) and were that data is stored and retained. **REVIEWER'S ASSESSMENT:** Risk strategy accepted.
3a	**STATE'S RISK RESPONSE:** N/A. No risk noted.
4a	**STATE'S RISK RESPONSE:** N/A. No risk noted.
5a	**STATE'S RISK RESPONSE:** N/A. No risk noted.
6a	**STATE'S RISK RESPONSE:** N/A. No risk noted.
7a	**STATE'S RISK RESPONSE:** AIR provided a response to this concern as follows: "For 2017-18, when testing will start in Vermont, the offsite backup storage location will be in an identified, second Rackspace data center. Data is retained for the entire school year/testing cycle." **REVIEWER'S ASSESSMENT:** Risk strategy accepted. Suggest AOE include in the contract, language indicating the data retention as stated and off site backup storage location. See Risk 2a, #4 above.
7b	**STATE'S RISK RESPONSE:** AOE ACCEPTS this risk, noting that in three years working with this Vendor's systems any downtime exceeding those percentages was planned and occurred on weekends or in the middle of the night when schools would not be using the systems. To date there has been NO downtime because of systems failures **REVIEWER'S ASSESSMENT:** Risk strategy accepted.

7c	**STATE'S RISK RESPONSE:** AOE has worked with AIR for SBAC and given the fact that test data up to the point of failure is retained, and as there has never been a complete data center failure, AOE accepts this risk. **REVIEWER'S ASSESSMENT:** Risk strategy accepted.
7d	**STATE'S RISK RESPONSE:** AOE ACCEPTS this risk, noting first of all that successful delivery of these assessments is dependent on a combination of the vendor systems and the quality of our schools IT infrastructure and devices. Our experience with this vendor has been such that any problems with their systems are few and corrected very quickly, and that their multilevel customer support systems works very closely with school to resolve issue that are frequently one student with one device. **REVIEWER'S ASSESSMENT:** Risk strategy accepted.
7e	**STATE'S RISK RESPONSE:** AOE ACCEPTS this risk, noting that in addition to the information provided in 7d, the Vendor has generally been able to resolve issues very quickly and when they cannot, they provide time estimates that have been remarkably accurate. **REVIEWER'S ASSESSMENT:** Risk strategy accepted.
8a	**STATE'S RISK RESPONSE:** AOE ACCEPTS this risk, noting that the item development activities will add to existing item pools that will be used to replace items rather than create the items needed to launch the first administration of the test. AOE also notes that the item development collaborative has been in place for two years with a positive record of success. **REVIEWER'S ASSESSMENT:** Risk strategy accepted.
8b	**STATE'S RISK RESPONSE:** AOE will MITIGATE this risk by adding appropriate language to the contract **REVIEWER'S ASSESSMENT:** Risk strategy accepted.
9a	**STATE'S RISK RESPONSE:** N/A. No risk noted.
10a	**STATE'S RISK RESPONSE:** N/A. No risk noted.
11a	**STATE'S RISK RESPONSE:** AIR response: Question: Will Rackspace employees have any logical access to these servers and if so, how is that monitored/controlled?

	AIR Answer: Yes, AIR and Rackspace grant access to a set of administrators and engineers to log in to servers. All administrators and engineers are required to access customer servers through a gateway servers that logs all actions. Logs can be reviewed upon request. Question: Why are the vulnerability results on a "fee basis?" If they are already paying a vendor to run a vulnerability test, why are they asking us to pay a fee to see what they already have? AIR Answer: We obviously misunderstood this question. We misread Item 10 to ask if we would allow Vermont to hire a third party to conduct additional, independent penetration testing quarterly. This is not an unusual request in a State contract, and AIR agrees to those clauses, at the State's cost. AIR would be happy to discuss the findings of our own penetration testing program and remediation. That discussion, of course, would not incur any additional costs. **REVIEWER'S ASSESSMENT:** Risk strategy accepted. Suggest AOE review AIR's penetration tests at least annually, and include that in the contract. See Risk 2a, #5 above.
12a	**STATE'S RISK RESPONSE:** N/A. No risk noted.

AGENCY OF EDUCATION: Multi State Science Assessment Project - 4 Year Life Cycle

STATEMENT OF: Use of Funds (Expenses), Source of Funds (Revenue), Cash Flow, and Net Change in Operating Cost

Click on the Click on the links to the left to go to that data

CASH FLOW ANAL **CASH FLOW ANAL** Click Here

SUMMARY:	
Total Cost:	$3,204,041
Total Funding:	$3,204,041
State Funding:	$0
Federal Funding:	$3,204,041
Potential Revenue Recovery:	$0
Funding Excess/(Shortage):	$0

IMPLEMENTATION and OPERATING COSTS:	
Implementation Costs:	$609,891
New Operating Costs:	$2,594,150
Current Operating Costs:	$2,492,567
	$
NET CHANGE IN OPERATING COSTS-Decr./(Incr.):	($101,583)
State Decrease/(Increase):	$0
Federal Decrease/(Increase):	-$101,583

USE OF FUNDS - START

Description	Note	Unit Price	Impl/Ops	Total		Prior Costs	IMP Year 1 (FY18)	M&O Year 2 (FY19)	M&O Year 3 (FY20)	M&O Year 4 (FY21)	TBD Year 5 (FY22)	TBD Year 6 (FY23)	TBD Year 7 (FY24)	TBD Year 8 (FY25)	TBD Year 9 (FY26)	TBD Year 10 (FY27)	Software Total	Source
EXTERNAL-RELATED COSTS																		
VENDOR COSTS																		
SOFTWARE AND SERVICES																		
SOFTWARE ❶																		
Software Being Licensed:																		
Implementation: No software expected to be licensed			I				$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Operations: No software expected to be licensed			O				$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
																	$0	
SOFTWARE TOTAL							$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
SERVICES																		
			Impl/Ops			Prior Costs												
Implementation Services	**ALL VENDOR PROPOSED FEES ARE SPLIT EVENLY BETWEEN RI AND VT, EXCEPT THOSE WITH ITEMS WITH PER STUDENT FEES; FEES SHOWN HERE ARE VT PORTION**																	
Project Manager-Implementation		$23,071 per month, 12 months	I				$138,426	$0	$0	$0							$138,426	Vendor Proposal
Project Manager-Operations		$23,071 per month, 36 months	O				$0	$138,426	$138,426	$138,426							$415,278	
Test Form Construction-Implementation		$5K per form, 9 forms	I				$22,500	$0	$0	$0							$22,500	Vendor Proposal
Test Form Construction-Operations		$5K per form, 9 forms	O				$0	$22,500	$22,500	$22,500							$67,500	
Student Registration and Administration:																		
Student Registration Setup and Configuration		$59,117 annually	O				$29,559	$29,559	$29,559	$29,559							$118,234	Vendor Proposal
Online Test Administration Setup and Configuration		$49,173 annually	O				$24,587	$24,587	$24,587	$24,587							$98,346	Vendor Proposal
Online Test Administration	Of 49,916 total students quoted, 17,677 are Vermont students	$3/student	O				$53,031	$53,031	$53,031	$53,031							$212,124	Vendor Proposal
Online Scoring	Of 49,916 total students quoted, 17,677 are Vermont students	$.85/student	O				$15,025	$15,025	$15,025	$15,025							$60,102	Vendor Proposal
Online Reporting System Setup and Configuration		$131,742 annually	O				$65,871	$32,936	$32,936	$32,936							$164,678	Vendor Proposal
Print Reporting; Student reports printed and shipped to schools	Of 49,916 total students quoted, 17,677 are Vermont students	$1/student	O				$17,677	$17,677	$17,677	$17,677							$70,708	Vendor Proposal
Meetings:																		
Project Kickoff		$25,146 per meeting, 1 meeting annually	I				$12,573	$0	$0	$0							$12,573	Vendor Proposal
Blueprint		$24,157 One time	I				$12,079	$0	$0	$0							$12,079	Vendor Proposal
Annual Item Development Plan Meeting		$16,899 per meeting, 1 meeting annually	O				$8,450	$8,450	$8,450	$8,450							$33,798	Vendor Proposal
Grade-specific Item Review		$60,283 per meeting; 3 meetings annually	O				$90,425	$90,425	$90,425	$90,425							$361,698	Vendor Proposal
Across-grade Bias Review		$46,461 per meeting, 1 meeting annually	O				$23,231	$23,231	$23,231	$23,231							$92,922	Vendor Proposal
Performance Level Descriptors		$90,637 One time	I				$45,319	$0	$0	$0							$45,319	Vendor Proposal
Standard Setting		$114,145 per meeting, 1 meeting	I				$0	$57,073	$0	$0							$57,073	Vendor Proposal
Half-day regional training		$20,962 per meeting, 8 meetings annually over 2 years	I				$83,848	$83,848	$0	$0							$167,696	Vendor Proposal
Webinars		$7,500 per meeting, 4 meetings annually	O				$15,000	$15,000	$15,000	$15,000							$60,000	Vendor Proposal
TAC		$35,000 per meeting, 2 meetings annually	O				$35,000	$35,000	$35,000	$35,000							$140,000	Vendor Proposal
Practice Tests		$5,000 each, 3 tests, year 1 only	I				$7,500	$0	$0	$0							$7,500	Vendor Proposal
Manuals		$5,000 each, 2 manuals year 1, 1 manual years 2-4	O				$5,000	$1,250	$1,250	$1,250							$8,750	Vendor Proposal
Additional Analyses		$50,000 per analyses, 1 per year	O				$25,000	$25,000	$25,000	$25,000							$100,000	Vendor Proposal
Technical Report		$89,000 per report year 1, $45,500 per report years 2-4	O				$44,500	$24,750	$24,750	$24,750							$118,750	Vendor Proposal

Consortium Item Development	Optional charge that VT, RI, and other consortium states such as CT, WV, HI will participate in	$547,855 over the 4 year life cycle		O				$68,481	$68,481	$68,481	$68,481							$273,923	Vendor Proposal
Travel:	Included in fees above			I				$0	$0	$0	$0							$0	Vendor Proposal
Other																			
Contingency	Nothing allocated at present			I				$0	$0	$0	$0							$0	
TOTAL: IMPLEMENTATION SERVICES							$0	$843,079	$766,246	$625,325	$625,325	$0	$0	$0	$0	$0	$0	$2,859,974	
								Impl: $322,244	$140,921	$0	$0								
								Ops: $520,835	$625,325	$625,325	$625,325								
Other Services:																			
								$0	$0	$0	$0							$0	
Other Services Total:							$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
SERVICES TOTAL							$0	$843,079	$766,246	$625,325	$625,325	$0	$0	$0	$0	$0	$0	$2,859,974	
SOFTWARE AND SERVICES TOTAL							$0	$843,079	$766,246	$625,325	$625,325	$0	$0	$0	$0	$0	$0	$2,859,974	
MAINTENANCE AND OPERATIONS SUPPORT																			
No maintenance fees contemplated								$0	$0	$0	$0							$0	
																		$0	
MAINTENANCE AND OPERATIONS SUPPORT TOTAL			$0	$0		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
HARDWARE																			
Hardware for Implementation	No additional hardware expected			I	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Hardware for Operations	No additional hardware expected			O	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
HARDWARE TOTAL							$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
			$0				$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
HOSTING FEES		**Impl/Ops**																	
Included		I	$0				$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	Vendor Proposal
Included		O	$0				$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	Vendor Proposal
HOSTING TOTAL							$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
OTHER FEES																			
		I					$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
																		$0	
OTHER TOTAL			$0	$0		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
TOTAL VENDOR COSTS			$0			$0	$843,079	$766,246	$625,325	$625,325	$0	$0	$0	$0	$0	$0	$2,859,974		
TOTAL EXTERNAL-RELATED COSTS		TotlO				$0	$843,079	$766,246	$625,325	$625,325	$0	$0	$0	$0	$0	$0	$2,859,974		
INTERNAL COSTS																			
DEPARTMENTAL INTERNAL COSTS		**Impl/Ops**																	
Staffing Costs: ❷																			
Implementation:	100% funded by Federal Funds																		
Internal Project Manager: Michael Hock	.3 FTE@$55@2080 hours per year	I					$34,320	$0	$0	$0	$0	$0	$0	$0	$0	$0	$34,320	IR	
State Assessment Coordinator: Jon Strazza	.4 FTE@$55@2080 hours per year	I					$45,760	$0	$0	$0	$0	$0	$0	$0	$0	$0	$45,760	IR	
State Assessment Coordinator for Special Populations: Linda Moreno	.2 FTE@$55@2080 hours per year	I					$22,880	$0	$0	$0	$0	$0	$0	$0	$0	$0	$22,880	IR	
Data team: Glenn Bailey	0.1 FTE@$55@2080hours per year	I					$11,440	$0	$0	$0	$0	$0	$0	$0	$0	$0	$11,440	IR	
Operations:	100% funded by Federal Funds																		
Internal Project Manager: Michael Hock	.2 FTE@$55@2080 hours per year	O					$0	$22,880	$22,880	$22,880	$0	$0	$0	$0	$0	$0	$68,640	IR	
State Assessment Coordinator: Jon Strazza	.2 FTE@$55@2080 hours per year	O					$0	$22,880	$22,880	$22,880	$0	$0	$0	$0	$0	$0	$68,640	IR	
State Assessment Coordinator for Special Populations: Linda Moreno	.1 FTE@$55@2080 hours per year	O					$0	$11,440	$11,440	$11,440	$0	$0	$0	$0	$0	$0	$34,320	IR	
Data team: Glenn Bailey	0.075 FTE@$55@2080hours per year	O					$0	$8,580	$8,580	$8,580	$0	$0	$0	$0	$0	$0	$25,740	IR	
Other Internal Costs:																			
WAN Costs		O					$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
Other 3rd Party Software		I					$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
DEPARTMENTAL INTERNAL COSTS TOTAL							$114,400	$65,780	$65,780	$65,780	$0	$0	$0	$0	$0	$0	$311,740		
TOTAL INTERNAL COSTS		TotlO					$114,400	$65,780	$65,780	$65,780	$0	$0	$0	$0	$0	$0	$311,740		
ADS FEES																			
Project Implementation Costs Summary:							$436,644	$140,921	$0	$0	$0	$0	$0	$0	$0	$0	$577,565		
3% Charge for ADS PMO/EA Services Project Implementation Costs:		I					$13,099	$4,228	$0	$0	$0	$0	$0	$0	$0	$0	$17,327		
Independent Review		I					$15,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$15,000		
ADS FEES TOTAL		**TotlO**					$28,099	$4,228	$0	$0	$0	$0	$0	$0	$0	$0	$32,327		
TOTAL COSTS (IMPLEMENTATION and OPERATIONS)						$0	$985,578	$836,253	$691,105	$691,105	$0	$0	$0	$0	$0	$0	$3,204,041		

COST BREAKOUT (IMPLEMENTATION and OPERATIONS)

Implementation				**$0**	**$464,743**	**$145,148**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$609,891**	
Operations				**$0**	**$520,835**	**$691,105**	**$691,105**	**$691,105**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$2,594,150**	
COST BREAKOUT TOTALS (IMPLEMENTATION and OPERATIONS)				**$0**	**$985,578**	**$836,253**	**$691,105**	**$691,105**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$3,204,041**	**$0**

USE OF FUNDS - END

SOURCE OF FUNDS - START

Revenue Source:				**Prior**	**Year 1 (FY18)**	**Year 2 (FY19)**	**Year 3 (FY20)**	**Year 4 (FY21)**	**Year 5 (FY22)**	**Year 6 (FY23)**	**Year 7 (FY24)**	**Year 8 (FY25)**	**Year 9 (FY26)**	**Year 10 (FY27)**	**TOTAL**
															$0
Assume Year 1 and 2 are Implementation related, Years 3-x are Operations related															
❸															
STATE FUNDING: Implementation: Operating Budget	0.00%		I	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
STATE FUNDING: Operations: Operating Budget	0.00%		O	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant Funding: Implementation	0.00%		I	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Grant Funding: Operations	0.00%		O	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FEDERAL FUNDING: Implementation	18.32%	US DOE Funding Sources: SARA (State Assessment and Related Activities) Funds from Title VI of Elementary and Secondary Education Act to administer assessments plus Funds from Title I for Improving Academic Achievement of the Disadvantaged	I	$0	$441,863	$145,148	$0	$0	$0	$0	$0	$0	$0	$0	$587,011
FEDERAL FUNDING: Implementation	0.71%	IDEA (Individuals with Disabilities Education Act) Part B	I	$0	$22,880	$0	$0	$0	$0	$0	$0	$0	$0	$0	$22,880
FEDERAL FUNDING: Operations:	79.89%	US DOE Funding Sources: SARA (State Assessment and Related Activities) Funds from Title VI of Elementary and Secondary Education Act to administer assessments plus Funds from Title I for Improving Academic Achievement of the Disadvantaged	O	$0	$520,835	$679,665	$679,665	$679,665	$0	$0	$0	$0	$0	$0	$2,559,830
FEDERAL FUNDING: Operations:	1.07%	IDEA (Individuals with Disabilities Education Act) Part B	O	$0	$0	$11,440	$11,440	$11,440	$0	$0	$0	$0	$0	$0	$34,320
TOTAL:	**100.00%**			**$0**	**$985,578**	**$836,253**	**$691,105**	**$691,105**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$3,204,041**

Summary by State and Federal:

State Funding:	**$0**		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Federal Funding:	**$3,204,041**		$0	$985,578	$836,253	$691,105	$691,105	$0	$0	$0	$0	$0	$0

Implementation Funds:	**$609,891**	**Funding Overage/(Shortage):**
Implementation Costs:	**$609,891**	**$0**
Operational Funds:	**$2,594,150**	
Operational Costs:	**$2,594,150**	**$0**

SOURCE OF FUNDS - END

PROJECT CASH FLOW - START

IMPLEMENTATION	**Prior**	**Year 1 (FY18)**	**Year 2 (FY19)**	**Year 3 (FY20)**	**Year 4 (FY21)**	**Year 5 (FY22)**	**Year 6 (FY23)**	**Year 7 (FY24)**	**Year 8 (FY25)**	**Year 9 (FY26)**	**Year 10 (FY27)**	**TOTAL**
Use	$0	$464,743	$145,148	$0	$0	$0	$0	$0	$0	$0	$0	$609,891
Source	$0	$464,743	$145,148	$0	$0	$0	$0	$0	$0	$0	$0	$609,891
Net Cash by Fiscal Year:	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cash Flow:	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

OPERATIONS	**Prior**	**Year 1 (FY18)**	**Year 2 (FY19)**	**Year 3 (FY20)**	**Year 4 (FY21)**	**Year 5 (FY22)**	**Year 6 (FY23)**	**Year 7 (FY24)**	**Year 8 (FY25)**	**Year 9 (FY26)**	**Year 10 (FY27)**	**TOTAL**
Use	$0	$520,835	$691,105	$691,105	$691,105	$0	$0	$0	$0	$0	$0	$2,594,150
Source	$0	$520,835	$691,105	$691,105	$691,105	$0	$0	$0	$0	$0	$0	$2,594,150
Net Cash by Fiscal Year:	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cash Flow:	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

CASH FLOW - END

NET CHANGE IN OPERATING COSTS - START

		Year 1 (FY18)	Year 2 (FY19)	Year 3 (FY20)	Year 4 (FY21)	Year 5 (FY22)	Year 6 (FY23)	Year 7 (FY24)	Year 8 (FY25)	Year 9 (FY26)	Year 10 (FY27)	TOTAL
Proposed Operating Costs:												
Total Operating Costs	*See COST BREAKOUT section above*	$520,835	$691,105	$691,105	$691,105	$0	$0	$0	$0	$0	$0	$2,594,150
Total: Proposed Operating Costs:		**$520,835**	**$691,105**	**$691,105**	**$691,105**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$2,594,150**
Current Operating Costs:												
State Labor to Operate and Maintain NECAP	Same level of State Labor to maintain new solution as current solution	$65,780	$65,780	$65,780	$65,780	$0	$0	$0	$0	$0	$0	$263,120
Current NECAP Paper Based Science Tests:	Through Vendor Measured Progress; Costs show VT's portion of the shared cost with RI and NH											
Project Mgt		$80,971	$80,971	$80,971	$80,971							$323,884
Item Dev		$67,668	$67,668	$67,668	$67,668							$270,672
Test Construction		$119,620	$119,620	$119,620	$119,620							$478,478
Administration		$38,476	$38,476	$38,476	$38,476							$153,904
Scanning/Scoring		$96,675	$96,675	$96,675	$96,675							$386,700
Analysis		$31,042	$31,042	$31,042	$31,042							$124,168
Reporting		$28,482	$28,482	$28,482	$28,482							$113,928
Overhead		$66,817	$66,817	$66,817	$66,817							$267,268
Fees		$27,611	$27,611	$27,611	$27,611							$110,445
				$0								
Total: Current Operating Costs:		***$623,142***	***$623,142***	***$623,142***	***$623,142***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$2,492,567***
Net Operating Cost Decrease/(Increase)		**$102,307**	**($67,963)**	**($67,963)**	**($67,963)**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**($101,583)**
New Operating Costs funded by SOV Sources		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Current Operating Costs funded by SOV Sources		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
❹ **Net SOV Operating Cost Decrease/(Increase)**		**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
New Operating Costs funded by Federal Sources		$520,835	$691,105	$691,105	$691,105	$0	$0	$0	$0	$0	$0	$2,594,150
Current Operating Costs funded by Federal Sources		$623,142	$623,142	$623,142	$623,142	$0	$0	$0	$0	$0	$0	$2,492,567
❺ **Net Federal Operating Cost Decrease/(Increase)**		**$102,307**	**($67,963)**	**($67,963)**	**($67,963)**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**($101,583)**

NET CHANGE IN OPERATING COSTS - END

NOTES / ASSUMPTIONS:

❶ No software licensed
❷ Staffing levels anticipated through this project
❸ Funding Sources
❹ Net State Operating Cost Changes
❺ Net Federal Operating Cost Changes