Independent Review

Smarter Balanced Implementation Project

For the

State of Vermont
Agency of Education and Department of Information and Innovation

Submitted to the
State of Vermont, Office of the CIO
By

Strategic Technology Services

8/26/2014

Attachments:
1. FINAL-REVIEW-SOW-DII-AOE-Assessment-IR-STS-Risk_Register.pdf
2. FINAL-REVIEW-SOW-DII-AOE-Assessment-IR-STS-Project-Cost-Detail.xlsx
3. FINAL-REVIEW-SOW-DII-AOE-Assessment-IR-STS-Project-Schedule(from Proposal - Appendix G).pdf
4. FINAL-REVIEW-SOW-DII-AOE-Assessment-IR-STS-SARA_Grant_Award.pdf
5. AOE_New_England_Assessment_Consortium_ABC_Form.pdf

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1. Executive Summary

1.1 Cost Summary

IT Activity Lifecycle:	3 Years (contracted time period)	7 Years (years 4-7 are estimates)
Total Lifecycle Costs:	$5.83M	$12.98M
Total Implementation Costs:	$5.83M	$12.98M
New Annual Operating Costs:	$5.83M	$12.98M
Current Annual Operating Costs:	$4.30M	$10.04M
Difference Between Current and New Operating Costs:	$1.53M increase	$2.93M increase
Total Cash Flow between Source and Use of Funds:	$0 cash flow (*using Grant funding to meet cost obligation, so only spending up to what is needed*)	$0 cash flow (*using Grant funding to meet cost obligation, so only spending up to what is needed*)
Funding Source(s) and Percentage Breakdown if Multiple Sources:	SARA (State Assessment and Related Activities) Funds as part of Title VI of Elementary and Secondary Education Act to administer assessments; **$4.96M, 85%** SARA FY14 carry forward; **$867K, 15%**	SARA (State Assessment and Related Activities) Funds as part of Title VI of Elementary and Secondary Education Act to administer assessments; **$12.11M, 93%** SARA FY14 carry forward; **$867K, 7%**

The table below provides additional detail on the overall project Cash Flow:

	Year 1 (FY15)	Year 2 (FY16)	Year 3 (FY17)	Year 4 (FY18)	Year 5 (FY19)	Year 6 (FY20)	Year 7 (FY21)
Use	$2,028,651	$1,928,371	$1,876,092	$1,786,092	$1,786,092	$1,786,092	$1,786,092
Source	$2,028,651	$1,928,371	$1,876,092	$1,786,092	$1,786,092	$1,786,092	$1,786,092
Net Cash by Fiscal Year:	$0	$0	$0	$0	$0	$0	$0
Cash Flow:	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

The table below provides additional detail on the overall use of Grant Funds:

		Annual Amount used for this project	3 Year Total	7 Year Total
Source of Funds: Title VI of Elementary and Secondary Education Act to administer assessments. AOE has received this each year since the Elementary and Secondary Education Act was reauthorized in 2000.				
Grant Award Number:	S369A140047			
Grant Amount:	**$3,355,365**			
Funds to be allocated to this project (51647915):		$1,655,365	$4,966,095	$12,110,462
Other Expenditures of these funds:				
SARA (State Assessment and Related Activities) Pk-Middle - personal services and operating (Project Grant Code 51647315) (*not used for this project*)		$600,000		
SARA Pk-Middle Contracts (Project Grant Code 51647415) (*not used for this project*)		$100,000		
SARA Secondary & Adult personal services and operating (Project Grant Code 51647815) (*not used for this project*)		$1,000,000		

		Between $220K and $373K/year		
SARA FY14 Carry Forward		Between $220K and $373K/year	$867,019	$867,019
TOTAL USE OF GRANT FUNDS:			$5,833,114	$12,977,481
Difference between Source and Use of Funds for the GRANT:			$0	$0

1.2 Disposition of Independent Review Deliverables

Deliverable	**Highlights from the Review** *Include explanations of any significant concerns*
Acquisition Cost Assessment	Costs seem reasonable and in line with comparable bids.
Technology Architecture Review	Sound technology architecture based on Microsoft .NET Framework, and SQL Server database running in Rackspace.com server infrastructure using virtualized servers.
Implementation Plan Assessment	Project management approach and methodology has yielded positive results on all previous projects.
Cost Analysis and Model for Benefit Analysis	Cost analysis provides accurate 3 year costs. No quantified monetary benefits. Non-measurable monetary benefits include better assessment data with which to better instruct students and achieve desired outcomes, better testing methods using adaptive questioning based on student response, better scoring using artificial intelligence where appropriate, and increased data quality.
Impact Analysis on Net Operating Costs	Slight increase in net operating costs.

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 the 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).

1. The project being considered is a Federal Department of Education requirement and is funded with Federal monies. It is recommended that this project proceed with the following items being successfully addressed.

2. Get the contract completed with AIR and the project started immediately, in order to meet the project timeline of March, 2015. Of critical importance is to align payment schedules with deliverables and to determine whether NEAC or individual states are being invoiced. AIR suggests the following milestones and related payment schedule:
   a. Commitment of student counts (October/November)
   b. Approval to print paper materials (January/February)
   c. Completion of User Acceptance Testing/Approval to open online testing window (January/February)
   d. Completion of testing/Closing the test window (May)
   e. Delivery of results (June)
   f. Meetings (whenever held)

3. On a parallel track, develop a simple governance model between CT, NH, and VT, using the following roles, with suggestions for who from VT should fill those roles:
   a. Executive Sponsor: Suggest Rebecca Holcombe, Secretary of Agency of Education - <5% FTE
   b. Project Oversight: Suggest Frank Gerdeman, Assistant Division Director of Integrated Support, High School and Adult, who is also VT State lead for Smarter Balanced Consortium – 20% FTE
   c. Project Manager: Suggest Michael Hock, Assessment Director, who is also a Smarter Balanced Executive Committee member and serves as liaison to the Smarter Balanced Test Administration and Student Accessibility workgroup– 50% FTE. IMPORTANT: This role will be expected to making major consortium decisions, assuming the responsibility to gather input from colleagues and the SOV decision-makers

4. Given the significance of the change in Assessment method from paper-based to computer-based, develop a fall-back position of providing paper-based assessments for schools who may not be ready to use

computers for assessments for reasons *other than* not meeting minimum computing standards.

5. Per the Grant Award letter provided by Mr. Talbott, there appears to be adequate funding for this project, and those funds *ARE NOT ALSO* allocated to other initiatives. Suggest building in a 5% contingency, which fits nicely into the total funding allocation. (For example, Year 1 Use of Funds if $1.56M. 5% is $78K. The project has free cash flow of $86K in year 1 and more in years 2 and 3.

6. Formalize the VT working team, using the following Project Organization Structure, with adequate support and time from the following individuals:
   a. Project Manager: Michael Hock, Assessment Director – 50% FTE
   b. School Outreach: Peter Drescher - Responsible for working with schools to ensure that they meet tech readiness standards for the administration of the on-line testing – 50% FTE
   c. Data Analyst: Glenn Bailey - Responsible for the secure transfer of student data to and from the vendor, as well as a host of other functions including analysis and reporting – 50% FTE
   d. Consortium Project Manager: TBD – 1 FTE – This is expected to be a contracted position for 10 months, with costs shared equally among the 3 states.

1.6 Certification

I hereby certify that this Independent Review Report represents a true, independent, unbiased and thorough assessment of this technology project/activity and proposed vendor(s).

_____   _____

Signature   **Date**

2. Scope of this Independent Review

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 (which includes a Risk Analysis)
- A cost analysis and model for benefit analysis; and
- An impact analysis on net operating costs for the Agency carrying out the activity

2.2 Out-of-Scope

A separate deliverable contracted as part of this Independent Review may be procurement negotiation advisory services, but documentation related to those services are not part of this report *at this time.*

3. Sources of Information

3.1 Independent Review Participants

Name	Employer and Title	Participation Topic(s)
Michael Hock	AOE – Assessment Director	Project Leadership and Primary Subject Matter Expert
Glenn Bailey	AOE – Data Management Director	System/Data Interfaces, Data Integrity
Frank Gerdeman	AOE – Assistant Division Director of Integrated Support, High School and Adult	Project Oversight and Subject Matter Expert
Peter Drescher	AOE – Educational Technology Director	School technology outreach point of contact
Bill Talbott	AOE – Deputy Secretary and Chief Financial Officer	Project source/use of funds
Jon Cohen	AIR - Executive Vice President at American Institutes for Research and President of AIR Assessment	AIR Proposal and related services
Steve Kromer	AIR - Vice President at American Institutes for Research and Chief Operating Officer, AIR Assessment	AIR Proposal and related services
Heather Hayes	AIR – Director, On Line Testing	Call participation, although no specific dialog

Additionally, attempted to meet with John Fischer, AOE – Deputy Secretary and Transformation and Innovation Leader, but did not receive a response to the request to meet.

3.2 Independent Review Documentation

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

Document Name	Description	Source
Smarter Balanced Hosting Requirements V1 1.pdf	Document provided by Smarter Balanced detailed the recommended Technical Infrastructure related to AWS (Amazon Web Services)	Project SharePoint site
AIR_Proprietary Information.pdf	Areas of proposal identified by AIR as proprietary	Project SharePoint site
AIR_Signed Letter of Submittal.pdf	Submission letter by primary vendor American Institutes for Research	Project SharePoint site
MI_Signed Letter of Submittal.pdf	Submission letter by subcontractor Measurement Incorporated to perform printing, delivery, scanning, data forensics, AI, and hand scoring of paper-based tests.	Project SharePoint site
Appendix A_Resumes.pdf	Appears to be resumes of all AIR Assessment staff	Project SharePoint site
Appendix B_Typology of Assistive Technology Products.pdf	Listing of technologies used to assist people with special needs grouped by testing topic	Project SharePoint site
Appendix C_Sample Brochures.pdf	Sample marketing brochure of Utah's Assessment system	Project SharePoint site
Appendix D_Sample User Role Chart.pdf	Matrix of AIR systems and access by User Type	Project SharePoint site
Appendix E_Adaptive Algorithm Letter & Design Document.pdf	AIR's testing algorithm design document	Project SharePoint site
Appendix F_MI Work Samples.pdf	Samples of MI work product, including Pull List, Box List, Packing List, Security List, Security Check-in Report, Sample District Return Form, Sample School Security Checklist Blank Form, Sample Test Booklet Receipt Form	Project SharePoint site
Appendix G_Project Schedule.pdf	Sample Project Plan 7/17/2014 through 8/24/2015	Project SharePoint site
6.1 Introduction.pdf	Proposal introduction	Project SharePoint site
6.2 Scope of Work.pdf	Proposed Scope of Work (Section 8)	Project SharePoint site
6.3 Project Staffing.pdf	Proposed Project Staffing	Project SharePoint site
6.4 Budget.pdf	Proposed Project Budget	Project SharePoint site
6.5 Corporate Capability.pdf	Summary of AIR skills, including listing of sample/similar projects over the past 10 years	Project SharePoint site
6.6 State Specific Appendices and Cover Materials.pdf	AIR and MI response to specific forms/insurance requirements	Project SharePoint site
6.7 Liquidated Damages_Penalties.pdf	AIR statement acknowledging liquidate damages clause in the RFP	Project SharePoint site
8.1 Project Management & Planning.pdf	Overview of PM approach, related documentation, project team, and project schedule.	Project SharePoint site
8.2 Technical & Policy Issues.pdf	Overview of how AIR will support the NEAC Technical Advisory Committee (TAC).	Project SharePoint site
8.3 Online Assessment & Technical Support.pdf	Overview of AIR's Online Test Delivery System (TDS), Test Administration, Student Testing Interface, Accommodations and Embedded Supports for students with disabilities, description of Fault Tolerance approach, and related Technical Support.	Project SharePoint site
8.4 Test Items & Performance Tasks.pdf	Overview of Embedded Field Testing (EFT) approach to developing and maintaining the Test Item Bank. The EFT algorithm consists of two	Project SharePoint site

Document Name	Description	Source
	different algorithms—one for identifying which field-test items will be administered to which student (the distribution algorithm) and one for selecting the position on the test for each item administered to the student (the positioning algorithm).	
8.5 Paper-Based Tests.pdf	Description of developing, producing, delivering, scanning, and scoring of Paper-Based Tests, including related security, for schools that lack the technology readiness for computer-based assessments.	Project SharePoint site
8.6 Security, Chain of Custody & Data Forensics.pdf	Overview of test and data security, forensic analysis, and related security policies and procedures.	Project SharePoint site
8.7 Test Administration.pdf	Description of the Administrative function of managing and delivering tests through the AIR solution.	Project SharePoint site
8.8 Scoring.pdf	Overview of hand –scoring and machine-scoring of tests.	Project SharePoint site
8.9 Web-Based Designated Supports.pdf	Overview of *web-based* accessibility tools, supports, and accommodations.	Project SharePoint site
8.10 State Led Item Development.pdf	Overview of test item development and scoring, specifically Math and English Language Arts, the two items types called for by Common Core State Standards (CCSS) and thus, Smarter Balanced.	Project SharePoint site
8.11 Web Based Analysis & Reporting.pdf	Overview of the online reporting system (ORS).	Project SharePoint site
8.12 State Specific Requirements.pdf	Acknowledgement that Vermont has no state-specific requirements.	Project SharePoint site

4. Project Information

4.1 Historical Background

Provide any relevant background that has resulted in this project.

SUMMARY

The New England Assessment Consortium (NEAC), comprised of the states of Connecticut, New Hampshire and Vermont, issued an RFP in **April, 2014**, seeking to implement the Smarter Balanced Assessment Consortium's (SBAC) English Language Arts and Mathematics assessments in grades 3 through 8 and 11, through a multi-state procurement collaborative. Specifically, NEAC is seeking services that will be needed to manage the project, and to administer, score and report the SBAC Assessments.

In addition, NEAC are seeking separate bids for the development and hosting of a secure on-line analysis and reporting system.

The assessments will be administered in accordance with Smarter Balanced policies, procedures and technical specifications, and consistent with the policies and guidelines that govern procurement and project implementation in each of the three states, the state guidelines and regulations taking precedence if conflicts occur.

The NEAC states are all governing states in the Smarter Balanced Assessment Consortium and have made extensive contribution to the design and development of the assessments.

Smarter Balanced has contracted for the development of a comprehensive and integrated assessment system that includes summative, interim and formative components. The summative assessment will feature on-line delivery of test items, using computer adaptive technologies, and performance tasks. An array of digital tools and features that will enhance the testing experience for all students, particularly students with disabilities, English language learners, and other students with special assessment needs, will also be provided (note: the digital tools will be provided by SBAC and are not included in the scope of work for this project). Both the summative and interim assessments will require web hosting, as well as provisions for technical assistance to schools and other users (the proposed digital library of formative assessment professional development modules will be hosted on the web by Smarter Balanced).

ADDITIONAL DETAIL

In June, 2014, NEAC selected American Institutes for Research. See this link for more detail on AIR's Assessment services: http://www.air.org/program/air-assessment-program.

AIR is subcontracting to Measurement Incorporated to score the operational items (non-computer-based scoring) and support AIR in the limited paper-pencil operations. See this link for more information: http://www.measurementinc.com/Solutions/EducationalTesting

See the SBAC link for more information: http://www.smarterbalanced.org/.

ADDITIONAL BACKGROUND

New Hampshire and Vermont are currently members of the New England Common Assessment Program (NECAP), which was formed in 2004 and has jointly administered annual reading, writing and math assessments each fall to students in grades 3 to 8 and grade 11. The final of administration of NECAP Reading, Writing and Mathematics tests occurred in October 2013. The success of NECAP has demonstrated that a consortium of small states can share resources and apply economies of scale to produce high quality assessments at a price each state can afford. NEAC will build on the NECAP experience, and will expand both capacity and expertise with the addition of Connecticut.

4.2 Project Goal

Explain why the project is being undertaken.

NEAC has a three (3)-year time horizon for this project.

The high level deliverables include:

1. Web-based operational testing, including development, deployment and scoring of Pencil and Paper tests;
2. Development and deployment of web hosting for on-line administration, and preparation of scoring procedures and training packs for all Pencil and Paper test items, some on-line items and performance tasks;
3. Three operational administrations of the assessment, including debriefing with the states and Smarter Balanced after the first testing cycle that may require adjustments and improvements in the second and third administrations;
4. Reporting functions that shall be bid and evaluated separately (this is not expected to be part of this project).

Additional goals include:
1. Efficiency is a guiding principle of the partnership among the NEAC states. Cost savings and the ability to pool resources and staff to implement the Smarter Balanced Assessments efficiently and effectively were major factors in the initial decision to form NEAC;
2. Leveraging technology in assessment, while accounting for schools differing technology readiness, and mitigating test fraud.

4.3 Project Scope

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

The project scope, major deliverables, and schedule are summarized in Section 4.4: Project Phases, Milestones, and Schedule.

4.3.1 Major Deliverables
See Section 4.4.

4.4 Project Phases, Milestones and Schedule

The chart below outlines the schedule of activities as suggested in the proposal.

Following this initial chart is a response to a question posed during the IR process, whereby we sought to understand payment schedule and how those payments are tied to deliverables.

DATE	ACTIVITIES
July to November 2014	Articulate procedure and prepare materials for initial administration, including: development of technology approach, support and web-hosting, articulation of key policies and procedures regarding test security, scoring procedures, and development of test administration training procedures, others as described in the project plan. Determine schools and number of students needing Pencil/Paper tests.
December 2014 - February 2015	Continue preparation for testing. Print and distribute Pencil/Paper tests. Train test coordinators and Test Administrators. Recruit and train service center representatives Recruit and train scorers. Prepare for reporting.
March to June 2015	Test Administration Window: deploy on-line testing; provide consultation and technical assistance to schools through the service center, and score assessments, update training materials, others as recommended. Complete scoring; Continue providing technological support to schools.
July to September 2015	Complete reporting following final Smarter Balanced standard setting using; Review and analyze first operational assessment, providing reports on scoring, use of service center, test security and others as included in the project work plan. Develop and implement a plan for corrective actions as needed. Interact with Smarter Balanced to review and implement recommended changes to the assessment. Prepare for Spring 2016 Administration

QUESTION: What are the expected invoicing/payment schedule, both during implementation as well as in production?

ANSWER FROM AIR: We have just started thinking about invoicing schedules for Smarter Balanced clients. Clients generally like to pay us when we meet certain clear milestones. For this project, we envision the payments upon (all dates approximate):

- Commitment of student counts (October/November)
- Approval to print paper materials (January/February)
- Completion of User Acceptance Testing/Approval to open online testing window (January/February)
- Completion of testing/Closing the test window (May)
- Delivery of results (June)
- Meetings (whenever held)

We would also like to negotiate progress payments for Project Management (quarterly) and during online testing (monthly, March and April)

Additional questions related to payment follow:

QUESTION: Will AIR be billing the NEAC or individual states for their portion? Will that bill recipient just be getting invoiced from AIR, or from AIR as well as MI (as well as anybody else)?

ANSWER FROM AIR: are happy to bill either NEAC or the states. We didn't know if the Pricing Forms from the RFP represented the final decision on how states or NEAC should be billed. We assumed we would have to work out a billing process that works for the individual states.
Invoices would only come from AIR and would cover all subcontractor and other costs.

QUESTION: What cost differences are there between the open source solution and the proposed solution?

We have not calculated the cost difference, but it would certainly cost AIR more to use the open-source version. As we stated in Section 8.3:

> "Using our proprietary architecture, we can deliver the tests more efficiently, reducing costs to NEAC. Even with the license fees we pay to Microsoft for our SQLServer (the open-source system uses the free MySQL) and Internet Information Services (IIS) web servers (the open source uses the free Apache), the total cost is lower because we can deliver better performance with less hardware and lower support costs."

In addition to lower costs, AIR's well-proven TDS delivers the same tests with reduced risk.

1. Acquisition Cost Assessment

The following chart represents the *known* project Acquisition Costs over a 3 year period. The 7 year Costs represent *anticipated* costs between years 4 and 7.

Acquisition Costs	3 Year Costs	7 Year Costs	Comments
Hardware Costs	$0	$0	Hosted solution
Software Costs	$0	$0	While AIR is using their software to provide the proposed service, NEAC is not licensing software
Implementation Services	$0	$0	Included in Professional Services
System Integration Costs	$0	$0	Included in Professional Services
Professional Services (e.g. Project Management, Technical, Training, etc.)	$3.93M	$8.99M	This project a services project, so most of the project dollars are here. As such, this chart does not lend itself well to highlighting ONLY acquisition costs, as the costs associated with the solution are service and run the entire time the services are rendered. In other words, there is no delineation between an "acquisition phase" vs. a "production phase".
Smarter Balanced Membership Fee	$1.24M	$2.89M	
Travel	$.323M	$.753M	
Other	$.307M	$.307M	Contingency, Project Management, DII EA and Project Oversight
Total Acquisition Costs	**$5.83M**	**$12.98M**	

See Attachment 3 for detailed project costing information.

5.1 Cost Validation

The Acquisition Costs were validated through two methods:
1. The Acquisition Costs were validated first by comparison of the AIR proposal with other finalist bids. The chart below shows the actual bid. These bids all provide an "apples-to-apples" comparison of deliverables, although the method of getting to the deliverables differs (AIR proprietary solution vs. Open Source alternative*). In summary, AIR is in the middle of all bidders (3rd of 5), but on the low end of the group weighting, as that 3 of the 5 are in the $21-23M grouping, and 2 are in the $30-32M grouping.

	Bid1	Bid2*	AIR	Bid4	Bid5
TOTAL	**$21,410,891**	**$22,161,498**	**$23,069,738**	**$30,311,410**	**$32,159,252**
Delta between AIR and other Finalists (measured as a percentage)	*-7.19%*	*-3.94%*		*31.39%*	*39.40%*

2. The Acquisition Costs were validated secondly through discussion with AIR regarding how the NEAC project scope compared with other projects of similar size and scope. AIR is under contract to deliver the Smarter Balanced assessments in Delaware, Oregon, and Missouri. When asked if any of these sized similarly to NEAC and/or VT, Oregon was suggested to be similar to NEAC in scope (60K children/grade level). CT has 42K, NH has 14.7K, and VT has 6.9K children per grade level. Confidentially, NEAC did a little better in pricing, as the scope of work was more clearly specified.

5.2 Cost Comparison

1. The Cost Comparison was conducted as a function of the Cost Validation. See Cost Validation Points #1 and #2 above.

5.3 Cost Assessment

It is the opinion of the report writer that the Acquisition Costs as outlined in the associated costing spreadsheet are appropriate.

2. Technology Architecture Review

1. **State's IT Strategic Plan:**   Describe how the proposed solution aligns with the State's IT Strategic Plan (http://dii.vermont.gov/sites/dii/files/pdfs/DII-Strategic-Plan-FY2014-2019.pdf).
   a. The State's 2014-2019 IT Strategic Plan contains 5 major goals and uses 6 key principles in designing and prioritizing work.
      i. 5 Major Goals:
         1. to modernize critical technologies
         2. to ensure sustainability of the state's information services
         3. to operate IT effectively and efficiently
         4. to use IT to improve the productivity of all state services
         5. Create new solutions partnering with State Agencies
      ii. 6 Key Principles:
         1. Leverage successes of others, learning best practices from outside Vermont.
         2. Leverage shared services and cloud-based IT, taking advantage of IT economies of scale.
         3. Adapt the Vermont workforce to the evolving needs of state government.
         4. Leverage modern IT delivery frameworks and enterprise architectures.
         5. Couple IT with business process optimization, to improve overall productivity and customer service, not just IT itself.
         6. Optimize IT investments via Enterprise Architecture and Project Management methodologies.
   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 has been implemented through the SBAC Test Pilot, where 4.3M students used the proposed solution, including nearly the entire student population in the State of California.*
      ii. Leverage shared services and cloud-based IT, taking advantage of IT economies of scale.
         1. *AIR's solution runs on Rackspace hosted infrastructure.*
      iii. Adapt the Vermont workforce to the evolving needs of state government.
         1. *Not entirely applicable. The beneficiaries of this project are educators, not state government.*
      iv. Leverage modern IT delivery frameworks and enterprise architectures.
         1. *The platform upon which the proposed services are being delivered (.NET, SQL Server, Windows, Browser technology) is modern IT framework and enterprise-class architecture.*
      v. Couple IT with business process optimization, to improve overall productivity and customer service, not just IT itself.
         1. *AOE IT is largely not involved with this project. This is less an "IT" project and primarily a services project whereby the service provider is using technology (albeit, their technology) to deliver the proposed service.*

vi. Optimize IT investments via Enterprise Architecture and Project Management methodologies.
1. *EA is not applicable here, but Project Management methodologies are, and the Project Management methodologies proposed by AIR are proven.*

2. **Service Level(s):** What is the desired service level for the proposed solution and is the technical architecture appropriate to meet it?
   a. AOE did not define the desired service level in the RFP or during the IR process. However, it is known that the critical period of time that the solution needs to be available is during the testing period. A reasonable level of system availability during this testing period is 99.5%.
      i. Given the description of the solution architecture described in **Attachment 4**, it is *reasonable* to expect that the 99.5% system availability service level will be achieved.
      ii. However, the RFP did not state the expected system availability service level in the RFP, nor did AIR state the guaranteed system availability, and as such, this should be addressed in the contract.
      iii. Further, AOE **did** put the following "*Liquidated Damages/Penalties*" language in the RFP, and AIR agreed to this language. What is yet to be defined is what constitutes "non-performance or breach of contract". Again, this should be defined in the contract.
         1. <u>Liquidated Damages/Penalties language in the RFP</u>: "The final contracts negotiated under this contract will include a provision for penalties or liquidated damages due to non-performance or breach of contract. In particular, penalties or liquidated damages will be tied primarily to actions on the part of the contractor that result in either the late delivery of materials or services, or execution of deliverables that fail to meet contract specifications Specifics of the penalties and liquidated damages will be determined during contract negotiations. As a starting point for negotiations, the States propose a policy in which the contractor shall be penalized no more than a fixed percentage (e.g., 7.5%) of the total contracted amount in a given year. The maximum penalty shall be prorated against the number of days in which the contractor is determined to be in non-compliance with the contract (e.g., failure to provide deliverables on time and/or insufficient to meet technical specifications). States will hold the penalty sum in escrow over the course of the contract year and will add the sum to the final annual payment if all contract deliverables have met timelines and specifications. Contractors will not be held responsible for delays that result from states failing to meet their specific timelines and responsibilities."
      iv. Additionally, AIR claims their system is infinitely scalable and is currently the largest system deployed that can handle 500,000 simultaneous users. All of the features proposed are currently operational in other AIR client environments.

3. **Sustainability:** Comment on the sustainability of the solution's technical architecture (i.e., is it sustainable?).
   a. It appears that the technical architecture is sustainable, given the underlying technology used (.NET and SQL) and given the Rackspace hosting platform.

4. **License Model:** What is the license model (e.g., perpetual license, etc.)?
   a. 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.
   a. **Application Security**: The objective of system security is to ensure that all data is kept protected and that it is accessed appropriately by the right user groups. It is about protecting data and maintaining data and system integrity as intended, including ensuring that all personal information is secured, that transferred data (whether sent or received) is not altered in any way, that the data source is known, and that any service can only be performed by a specific, designated user. AIR indicates that their systems protect individual privacy and confidentiality in a manner consistent with NEAC state privacy laws, Family Educational Rights and Privacy Act (FERPA), and other federal laws. 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. When data gets stored, it resides securely on database servers behind multiple firewalls and is secured through an encrypted connection.

   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.

System Security	AIR Meets Requirement Currently
General Requirements	
Student authentication through secure administrative system	Yes
Administrative authentication to gain access to administer tests	Yes
Each user's access privileges evaluated at login with automatic disable/enable functions based on user's profile	Yes
Security of Test Content and Student Data	
Security of test content shall be device-specific and device-appropriate	Yes
Only valid authentication information enables test content to be viewed	Yes
Test content displayed only while student is taking test	Yes
Cached content is secured, managed, and purged	Yes
Transmissions of student data are secure	Yes
Desktop Security	
Decrypted test content is protected through control of the desktop computer while students are testing	Yes
Access to other applications are disabled while a test is being accessed	Yes
Other Security Features EXCEEDING RFP Requirements	
Built-in authentication sign-on process exists between the TA and the student (illustrated in Section 8.3.6)	
Immediate security updates to all AIR systems provided via integrated Test Information Distribution Engine (TIDE) system	
Test administration environment is secured through prevention of forbidden applications, the secure browser, and built-in security features on the TA and Student Interfaces	

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. **Physical Security**: NEAC states' 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. All access is keycard controlled, and sensitive areas require biometric scanning. Access credentials are assigned only for authorized data center personnel, and only they have access to the data centers. Visitors' identities are verified, and visitors are escorted at all times while in the facility. All data center employees undergo multiple background security checks before they are hired. All AIR employees have undergone rigorous background checks. Staff at both AIR and Rackspace receive formal training in security procedures to ensure that they know and implement the procedures properly.

c. **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. 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.

d. **Measurement Inc. Security**: At the heart of the MI information technology system is a firewall implementation that allows it to block, audit, and respond to both internal and external threats. MI currently employs 19 separate firewalls to provide layered and redundant protection. These firewalls utilize state-of-the-art deep packet inspection, port blocking, proxying, address translations, heuristics, and trend analysis to provide security. In addition, this multivendor solution limits exposure to potential weaknesses associated with each implementation that might be exploited in the future. In recent years new attack vectors have emerged that largely bypass many of the port based security protections that traditional firewalls provide. In response MI has implemented state-of-the-art enterprise class HTTP attack and other application layer protection appliances. MI's firewalls, both virtual and physical, are from industry recognized leaders such as Juniper, Radware, and Checkpoint. MI immediately updates all defenses as soon as emerging threats and countermeasures are identified. MI also employs an Intrusion Detection System that allows rule sets to be updated automatically to block unwanted traffic in real time, whether the source is internal or external. To further complement these capabilities, MI has deployed software that detects, removes, and destroys viruses, spyware, and other forms of malicious software. This software is updated at least daily through automated means backed by constant monitoring by Network Operations staff. MI also routinely deploys security patches and updates for operating systems and commercial software using a central update management server. MI employs onsite state-of-the-art Distributed Denial of Service (DDoS) protection in its Tier III data center as a complement to the Internet Service Provider (ISP) based upstream DDoS services. Behavioral protection and advanced challenge/response techniques allow us to mitigate modern DDoS attacks that use new methods to exploit areas that traditional security solutions, such as firewalls, are not equipped to handle. MI is able to automatically defend against network flooding. MI deploys web services in an untrusted domain separate from the main corporate network and with additional layers of firewall protection. It employs compartmentalization to divide internal users on a "need to know" basis with controlled access between NEAC states and project-related resources and discrete subnets within the network. An Active Directory based Identity Management Services provide the foundation for this capability. The internal network users are monitored in a "trust but verify" approach that audits and records the actions of users and prevents the pass-through of undesired traffic. This audit allows MI to monitor for irregular and illegal acts and provides reinforcement of MI's standards. MI enforces a policy of encrypting all sensitive data at rest when physical access controls cannot

be enforced. Laptops and other mobile devices are not allowed to store sensitive data unless it is encrypted on the disk, folder, or file level. In addition all sensitive data in transit is fully encrypted through the use of SSL, SFTP, VPN or other secure means. In order to verify the effectiveness of all its security measures MI periodically engages an independent expert cyber security company to audit the operations. The audits include but are not limited to penetration testing, web application testing, network infrastructure security testing, best security practices reviews, wireless audits, and social engineering security testing. If at any time critical deficiencies are identified immediate remedial action is taken. Other less critical security deficiencies are scheduled for remediation upon the next release or maintenance window as appropriate.

6. **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?
   a. AIR has designed their system to be extremely fault tolerant. The system can withstand failure of any component with little or no interruption of service. One way that they achieve this robustness is through redundancy. Key redundant systems are 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.

7. **Data Retention:** Describe the relevant data retention needs and how they will be satisfied for or by the proposed solution.
   a. Data are protected by nightly backups. AIR completes a full weekly backup and incremental backups nightly. The systems are run with full transaction logging, enabling AIR to restore the system to its state immediately prior to a catastrophic event.

8. **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?
   a. There is no SLA for system availability, as noted above in the "Service Level" section, and that should be addressed in contracting.
   b. What is addressed in the AIR proposal is an SLA related to response time to **help desk tickets**, and the process AIR uses to facilitate maintaining this service level. AIR proposed the following SLA regarding help desk support: "AIR commits to providing a toll-free customer support line, chat, and e-mail for state users, educators, and administrators Monday through Friday from 8:00 am to 5:00 pm EST, outside of the testing windows, and between 7:00 am and 7:00 pm

EST during the testing window." This service level meets AOE's needs. The manner in which AIR provides this level of service is described below:

    i.   AIR implements a tiered approach for the help desk to escalate and resolve questions from callers. AIR's help desk software (8x8, Inc., version 7.1.2) integrates voice, e-mail, and chat functions. A user can call the help desk on a dedicated number, e-mail a dedicated e-mail address, or initiate a chat with one of our customer service representatives. NEAC will be provided its own unique toll-free number, and agents will be trained on the degree of direct contact with districts and schools and on which inquiries should be directed to and addressed by NEAC.

   ii.   During the testing window, AIR will make initial contact regarding any inquiries within 2 hours of receipt; outside the testing window, the response time would be within 24 hours. Most help desk calls are from users who are unfamiliar with the system and need assistance. Successful training and the online availability of thorough system documentation and support in the testing system typically keep these requests to a minimum. The few help desk calls that require technical assistance tend to relate to problems with the user's local infrastructure. These include firewall problems and local network Internet connectivity and are escalated to AIR's Tier 2 network staff for follow- up and resolution.

  iii.   The first tier (Tier 1) consists primarily of scripted answers approved by NEAC and the resolution of routine queries by help desk agents. AIR will work with NEAC to ensure the scripts reflect state-specific policies and testing procedures. AIR's Tier 1 help desk will receive technical questions with respect to the test engine and all other technology supporting the assessment program. Inquiries of a technical nature and specific to AIR's systems that require more involved technical support will be escalated to a member of AIR's Tier 2 technical support staff. During the testing window, AIR will make initial contact regarding any inquiries within 2 hours of receipt; outside the testing window, the response time would be within 24 hours. Roughly 85% of all calls are resolved at Tier 1.

   iv.   The second tier (Tier 2) consists of a help desk representative escalating a case to a member of a technical support team for further investigation. Each team has an area of expertise that allows them to quickly resolve cases assigned to them (e.g., network support, testing support, reporting). If the issue cannot be resolved at the Tier 2 level, it will be escalated to a senior subject matter expert.

   v.   The third tier (Tier 3) consists of contacting a subject-matter expert, such as a network engineer or a senior software engineer.

9. 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 **Attachment 1** of this report. Will the solution be able to integrate with the State's Vision and financial systems (if applicable)?

    a.   See **Attachment 1** for details regarding <u>WHAT</u> is being exchanged.

3. Assessment of Implementation Plan

7.1 Implementation Readiness

1. The reality of the implementation timetable
   a. The overall proposal contemplates a **3 year** period of service delivery, with a **7-8 month implementation schedule**.
   b. Given other project experiences by AIR, the 7-8 month implementation period is right at the edge of what is recommended by AIR, and therefore, is fairly aggressive with little contingency. However, the solution itself is proven, in that, 4.3M students took pilot tests using the proposed solution.

2. Training of users in preparation for the implementation
   a. The project plan calls for a piloting period to train students and test administrators (most often teachers) how to take the tests and how to administer the tests. Test administrators will be trained and certified that they can conduct the necessary steps.
   b. AIR proposes an annual training plan that uses the Smarter Balanced training modules as the foundation for all training sessions. Because of their role in designing and implementing the Smarter Balanced online testing system, AIR's technical writers and project staff are intimately familiar with the Smarter Balanced online testing system as well as the Smarter Balanced content and format specifications for Smarter Balanced training and publications. A particularly important part of the training plans include the self-paced online test administrator certification course. This course teaches users on how to set up and monitor test sessions, set test settings and accommodations, and adhere to security procedures.
   c. **Technical Support Documents**: The technical documentation will include all of the details needed to configure school networks and computer labs. These documents will include, at a minimum, guidance on:
      i. Configuring content filters and proxy servers if schools are using them. Such devices can interfere with test delivery and must be configured not to do so. They should be prevented from caching information, should have a sufficiently high time out setting, and of course, should not prohibit access to the testing site
      ii. Avoiding bandwidth bottlenecks
      iii. Configuration of wireless access points (typically they cannot support more than about 20 (802.11g) or 40 (802.11n) connections each, so connections should be distributed across a sufficient number of access points
      iv. A series of interactive presentations on each of the online systems to be delivered through a combination of webinars, self-guided and self-paced online tutorials, and train-the-trainer sessions, as well as optional face-to-face training sessions. AIR proposed that the content of the webinar presentations would largely be the same as the face-to-face training presentations and will form the basis for the online tutorials. AIR's online tutorials are designed to teach both sophisticated technology users and users new to the system their roles and responsibilities in context of the new online systems. The bulk of these preparations will be AIR's adaptation of the Smarter Balanced standard materials.
      v. To ensure that teachers are familiar with the online environment and that TAs understand their test security obligations, AIR will produce the following training materials: Online test administrator certification course and Training module on the TA Interface for online testing. AIR recognizes the importance of providing security training for all TAs and ensuring all proctors are certified before they can administer a test. AIR offers a self-paced, online test administrator training course. AIR has the capability to make this course

mandatory and prevent a TA from administering tests until he or she passes the course, or AIR can make it an optional activity.

3. Readiness of impacted divisions/ departments to participate in this solution/project
   a. AOE's Assessment Division appears ready to take on this project, given the staff assigned to this, and the FTE% allocation of time to this project.

4. Adequacy of design, conversion, and implementation plans
   a. The Implementation plans are proven and adequate.
   b. Conversion is not part of the Scope of this project.

5. Adequacy of support for conversion/implementation activities
   a. Conversion is not part of the Scope of this project.

6. Adequacy of agency and partner staff resources to provide management of the project and related contracts (i.e. vendor management capabilities)
   a. **Mr. Michael Hock** will provide Project Oversight for this initiative, and appears to have the requisite knowledge and time required by this project.
   b. AIR is assigning **Ms. Jennifer Chou**, Senior Project Director, who managed the project to deliver the successful Smarter Balanced pilot and field tests and delivery of the open-source testing software. Ms. Chou will serve as the primary point of contact, working closely with her project managers.
   c. **Mr. Gregory Eller**, Project Manager, Paper/Pencil Operations, who has 20 years of experience in the field of educational assessment and has delivered operational support to Connecticut. Mr. Eller will take a lead role in implementation in Connecticut.
   d. **Ms. Anne Atwell**, Scoring Project Manager, who has served in scoring management at MI for 26 years and managed scoring in Connecticut, Texas, and Maryland.
   e. **NOTE: It is expected that the consortium hire an independent Project Manager to provide PM Services during the solution implementation.**

7. Adequacy of testing plan/approach
   a. The project plan has adequate time allocated to testing, and AIR has significant experience with their solution, including data validation of incoming student census data.

8. General acceptance/readiness of staff
   a. The AOE and schools appear ready to embrace this testing solution.

7.2 Risk Assessment & Risk Register

*After performing a Risk assessment in conjunction with the Business, please create a **Risk Register** as an **Attachment 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 **Attachment 2.**

Additional Comments on Risks:

4. Cost Benefit Analysis

1. **Analysis Description:** Provide a narrative summary of the cost benefit analysis conducted: The approach used was to gather all costs associated with the project for a 3 year period, identify revenue sources for the project, and identify tangible benefits that might also be used as revenue sources or expense reductions.

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

   b. BENEFIT COMPONENT: See the detailed spreadsheet referenced in **Attachment 3**. There are no quantifiable monetary benefits.

2. **Assumptions:** List any assumptions made in your analysis.
   a. No staff additions or reductions are expected through the implementation of this solution.

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. See the detailed spreadsheet referenced in **Attachment 3.**

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 monetary tangible benefits identified for 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. Reduction in staff time it takes to collect data due to test results being "data entered" by the students vs. collecting paper tests/scanning test results into a system. (Again, reduction in staffing is not expected however).
    b. Increase in data timeliness, due to test results being "data entered" by the students vs. scanning test results into a system.
    c. Improved data accuracy/completeness, due to test results being "data entered" by the students vs. scanning test results into a system.
    d. Reduction in staff time allocated to correcting errors, due to improved data accuracy. (Again, reduction in staffing is not expected however).
    e. Better assessment data with which to better instruct students and achieve desired outcomes.
    f. Improved testing methods using adaptive questioning based on student response.
    g. Improved scoring using artificial intelligence where appropriate.
    h. By forming a consortia (VT, NH, CT), there is reduced cost due to economies of scale as opposed to undertaking such a project individually. However, if states do not accept identical standards and the same tests, the payoffs in production and scoring are lost.
    i. Given the proximity of the states in the NEAC, graduates often shuffle among New England states, providing a venue to establish collective "must haves" for graduates.

    METHODOLOGY: It is expected that the above listed Intangible Benefits yield a value of $120,000 annually, based on the approximation of 2 FTEs among the schools no longer collecting and correcting data.

    These are considered Intangible Benefits as there is not expected to be any staff reductions, and as such, those savings are not expected to be realized.

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. Without quantifiable and measurable dollar benefit, it is not clear that the TOTAL Benefits outweigh the Costs.
    b. The Intangible Benefits represents a **$360K savings ($120K/year for 3 years)**. If applied to the project cost calculation, those cost savings would further enhance the positive cash flow position.

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. Yes, the ABC form is consistent with the Independent Review. The ANNUAL and TOTAL project cost estimates provided in that form are within $70K of the anticipated project costs ($4.49 in ABC form vs. $4.56 in the IR analysis for the AIR portion of the project, excluding SBAC membership fees). See AOE_New_England_Assessment_ Consortium_ABC_Form.pdf attached to this report.

Additional Comments on the Cost Benefit Analysis:
    a. The cost benefit analyses of conducting student assessments back when the NECAPs were initiated were not available, and as this project replaces NECAP, we feel that the SBAC assessments are conservatively *at least as effective* as the NECAP, for a nominally higher price, and that price increase is still covered by the federal grant used as the source of funds for this project.

5. Impact Analysis on Net Operating Costs

1. Insert a table to illustrate the Net Operating Cost Impact.
    a. See the detailed spreadsheet referenced in **Attachment 3**.

2. Provide a narrative summary of the analysis conducted and include a list of any assumptions.
    a. See the Cost/Benefit Analysis section, which covers this topic.

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. See the detailed spreadsheet referenced in **Attachment 3**.

4. What is the break-even point for this IT Activity (considering implementation and on-going operating costs)?
    a. When comparing Funding Uses to Funding Sources, there is a "break even" point, defined as a positive cash flow, in Year 1. Even though there is a Net Increase in Operating Cost, the Grant Fund is able to cover the "new" operating cost, resulting in a positive cash flow throughout the project life cycle.

Attachment 1 – Illustration of System Integration

The key integration point in this project will be the NEAC states uploading Student Census data into the Test Information Distribution Engine (TIDE).

TIDE can automatically import student files provided by the state systems to an 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. This is the recommended mode of operation.

Should NEAC 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 NEAC 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.

A key point: Vermont participated in the Pilot with SBAC, and as such, has demonstrated their ability to upload Student Census data.

Attachment 2 - Risk Register

See attached document: <u>FINAL-REVIEW-SOW-DII-AOE-Assessment-IR-STS-Risk_Register.pdf</u>

Attachment 3 – Lifecycle Cost Benefit Analysis

See attached document: <u>FINAL-REVIEW-SOW-DII-AOE-Assessment-IR-STS-Project-Cost-Detail.xlsx</u>

Attachment 4 – System Architecture

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

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 well-considered real-time backup processes prevent loss of student data, even in the unlikely event of system failure.
g. AIR's hosting provider 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.

1. Student Machine
2. Test Delivery Satellites
3. Hub
4. Demographic and History Servers
5. QA System
6. Database of Record
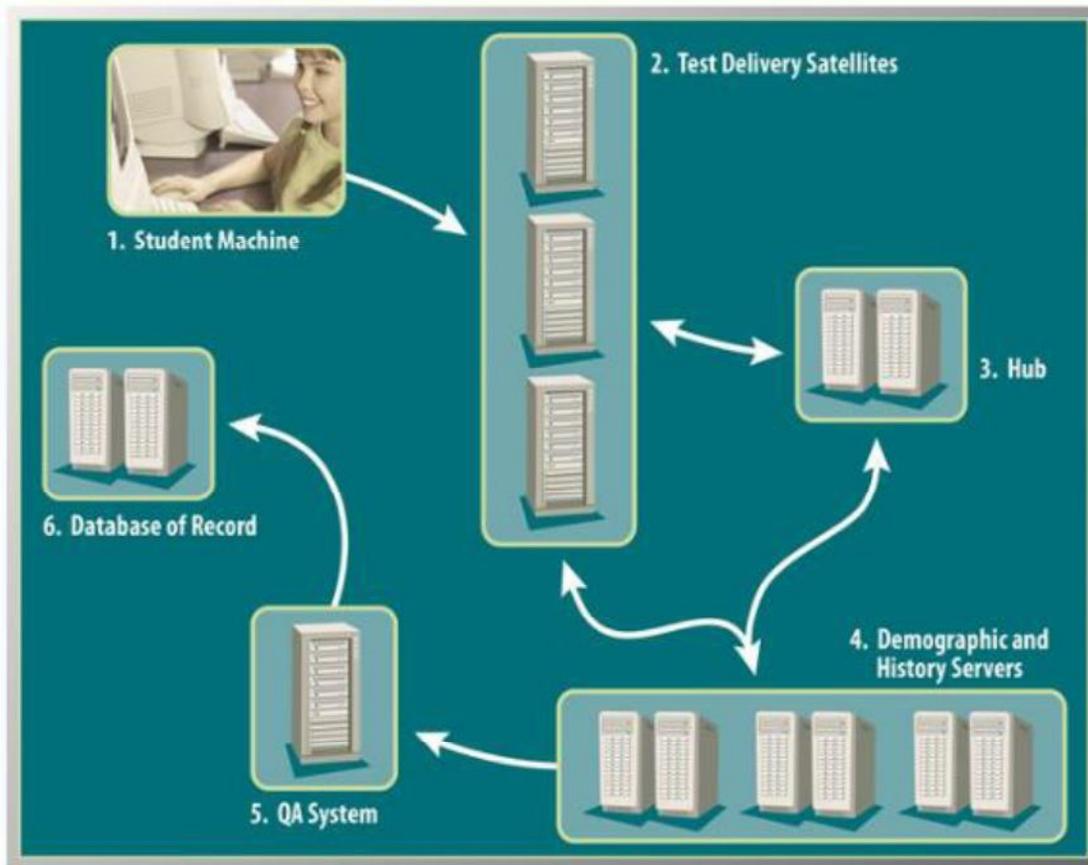
a. Every time a student answers a question, the response is saved to AIR servers. Results from 2013 show that the typical student waited less than half a second after finishing one item before the next item was fully displayed on his or her screen. For longer responses, such as essays, the system can 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 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, we 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 Smarter Balanced field test, 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.

b. **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.

c. **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.