Internet2 Cloud Scorecard Working Group Final Report

Recommendation for a Research and Education Cloud Scorecard

February 2021

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Executive Summary

The Internet2 NET+ program was created based on [recommendations](#) developed at the 2010 NACUBO / EDUCAUSE Cloud Summit. A decade later, the utilization of cloud services in research and education (R&E) has exploded. The NET+ program has taken a notable role in the R&E community managing a portfolio of mission-critical cloud technology services with rich, strategic engagement between R&E and industry. The need to evaluate relevant cloud services for use by many institutions requires the community to think differently about how to manage due diligence at scale, beyond the services included in the NET+ portfolio. Responding to member feedback, Internet2 convened a working group to evaluate how to leverage the standards that have been developed and utilized in the NET+ program to assess and report on efficacy of various cloud services. The working group's charge is detailed in Appendix 1.

The working group is recommending the development of a cloud scorecard to help R&E institutions to quickly assess the degree to which new cloud services meet common requirements for operating in the complex technology, security, compliance, and legal environments in R&E. The cloud scorecard will allow service providers to express their readiness within a series of dimensions that are widely used across R&E institutions. The scorecard will provide institutions with a first pass at evaluating prospective service providers, in an effort to shorten time to procurement and reduce duplication of effort.

Background

Why A Cloud Scorecard?

The interest in and use of cloud services continues to grow rapidly across the R&E community. The current COVID-19 crisis has further accelerated the need for institutions to be able to quickly evaluate and adopt cloud services. The range of opportunities available in cloud services can quickly overwhelm current practices for assessment and procurement. The need remains, however, for thoughtful evaluation and review of cloud services to ensure that requirements for security, compliance, and technology are being met. The Internet2 NET+ cloud community is organizing to address this challenge efficiently.

Based on stakeholder guidance, the cloud scorecard working group is recommending developing a cloud services scorecard to help Internet2 members and the broader R&E community assess cloud services for compliance with higher education standards and needs. Using standards and best practices developed within the R&E community over the past 25 years with organizations like Internet2, the scorecard will be a self-assessment completed by a vendor. Institutions can use the scorecard standards in RFPs and also to benchmark or evaluate services against key criteria. This cloud scorecard will complement existing capabilities and efforts within the Internet2 NET+ program. *The goal is not to create new methods or standards for evaluating cloud services, but to provide a way of collecting vendor responses to their degree of adherence to existing standards and practices that the community deems important.*

What's Different about Higher Education?

The R&E community—including the leading universities that founded Internet2—played a seminal role in the creation of the modern Internet and the applications that have made it one of the most transformative technologies of our time. This large and sprawling community has characteristics that are

unique from those of the commercial marketplace. Some of the key characteristics that differentiate higher education from other industries include a high degree of decentralization, highly complex and regulated business units and users who assume multiple roles and responsibilities. Furthermore, the cross-institutional collaboration that takes place, such as in research, drives the need for a robust Identity federation framework.

Universities are large and complex organizations that contain units that are themselves large and complex businesses, including police and fire departments, hospitals, and facilities management units. Indeed, in many institutions, the hospital is organized as a separate business entity from the university. This complex environment can be difficult for service providers to understand and navigate. The scorecard can provide a single place where service providers can address concerns that arise across the array of units within the institution.

R&E institutions are highly distributed and management of IT functions is not tightly controlled by a single department or organization in most schools. It is frequently not clear to vendors, or even prospective users of cloud services within an institution, where the authority to make vendor selections and purchasing decisions lies. The scorecard allows the institution to clarify to vendors what criteria matter for picking services and provides a central point for addressing those criteria.

Within a university, people often assume multiple roles, switch departments and positions, or move in and out of the institution. Students (who operate in a different legal and compliance landscape from employees) have their own complex lifecycle that may have as many exceptions as it does regular rules. Universities have built up complex systems for managing roles and identities, and it is important for cloud services to interact smoothly with these systems. Many of the roles within institutions are subject to various security and compliance regimens (FERPA, HIPAA, etc.) and cloud services must fit into the compliance and security requirements. The scorecard provides a single place to answer general questions about the entire range of security and compliance requirements within an institution.

A high degree of cooperation and communication between institutions is a characteristic of R&E institutions. There is a long tradition of people working together across institutions to achieve common goals in IT - as evident in the development of much of the Internet and *nix operating systems. This makes it possible for service providers to engage simultaneously with multiple institutions, but also makes it difficult for institutions to operate within non-disclosure or other proprietary agreements. Filling out the non-proprietary scorecard allows multiple institutions to get the same information and provides a simple way for multiple institutions to express common requirements.

The above characteristics and other reasons present challenges for the adoption of cloud services in the institutions that are members of Internet2. By coming together within the context of the NET+ program, the members of Internet2 have been able to express common needs and requirements, enabling service providers to more easily understand the needs of research institutions and providing a forum for addressing those needs. The scorecard represents a way for the Internet2 community to express the requirements that grow out of these common needs and a way for service providers to address them.

Marketplace Dynamics

There are marketplace challenges unique to the public sector generally and R&E specifically that make the creation of the scorecard worthwhile as a means of assessing cloud services. We will evaluate some

ways higher education has attempted to work through these challenges later in this report and lessons we can learn from those efforts and apply to this project.

The proliferation and growth of cloud services present challenges for institutions wishing to use those services. As small businesses grow or vanish, become acquisitions for larger firms or launch public offerings, or just change management and strategies, institutions are left struggling to adapt to the pace of change. Technical staff are frequently challenged to keep up with the pace of change in cloud service offerings from both large and small providers. With tightened IT budgets, universities share a need for this type of evaluation service to save on resources and time.

Business Case for R&E and Industry

Why is this idea attractive to R&E institutions?

Research universities are large and complex institutions operating in multiple overlapping legal and compliance contexts. This can result in procurement practices that are lengthy, protracted, and costly in time and effort to obtain new services. As we are seeing in the current COVID-19 crisis, events can drive needs for new or expanded services that are far more immediate than the usual purchase cycle will allow. New approaches are needed to help shorten the time to procurement without sacrificing the quality of evaluation.

One of the time-consuming steps in evaluating cloud services for use at research institutions is assessing the degree to which the desired solution fits with campus practices for security, identity, accessibility, and integration. While many campuses will want to do more in-depth analyses in some of these areas, having initial information from a vendor about their features and practices can save valuable time and effort. The idea behind the cloud scorecard is to provide the ability to do a quick market scan for all these attributes. Further, survey respondents and those we interviewed cited the cloud scorecard as an opportunity to gauge a vendor's ability to work with R&E institutions prior to taking a sales phone call or demonstration.

Why is this idea attractive to cloud service providers?

Currently, R&E institutions use a wide variety of different audit reports, assessments, and questionnaires in the evaluation of cloud services. Some of these are locally developed reports for individual institutions while others are required by state, system or local procurement. The variety of different reports increases the cost of sale and decreases sales velocity for service providers and in some cases may delay campus implementations as well. As discussed in the appendix to this report, some previous efforts, such as the Higher Education Community Vendor Assessment Toolkit (HECVAT) have been useful in identifying standard higher education reports. The scorecard is an effort to further standardize on various documents and compliance requirements for ease of doing business.

The scorecard also presents a targeted marketing opportunity for cloud service providers - whether they are already active in higher education or they are looking to expand their footprint into higher education. The scorecard will allow those providers to showcase various accessibility, identity, and security capabilities they can offer to higher ed. Survey results and discussions with this working group illuminated the fact that the scorecard could serve as an initial market scan of capable vendors in

various technical domains. Some went as far as to surmise that the scorecard could replace a more traditional RFI process for their institution.

Relationship of the Cloud Scorecard to Internet2 NET+ Services

The Internet2 NET+ program offers tailored agreements for cloud services through well-vetted customer agreements and contractual vehicles that align with established practices used in higher education and research. The community-driven service validation process for NET+ services is thorough and therefore can be quite lengthy. The amount of effort and coordination required for a full NET+ evaluation limits the number of services that can undergo evaluation.

The cloud scorecard is not intended to supplant the NET+ service evaluation process. In an era of the rapid proliferation of cloud services, there are many more interesting and valuable services than can be put through the NET+ service evaluation process. The cloud scorecard provides a way for services that are not likely candidates for full NET+ service evaluation to present their services to R&E institutions and to provide a convenient way of answering many of the questions that these institutions commonly ask of service providers. This will provide a pathway for service providers to 'test the market' without expending a significant amount of resources, as required in the NET+ program, and ultimately be well positioned to join the NET+ program if community interest materializes.

NET+ Program	Cloud Scorecard
- Compliance with standards is reviewed by higher ed institutions as part of service evaluation and integrated into a contract - Evaluations take 90+ days to complete and include a ratified contract and pricing - Portfolio of ~ 20-30 services - Service Advisory Board and online Community of Practice supporting program and product advocacy and peer-to-peer knowledge sharing	- Compliance with standards is self-attested - Standard/existing contracts - Scorecard can be completed by cloud service providers in a matter of hours - Unlimited number of services that may be listed - Future development consideration for community peer-to-peer connections

Figure 1*: Key differences between standard NET+ intake and the scorecard*

Community Consultation

Community Survey Summary

In December 2019, the working group surveyed the community of R&E institutions about the need for a cloud vendor assessment vehicle. There were 84 respondents, indicating a high degree of interest. Responses came from a wide variety of institutions, including both large and small universities from both public and private sectors. 84% of respondents said they would definitely make use of such a vehicle in evaluating cloud services.

Figure 2: Summary of scorecard survey responses

Perhaps unsurprisingly Security considerations were the area of highest interest, followed closely by Privacy and Identity areas. More details on the responses can be found in the following linked slide deck: Cloud Services Scorecard Survey Results and as included in Appendix 2.

Internet2 received significant verbal and written feedback related to the scorecard from both R&E institutions and industry.

In addition to participants in the working group, an I2 Online event on the scorecard project was held in August 2020. The event had over 80 attendees from 55 institutions. The scorecard idea was well received by the attendees. Smaller institutions expressed the difficulties they have in reviewing multiple cloud vendors with highly constrained staffing and noted that the cloud scorecard will help them more quickly qualify service providers.

Discussions with service providers showed enthusiasm for the cloud scorecard as a means of marketing services to higher education. One major infrastructure provider noted that it is likely that services built on their platform will want to use the scorecard and discussed a desire to enable those services to inherit common attributes derived from the platform.

Scorecard Standards and Practices

The cloud scorecard working group strived diligently to curate a list of standards and practices that are important to Internet2 member institutions. These are classified in seven broad topic areas, listed below. Again, it should be noted that the intent is not to invent new ways of demonstrating compliance in these areas, but to gather in one place the kinds of questions and documentation that are most commonly asked by member institutions. As can be seen by reviewing the results of the community survey referenced below, not all areas are of equal importance across the community, and different practices will be more important to some institutions (and for some purposes) than others.

- Accessibility Compliance
    - WCAG (the W3C's Web Content Accessibility Guidelines)

- ○ VPAT (the GSA's [Voluntary Product Accessibility Template](#))
- ● Identity and Federation
  - ○ SAML for Single Sign-On (the OASIS-Open [Security Assertion Markup Language](#))
  - ○ Metadata published in the InCommon (or other national federation) Registry (https://www.incommon.org/federation/metadata/)
- ● Network and Connectivity
  - ○ Service availability via the Internet2 Peer Exchange (https://www.internet2.edu/products-services/advanced-networking/layer-3-services/)
  - ○ No charges for data egress
  - ○ No bandwidth throttling
- ● Security
  - ○ Availability of SOC2 and SOC3 reports (the AICPA's [System and Organization Controls](#))
  - ○ Completed HECVAT (Educause's [Higher Education Community Vendor Assessment Toolkit](#))
  - ○ Availability of audit logs
  - ○ Penetration test results
  - ○ Documented incident response plans
- ● Privacy
  - ○ A published privacy policy
  - ○ Compliance with ISO 27018 practices on protection of personally identifiable information in public clouds (https://www.iso.org/standard/76559.html)
  - ○ Return and/or destruction of customer data at end of contract
  - ○ Non-disclosure of customer's intellectual property to third parties
- ● Technical Integration
  - ○ Functionality exposed via a documented API
  - ○ Standard formats for consumption and analysis of data
  - ○ SDKs available for common languages
  - ○ Source code available as open source
- ● Other Compliance and Contractual Issues
  - ○ FERPA compliance (the US Department of Education's [Family Educational Rights and Privacy Act](#))
  - ○ Legal adjudication in customer's locale
  - ○ Customer control of all uses of name, logos, trademarks
  - ○ Liability terms that differentiate between use by employees and students
  - ○ Compliance with public records requests
  - ○ Willingness to tailor agreement language for specific institutional requirements
  - ○ Data remains property of customer
  - ○ Ability to limit hosting within the US

○ HIPAA BAA availability (A [Business Associate Agreement](#) under the Health Insurance Portability and Accountability Act)

Final Recommendation

After completing the survey, reviewing results and discussions, the cloud scorecard working group is recommending the implementation of a cloud scorecard with Internet2 serving as the home community organization. Based on lessons learned from current and past community projects (see Appendix 3), the working group recommends starting this effort with a narrow-scoped implementation, clear community governance and a sustainable business model to support ongoing growth.

Cloud Scorecard Questionnaire

The working group developed an initial scorecard questionnaire to be vetted on both the supply and demand side cloud service acquisition. The questionnaire was presented as part of a community webinar in October and has been reviewed with an initial set of service providers, including questions for the providers to attest to their degree of compliance with the standards and practices listed above. Thus far feedback has generally been positive. The design is currently being further vetted with several cloud service providers.

The initial design for a questionnaire for service providers to fill out has been completed by the working group (available at https://forms.gle/5NS8ZGbdkNyFo4jY7). At this time, the working group is recommending moving forward with this set of questions to be collected via a webform or other application.

The working group is recommending implementing the cloud scorecard on an accessible, dynamic and searchable website with access available to at least the US R&E community. There are a number of reasons to consider requiring federated authentication to encourage disclosure and to enable ideas for future development. Wireframes for the presentation of scorecard results as part of an implementation effort for a first-generation scorecard are included in Appendix 4.

Business Model

The working group recognizes that to be successful the scorecard project will require a sustainable business model to build, maintain and enhance the service. This includes development resources for both front end and back end work and professional staff to support business development, intake and maintenance of the questionnaire.

As discussed in the governance section, the working group recommends the cloud scorecard be organizationally 'homed' at Internet2. With that in mind, the group considered various financial models. The group recognized that the utility of the scorecard is increased by broad availability to institutions and providers. Striving to provide the scorecard to institutions and providers at the lowest possible cost (preferably at no direct cost) will achieve the maximal use of the scorecard. For institutions, having access to the scorecard as one of the services that comes with membership (e.g. in Internet2 or InCommon) will help to reinforce the overall value of membership in such an organization without requiring approval of additional payments. Therefore, the group recommends that the best funding

model for the scorecard is to fund it out of membership fees in either Internet2 or InCommon – including increasing such fees by a modest amount to fund the activity

If Internet2 is unable to fund this activity by including startup and ongoing costs in existing sustaining contributions or participation fees, the group recommends charging service providers a relatively low (less than $1,000/year) participation/listing/licensing fee to fund this activity. While this could be seen as a reasonable marketing expense, the working group is concerned that this would be a deterrent for established service providers and those service providers are essential for the launch and ongoing success of this effort. Therefore, a reduced or waived fee for existing NET+ service providers in recognition of their established community support is recommended.

Governance

The working group recommends convening an advisory committee with representatives from member institutions to advise Internet2 on the operations and evolution of the Scorecard. This includes providing technical guidance and feedback for the implementation of the web version of the cloud scorecard, the ongoing maintenance of the scorecard specification and questions and providing guidance for future development. Further, the committee will be tasked with evaluating member and service provider feedback on the success of the program and to advise Internet2 when there are issues that need to be addressed. The committee should be formed based on Internet2's standard community governance process and convened as part of the NET+ program.

Opportunities for Future Development

Ideas of Future Enhancement

The cloud scorecard working group and various community stakeholders made a number of recommendations to build a robust scorecard tool. The group ultimately concluded, partially based on past community projects, to procced with a narrow scope for the initial scorecard implementation but record a number of ideas for future development. These include:

1. Developing a scoring matrix or heat map to evaluate compliance with scorecard standards
2. Providing an opportunity for research and education institutions to share they are using a various service to foster collaboration and community
3. Including verified and protected community reviews for listed services
4. Providing links to community cloud contracts that may be leveraged for listed services

It is important that any architecture utilized for the first iteration of the scorecard is flexibile enough to incorporate some of these enhancements in the future.

Connecting to Related Projects

The initial implementation of the Scorecard will be built as a standalone web application. As a critical mass of service providers begin to participate, we envision that there will be opportunities for expansion of the Scorecard within major cloud ecosystems, such as the AWS, Azure, and Google Marketplaces, or in specific implementations such as a custom DLT Storefront. Internet2 is open to work with vendors to encourage implementation on multiple platforms.

Internet2 and working group members have already engaged in conversations with a number of for-profit companies and community organizations about incorporating the cloud scorecard into their business processes to support cloud contract and procurement. The working group endorses the idea of the cloud scorecard being democratized as much as possible and leveraged in various use cases. Working with other organizations may also presents opportunities for additional revenue streams to cover the costs of various community activities including the scorecard itself.

While the Scorecard development has taken place within Internet2, the concept of a method to more easily evaluate cloud services is clearly of interest to a wide variety of organizations operating within higher education, such as Educause, E&I, and NACUBO. Internet2 will encourage widespread adoption of the cloud scorecard across higher education and will look for opportunities to partner with other organizations to further the reach of the cloud scorecard.

Appendix 1: Working Group Information

Working Group Charge

The purpose of this group is to explore how to leverage the standards that have been developed and utilized in the NET+ program to assess and report on compliance of various cloud services. This group is tasked with drafting a report to:

1. explore whether there is a need for such an assessment/badging/scorecard activity
2. articulate the benefits to the academy and industry of such a program
3. recommend which compliance and contract areas would be subject to review under such a program and whether there are existing standards to use or whether new standards should be created
4. identify ways this process or program could be leveraged in other areas of the R&E community, particularly trust and identity
5. seek opportunities to partner with other community organizations to enhance this program (EDUCAUSE, regional networks, global NREN's, procurement consortia, etc.).
6. share initial ideas for implementation of this process or program
7. share additional ideas this group develops during their work

NET+ Scorecard Working Group Membership

- **Loren Malm,** Vice President for Information Technology and Chief Information Officer, Ball State University (Working Group Chair)
- **Jon Allen,** Associate Vice President & Chief Information Officer & Chief Information Security Officer, Baylor University
- **John Bailey,** Manager of Cloud Services, Washington University in Saint Louis
- **Kitty Bridges,** Associate Vice President for Digital Accessibility, New York University
- **Tom Dugas,** Assistant Vice President/Chief Information Security Officer, Duquesne University
- **Dana German,** Associate Vice President and Deputy Chief Information Officer, University of Virginia
- **Erik Lundberg,** Assistant Vice President, Research Computing and Strategy, University of Washington
- **Michael Ospitale,** Assistant Vice President of Customer Engagement and Support, Stony Brook University
- **Scott Stremick,** Senior IT Sourcing Specialist, University of Nebraska

Internet2 Staff Support

- **Kevin Morooney**, Vice President for Trust and Identity & NET+, Internet2 (Executive Sponsor)
- **Sean O'Brien**, NET+ Cloud Services Program Director, Internet2 (Staff Liaison)
- **Oren Sreebny**, Cloud Programs Consultant, Internet2
- **Albert Wu,** InCommon Federation Service Manager, Internet2

Appendix 2: Scorecard Survey Results

Cloud Services Scorecard Survey Results

Appendix 3: Lessons Learned from Previous Community Projects

Several past community projects provide lessons learned that can be leveraged to support this new initiative. The staff supporting the Working Group interviewed key stakeholders involved in various higher education assessment projects over the past decade. These findings will help us to improve the rollout and ongoing support of the class scorecard. Here we have shared selected feedback and lessons learned from the Higher Education Community Vendor Assessment Toolkit and the Center for Service Discovery.

Higher Education Community Vendor Assessment Toolkit

The HECVAT (Higher Education Community Vendor Assessment Toolkit) is "a questionnaire framework specifically designed for higher education to measure vendor risk." The HECVAT, which has been in active development since 2016, focuses on details pertaining to information security. The HECVAT is filled out by the vendor and serves as a means of providing information to campuses. The original HECVAT contains approximately 220 questions, and gave rise to requests for a more streamlined version. The Lite version of the questionnaire is slimmed down to 61 questions, and is used by 70-80% of vendors. There is a list of vendors that have completed a HECVAT known as the Community Broker Index, hosted by REN-ISAC, though there are a significant number of vendors who have filled out the HECVAT but do not want to make that publicly available.

Currently there are more than 100 higher education institutions that use the HECVAT to help evaluate technology, and over forty products represented in the CBI.

Discussions with Jon Allen (CIO at Baylor and co-chair of the HECVAT Users Community Group) and Nick Lewis (Internet2) illuminated several lessons learned during from the experiences of developing the HECVAT that are useful for the Scorecard effort:
- It is important to define the tool in a clear and marketable way. Why is it important, and what differentiates it from other tools?
- It is crucial to ask only questions that are important to the campuses and to define why they are important.
- The value to the vendor for participating must be clear.
- It is important to engage the community early and continuously in the effort, and to get them to champion the tool when in discussions with vendors.
- Keeping the responses up to date is a challenge.
- The questionnaire should be completed by product managers or engineers, not salespeople eager to please a customer.
- Think about the ownership of intellectual property and how the tool can be financially sustained.
- Publicity and engagement are important - webinars, conference sessions, etc., can help build momentum.
- The amount of effort to coordinate and manage the tool grows proportionally to the use of the tool, so plan for that.

The Center for Service Discovery, also known as "The Hub", was an early effort by Internet2 to solve some of the same problems that are driving the creation of the cloud scorecard today. While still in development, the Center for Service Discovery Project was cancelled by Internet2 as part of a determination that the project was focused on cloud services procurement – a then declining priority for Internet2. We conducted interviews with Shel Waggener, the executive responsible for the project, and Ben Fineman, the program manager responsible for the project and current NET+ program staff to gain any lessons we could learn from this effort to apply moving forward.

The Center for Service Discovery was envisioned as both a community or peer to peer based discovery framework for cloud services that could be used at a campus, system, regional, or national level, while providing local administrative tools to manage the anticipated cloud service inventory sprawl at an institutional level while supporting simplified advanced vetting and cloud procurement and deployment options.

While the project was ended prior to production deployment, there were some common lessons learned across multiple individuals involved. One of the key variables cited was simply timing. The growth of cloud services had not yet reached a tipping point to necessitate such an effort. Additional lessons learned include:

- The importance of protecting the existing NET+ brand by keeping standards high and not be seen as a generic buying club.
- Greater involvement from the campuses on the development of any such tool (development of software specs, features).
- Ensuring community buy in with the effort and an understanding of the problem we are working to solve

The work that went into creating the Center for Service Discovery provides us with several ideas for current and future development for the cloud scorecard. Our members have indicated it is very difficult to eaily capture and consistently use cases and needs of cloud services due to the decentralized nature of higher education IT and the ability for such cloud services to be deployed by any individual. The primary goal of the Center for Service Discovery was to partially address that challenge by increasing transparency and visibility of services used. The Center for Service Discovery also sought to provide sharing of benefits within and across campuses while exposing challenges at the user level in providing community support for the massive scale of cloud services. While our cloud scorecard is not yet that ambitious, many of these sentiments still exist in the community today and will be considered in further iterations of the scorecard.
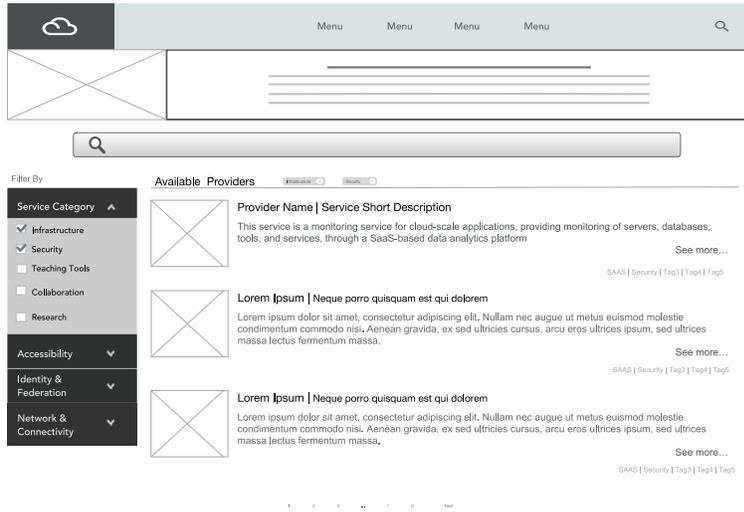
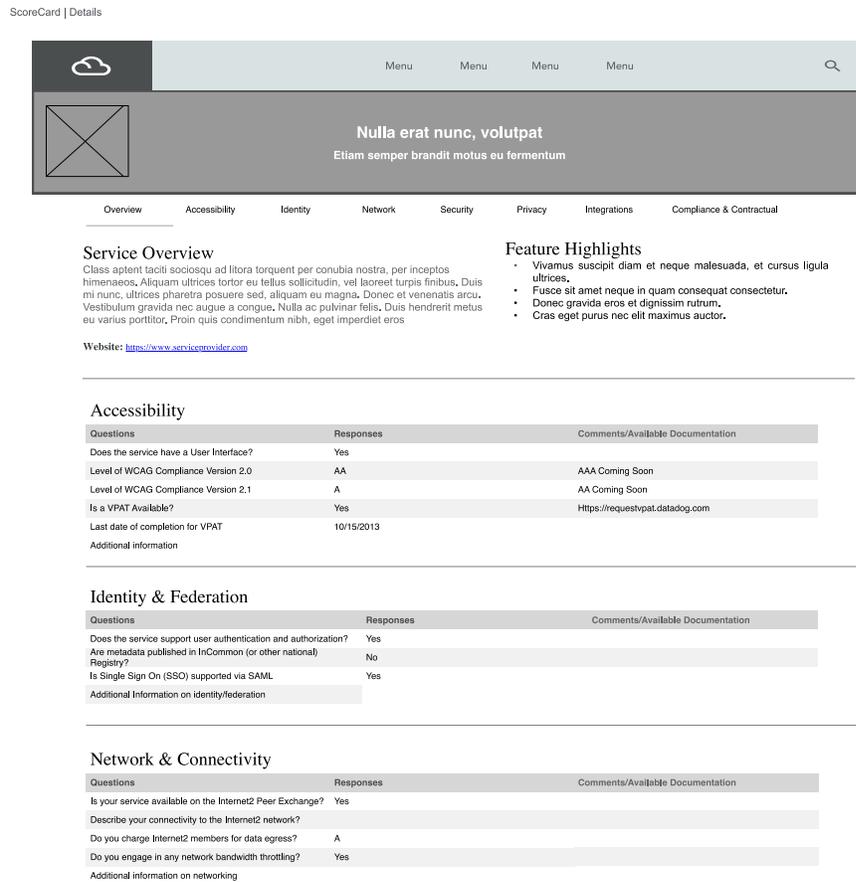# Appendix 4: Scorecard Wireframes

Figure 3: Scorecard Homepage Rough Mockup

Figure 4: Scorecard Service Detail page rough mockup