SBA
U.S. Small Business Administration

Modernizing the Small Business Administration's Digital Services

A Report by the U.S. Digital Service Discovery Sprint Team

March 6, 2015

Introduction

Every year, the SBA supports hundreds of thousands of American small businesses by expanding their access to capital, helping them receive federal government contracts, providing disaster assistance when needed, and offering general small business counseling services. Each of these mission areas is supported by a suite of digital services.

Because many of the SBA's digital products have not been refreshed since they were first implemented, user experience no longer meets expectations. Additionally, the hardware and software that underpins the SBA's digital services is obsolete. Improving these digital products is a key goal of SBA leadership.

This document provides a set of specific implementation recommendations for improving several of SBA's key digital services. It also includes a general set of technical principles that can guide modernization efforts across the SBA. Finally, the document proposes the creation of Digital Service team inside of SBA that can lead these efforts.

These recommendations were developed by a U.S. Digital Service team, over the two week period from February 23 to March 6, 2015. To develop these recommendations, the Digital Service team worked closely with SBA political leadership, technical staff, contractors, and leaders within the SBA's program offices and the Office of the CIO.

Summary Recommendations

- Align the organization around specific, quantifiable business goals, and measure how well the SBA's digital services are contributing to these goals.
- Transition to a modern technology stack. Core parts of this stack include a modern, industry-standard web application development framework such as Ruby on Rails; a modern, open source relational database such as PostgreSQL; and hosting on virtual machines in the cloud, using an infrastructure-as-a-service provider such as Amazon Web Services.
- Execute a migration strategy with intermediate deliverables shipped on short timelines. Make the deprecation of old databases and web applications an explicit goal of this project, capturing both maintenance and financial cost savings.
- Build a data analytics capability so that SBA can easily measure business metrics related to its digital services. Instrument SBA's digital services to ensure they capture the metrics required to assess each product's success.

- Build a Digital Service team inside of SBA, and task this team with product and technical management of the modernized version of SBA's services. Give this team accountability and autonomy.[1]

A Note About Our Technical Recommendations

Throughout this document, our team has opted to propose specific technologies, products and services that can be used to implement our recommendations. We have based these recommendations on our collective experience building similar products and our understanding of current industry best practices. However, as with all digital services there are multiple ways these solutions could be implemented.

We choose to recommend specific solutions so that future individuals implementing these changes know what choices our team would make if we were to begin implementing these recommendations today. We also believe that these choices are representative of what a startup trying to build similar products would use. It's possible that by specifying these or similar technologies up front, SBA may attract firms with experience using more modern technologies in its contracting process.

We do not believe that success is dependent on making these specific technology decisions. Indeed, these recommendations may change if a technically-competent team provides a compelling reason for a different choice.

Schedule and Cost

We estimate that each individual milestone, below, will take 4 to 12 weeks for an experienced team of two. Scheduling longer milestones increases risk because business priorities are likely to change before the milestone is delivered.

This results in a total estimated effort of 5 to 15 person-years. Since efficiency declines as the team size expands beyond the natural parallelization boundaries of the work, a realistic schedule might be 12 to 18 months for a team of 10.

Applying industry standard consulting rates would result in an estimated cost somewhere between $4M and $9M.

[1] The SBA should set an aspirational goal that within 12 months it has the ability to make and deploy a change to all of SBA's production applications without depending on third parties, should the need arise.

Priorities and Business Metrics

Clearly laying out business goals, including indicators and metrics that define progress against those goals, is important to align the organization on all that it does. With digital products as much as anything else the SBA does, work should be done in service of those goals and different workstreams prioritized based on potential to advance those goals.

The SBA has several specific business goals with readily quantifiable metrics. These include:

Goal	**Metric (as understood by our team)**
Increase lending to small businesses	● Total dollar amount of loans to small businesses, by demographic ● Total volume of loans to small businesses, by demographic
Ensure the federal government contracts with small businesses whenever possible	● Percentage of all federal contracting dollars that go to small businesses, by type of business ● Number of small businesses certified to do business with the federal government, by type of certification
Provide counseling services to American entrepreneurs seeking to start and expand a business	● Number of businesses that receive counselling from SBA, by type of business ● Number of businesses who receive counseling and that go on to receive a loan, win a government contract, or receive a small business certification
Ensure businesses impacted by disasters have timely access to capital to rebuild and restore their operations	● Number of small businesses receiving disaster loans ● Dollar amount of disaster loans given ● Average number of days required for a business impacted by a disaster to receive a loan

The success of the digital products the SBA creates or supports should be measured by each service's impact on these metrics and any others that SBA tracks.

Product Roadmap

At the request of SBA leadership, our Discovery Sprint focused on creating specific implementation recommendations for three products: Contractor Certification, Small Business Search, and Data Analytics.

For each of these products, we discuss the objectives and current state of the product, our proposal for what the “ideal” product would look like, and a technical implementation plan for getting from the current state to the ideal state. Additionally, we propose quantitative metrics that should measured to gauge the success of these products.

Contractor Certification

Current

Small business certifications enable companies to qualify for set-asides and other assistance in government contracting. The SBA recognizes four different certifications, each with its own eligibility requirements and application process:

1. 8(a) Business Development Program (referred to as 8(a) throughout this document), for socially and economically disadvantaged individuals
2. HUBZone, for historically underutilized business zones
3. Women-owned small businesses (WOSB)
4. Service-disabled veteran-owned small businesses (SDVOSB)

8(a) and HUBZone both require “front-end” certification where a business must go through the paperwork and eligibility process up-front to be designated as 8(a) or HUBZone — there are web apps for small businesses to apply and for SBA employees to evaluate the applications for each of these. WOSB qualification is self-reported; only in the case of a protest does SBA verify the supporting documents the business has uploaded into an online repository. SDVOSB certification is also self-reported and only verified in the case of an appeal, but there is no online system to support this verification workflow.

The 8(a), HUBZone, and WOSB online systems are each separately maintained and have cobbled together their own ways of handling physical and digital paperwork. Data across the systems is generally not synchronized, requiring businesses to set up new profiles in each place and resulting in business profiles getting out of sync between SBA databases and SAM.gov. It can take months for businesses to be certified, and businesses often lean on third party private sector consultants for help.

The ultimate purpose of these certification programs is to make it easier for disadvantaged individuals and businesses to win government contracts. However, the current certification product creates a difficult experience for the very companies SBA is seeking to help by making these companies incur tremendous overhead in trying to prove their qualifications for certification assistance.

Ideal

The primary goal of the contract certification products is to streamline certification processes for small businesses, including applications and subsequent reviews. For the business owner, the product should:

- Unify the various certification processes in one web app
- Eliminate duplicated data entry; use business profile data the business has already entered on SAM.gov

- Provide fully digitized application (and eligibility renewal) flows, including document upload management and certification application status monitoring
- Enable application turnaround times in days instead of months
- Give business owners an up-to-date, go-to place for application status and next steps
- Send notifications to business owners when applications change status
- Support both both desktop and mobile access

The other side of the experience is the analyst's—the SBA employee reviewing applications. For the analyst, the product should:

- Allow for assigning cases to analysts
- Provide dashboard and management views of in-progress applications
- Automate repetitive tasks
- Support direct communication with the business owner
- Make document review straightforward
- Provide tools for identifying fraud, waste and abuse

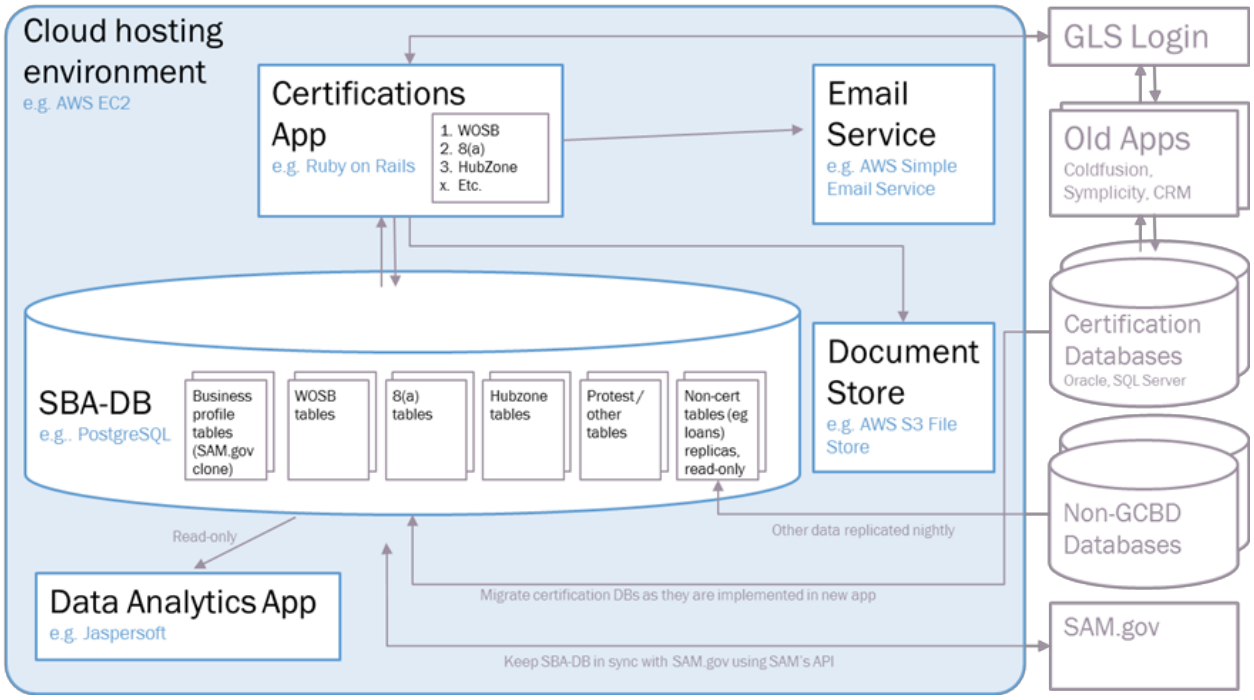
Implementation

Our recommendation is to integrate all the certification processes—8(a), HUBZone, and WOSB, as well as other related workflows—into a single web app, using a modern open-source stack, running on cloud infrastructure. Each certification process will access a shared copy of SAM business profile data, but manage its process-specific data in its own tables. Documents will be uploaded to a secure cloud system but managed and accessed through the app itself.

Our proposed implementation stack is:

- Linux
- PostgreSQL, operated and hosted by Amazon RDS
- Amazon S3
- Amazon SES
- Ruby on Rails, hosted in Amazon EC2, or operated and hosted by a service such as Heroku
- Google Analytics

A diagram of the proposed architecture is below:



First Project: Migrate WOSB to New Architecture

Rebuild the WOSB online repository and deprecate the old WOSBPR app, database, and document store.

We choose WOSB as the first project because it is the simplest to implement from a technical standpoint and is therefore the likeliest to offer a relatively quick win. At the same time, it does require migrating SAM data, integrating with GLS for login, and creating a new document management system. These are all dependencies of the other more complex certification processes, so the work done on WOSB lays the foundation for the other certification app migration efforts. Any of the other certification apps could also be built first, though those migrations are more difficult to execute due to their complexity.

Milestone 1

The first milestone implements the initial migration of SAM data from the SBSS-CCR legacy system.

- Setup new SBA-DB (PostgreSQL)
- Design schema for SAM business profile data (PostgreSQL)
- Create corresponding tables (PostgreSQL)
- Create repeatable ETL (extract-transform-load) to populate tables from SBSS-CCR (PostgreSQL, Ruby)
- Operationalize script to maintain hourly updates (Linux)

Milestone 2

The second milestone focuses on migration of legacy SBA-specific WOSB business data.

- Design schema for WOSB data (PostgreSQL)
- Create corresponding tables (PostgreSQL)
- Create repeatable ETL to populate tables from SBSS-CCR (PostgreSQL, Ruby)
- Operationalize script to maintain hourly updates (Linux)

Milestone 3

The third milestone implements the initial bare-bones certification app, including business owner views, and gets it deployed.

- Create minimal version of new certifications web app, including responsive design for desktop and mobile (Ruby on Rails)
- Integrate GLS login service (Ruby on Rails)
- Implement business owner views and workflows (Ruby on Rails)
- Deploy app (Ruby on Rails)

Milestone 4

The fourth milestone implements and migrates document upload, management, and storage.

- Integrate document storage with application (Amazon S3)
- Implement document upload (Amazon S3)
- Implement document views (Ruby on Rails)
- Migrate WOSB documents to the new storage (Amazon S3)

Milestone 5

The fifth milestone adds the analyst views to the app.

- Design and implement analyst views (Ruby on Rails)

Milestone 6

The sixth milestone adds audit capability.

- Design a schema for audit logs (PostgreSQL)
- Integrate logging into all user actions (Ruby on Rails)
- Implement audit log views (Ruby on Rails)

Milestone 7

The seventh milestone finalizes the migration and shuts down legacy components.

- Rerun all migrations and ETLs to make sure all data is available
- Shut off WOSBPR ColdFusion app
- Drop WOSBPR Oracle tables
- Turn off WOSBPR document storage
- Cancel any associated maintenance contracts

HUBZone Project

Rebuild the HUBZone app as part of the new certifications web app, and deprecate HCTS and the HCTS Oracle database.

Milestone 1

The first milestone migrates the legacy HUBZone business data.

- Design schema for HUBZone data (PostgreSQL)
- Create corresponding tables (PostgreSQL)
- Create repeatable ETL to populate tables from old HCTS database (PostgreSQL, Ruby)
- Operationalize script to maintain hourly updates

Milestone 2

The second milestone implements the bare-bones app, with the initial business owner workflows.

- Implement views and controllers for the business's application process (Ruby on Rails)
- Implement document upload (Amazon S3)
- Integrate e-signature steps

Milestone 3

The third milestone implements the analyst actions.

- Implement analyst views and controllers (Ruby on Rails)
- Implement analyst actions (Ruby on Rails)
- Implement notifications to the business on state change (Amazon SES, Twilio)

Milestone 4

The fourth milestone integrates SAM with the certification app.

- Implement SAM integration for application acceptance/revocation actions (Ruby on Rails)

Milestone 5

The fifth milestone, which is optional, eases self-qualification by automating the employee address mapping process.

- Implement a HUBZone map tool that makes it easy for a business owner to upload addresses of employees to verify residence eligibility requirement (Ruby on Rails)

Milestone 6

The sixth milestone implements an audit log.

- Duplicate audit schema from WOSB (PostgreSQL)
- Integrate logging into all user actions (Ruby on Rails)
- Duplicate or extend WOSB audit log views for HUBZone (Ruby on Rails)

Milestone 7

The seventh milestone finalizes the migration and shuts down legacy components.

- Rerun all migrations and ETLs to make sure all data and documents are available in the new app
- Shut off HUBZone ColdFusion app
- Drop HUBZone Oracle tables
- Turn off HUBZone SharePoint document storage
- Cancel any associated maintenance contracts

Enumerating milestones for further products requires a deeper understanding of product goals and requirements than we currently have. We recommend choosing granular milestones similar to what is laid out for projects 1 and 2 before embarking on these projects. Once three or four of the first project's milestones are reached (i.e. GLS Integration, SBA-DB setup and SBSS-CCR migrations, initial application deployment), other projects can potentially be initiated in parallel.

The milestone planning process is useful for uncovering dependencies and unexamined assumptions, and helps execution teams deliver business value consistently and with low risk.

8(a) Project

Rebuild the app for 8(a) certification as part of the new certifications web app, and deprecate BDMIS, the e8a app and database, and the 8(a) terminations database.

PRONet Project

Rebuild the Pronet app as part of the new certifications web app, and deprecate the old PRONet app and database.

Other Business-Focused Applications

Build workflows for managing Mentor-Protege Approvals and Joint Venture Approvals, and other applications which manage records related to individual businesses.

SBSS-CCR Deprecation Project

Deprecate and decommission SBSS-CCR. This is dependent on migrating DSBS from SBSS-CCR as well. At this stage, SAM needs to push updates to SBA-DB instead of SBSS-CCR.

Small Business Search

Current

One of SBA's primary missions is helping small businesses find and win government contracts. The agency supports this goal in part by helping to enforce a procurement rule which requires the government to award contracts to small businesses if two or more small businesses could are capable of completing the work. SBA provides a search tool called DSBS to support this mission.

Currently, procurement officers and SBA officials use several tools to find qualified small businesses for government contracts. They use commercial tools like Google, the SBA's DSBS search tool, and SAM.gov to search for government contractors.

Small businesses interact with two systems related to small business search: SAM.gov and SBA's "Supplemental Pages" application. Their main business profile is maintained in SAM.gov. Additionally, small businesses may optionally add profile information in a profile SBA maintains. This additional information appears in DSBS search results, but not SAM.gov search results. It is not copied to the business's SAM.gov profile. Small businesses and the public may also use the search capabilities of DSBS and SAM.gov in order to research the competitive landscape of government contractors.

SBA's current search product has several issues:

- The DSBS dataset is limited and incomplete
- The method by which business extend their searchable profiles for both DSBS and SAM.gov is confusing
- The DSBS search interface is baroque and unwieldy
- DSBS results are not returned in relevance order

In addition, no business metrics are captured that can be used to measure or optimize the customer experience of the search tool.

Ideal

Ideally, all small business search use cases would be supported by the SAM.gov product. As per our policy recommendations below, the best-case scenario is that the SBA collaborates with the GSA to implement small business-specific search functionality on SAM.gov, as it is already the primary place that many contracting officers and businesses use to find and manage business profile information. Another collaboration possibility is expanding the GSA's newly launched Discovery tool for procurement market research to index all businesses and small businesses, not just OASIS vendors.

The SBA may choose to revamp its own small business search product. If so, this tool should have a simple interface adapted to the use cases described above. Initially, the product must:

- Include a “Google-like” text entry box with faceting that facilitates exploration rather than selectivity
- Expose only the most commonly used filtering conditions by default, such as NAICS code and small business certifications
- Return results in relevance order
- Tracked and monitor usage so program developers know what to improve

In addition, the product could:

- Provide a better way for businesses to update their profiles, perhaps with a “LinkedIn-like” landing page
- Link profiles to SAM.gov, so that businesses can update their profile in one location
- Increase search coordination with SAM.gov, so that contracting officers using SAM.gov to search for small businesses get the best results possible
- Include additional data such as past performance information
- Include bookmark functionality to help procurement officers (or any logged-in user) track results
- Provide the ability to automatically or manually save queries
- Take government-only data into account for appropriate logged-in users

Implementation

Our proposed small business search product implementation is based on a modern, primarily open-source stack:

- Linux
- PostgreSQL (shared component), operated and hosted by Amazon RDS
- ElasticSearch, hosted in Amazon EC2, or operated and hosted by a service such as Compose.io
- Ruby on Rails, hosted in Amazon EC2, or operated using a service such as Heroku
- Google Analytics

Milestone 1

The first milestone focuses on basic functionality.

- Set up components
- Build and automate an ETL for populating the search index (ElasticSearch)
- Design and build a basic web interface for querying (Ruby on Rails)
- Design and build results pages (Ruby on Rails)
- Design and build individual per-business profiles for drilldown (Ruby on Rails)

- Iteratively tune indexing and ranking to get a good baseline (ElasticSearch)
- Add basic usage tracking

Milestone 2

The second milestone adds personalization features for searchers.

- Integrate single sign-on (ideally using the SAM.gov login information)
- Add bookmarks (Ruby on Rails)
- Add saved searches (Ruby on Rails)

Milestone 3

The third milestone takes advantage of the sign-on capability to include government-only data.

- Update the index ETL to include government-only fields (ElasticSearch)
- Extend the interface pages to include this data for government users (Ruby on Rails)
- Build a new ranking function that takes this data into account, for government users (ElasticSearch)

Milestone 4

The fourth milestone adds profile and personalization options for businesses, and increases public search engine penetration.

- Make sure that business profile pages have static, SEO-friendly URLS (Ruby on Rails)
- Improve the styling of profile pages (Ruby on Rails)
- Add additional fields in the profile that can contain data otherwise inaccessible to searches, such as capabilities (Ruby on Rails)
- Create an edit view for the profile, accessible to the business (Ruby on Rails)
- Update the index ETL to include the new data (ElasticSearch)
- Update the ranking functions to include the new data (ElasticSearch)
- Add branding fields to the profile, such as logo upload (Ruby on Rails)

Success Metrics

The goal of the search product is to increase the suitability and number of small businesses selected for contracting or subcontracting work. This is difficult to measure, but some proxies for whether the product is succeeding might include:

- Small business search query volume
- Number of repeat users
- Click-through rates to results views and outbound links such as company websites
- Usage rates of personalization features
- Relevancy scoring of sample results using user research techniques

Data Analytics

Current

There is currently no automated interface for creating reports from most of the SBA systems. One slight exception is counseling (EDMIS) which has a report generation front end, but the data in EDMIS is less useful than the data in other SBA systems. Generally, reports are generated on demand manually. A request from SBA managers for a specific report is given to a database administrator who formulates and runs a SQL query with results usually delivered in the form of a spreadsheet.

Ideal

The goal of this project is to produce a business intelligence application giving interactive access to reports needed by managers, business analysts, and leadership in the SBA.

Implementation

We will build a front end customized to the needs of the SBA using an open source business intelligence and reporting tool such as Jaspersoft or Pentaho. It will be cloud-hosted in the same environment as the new certification applications, and use data from the newly migrated SBA-DB described in the Certification section. We will migrate and replicate data from existing SBA databases to SBA-DB to be able to create these reports.

There are three major components to this product.

- An ETL process to make existing data accessible and in a useful format for the analytics engine.
- A report designer to allow developers to add new types of reports to the engine.
- A dashboard that give users convenient interactive access to their reports in the form of business graphics and spreadsheets.

Either of the open-source business intelligence packages Jaspersoft and Pentaho would provide support for building these products.

Milestone 1

The first milestone is to install the basic tools needed and begin migrating data.

- Make purchase decision; compare Jaspersoft and Pentaho and any other competitive open-source BI packages
- Install BI software in the cloud-hosting environment where the certification app is running (Amazon EC2)

- Build the data migration tools necessary to replicate some data from existing SBA databases (e.g. loans, EDMIS) to the new SBA-DB using ETL tools within the BI package

Milestone 2

The second milestone is to deliver a tool that can entirely replace one current hand-generated set of reports for a user inside the agency.

- Identify the first app and the data analysis requirements
- Replicate necessary data from existing SBA databases to the new SBA-DB (PostgreSQL)
- Add the database queries to support the first reports to the BI package (PostgreSQL)
- Design and build a visual interface to allow the first customer to set parameters and obtain results in the formats they desire

Milestone 3 and later

After Milestone 2 is met, further milestones consist of satisfying more report requests, until all requested reports can be rendered by this application instead of by custom manually-created queries. At this point the new application shifts from development to maintenance. Although all existing reports are possible to create at this point, we expect changes to this tool to be made throughout its lifetime to support new business intelligence requirements as they arise.

- Identify the next set of customers and their data requirements
- Add the data migration they need
- Add the database queries they need
- Add to the visual interface any controls or display they need

Product completion

The process described for Milestones 3 and later essentially continues for the lifetime of the use of this product. We expect that all reports based on aggregated data can be satisfied by this process. As new business applications are created, new reports will be needed as well, so there is no point at which this product development can be assumed to be finished.

Success Indicators

- **Business value**: reports generated with this tool should meet the business requirements of SBA leadership at least as well as their current system of hand-generated reports
- **Lower Cost**: the number of one-off, hand-generated database queries written to support data analysis requests should be steadily reduced. The product's goal should be that zero such queries should be required.

- **Usability**: the front end must be readily usable by business analysts and produce reports in their preferred formats
- **Interactivity**: reports can be created on the fly and results imported into Excel or viewed within a browser immediately

Technology Principles

The roadmap and implementation plans above are guided by a set of broad principles that help ensure software project success. Understanding these principles will help the above projects succeed.

These are based on the U.S. Digital Services Playbook, with some adjustments to account for the specific circumstances of the SBA. Issues that are unusually acute for the SBA are:

- Lack of automation
- Lack of software and data re-use
- Incomplete migrations of legacy systems
- Lack of modern development tools

Digital Service Play	**Assessment of SBA Progress**
Understand what people need, address the whole experience, from start to finish, make it simple and intuitive	The SBA has made a good start by inviting actual customers in to discuss their use of the product. This mindset needs to be maintained. Products should be designed to reflect user needs, not the organizational structure of the SBA.
Build the service using agile and iterative practices / structure budgets and contracts to support delivery	The SBA needs to move aggressively to short, tightly-scoped product iterations. The focus should be on maintaining a dialogue between all the project stakeholders, rather than trying to comprehensively specify requirements up-front. Short iterations that get to production quickly (in a span of a few months) can let the SBA take calculated risks, learn from its real-world customers, and build value quickly and consistently. Although it's useful to have standards to encode shared knowledge, they do not exempt project owners from exercising their judgment as to whether any individual standard applies to their context. The SBA needs to give individuals the freedom to innovate and try new things and update standards according to lessons learned; otherwise the standards ossify and become roadblocks.
Assign one leader and hold that person accountable	Software products cannot be successfully built without unifying authority, experience, and responsibility. The SBA needs to make each person accountable for the outcomes of their projects and give them the freedom to execute according to

	their judgment. This applies at all levels, from the individual developers up to the eventual leadership of the SBA Digital Service. Leaders within the SBA need to lead by example more than by rule-setting to preserve the agency and morale of the team.
Bring in experienced teams	A general lack of technical experience within the SBA makes communication difficult and puts projects at the mercy of contractors. The SBA needs to hire people with the technical experience necessary to understand, collaborate with, and challenge contractors and hold them to a high standard. In addition the lack of internal technical understanding makes it difficult for SBA's leaders to understand what is possible or practical as product goals are decided. Ultimately, the success and shortcomings of an agency's digital services are the direct responsibility of the agency's leaders. If these leaders do not have experience building and managing successful digital services, it is leadership's responsibility to build a trusted team that does.
Choose a modern technology stack / default to open	A better choice of tools can lead to lower cost-of-ownership and better outcomes for the SBA. In particular, the SBA needs to retain the rights to all data and code, be the account of record for cloud services, and understand how to operate and iterate on its systems without requiring a contractor to be involved. This will help the SBA create transparency and competition in its own contractor solicitations. An easy way to achieve this is to use open-source components for all mission-critical products. If some of the components are shared across products, maintenance cost can be reduced and product consistency can be improved as well. Finally, the SBA needs to be aggressive about choosing modern tools and sunsetting legacy components, to reduce the long-term maintenance burden and improve developer productivity.

Deploy in a flexible hosting environment	Cloud infrastructure has been one of the biggest industry innovations in the last ten years, for good reason. Outsourcing commodity operations functions frees the SBA to focus on building products. To the extent that standard, replaceable cloud components exist for the SBA's technical needs, they should be used. However, the SBA must be careful about becoming dependent on proprietary products that cannot be replaced if the relationship with the vendor sours.
Automate testing and deployments	One of the SBA's biggest drags on productivity is the lack of basic development tools: source code version control, an issue tracker, automated tests, and local development environments. All future projects should adopt an automation-first mindset and invest in developer and operational tooling. Additionally, automated tests should be required for all new application code developed. The lack of a source code control system run by SBA for all employees and contractors to store application code and manage deployments is a particularly glaring problem that should be remedied as soon as possible. As a rule, software teams need to focus on making long-term investments and avoid doing short-term, unscalable work, such as manually generating reports, deploying code, or restarting processes.
Use data to drive decisions	It's important to balance qualitative as well as quantitative goals. Most of SBA's products have easy-to-track proxies for customer satisfaction. These should be chosen upfront to help measure success and guide development. Database schemas should be designed with reporting and auditing in mind. Real-time system metrics should be captured in an off-the-shelf dashboard product to assist developers and operators.

Team and Talent

As digital products are critical to the delivery of the SBA's services, the SBA needs people in-house that can effectively direct and manage them.

Leadership

A key early hire is a digital service lead who takes a strategic, technical executive role within the SBA. This person is responsible for defining product vision and technical vision, building out and managing the in-house digital service team, setting up an effective product development process with employees and contractors, and communicating with agency leadership and the various program offices. Ideally the digital service lead is a seasoned technical lead and senior engineer with full stack web application development experience and has previously worked on deprecating and migrating legacy systems.

Initial Team Members

Across the initial SBA digital service team there are a few important roles, some of which can be played by the same person or shared among multiple people, depending on the skills of the individuals on the team:

- **Senior Engineer / Technical Lead** (ideally, one per major contracting project): Guides technical direction on contracting projects; tasks and manages contractors, performs code reviews. Has experience architecting, building, and shipping full stack web applications with modern technologies.
- **Design Lead**: Responsible for the user experience and visual design of the SBA's digital products. Starts with user research and guides the design process. Capable of executing individually but more likely to oversee design work by others and approve all final decisions.
- **Product Manager** (ideally, one per major contracting project): Sits with the program offices to understand product goals. Helps translate customer feedback into a prioritized list of features. Partners closely with design and engineering to help the team ship the right product to users.
- **Digital Service Contracting Officer**: In charge of contracts relating to all new digital services and products. Experienced government contracting officer that is trained in the particular nuances of software product delivery via contracting vehicles. Can draw on competent legal counsel for acquisition of digital products.

Other desirable skillsets for at least one person on the initial team include:

- Deep relational database skills (experience with Oracle not required but helpful). Ideally with some prior experience doing database migrations.
- Infrastructure operations skills.

Individuals who have multiple skillsets can be particularly valuable early on (for example, someone who functions as both design lead and product manager), but a team composed of individuals with overlapping skills is entirely sufficient. In either case, it is critical that each person possess strong communication skills and a high degree of empathy.

Filling Out the Team

The initial SBA digital service team will be the best ones to determine how to grow the team over time. It will take deliberate effort to craft the right roles and organizational structures, to source and recruit qualified candidates, and to onboard them in a way that maintains the culture and effectiveness of the team; and the process of scaling the team is a continuous one.

On the specific question of hiring more junior candidates in technical roles, our recommendation is to be open to taking on people with at least 1-2 years of work experience, so that they have some familiarity with industry practices even if they need more structure and guidance around their work.

Ongoing Support from the U.S. Digital Service

The U.S. Digital Service HQ can help in two major capacities:

1. Recruiting. Especially as the SBA is just beginning to build out its in-house digital service team, but also on an ongoing basis afterwards, U.S. Digital Service HQ can help to source and evaluate candidates for the SBA digital service team.
2. Providing an ongoing “technical advisory board”. On an as-needed basis, likely not more than an hour per week, someone from the U.S. Digital Service can advise on technical direction and acquisition strategy, or more tactical issues like drafting or reviewing statements of work and task orders or evaluating contractor proposals. This will be especially important as SBA builds its internal team.

Policy Changes

The team identified several specific policy impediments to improving SBA's digital services. SBA, OMB, GSA and other agencies involved in these uses cases should begin work now towards removing these policy impediments. This work does not depend on SBA building a digital service team. It should begin immediately.

Implement E-Signature Everywhere

The requirement for wet signatures unnecessarily induces significant time delays and other overhead (in cost and convenience, e.g. in postage and physical file storage) for submitting and processing paperwork. Although we should continue to support paper applications, ideally wet signatures are not required and completely digital flows are the default.

Collect Counseling Data

Because small business development centers cannot submit identifying information back to the SBA about the businesses they've served, there is no way of answering basic questions around the number of businesses served or efficacy of counseling services delivered, and no way of tracking the later progress of these businesses through other SBA programs. Ideally SBDCs and other counseling programs submit uniquely identifying information like EINs or DUNS numbers for each business they help, so that the SBA can accurately measure the impact of these counseling programs and understand how they tie into the SBA's other offerings.

Consolidate Business Profile Data and Searching Capability

Today, small business profile information is split across SAM.gov and the SBA's "Supplemental Pages" application and database. The unique business profile information, and any profile updates SBA collects or receives through its certification and counseling work does not get fed back to SAM.gov. In addition, the SAM.gov and SBA's "Dynamic Small Business Search" products have overlapping functionality, and neither is working well at helping users research qualified small businesses to do government work.

Ideally, small businesses would only need to enter profile information in one system with one login. Contracting officers, PCRs and others would only need to do market research using one tool. If policy, regulatory or other obstacles are preventing the GSA team that manages SAM.gov from implementing changes required to better support small business use cases, SBA leadership should work with OMB's OFPP to remove these impediments.

Appendix: About the Team

This document was written by a team of software engineers and product designers at the U.S. Digital Service. The team consisted of:

Eric Benson

Eric is a software engineer who retired from Amazon.com. He worked there from 1996 to 2001, building a variety of customer visible features, including the first version of “People who bought … also bought ....” and A/B testing. A major focus of his work was scaling systems while Amazon’s business was growing exponentially. He also ported their large C++ codebase to Linux from a proprietary Unix system in 2000. Prior to Amazon, he built the ScriptX programming language implementation for Kaleida Labs, and he was a founder and principal scientist at Lucid, Inc. and the architect of Lucid Common Lisp. He is a co-inventor of 5 U.S. patents and has a B.S. in Mathematics from the University of Utah.

Eric Benson recused himself from decision-making as to specific cloud providers or cloud technologies due to a potential conflict of interest.

Tracy Chou

Tracy is a software engineer and tech lead at Pinterest. She was previously at Quora, also as an early engineer there. With initiatives in the workplace and the community, Tracy works actively to promote diversity in the tech industry and has pushed for greater transparency and discussion on the topic with a crowdsourced data collection effort on women in software engineering. She was named Forbes Tech 30 under 30 in 2014 and recently profiled in Vogue for her work. Tracy holds an M.S. in Computer Science and a B.S. in Electrical Engineering from Stanford University, where she was a Terman Fellow and elected to Tau Beta Pi and Phi Beta Kappa.

Evan Weaver

Evan is the CEO of FaunaDB, a distributed database startup. He is the former Architect and Director of Infrastructure of Twitter. At Twitter he led a team of 25, and was responsible for the design, implementation, and integration of all of Twitter's mission-critical database and caching services. The systems he built at Twitter remain in place today. Previously he worked at CBS Interactive and SAP. He holds an M.S. in Computer Science from the University of Delaware.

Charles Worthington

Charles is a product designer and software engineer who has been building the U.S. Digital Service since October 2014. Charles was a Senior Advisor to the U.S. CTO, where he co-authored and did the front end development for the U.S. Digital Services Playbook. Before joining government, Charles built products for clients at Gray Duck Labs and created Preamp.fm, a live music discovery service. Charles has a B.A. from Harvard University.