Cost Engineering Service

October 5, 2017
New Service Template

Purpose / Objective: The Cost Engineering will provide, configure, and support the CloudHealth platform, and make recommendations based on usage analytics for optimizing cost and performance of assets in the cloud.

Users: Service is open to users managing supported Cloud IaaS vendors at Harvard. Currently this includes all groups in HUIT and Non-HUIT AWS General Payer participants, HBSP and DCE.

Value / Benefits:
• Efficiencies in cloud cost and performance
• Improved reporting leading to more accurate planning and budgeting
• Effective monitoring for compliance to security policies and best practices
• More informed cloud strategies

Service Offering if focused on providing:
• Standard dashboards using CloudHealth platform to assess cloud spend
  – HarvardKey integration
  – Asset grouping based on customer affiliations
  – Detail on trends, billing activities, comparisons and operational processes
• Support for CloudHealth platform, including operations and maintenance
• Best practices and standards for managing cloud costs
• Implementing and monitoring automated actions for policy compliance
• Training and other knowledge artifacts to support users
New Service Template

Consulting
• Customized support for users developing approach to manage cloud spend

Self-service
• Create reports on costs and usage
• Export reports

Optimization
• Design and develop cloud-specific policies, standards, procedures, guidelines, and documentation to achieve cost efficiencies
• Ongoing assessment and monitoring of AWS spend and report on areas for recommended cost savings
• Guidance on costs associated with proposed engineered cloud environments for new projects

Service and Offering Owners: Matthew Zeller

Provider Group: Infrastructure Technology Services

Support Model (Tier 1 – Tier 3):
• Self-service – users will use vendor platform for training and troubleshooting
• Managed by Cost Engineering Service Manager
  – Adding and updating user information and access (this will be distributed to application owners over time)
New Service Template

• Tier 1: Cost Analyst
• Tier 2: Cloud Consulting group
• Tier 3: Cloud Health vendor

Service and Technology Dependencies:
• Cloud vendors, tool vendors
• DevOps resource availability
Appendix
Business Analysis: Process Overview

- Validate the problem statement (slide 6)
- Identify stakeholders and potential users (slide 7)
- Gather information on current state, process(es), and context (e.g., organizational, financial) (slide 8)
- Interview stakeholders and users to understand priorities, criteria, challenges, and desired outcomes (slides 9 to 12)
- Determine scope of problem to address (slide 13)
- Evaluate possible solutions (slide 9)
- Conduct financial analysis (e.g., who pays/who’s willing to pay) (slide 13)
- Assess whether HUIT should and could provide a solution (slide 14)
Business Analysis: Problem Statement

• Current cloud service consumption by delivery area is open-ended and decentralized with minimal information for operational and financial oversight.

• These circumstances result in higher spend on cloud services with no processes or policy that optimize and/or reduce operating costs.

• The Cost Engineering service will provide, configure and support an online dashboard that provides insight into all AWS cloud usage and spend for both cloud users and financial management.
## Business Analysis: Stakeholders and Users

<table>
<thead>
<tr>
<th>Stakeholder/User</th>
<th>Reason for Inclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oversight Committee (OCCOS)</td>
<td>Manages the consolidated HUIT budget. The OCCOS ensures consumption of Cloud resources is effective, efficient, and equitable. Establishes best practices, policy changes, and procedural requirements. Members are HUIT decision makers consuming cloud services and need cost engineer service to manage their areas.</td>
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<tr>
<td>HUIT and Non-HUIT AWS General Payer participants (HBS, DCE, &amp; HMS)</td>
<td>Current non-HUIT cloud resource consumers passively managing costs. Participated in service tool selection and eager to actively manage costs and decide operational impacting of their own cloud use.</td>
</tr>
<tr>
<td>DevOps Design Teams</td>
<td>DevOps and developers key advisors on infrastructure decisions and dependencies of cloud resources.</td>
</tr>
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<td>Finance</td>
<td>Presents financial health to HUIT senior leadership, supports management of consolidated HUIT budget and manages frozen HUIT budgets. Cost and funding modeling for cost engineering services and impact on customers necessary to align service effort with user expectations.</td>
</tr>
</tbody>
</table>
Business Analysis: Current State, Processes and Context

- Cloud services activity captured through SLASH monthly billing process
- Limited visibility into cloud resources for monitoring cost efficiency and performance
- Focus on migrations first results in less emphasis on monitoring cloud resources and reducing costs
A workgroup of stakeholders and users consisting of Cloud & ITS; Architecture, DevOps, HMS, DCE, HBXP, HUIT-Finance, HUIT-DMS, and others participated in identifying requirements, reviewing vendor presentations, evaluating features, and selecting the option that best met the requirements.

The following products were evaluated:

- CloudHealth (selected)
- CloudCheckr
- Apptio
- Orbitera
Business Analysis: Interview Stakeholders and Users

Users completed a survey based on the must-have requirements before using the CloudHealth tool:

• Survey participants are managers and product owners from ATS and Campus Services

• 71% of participants expected to use the tool once week

• The top 5 uses of the tool are expected to be:
  1. Visibility into cloud cost and performance
  2. Ability to fix cloud issues and realize savings
  3. Track costs and performance over time to manage budgeting
  4. Use reserved instances to save on cloud cost
  5. Visualize data across the business and report out

• Other expectations about features most likely to be used:
  – Reporting: reconciling data to monthly billing
  – Costing: averaging costs over months and providing proactive alerts based on cost parameters
  – Optimization: getting under-utilization recommendations for assets
  – System: analyzing AWS, Azure, & Google as IaaS providers
## Business Analysis: Interview Stakeholders and Users

### Must-have Requirements

<table>
<thead>
<tr>
<th><strong>Cost</strong></th>
<th><strong>Optimization</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Forecast based on run rate</td>
<td>• Provide RI recommendations</td>
</tr>
<tr>
<td>• Average costs over months</td>
<td>• Provide under-utilization recommendations for RIs</td>
</tr>
<tr>
<td>• Provide proactive alerts based on cost parameters</td>
<td>• Provide under-utilization recommendations for assets</td>
</tr>
<tr>
<td>• Provide alerts based on budget numbers</td>
<td>• Auditable automated actions</td>
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<tr>
<td>• Provide alerts based on instance type</td>
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</tr>
<tr>
<td>• Fully control ranges for alerts</td>
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<tr>
<td>• Customize reporting based on user role</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Reporting</strong></th>
<th><strong>System</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Create custom groups of assets within reporting</td>
<td>• Analyze AWS, Azure &amp; Google as IaaS providers</td>
</tr>
<tr>
<td>Create three-dimensional reports</td>
<td>• Analyze multiple accounts</td>
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<tr>
<td>• Initiate scheduled reports and mail them out</td>
<td>• Integrate with CAS/SAML and group management</td>
</tr>
<tr>
<td>Display both blended and unblended costs</td>
<td>• Granular role-based permissions (account level)</td>
</tr>
<tr>
<td>• Data reconciles to monthly billing</td>
<td>• Robust support of tags</td>
</tr>
<tr>
<td>• Provide historical comparison M to M, QoQ, YoY</td>
<td></td>
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</tbody>
</table>
## Business Analysis: Interview Stakeholders and Users

### Nice-to-have Requirements

<table>
<thead>
<tr>
<th>Cost</th>
<th>Optimization</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Better cost estimates than AWS provides</td>
<td></td>
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<tr>
<td>• Supports budgeting process by allowing for anticipated changes in volumes</td>
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<tr>
<td>• Integration with on-premises assets for broader cost analysis</td>
<td></td>
</tr>
<tr>
<td>• Instance lifetime thresholds - older implies brittle or not actively unmanaged</td>
<td></td>
</tr>
<tr>
<td>• Data transfer costs and optimization recommendations</td>
<td></td>
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<tr>
<td>• Ability to create invoices or invoice-like statements for accounts within Consolidated Billing</td>
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<tr>
<td>• Modeling for what impact changes might have on future costs</td>
<td></td>
</tr>
<tr>
<td>• Can actively manage costs without intervention</td>
<td></td>
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<tr>
<td>• Tool allows for customizable approval workflows</td>
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</tr>
<tr>
<td>• Automation UI has a validation function, aka. &quot;dry run&quot;</td>
<td></td>
</tr>
</tbody>
</table>

### Reporting

| • Ability to create >three-dimensional reports  |
| • Reports can be generated in multiple formats  |
| • Data can be exported for external manipulation  |

### System

| • Can integrate with other systems (e.g., API)  |
| • Integration with other BI tools  |
| • Can analyze SaaS vendors  |
| • Granular role-based permissions (tag level)  |
| • Vendor creds can assume-roles across cloud accounts, reducing access key mgmt  |
Business Analysis: Determine Scope

• Support for CloudHealth tool, including operations and maintenance
• Standard dashboards to assess cloud spend that provide detail on trends, billing activities, comparisons and operational processes
• Recommendations based on usage analytics for optimizing cost and performance of assets in the cloud.
• Best practices and standards for managing cloud costs
• Training and other knowledge artifacts to support users
• Service available to HUIT and Schools
Does It Qualify as a New Service?

A service is a means of delivering value to customers by facilitating outcomes customers want to achieve without the ownership of specific costs or risks.  ITIL v3, Service Design

An IT Service exhibits the following characteristics:

• Fulfills one or more needs of the customer ✔
• Supports the customer’s business objectives ✔
• Is perceived by the customer as a coherent whole or consumable product ✔

When trying to determine whether an offering is a service, consider the following:

• If someone can request and purchase it, it is probably a service.
• If it can be viewed as an add-on or an option of a service, it should be considered a part of that service and not a service of its own
• Applications, themselves, are not services. They enable services that may be provided by someone else.
## Strategy
- Procure cloud cost reporting tool and integrate with cloud product service billing accounts
- Develop base dashboards/reports and alerts/policies validated by Oversight and tool selection groups
- Deliver enriched cost information to cloud customers

## Future State
Continuous cost information used:
- Monitor ongoing cloud operating activity thresholds
- Model cloud application changes as technology changes
- Drive cost performance decision making at leadership level

## Current State
- Cloud services activity captured through SLASH monthly billing process
- Limited visibility into cloud resources cost efficiency options
- Focus on migrations first, then cost efficiencies

## Gaps
- Limited cost reporting and analysis processes for cloud services consumed
- Small group knowledgeable of cloud cost structure and best practices
Proposed Service Definition

Purpose / Objective: The Cost Engineering will provide, configure, and support the CloudHealth platform, and make recommendations based on usage analytics for optimizing cost and performance of assets in the cloud.

Users: Service is open to users managing supported Cloud IaaS vendors at Harvard. Currently this includes all groups in HUIT and Non-HUIT AWS General Payer participants, HBSP and DCE.

Value / Benefits:
- Efficiencies in cloud cost and performance
- Improved reporting leading to more accurate planning and budgeting
- Effective monitoring for compliance to security policies and best practices
- More informed cloud strategies

Offerings:
- Standard dashboards using CloudHealth platform to assess cloud spend
  - HarvardKey integration
  - Asset grouping based on customer affiliations
  - Detail on trends, billing activities, comparisons and operational processes
- Support for CloudHealth platform, including operations and maintenance
- Best practices and standards for managing cloud costs
- Implementing and monitoring automated actions for policy compliance
- Training and other knowledge artifacts to support users
Proposed Service Definition

Self-service

• Reports on trends, billing activities, benchmark comparisons, and operational processes
• Notification of AWS cost overages based on customer benchmarks

Consulting

• Assist in the selection and tailoring of approaches, methods, and tools to support cloud product adoption
• Assess and analyze customer cloud product usage, costs, drivers, tools, and support
• Develop unique solutions to customer specific issues and problems
• Partner with other support and technical teams in developing engineered infrastructure solutions
• Advise on options available to customers

Optimization

• Design and develop cloud specific policies, standards, procedures, guidelines, and documentation
• Monitor AWS billing and report on recommended cost savings
• Guidance on costs associated with proposed engineered cloud environments
Proposed Service Definition (cont)

**Service Owner:** Matthew Zeller

**Provider Group:** Infrastructure Technology Services

**Service Support**

- Self-service – users will use vendor platform for training and troubleshooting
- Managed by Cost Engineering Service Manager - Adding and updating user information and access (this will be distributed to application owners over time)
- Tier 1: Cost Analyst
- Tier 2: Cloud Consulting group
- Tier 3: Cloud Health vendor

**On-call and Escalations:**

- After-hours coverage: Not applicable

**End User Communications:**

- Proactive consultative engagement
- Self-service reporting
- Automated Notification/Alerts

**Dependencies/Relationships with Other Services:**

- Upstream: Cloud Vendors, Tool Vendor
- Downstream: DevOps resource availability
# Service Design Partners

<table>
<thead>
<tr>
<th>Design Partner</th>
<th>Why them? What do you need from them?</th>
<th>Engagement Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oversight Committee (OCCOS)</td>
<td>Manages the consolidated HUIT budget. The OCCOS ensures consumption of Cloud resources is effective, efficient, and equitable. Establishes best practices, policy changes, and procedural requirements. Members are HUIT decision makers consuming cloud services and need cost engineer service to manage their areas.</td>
<td>Beginning at committee meeting level by establishing costs which can be directly impacted and those which are indirectly impacted by operational activity. Establish reporting routine and decision criteria processes and policies which are shared and tested with design partners</td>
</tr>
<tr>
<td>Non-HUIT AWS General Payer participants, HBS, DCE, &amp; HMS</td>
<td>Current non-HUIT cloud resource consumers passively managing costs. Participated in service tool selection and eager to actively manage costs and decide operational impacting of their own cloud use.</td>
<td>As reporting routine and decision criteria become common with OCCOS, this group will be engaged based on total cost, migration priority, and infrastructure design to maximize and broaden service users</td>
</tr>
<tr>
<td>DevOps Design Teams</td>
<td>DevOps and developers key advisors on infrastructure decisions and dependencies of cloud resources</td>
<td>Continuous engagement as service is initiated and evolves</td>
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<tr>
<td>Finance</td>
<td>Presents financial health to HUIT senior leadership, supports management of consolidated HUIT budget and manages frozen HUIT budgets. Cost and funding modeling for cost engineering services and impact on customers necessary to align service effort with user expectations</td>
<td>Continuous engagement as finance must be aware of cost drivers and impact on service delivery. Additionally, reporting must be designed to meet existing finance process requirements and reporting.</td>
</tr>
</tbody>
</table>
Engagement Approaches – Services Workgroup

• Services Workgroup Charge
  – Develop a comprehensive strategy and plan to introduce new cloud services (including Cost Engineering) to the Harvard Community in support of a cohesive, University-wide cloud presence
  – Create service definitions, define a simple request/fulfillment processes, determine timelines for new and deprecating services, and articulate processes for service approval and exceptions

• Services Workgroup Members
  – Chair(s): Erica Bradshaw and Jefferson Burson
  – Members: Maria Curcio, Matt Zeller, Jane Sulkin, Jason Shaffner, Julie Broad, Tracey Robinson, Karen Pemstein, Mike Landino, Kathy Stuart
Engagement Approaches – Services Workgroup Subgroup

• **Services Workgroup Subgroup Charge**
  – Meet weekly to complete the service strategy and design phases including:
    • New service definition
    • Current and future state
    • Service handbook
  – Review documentation with Services Workgroups

• **Services Workgroup Subgroup Members**
  – **Chair(s):** Erica Bradshaw and Jefferson Burson
  – **Additional members:** Jim Booth, Luke Sullivan, Dave LaPlante, Ron Hawkins, Ben Rota, Hellen Zziwa, Kathy Stuart,
Engagement Approaches – CloudHealth Pilot

We are completing a pilot of the selected tool (CloudHealth) with customers from ATS and Campus Services. We have learned:

- Users want to see granular views of their assets and would like to reference application names instead of ID numbers
- Users would like to have access to reporting templates for easy reporting out
- Users want to make changes if they see indications of unused resources or excessive snapshots to improve cost efficiency
- We need to make sure assets are tagged correctly when migrated so they are visible in CloudHealth
D3 Service Design Checklist: Part 1

Service Attributes

- Description ✓
- Key Features and Benefits ✓
- Offerings ✓
- New or Replacement? ✓
- Service Stakeholders ✓
- Available to ✓
- Requirements and Limitations ✓
- Policies regarding Use of Service ✓
- Compliance and/or Regulatory Requirements – ✓
- Potential Risks ✓

Service Transition

- Timeline for Service Development & Launch ✓
Document Service Delivery

Timeline for service Development and Launch

• Phase 1 – Tool implementation – first 30 days: July to August 2017
• Phase 2 – Service preparation, design, and roll-out to pilot users – September to October 2017
• Phase 3 – General HUIT roll-out – November 2017
• Phase 4 – Expanded Roll-out to University – December 2017

Available to

• Service is open to any users of supported Cloud IaaS vendors (currently AWS, Azure, and Google) at Harvard

Requirements and Limitations

• Harvard Key required to be an end user

Policies regarding Use of Service

• User are actively engaged in managing cloud services provided by AWS or have begun development activity that will require cloud services provided by AWS or other cloud service provider.
Document Service Delivery

Compliance and/or Regulatory Requirements

Potential Risks

- Dependencies on security, cloud provider, and CloudHealth analytical tool create dependencies on system which the service needs to deliver performance.

Service Team
The Service Team is accountable for service operations. Responsible for strategy and development of service. s-functional group of HUIT members that can provide subject matter expertise to the Service Owner.

<table>
<thead>
<tr>
<th>Functional Team</th>
<th>Individual</th>
<th>Area of Expertise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Desk</td>
<td>Cost Engineering Cost Analyst</td>
<td>Intake of incidents relating to service. Troubleshooting according to standard Troubleshooting Guide knowledge. Escalation to Service Owners</td>
</tr>
<tr>
<td></td>
<td>E.g. [Application Team]</td>
<td>Multi-platform technical knowledge, incident and problem resolution</td>
</tr>
<tr>
<td>Service Delivery Manager</td>
<td>Matthew Zeller</td>
<td>Accountable for service operations. Responsible for strategy and development of service.</td>
</tr>
</tbody>
</table>
Service Support
Self: Users will use tool platform for training, documentation and managing support issues.
Managed: Updating user information and delivery directly supported by cost-engineering team.

Service Requests
• User access

Knowledge
• Self – users will use tool platform to train and manage support issues
• Managed – updating user information and delivery directly supported by cost engineering team (phased out?)

Major Incidents
• Major Incident – any system that the services is dependent (Cloud Health, AWS, network connectivity, Harvard Key).

• Upon discovery of an incident, on-call personnel are to be notified immediately and by phone call to 844-HUITNOC (844-484-8662) and by email to noconcall@harvard.edu. On-call person will assume responsibility for sending relevant notifications, and as primary point of contact for Customer, ITSM, and Client Services. On-call person will initiate a conference bridge when circumstances require. Incident responder must update ITSM on thirty minute intervals, at a minimum. Incident responder must update noconcall@harvard.edu with a firm “all clear” when the incident is resolved. Incident responder is responsible for performing any post-incident review activities, as required by the HUIT Incident & Problem management protocols.

• Users alerted through same notification process as dependent system notification.
Document Service Delivery

Technology and Vendors used for Service Delivery

• Service provided uses SaaS solution – CloudHealth

Service Dependencies

• “One-Down” Services this Service depends on
  – Cloud providers – AWS, network connectivity, Harvard Key - security

• “One-Up” Services that depend on this Client Service
  – HUIT service providers, Non-HUIT service providers

Service Level Agreements

• Service expected to support customer cost management activities such as bill payment, budgeting, forecasting, project planning, project design, and project implementation.

Underpinning Contracts

• Cloud Health 12 month subscription agreement with HUIT – ITS.
## Document Service Delivery

### Metrics

<table>
<thead>
<tr>
<th>KPI</th>
<th>Target</th>
<th>How Measured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability</td>
<td>October 2017</td>
<td>HUIT AWS accounts linked to analytical tool CloudHealth</td>
</tr>
<tr>
<td>Mean time to resolve Incidents</td>
<td>Within 1 Business day</td>
<td>Days to resolution</td>
</tr>
<tr>
<td>Time to fulfill request</td>
<td>Within 2 Business day</td>
<td>Time to close request ticket</td>
</tr>
<tr>
<td>Customer satisfaction survey</td>
<td>95% “Satisfied” or better rating</td>
<td>Customer relationship management records</td>
</tr>
</tbody>
</table>
Current Recommendations for Funding Model

• This is under review and not yet being distributed.
D10 Service Design Checklist: Part 2

Service Operations
- Service Team ✓
- Service Support ✓
- Service Requests ✓
- Knowledge ✓
- Major Incidents ✓
- Technology used for Service Delivery
- Service Dependencies ✓
  - “One-Down” this Service depends on
  - “One-Up” that depend on this Service

Service Level Management
- Service Level Targets ✓
- Service Level Agreements ✓
- Operating Level Agreements ✓
- Underpinning Contracts ✓
- Metrics ✓

Financial model (in progress)
- Internal
- External
Cost Engineering & Monitoring Phased Rollout

Phase 1: Pilot (no SN presence)
Provide access to the CloudHealth dashboard for selected users from ATS and Campus Services

Out of scope:
• Deep dive into customer by customer spend
• No login access to tool outside of tool admins

Pre-requisites:
• Procure cost management tool
• Set cost management tool up for admins

Reasoning: Our only experience with the tool was pilot work done to prove usefulness. Working initially with selected participants will help us take a deeper dive into the tool and identify the most important information to share more widely.
Cost Engineering & Monitoring Phased Rollout

Phase 2: (SN presence)
Rollout tool access to service owners and their financial partners including DCE and HMS. This will involve:
• Training, end user artifacts like Knowledge base, FAQs, etc.

Out of scope:
• No login access to tool outside of tool admins

Pre-requisites:
• Map AWS accounts to groups
• HarvardKey integration
• Training material, end user artifacts like Knowledge base, FAQs, etc.

Reasoning: Ideally we would wait till phase 3 to expand to schools, but DCE and HMS have already approached us with a desire to access this tool. HMS uses Azure, which provides a useful view into managing that cloud environment with the tool.

Phase 3:
Expand service to other non-HUIT groups
Service Handbook

https://hu.sharepoint.com/sites/cloudstrategy/Shared%20Documents/Services/Service%20-%20Cost%20Engineering/20171004-CE-service-handbook-October%202017.docx?d=w71f5a1f8c6274da7b0c938e97f3fd75b&csf=1