



Small Business, Rejoice

MSIS Capstone Project Report

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Company Background

Intuit is a leading software provider of business and financial management solutions for small and mid-sized businesses, consumers, financial institutions, and accounting professionals. It was founded in 1983 and is headquartered in Mountain View, California. Intuit's primary markets are the United States, Canada, India, Singapore, and the United Kingdom. The company organizes its business into four principal categories: Small Business Group, Tax, Financial Services, and Other business. These categories include seven segments: Financial management solutions, employee management solutions, payment solutions, consumer tax, accounting professionals, financial services, and other businesses. Intuit has several flagship products including QuickBooks®, Quicken®, and TurboTax.

Over 50 million users, seven million small businesses, and 1,600 financial institutions depend on Intuit's products and services.

Problem Definition

As Intuit is rapidly transforming to a Connected Service/SaaS company, the demand for IT hosting services has increased and resulted in a longer delivery time for hosting infrastructure solutions. The goal of this project is to conduct an end-to-end assessment of the processes used within the Operations Engineering Infrastructure (OEI) group to delivery hosting services and to identify and potentially deliver one or more improvements to lower delivery time, improve quality, or reduce cost.

Our Approach

The SCU team began this project by attempting to analyze the end to end hosting process (Appendix A). We assumed with knowledge of the complete process we would be able to identify deficiencies as well as redundancies and design a revised process which eliminated these. On average, hosting delivery time was 25 business days. (Appendix D) However as we progressed we learned a number of key details. First, the process is far more complex than we had imagined. There are a number of different paths a request can take, the combinations of configurations are virtually unlimited, and there is a real lack of comprehensive data about what is happening with these requests. Most requests seem to be handled in an ad-hoc fashion with little regard for tracking or speed. Fundamentally, Intuit has a problem. Intuit's hosting request process wants to be agile and swift while containing (and ideally reducing) the costs needed to deliver hosting. With these conflicting ideologies in mind we began interviewing various teams which make up the hosting request process. These teams and our observations are detailed below but the overwhelming conclusion which resulted from these discussions was it was the approval cycles and not the technology keeping Intuit from being agile. With hearsay in hand we attempted a statistics-based analysis and found roughly 60% of the time spent (Appendix C) during the end-to-end process could be directly attributed to the pre-provisioning approval cycles. Namely, AARB (Appendix B) and Capacity.

At this point, with the advice of our Project Sponsors, we refined the scope of our research. Clearly, the end-to-end process with its endless combinations and configurations could not be profiled and studied within our time limit. Therefore, it was decided the SCU team would continue their project but use a "1 VM" request as a model. That is, the team would take the simple use-case of requesting 1 Virtual Machine (VM), map all required steps within the current process, and design an optimized process within the 1 VM parameters. Using this model we have produced a revised hosting request process (given below) as well as thoughts on how it could be expanded to serve non-trivial requests.

What follows is a detailed discussion of our interviews and our proposed process. We have simplified the process into four key steps. The first step is submission. An end-user makes their way to a well-announced portal and submits a free-form request. The second stage is revision. Here, a Service Delivery team member receives the request from the portal, works with the end-user to revise the requirements, and sets it for execution. The execution step is forked between a manual provisioning and a Pharos-centric provision. Finally there is a review step which is triggered on an interval. This review looks at recently provisioned requests and evaluates whether standards were met, if capacity or financial metrics were met, and is able to levy sanctions or orders to retrofit a provisioned environment. The platform upon which all of this interaction happens is the IDSS and its associated DCOP Quickbase. This single source of truth for all organizations will play a key role in the future of Intuit's hosting requests.

Submission Phase

Interview Results & Observations

End Users (Business Unit)

We began trying to understand the current process by interviewing a few end-users. We learned that end-users have a few responsibilities in the current process including the creation of a Statement Of Work (SOW) as well as the completion of a CIS (Security) questionnaire. Generally end-users can work with Service Delivery (SD) or their Business Unit IT (BUI) organization to aid in the completion of these documents. Only once both of these documents have been completed, can they proceed with their hosting request.

Interestingly, most people we spoke with had no idea how to begin the hosting process. Many people gave specific names of people they reached out to when they required hosting but there was no well-known starting point described to us. Generally this led to two issues we identified. First, this ad-hoc method of accepting requests leads to poor tracking and ability to generate metrics regarding the hosting process and its end-to-end time required. Secondly, the end-user is unable to complete the SOW without formal aid and therefore their request is delayed as their SOW is repeatedly rejected.

Some simple suggestions discovered from these interviews:

- Train end-users; make them aware of the existing process and its procedures.
- Simplify the SOW document such that end-users can complete it without fear of multiple iterations and rejections.
- Create a common starting point for hosting requests.

Business Unit IT (BUI)

After interviewing BUI we were able to derive the following responsibilities they carry within the hosting request process.

- Establish business justification for the hosting request.
- Meeting with Product Development teams to create time frames and determine needs for the following year.
- Prioritize projects and estimate hardware requirements.

However, many of these responsibilities overlap with those of Service Delivery (SD).

Therefore, we propose removing BUI from the critical path of trivial ("1 VM") hosting requests.

Project Management Organization (PMO)

After interviewing members of the PMO organization we derived their responsibilities as the following:

- Create SHR and initial DCO records.

- Help in updating the SOW in cooperation with Service Delivery (SD).
- Conduct a pre-review along with AARB architects.
- Manage the end-to-end project request.
- Schedule an approval meeting with AARB via SharePoint.
- Based on forecasts, attempt to plan for delivery needs.

The PMO organization uses a tool called PPM (Portfolio Project Management) to track requests. However, the tool either fails or is used inappropriately as the PMO organization is unable to effectively use it to both organize requests across business units as well as measure the end-to-end time period of a request and its current status. In our “1 VM” case we have removed the PMO organization as their role is unnecessary in trivial requests.

Proposed Process

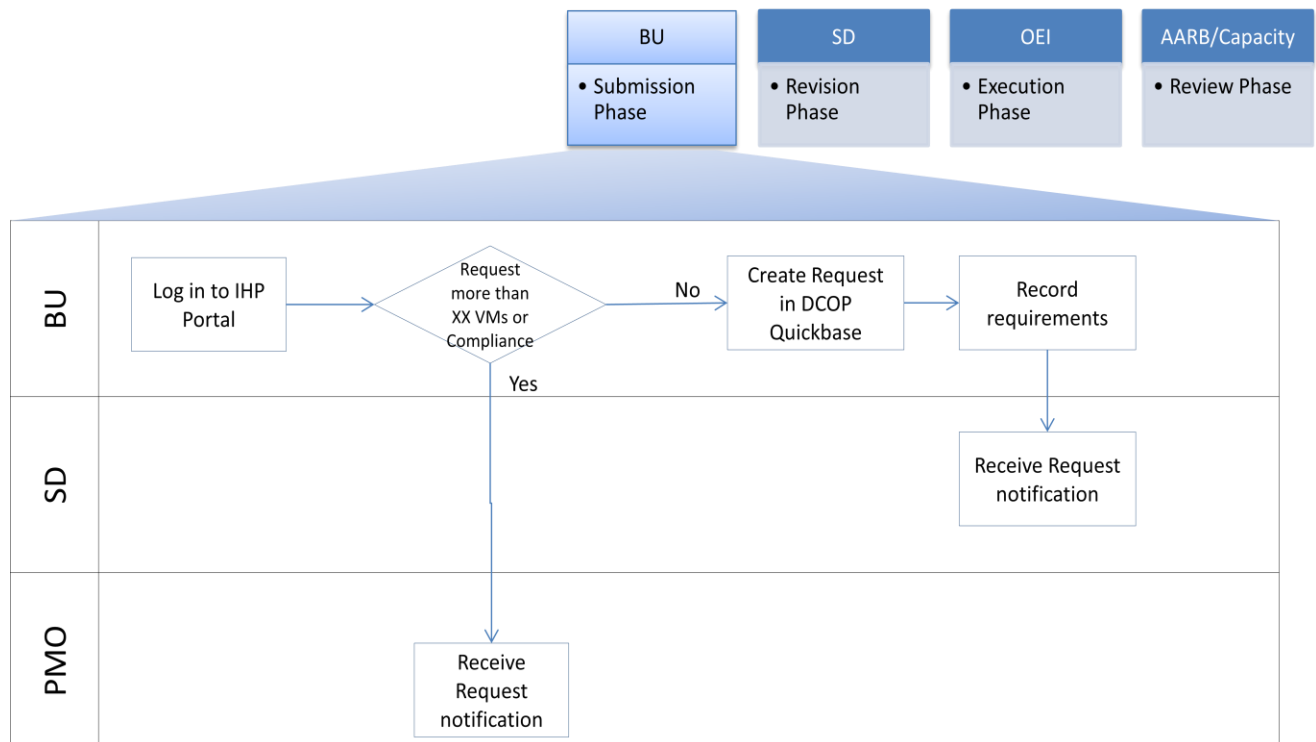


Figure 1 Submission Phase Proposed Process Flow

Revision Phase

Interview Results & Observations

Service Delivery (SD)

Based on the interviews and documentation, we assessed the current process and Service Delivery Team (SD). SD is one of the key organizations to facilitate hosting process.

Their main responsibilities include:

- Hosting Solutions Design: Design hosting solutions that balance business needs with IT standards/direction
- Project Delivery: Plan, estimate, and lead execution of projects (hosting solutions) that are aligned with both BU goals and IIT Standards
- Hosting Operations/Run the Business/Service Requests: Facilitate non-project work requests associated to services and capabilities that are in 'operations'
- Incident Response: Level 3 escalation point for complex issues that go beyond documented procedures, or requires specific knowledge about the service
- Drive IIT Big-Bet Initiatives in Coordination with BU/FG: Facilitate planning and execution of Data Center Strategy in partnership with BU/FG and IIT teams
- IIT Liaison: IIT point of contact for OEI groups. Assist BU/FG with establishing engagement with IIT teams. Orchestrate work across IT functions

Based on our interviews, we isolated several pain points. First is the requirements gathering phase. Some BUs are not aware of the Hosting Standard and Deployment Plan (SOW) document and therefore do not complete it accurately. There is also a lack of prioritization across BU requests. Out of frustration and in order to speed up their own request, some BUs escalate their project on an ad-hoc basis.

Many individuals interviewed also shared the view that AARB is very rigid. In order to pass the AARB meeting and obtain approval to proceed, the SOW document must be incredibly detailed which increases time spent on documentation rather than implementation.

Proposed Process

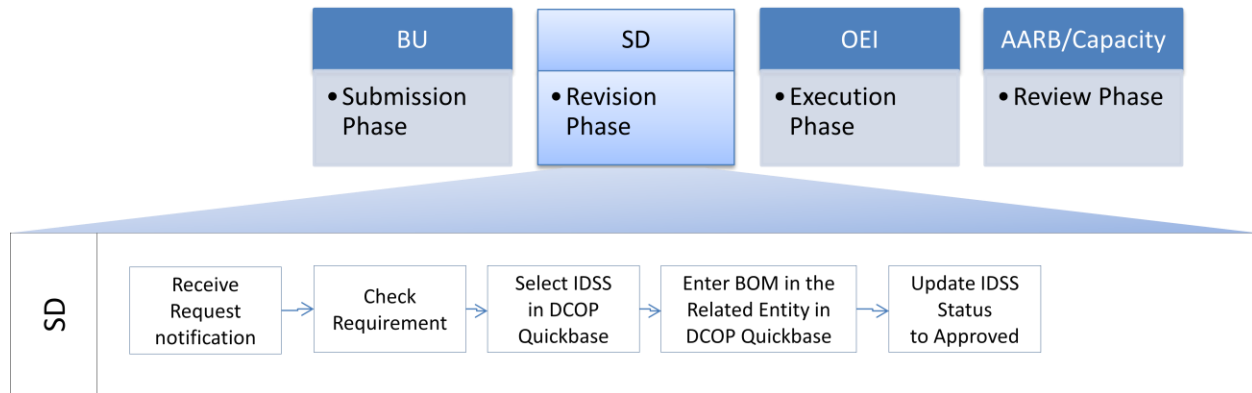


Figure 2 Revision Phase Proposed Process Flow

When a Business Unit creates a request, SD will receive notification via email. SD must validate and revise BU’s requirements to produce a Bill of Materials. First, SD should select IDSS which is generated for each BU. The IDSS is assigned to each BU for their budget and forecasting. After selecting IDSS, SD will create related entity and enter BOM data.

Figure 3 DCOP Quickbase BOM entry

After completing the data entry in DCOP Quickbase, SD will change the project status to ‘Approved’ since this process will bypass AARB and Capacity approval.

When the status changed to “Approved,” Platform Ops team will receive a notification. From this new process, SD can use unified tool which can trace individual hosting request. Currently, each SD maintains their own Quickbase which made it difficult to view overall project status. By utilizing DCOP Quickbase, user can have unified view for entire hosting project and their status. SD can also reduce delivery time. By bypassing AARB and Capacity Review which

took up to 80% of delivery time, new process allows SD to deliver requirement to OEI teams within a day.

Execution Phase

Interview Results

Within the OEI execution phase of the hosting request process we distilled the current process into a series of steps. First, Capacity Planning promotes a Bill of Materials, then Platform Operations provisions based on the Bill of Materials, next Service Delivery generates tickets for Network and Storage teams to create ACLs and assign storage, respectively. Once these sub-tasks are complete Service Delivery can post-provision the server and release it to the end-user.

From our interview with Johnathan Leghart, we learned that Platform Operations executes upon Bill of Materials records which are promoted within the Capacity Planning Quickbase. After a written Bill of Materials has been converted into a record in Quickbase, the Capacity Planning team reviews the request and “promotes” it within the Quickbase. This promotion occurs after Capacity reviews the request and ensures resources are available, it meets the BU’s forecast, among other criteria. Promotion is simply the act of setting the Bill of Materials record in Quickbase into a specific state or status. This status allows Platform Operations to view the Bill of Materials record and begin execution.

With the Bill of Materials record from the Capacity Planning Quickbase in hand, Platform Operations can begin execution. There are three primary methods in which execution occurs. The first type of execution is for those requests which can be completely fulfilled by Pharos. This implies that Pharos can completely provision these requests end-to-end and are most likely “simple” requests. If this is the case, Platform Operations assigns roles and resources to Service Delivery who actually execute the provisioning operation through the Pharos interface. The second type of request is those which are virtual but cannot be provisioned through Pharos. These requests are usually complex or custom and are manually provisioned by Platform Operations. This generally takes 2-4 hours before being handed off to Service Delivery. The last category of request are bare metal installations. These require the largest amount of time (generally 5 business days) as two network changes are required as well as the base OS installation. After these types of requests are provisioned they are passed along to Service Delivery.

Service Delivery receives of output of the provisioning phase from Platform Operations. If the output is permissions to execute a provision in Pharos they can proceed, post-provision the result, and deliver the result to the end-user. However, if the output of the provisioning phase was a server we must proceed to the next step. This new server requires both Network

Rules (ACLs) as well as a storage allocation. Service Delivery would create Change Requests in Remedy for both of these operations and be blocked waiting until both of them are complete.

Storage receives such requests via Remedy and executes on them with an approval cycle. The standard time to completion of any request is 5 business days. Similarly network relies on Remedy to receive requests. Requests go through an approval cycle and generally are completed in 3-5 business days. Once both of these Change Requests are complete Service Delivery can begin a post-provision phase. This phase includes installing database systems, configuring user accounts, and so on. The time required varies based on the required configurations however most of these tasks are completed within one business day.

At this point the server is configured and can be handed off to the end-user.

Observations

The OEI execution process is relatively well streamlined, however there is room for improvement. Starting with the BOM which Capacity promotes. Placing the Capacity organization in the critical path of provisioning for trivial requests is an unnecessary bottleneck. Such reviews for “small” requests are not a cost-effective use of time or resources. Similarly, for trivial provisioning requests Platform Operations should not be a member of this hosting request process as their only responsibility is to grant permissions for the Service Delivery team. This adds yet another unnecessary approval to the already approval-encumbered hosting request process. Beyond these minor improvements the execution phase of the hosting request process is well designed for handling any size request.

Proposed Process

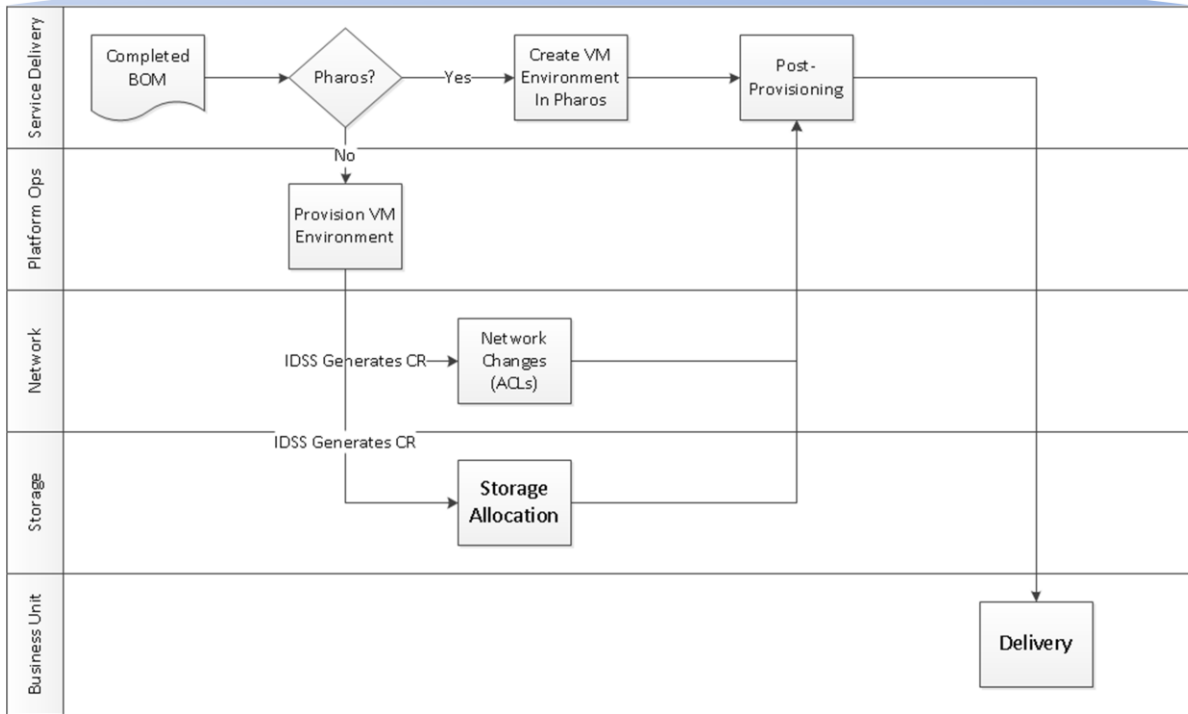
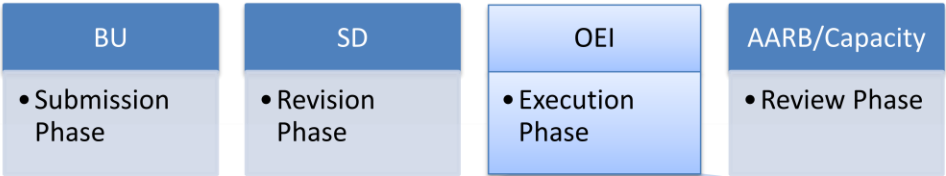


Figure 4 Execution Phase Proposed Process Flow (Level 3)

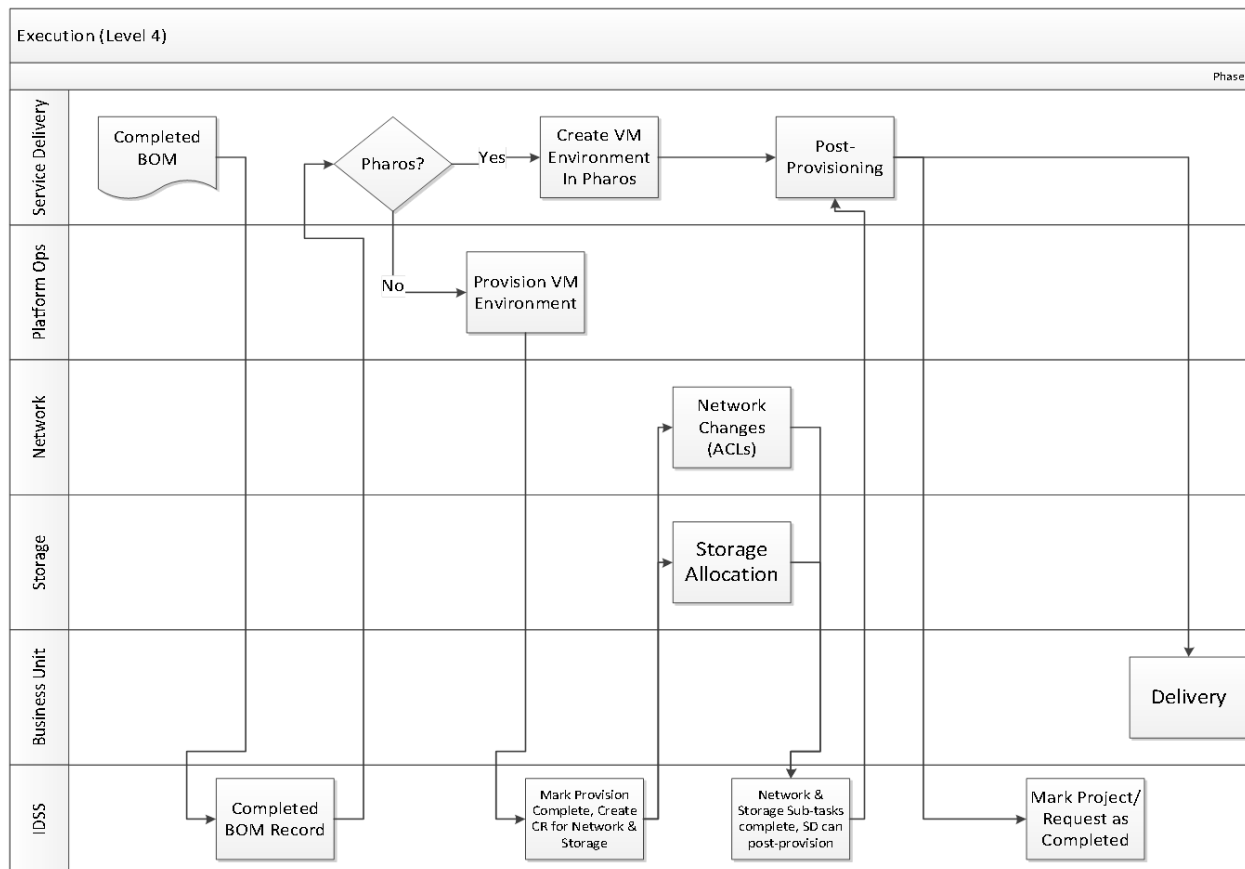


Figure 5 Execution Phase Proposed Process Flow (Level 4)

The new suggested process centers around the IDSS application. This application will allow for a process which is measurable, transparent, and more efficient. However, the process is limited in application “small” hosting requests which can safely bypass AARB as well as Capacity reviews. The process begins with the completed BOM in the DCOP Quickbase. With this completed BOM Service Delivery can either immediately provision via Pharos with their pre-allocated resources from the previous Capacity review. Alternatively Platform Operations can provision the environment manually and mark such a task as completed in IDSS. IDSS will automatically generate Change Requests in Remedy for both Network and Storage. An enhancement request for IDSS would allow it to poll the status of these requests and notify Service Delivery upon completion. Service Delivery can follow with post-provisioning, marking such activity as complete in IDSS, and delivering the environment to the end-user. With IDSS, IHP will be able to track all steps of a hosting request and produce reports to further optimize the provisioning process.

Review Phase

Interview Results

AARB plays a crucial role in the IHP onboarding process from many unique perspectives. A team comprised of various approvers including, IIT Architectural Team, Service Delivery Manager for the project, Network Architecture, Engineering and Operations, Infrastructure Delivery and Corporate Information Security. From meetings with Brandon Knitter and Natalya Flom we captured many points about the existing AARB Review process and how it impacts the Intuit Hosting Platform. AARB's main responsibilities are connected to their ability to map inbound application requirements to current standards, seek emerging requirements trends to drive new standards and seek alignment where exceptions are needed. Generally speaking the main tools for AARB are the AARB Quickbase and AARB BOM. To layout a sample of the AARB process we start with the meeting request. When an AARB meeting is requested, Natalya Flom will schedule a pre-AARB meeting to check the preparation materials, Scope of Work and Bill of Materials. If the documents are not adequately prepared, the request will not be considered in AARB meeting unless it is escalated. This often leads to schedule delays. The requests that properly satisfies AARB meeting requirements, is entered to AARB meeting where AARB Board reviews all requests every Tuesday based on the IHP current process. A successful pass will allow the project to continue and the hosting environment to be provisioned.

In evaluating whether or not a PD team is ready for the AARB the following checklist must be utilized and reviewed prior to the AARB review meeting.

Checklist	Yes/No
Cost estimate for a deployment plan has been obtained based on BOM Quickbase (contact Natalya Flom)?	
BU VP has approved estimated costs and the costs are included in the budget?	
Project team is familiar with the IHP AARB Decision Process Document (this document) and Deployment Plan template?	
AARB time/date will be scheduled only when the deployment plan is completed, and aligned with IHP standards (described in the IHP AARB Decision Process Doc.), and requests for exceptions to standards include technical and/or business reasons.	
Utilization and performance metrics have been collected and are available to be presented if requested (from the current production environment). Examples: CPU utilization, network load, storage IOPS etc., Important: Include how they were measured and what they were measured on.	
The following staff is in attendance during the AARB review: Requestor, Service Delivery Manager, PD Director (business questions), PD Chief Architect (or delegate) and/or Application Architect?	

Further the AARB Deployment Plan document must be kept current as it serves to streamline the process and help identify any issues that may arise.

The following are a brief overview of the Hosting Principals that AARB utilizes to evaluate each hosting request: All application environments must be virtualized. Production software should be tuned before adding more hardware. VMs should be correctly sized to sustain peak customer load. At sustained peak physical CPUs should be run at >50%. All storage should be network attached. Production storage will be mirrored only once. All non-production storage will not be mirrored. Storage should be correctly sized. Production environment across sites should be identical. Applications in virtual environments will be deployed across redundant physical infrastructure. These principals are the basis for the AARB review meetings and determining factors in whether the environment is provisioned or not.

Observations

As stated by some, AARB is a “harsh” environment. Generally speaking the entire process is challenging both for the Business Units making the request and for the AARB approvers involved in the vetting process. There is a double-edge sword as well. From our various interviews it seems that the BUs see the complex, high-quantity paper work for getting approved via the AARB process as a “road-block” and the AARB views the lack of proper documentation from the BUs as the main challenge and time-sink. Our observations and both the qualitative data from interviews as well as some quantitative data from past projects show that a major component of time for a project and delays in schedule do revolve around the AARB review process.

Some over-arching pain points are the following: Only 40-45 minutes are given to review the request (Deployment Plan, BOM), a limited time frame for many of the requests. All architects do not agree on the AARB Hosting Principals (as per the IHP Standard) and it often leads to arguments and further delays in the review process. Many Business Units and other teams are not completely aware of standards and AARB Hosting Principals. The content in the SOW document has various formats and lack of standardization leads to significant time consumption in completing documents. Lastly many of the escalation cases are a significant cause of delays in the project schedule.

Overall the AARB Review Process, although necessary, is a major cause for delays within many IHP onboarding projects.

Proposed Process

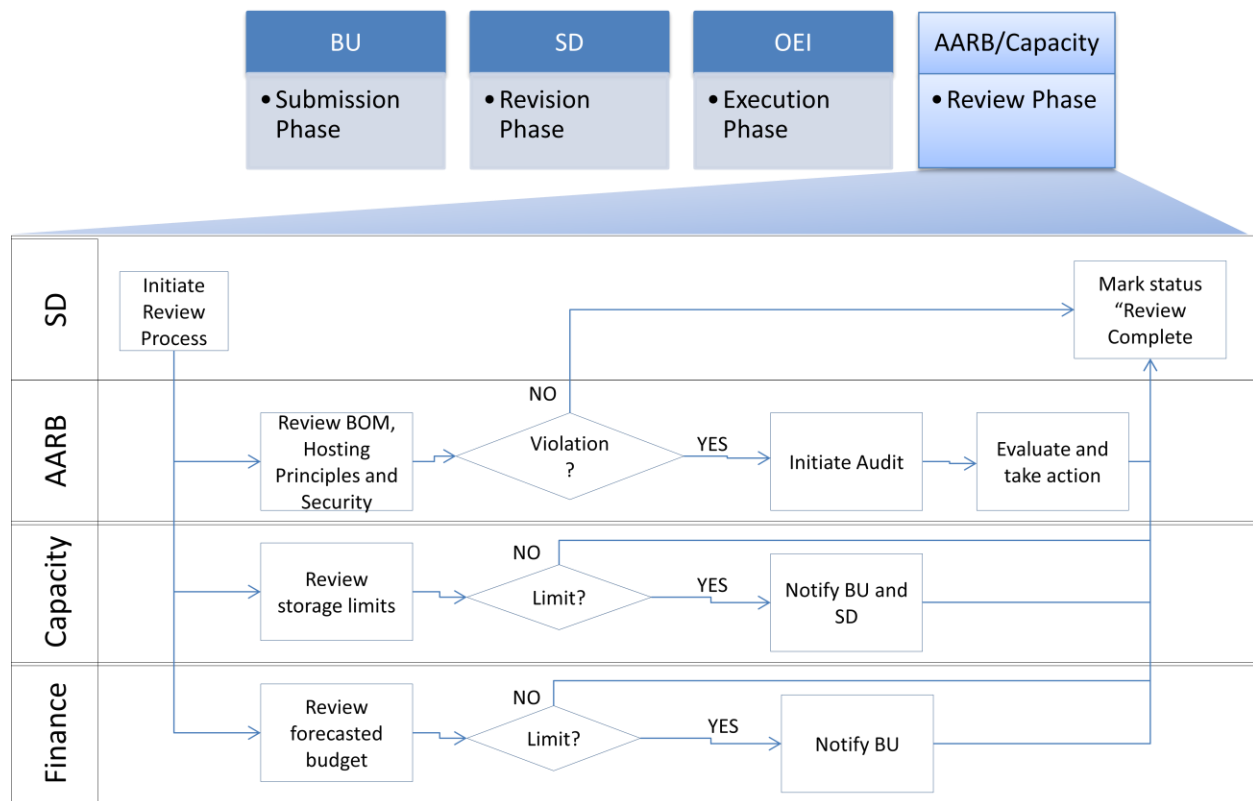


Figure 6 Review Phase Proposed Process Flow

When evaluating a 1 VM scenario the objective was to attempt to move the hosting request from start to finish with minimal need for review or interference. In cases where the size and complexity are minimal it is possible to completely push the AARB Review Process to post provisioning rather than pre-provisioning of the environment. With such little impact to the whole the 1 VM case was a great start to help shift the AARB and Finance approval process.

As a result the team decided to consider a new proposal for the AARB/ Finance Review Process. A detailed description of that process is as follows:

After the VM is delivered to the end user and all the documents are updated in Quickbase the hosting request will be marked "Ready for Review". SD will take the lead and initiate a Review Process every two weeks. Natalya Flom with the AARB

Scaling our Proposed Process

Submission Phase

The 1 VM request is easy to process and does not involve too many teams. However, when the request becomes large the 1VM solution becomes difficult to apply and therefore we need to include a team which can monitor the end-to-end processing of a request. For this reason, we suggest including the PMO team, to mediate and monitor the request and escalate where necessary. They will also support the BU's in the AARB meetings and try to follow-up with teams in case there are any roadblocks.

Revision Phase

In the revision phase, the scalabilities will be dependent on delivery risk. In the current scenario with 1VM request, Service Delivery will have autonomy to approve and deliver the hosting. The reasoning behind is that 1VM will hardly cause serious security or capacity issues. However, when the request becomes more complex due to large scale, incorrect hosting standard or mistakes can cause serious problems. For this reason, AARB approval should be required for large scale hosting request prior to deliver the hosting.

Execution Phase

At scale the execution phase of the overall hosting request process remains similar. However most requests will be provisioned by Platform Operations as Pharos is limited in its flexibility with regards to hosting environment selections and combinations. Therefore a sensible method in which to enhance the scalability of our proposed hosting process would be to enhance Pharos to handle more hosting request combinations. Such an effort should begin by looking at the most "popular" types of requests or environments and crafting them into Pharos's inventory of possible environments.

Review Phase

For larger use cases it's likely that the bulk of the process will remain similar to the single VM case. However, it will be necessary to initiate the Review Process more often and we'd recommend that increase to weekly. Further it is recommended that in more complex cases the violations of hosting principles or network security issues should be addressed immediately and more strictly than the 1 VM case.

- After the VM is delivered to the end user and all the documents are updated in Quickbase the hosting request will be marked "Ready for Review".
- SD will initiate Review Process every week.
- AARB representative (Natalya)
 - AARB will review the SOW, BOM, 'hosting principles' and network security.

- Escalation Point: If any “Hosting Principle” is violated SD and/or the SD Manager will be contacted.
 - Escalation Point: If any Security features are violated then SD Manager, IOC and CIS will be notified (as well as other necessary parties). Further an audit will take place to determine the cause of the violation.
- Capacity Review Representative
 - Review the completed requests weekly and verify that storage limits are not exceeded.
 - Notify BU when predefined limits are reached.
 - Additional storage, Capacity should notify Platform Ops to replenish storage and notify SD.
- Finance Review Representative
 - Review and verify that costs do not exceed the forecasted budget for the particular BU.
 - Notify BU when predefined limits are reached.
- SD will update Quickbase marking the requests “Review Complete”.

Lessons Learned

- Communicating with individuals face-to-face was generally far more productive than speaking with them over email or phone. Generally the people we spoke to were far more receptive and more willing to help when we stopped by their cubicle and asked questions.
- The hosting request process was a well-recognized pain point and all of the individuals we spoke with were eager to help improve the process.
- Many duplicate efforts to modify the hosting request process are currently underway at Intuit and there was probably some overlap between our efforts and others.
- There seems to be a seriously lack of inter-department transparency. Very rarely could one organization tell us what another organization was doing. Even more disconcerting was the fact that most organizations could not identify the points of hand-off or demarcation within the process. Namely, many organizations were unable to explain to us simple facts such as how they received work to execute on and how they told the next organization that their piece was completed.
- Making changes at Intuit is difficult. This is a common issue within any large organization, change is generally difficult to drive and requires a top-down approach to push changes sequentially at all levels of an organization.
- No single individual knows the E2E hosting request process. With no single source of truth we received many contradictory pieces of information and had to re-interview individuals to resolve information conflicts.

Changes That Would Have Helped

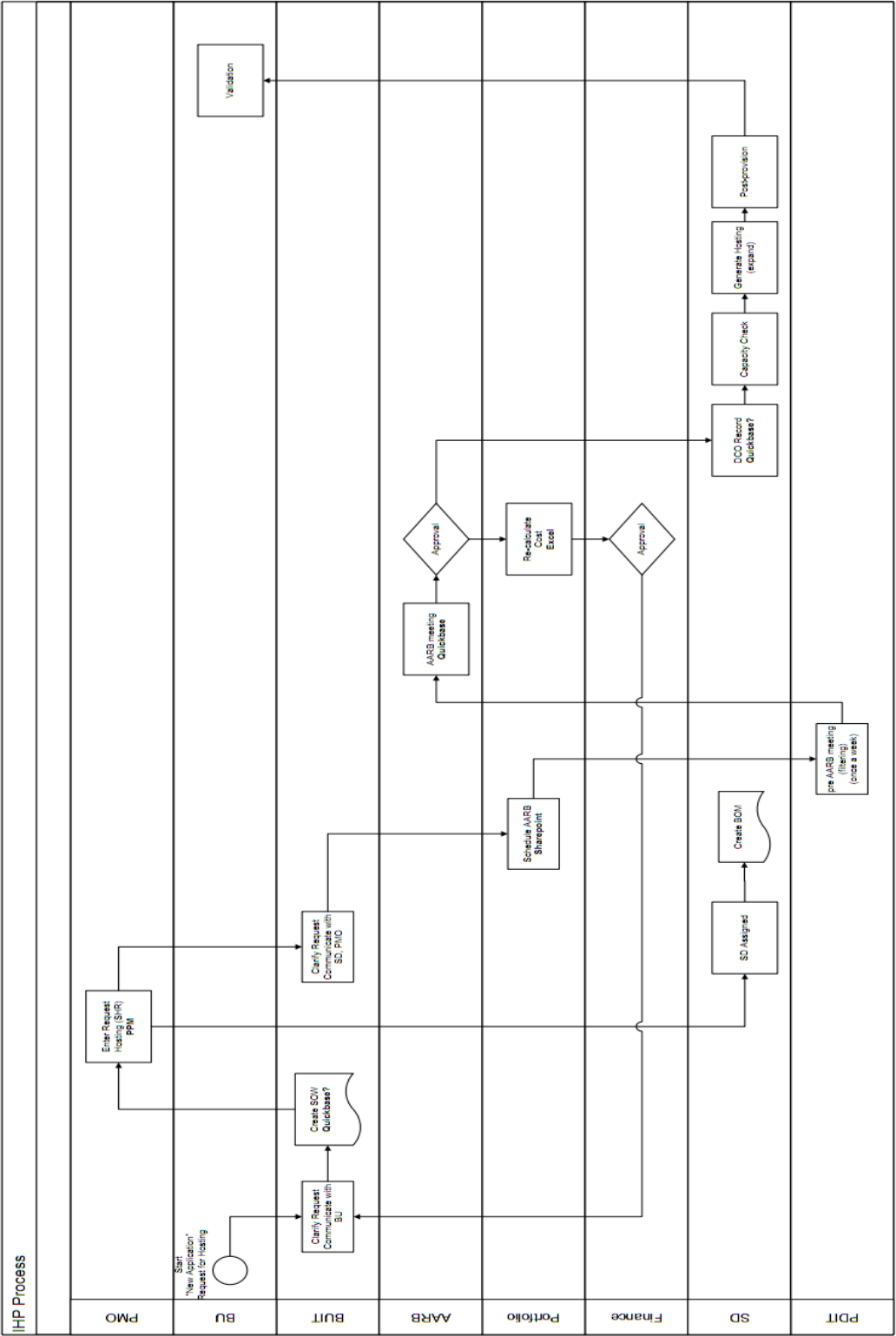
- Narrow scope of project to 1VM earlier. The 1VM model gave us an excellent framework for learning about the hosting request process and gave us a reference model when constructing a revised process.
- We spent too much time researching/interviewing individuals. If the 1VM scope had been given earlier we could have spent less time researching all possible incarnations of the process and perhaps have even reached some of the implementation of these ideas.
- There are many organizations currently working to drive change with regards to the hosting request process. It might have been interesting to partner with one of these and assist them drive change.
- The stakeholders in our project were critical to our success and we failed to engage them. We should have insisted on regular meetings with stakeholders to gain alignment and feedback on our suggestions.
- We would have liked to do some implementation to see our ideas come to fruition.

Notes to Intuit Executive Sponsor

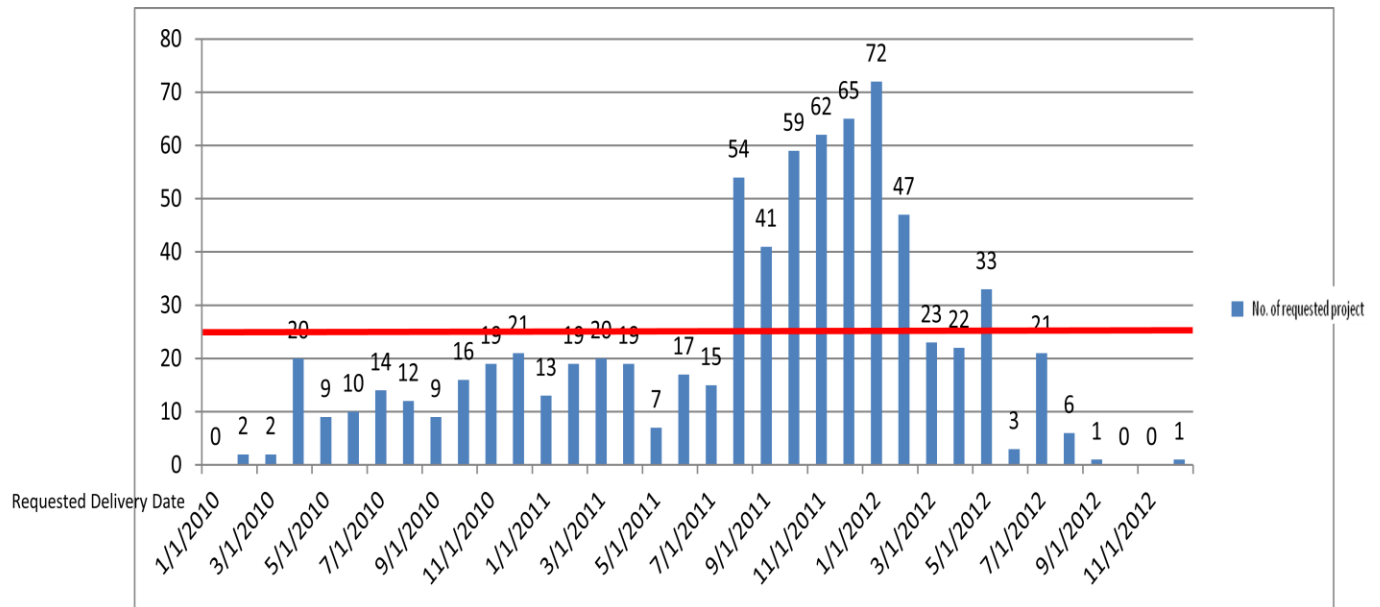
- The hosting request process wants to be agile/customizable while containing costs. This is unrealistic in the long-term and will yield to either a bucket methodology or rising costs.
- Believe in automation; remove the numerous manual tasks currently in place.
- Serious lack of trust between teams. Many reviews because team A does not trust that team B can complete their task correctly. Leads to complex approval cycles and very isolated silos of both knowledge and ability to execute.
- Too many solutions are currently in flight with no organization or oversight into how to harness and integrate these solutions. The net result, if left unmanaged, is these solutions will probably cause further more complex problems years from now.

Appendix

A. Current Process



B. AARB meeting turnover



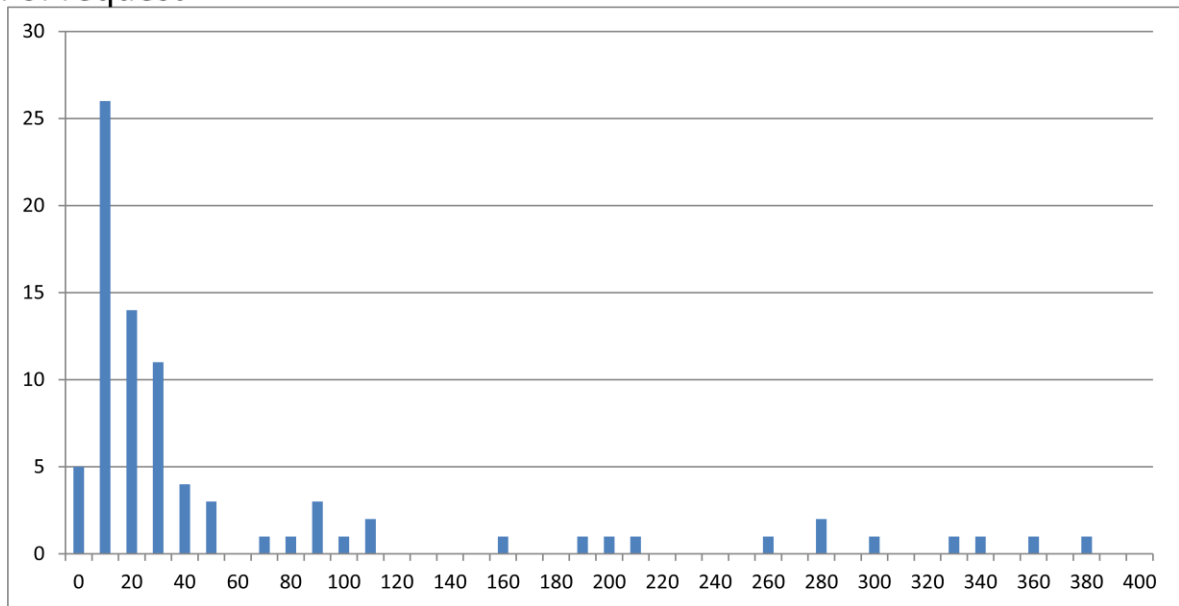
- Current AARB meeting capacity (red line) : 6 Requests per week * 4 = 24 requests per month
- In 2011, there were 391 requests
- Thus, AARB needs to review minimum 7.51 requests per week (Assuming no rejection) in order to process requests without delay.

C. Current Process Gantt chart

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
PMO			SHR	Schedule AARB / Pre-AARB meeting																	
BU	Request Hosting																			Validation	
BUIT		Estimate																			
AARB															AARB						
SD				Work with BU, BUIT, PMO to create SOW & BOM														DCO	Capacity	Generate Hosting provision	Post provision
	Initiate		SOW + AARB															Provision			
	15%		60%															25%			

D. Delivery Time

no. of request



Days to complete one request

Approvals

Intuit	SCU Capstone
Signature:	Signature:
Name:	Name:
Title:	Title:
Date:	Date: