

Analysis Report

The process of requirements analysis for software projects consists of Requirements Classification, Conceptual Modeling, Architectural Design and Requirements Allocation, Requirements Negotiation, and Formal Analysis. The following list provides more information on each process:

- Requirement classification breaks the classification of requirements into several dimensions. These classifications can range from whether the requirement is functional or non-functional, emergent property or imposed by stakeholder, product or process, priority, scope, volatility/stability, and other classifications may be appropriate depending on the organization's practice.
- Conceptual Modeling develops models of entities from the problem domain, configured to reflect their real-world relationship and dependencies. Their purpose is to aid understanding in the situation in which the problem occurs or depict a solution. (More detail about conceptual models found at the end)
- Architectural design and Requirements allocation identify at which point the requirement process overlaps with software or system design and illustrate how impossible it is to decouple any two tasks. The software engineer acts as a software architect because analyzing and elaborating the requirements demands that the architecture/design components that will be responsible for satisfying the requirements be identified.
- Requirements negotiation concerns resolving problems with requirements where conflicts occur between two stakeholders requiring incompatible features, between requirements and resources, or between functional and non-functional. Additionally, prioritization is necessary, not only to filter important requirements but also to resolve conflicts and plan for deliveries.
- Formal analysis requires requirements to have a language with formally defined semantics which have two benefits. First, it enables requirements expressed in the language to be specified precisely and unambiguously, avoiding the potential for misinterpretation. Secondly, it allows specified software to be proven. Formal analysis is used during the late stages of requirements analysis as it is generally counterproductive to apply formalization until business goals and user requirements have been identified.





Requirements need to be analyzed after being elicited to detect and resolve conflicts between requirements (conflict resolution), discover the bounds of the software and how it must interact with its organizational and operational environment (could involve prioritization), elaborate system requirements to derive software requirements.

Conceptual modeling has several kinds of models such as use case diagrams, data flow models, state models, goals-based models, user interactions, object models, data models, and many others to depict the functionality of the system. These models provide a crucial understanding of the software's context in its operational environment and identify interfaces in the environment.

Evidence of having classified requirements -

Key	Summary	Description	T	Linke d Issues	P	Labels	Risk
DB-65	When the legal info database is updated, the BLRB shall mirror the update to the Boomi Legal info backup database in case of errors/corruption.	Rationale: Having the legal info database mirrored to another backup database will ensure that there is a fail-safe in case the main database has a critical error.	☐		↑	Function al	Medium
DB-64	If a legal counsel clicks the edit question button, then BLRB shall display the edit mode page within 30 seconds.	Rationale: Any user, especially legal counsels with limited time will appreciate a consistent time frame for load times when trying to make edits to the list of legal questions. This time frame is a little longer than other requirements as the complete list of questions/answers will be loaded.	☐		↓	Nonfuncti onal	Low
DB-63	The BLRB shall share the account information database with the Dell hub for single sign-on capabilities.	Rationale: Having the two systems share a database will support interaction allowing any Boomi personnel entry from any point with the same information. Logical database requirement.	☐		↑	Function al	Medium
DB-62	If the legal counsel submits a change to the list of legal questions without any issues, then the BLRB shall prompt the legal counsel to wait for other's approval.	Rationale: If the change has no basic issues it will be sent to other legal counsels for approval to maintain consistency within the legal questions. This could potentially be verifiable by providing an ID to the change that occurred and sending an email to the legal counsel that made the change once it has been approved or denied.	☐	DB-20	↑	Function al	Medium
DB-61	If the legal counsel submits a change to the list of legal questions, then the BLRB shall prompt the legal counsel if a submission issue occurs.	Rationale: If a legal counsel submits a change to the list of legal questions they should be notified if an issue occurs. Issues can range from duplicate questions/answers, incorrect spelling, and incomplete changes such as a blank field. Some of the changes may need to be verified by other legal counsels and the prompt may appear later after revision (another requirement was made to tackle this issue).	☐	DB-20	↑	Function al	Medium
DB-60	The BLRB shall allow users to access the Dell	Rationale: Boomi personnel need to have the capability to reach the hypothetical larger system called "Dell Hub" to	☐		↓	Function al	Medium

	Hub through the BLRB home page.	reach other Dell/Boomi products/partners. Interface requirement.					
DB-59	If the user does not provide the correct login information, then the BLRB shall prompt the user to enter valid login information.	Rationale: Boomi personnel must be notified if the information they entered for their username or password is incorrect. Usability requirement.	☰		↑	Functional	Low
DB-58	Every three months, the BLRB shall prompt the user to update/change their password to maintain user security.	Rationale: Updating/changing one's password every three months is a requirement for all Dell Boomi employees.	☰		↑	Nonfunctional	Low
DB-57	The BLRB shall allow users to search for third-party products involved with Dell Boomi to depict correct legal information.	Rationale: The information provided by the BLRB will be limited to Dell Boomi's scope. It will not provide information about other of its third-party products but It should have the capability to provide direct links for any Boomi personnel looking for legal information about a specified product. Note, Boomi and its employees do not endorse the contents of the third-party sites.	☰		↑	Functional	Medium
DB-56	The BLRB shall provide a disclaimer about the legal information.	Rationale: The BLRB shall provide a disclaimer about the information provided by the bot. The information provided by the BLRB does not, and is not intended to, constitute legal advice; instead, all information content and materials available on this site are for general information purposes only.	☰		↑	Functional	Low
DB-50	While the user is logged in, the BLRB shall respond to any number of question entries.	Rationale: The BLRB shall not stop responding to questions until the user exists. Even if all questions were not satisfied the BLRB will continue to provide until the user is satisfied. Note - This follows the EARS structure of Optional features.	☰		↑	Nonfunctional	Low
DB-49	When the user is logged in, the BLRB shall allow users to provide feedback to the BLRB to improve bot interaction.	Rationale: Having user feedback is a great tool to maintain the software's health. User satisfaction is key. Not sure if it would have been better to use the EARS Ubiquitous structure here.	☰		↑	Functional	Low
DB-48	The BLRB shall prevent unauthorized access.	Rationale: The BLRB will only be used by Boomi personnel. Note: This follows the EARS structure of Ubiquitous requirements. This could be interpreted as ambiguous by SE as they understand the ins/outs of software security.	☰	DB-34	↑	Functional	Low
DB-47	BLRB shall permit legal counsels to remove legal answers to abide by current Boomi standards.	Rationale: BLRB must allow legal counsels to remove and update legal questions according to current standards to avoid conflicts with current transactions. This requirement is like https://wangola.atlassian.net/browse/DB-43 to ensure that these requirements are singular.	☰	DB-39	↑	Functional	Medium
DB-46	If the user clicks the view all questions button, then the BLRB shall display all current legal questions /answers.	Rationale: The account receivable provided a feature to view all questions on in own terms. All of the questions stored in the database may take some time to load and defeat the whole purpose of the response bot itself but some may not enjoy interacting with a bot. (Note - This follows the EARS structure of unwanted behaviors but I thought it could also be applied to wanted behaviors).	☰	DB-17	↑	Functional	Medium
DB-45	When a legal question is not found, the BLRB shall display legal department contact information within 10 seconds.	Rationale: BLRB is not going to use Machine learning algorithms as this concept is out of my understanding for now, and I'm not sure how advanced the algorithm has to be to provide consistent and correct legal answers. If BLRB does not provide a current legal answer from the database the legal department will gladly help.	☰		↑	Nonfunctional	Medium
DB-44	When a legal question is entered, the BLRB shall display a correct legal response within 10 seconds.	Rationale: Most stakeholders want quick response/quick access to legal information and placing a constraint of 10 seconds may allow stakeholders to be satisfied with its speed.	☰	DB-19	↑	Nonfunctional	Medium
DB-43	BLRB shall permit legal counsels to update legal answers to avoid inaccurate responses.	Rationale: The legal department must be able to update legal answers to avoid confusion within other departments and maintain integrity within Boomi's legal scope. I.e. Questions/answers that don't conform to Boomi's standards will cause issues.	☰	DB-20	↑	Functional	High

DB-42	When the user is not logged in, the BLRB shall display a login screen for username and password.	Rationale: If the user is not logged in it is convenient to display a login screen for the users. This system is strictly only for Boomi personnel use and only displaying a login screen will filter some unwanted users from attempting to breach in other ways increasing security.		DB-34		Nonfunctional	Low
DB-41	Once the user is logged in, the BLRB shall prompt the user within 6 seconds to input a question.	Rationale: Once the users are logged in the response bot should provide a prompt within 6 seconds so the users can input questions. User input is extremely important with the system as the interaction will revolve around the system response and user questions.		DB-18		Nonfunctional	Low

20 issues

The process I took to analyze the requirements for the BLRB -

Classification:

Once I gathered my requirements and prioritized and label them according to the 29148-2018 5.2.6 IEEE Standards. I created a separate page and copied MITRE Table 1. System-Level Requirements Checklist (p. 354-356) into my page to validate the characteristics of the requirements.

Table found here:<https://wangola.atlassian.net/wiki/spaces/DB/blog/2021/02/14/114196695/Requirements+Notes#Characteristics-of-this-set-of-system%2Fsoftware-requirements>

Checklist Item	
The system-level technical requirements are traceable to the user requirements.	<input type="checkbox"/> Not all requirements are traceable but according to previous assignments they only had to trace back to at least one requirement (I may have misunderstood this as at least one from the set rather than at least one to each requirement - Elicitation could have been better)
Each system requirement describes something relevant: a function the system must perform, performance a function must provide, a constraint on the design, or a reference such as to an interface definition.	<input checked="" type="checkbox"/> I believe all of the requirements have something relevant to function, performance, and design.
The level of detail that the requirements provide about system functionality is appropriate. The requirements are sufficient to describe what the overall system must do, what its performance must be, and what constraints an engineer should consider. There are few requirements that specifically affect the design of only one component of the system. The major requirements drivers (e.g., those stressing the design) and associated risks should be identified.	<input checked="" type="checkbox"/> All requirements provide a good level of detail to how the system functions and performs, one requirement of concern is DB-48 as preventing unauthorized access could handle a multitude of ways.
The requirements include any legal or regulatory constraints within which the system must perform. Example: There may be restrictions on the use or quantity of certain hazardous materials in a system.	<input checked="" type="checkbox"/> The requirements do include legal and regulatory constraints as it is restricted to Boomi personnel only. There may be other rules I may not be aware of.
The requirements include enterprise architecture constraints within which the system must integrate (or toward which the system is desired to migrate). Requirements include appropriate open systems and modularity standards. Examples: DoD Net-Ready requirements, modular open system architecture concepts, Electronic Systems Center strategic technical plan goals.	<input type="checkbox"/> It is still unknown what kind of architecture the proposed "Dell Hub" system will use or if any other parent-level systems will interact with the BLRB.

<p>Environmental design requirements are specified. Example: A control unit may be in a controlled office environment and the other major components may be outdoors, thus two environments must be defined and associated with the functionality operating in each environment.</p>	<p><input type="checkbox"/> No Environmental design requirements have been specified.</p>
<p>All external interfaces for the system are included. Major internal interfaces may also be included if they are important to system modularity, or future growth in capability. These may include physical (mechanical fastening, electrical wiring, connectors), functional (mechanical stress transfer points, cooling, power sources, antennas, wire message formats, data exchanges), and software (software interface specifications, library calls, data formats, etc.). Remember that an internal interface between two subsystems that use a transport mechanism that is not part of the system is a hidden external interface. For example, two subsystems that communicate internally with each other over a sensitive but unclassified network as the internal interface (the data exchanged between them) and an external interface (the wiring and internet protocols to enable the data exchanges with the network).</p>	<p><input checked="" type="checkbox"/> All current external interfaces for the BLRB have been identified ranging from any third-part website affiliated with Boomi and the Dell Hub that will interact directly with the BLRB.</p>
<p>Requirement statements use the word "shall" or "should." The word "shall" has meaning in contractual language and is enforceable legally. Other words like "will," "may," "should," and "must" may show intent but are not legally binding in contracts. In some situations, it may be desirable to use "should" to show the government's intent and preference while at the same time allowing flexibility and latitude. Example: "The system shall have a mean time between failures of greater than 500 hours."</p>	<p><input checked="" type="checkbox"/> All requirement statements use the word "shall"</p>
<p>Requirements statements are unambiguous. Terminology is clear without the use of informal jargon. Statements are short and concise.</p>	<p><input checked="" type="checkbox"/> All requirements except DB-43 are unambiguous but I don't think a simple and for "username and password" should be a problem.</p>
<p>Performance requirements statements (including logistics/sustainment/support) are quantifiable, testable, and/or verifiable. Avoid the phrase "shall not." It is very difficult to prove a negative. Avoid qualitative words like "maximize" or "minimize." They force an engineer to judge when the design is good enough. The user may think that the engineer did not "minimize enough" and get into a legal argument with the contractor. Note: Every user requirements document includes: "the system shall be easy to use" requirement. Talk to other MITRE staff for examples from other projects and seek out a human factors specialist for requirements wording that is suitable both for specifying these requirements and methodologies for verifying them. Avoid specific, one-point values when defining requirements. Use ranges (minimum of, more than, less than, maximum of, within, etc.) to accommodate appropriate interpretation. Using a single point value may cause arguments if the system is tested at that exact value only, or if a test appears to be successful from an intent perspective, but does not meet the exact value stated in the system requirement. Example: The system shall process a minimum of 100 transactions/sec. Example: The system shall be operable up to and including 30,000 ft. Example: The system shall operate in temperatures between 5 and 35 degrees Celsius.</p>	<p><input checked="" type="checkbox"/> There are a few quantifiable requirements that are Nonfunctional due to their behavior.</p>
<p>If objective performance values are included as goals, ensure they are clearly identified and distinguished from firm requirements. User requirement documents refer to threshold requirements (those that must be provided), and objective requirements (better performance has value to the user, but not above the objective requirement). Example: The system shall detect and display up to 100 targets within the surveillance volume with a goal of detecting and displaying up to 125 targets.</p>	<p><input type="checkbox"/> Not positive if any of my requirements have specified goals and I'm not sure how to distinguish them from "firm requirements".</p>
<p>The operational and support environment is described and defined. Example: The system shall be maintainable by an Air Force level 5 technician. Example: The system shall be reparable while in flight.</p>	<p><input type="checkbox"/> Only a few requirements describe how the legal department will support the BLRB but nothing operational has been specified, unless requirements like DB-47, DB-61, DB-62 fall under this scope.</p>

<p>The requirements include appropriate use of Government and industry specifications, standards, and guides. Only include them if they are relevant and ensure that the correct version is listed in a list of reference documents.</p>	<input type="checkbox"/> Some of the requirements abide to the rules placed by Boomi and all abide to the IEEE standards. Not sure if they all fall under the appropriate use of Government.
<p>Verification approaches for all system performance and sustainability requirements are complete and appropriate. Every requirement must have a verification method identified. If a requirement cannot easily be verified by a direct inspection, measurement, or one-time demonstration of the requirement, the verification requirement should include an expanded test criteria description to ensure that there is no disagreement later in the program. This can include describing the number of trials, statistical criteria to be used, conditions of the test such as simulated inputs, etc.</p>	<input type="checkbox"/> Some of the descriptions provide a way to verify the requirement but none have a process set in place to define a method. This could be implemented to test each requirement.

Stepping through the table I noticed my requirements were missing some key characteristics that may need to be improved. Some characteristics it was lacking were user requirement traceability, requirement from within which the system must integrate, and environmental design requirements to name a few. However, the characteristics that the requirements did meet were following IEEE standards, relevancy, and were quantifiable to name a few.

After completing the analysis I provided the completed list of requirements to my main stakeholder Ed McCarthy to verify that there were no errors, mistaken assumptions, lack of clarity, or deviation from standard practice. Additionally, we had a meeting a few days before to validate previous requirements and identify new ones which turned out to be on the completed document.

Proof -

William Angola
Sat 4/3/2021 10:24 PM
To: ed.mccarthy@dell.com



2 attachments (313 KB) Download all Save all to OneDrive - Florida Gulf Coast University

Here's the set of requirements created for the BLRB let me know if the prioritization of these requirements seems good or should if any should be shifted around. The SRD gives an overview of all that we have talked about related to the software and the purpose for having it in the first place, be sure to let me know if there should be any additional requirements. Thanks.

[Reply](#) | [Forward](#)

Sat, Apr 3, 10:23 PM

Hey Ed, just sent you the completed Software Requirements Document and the requirements on a separate doc file to see prioritization. Let me know what you think there is additional info in the email.

Sent as Text Message

Sunday 9:02 AM

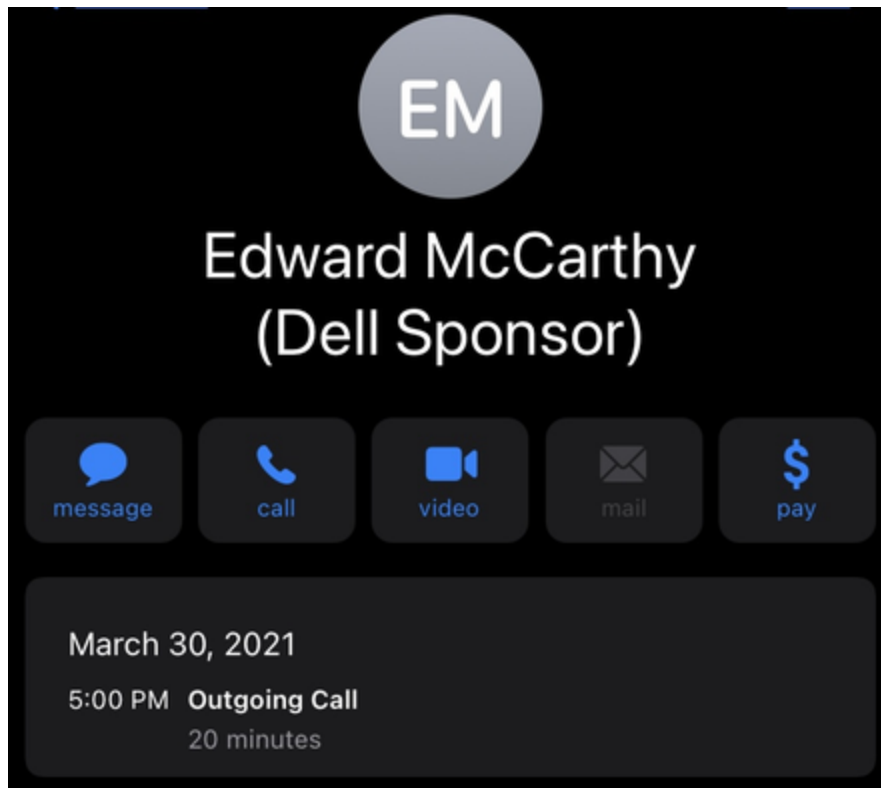
Thanks, William. I'll take a look today and report back. Have a nice Easter Sunday (if you're celebrating). Best, Ed

Sunday 11:49 AM

Sounds good. Happy Easter!

Tuesday 8:59 AM

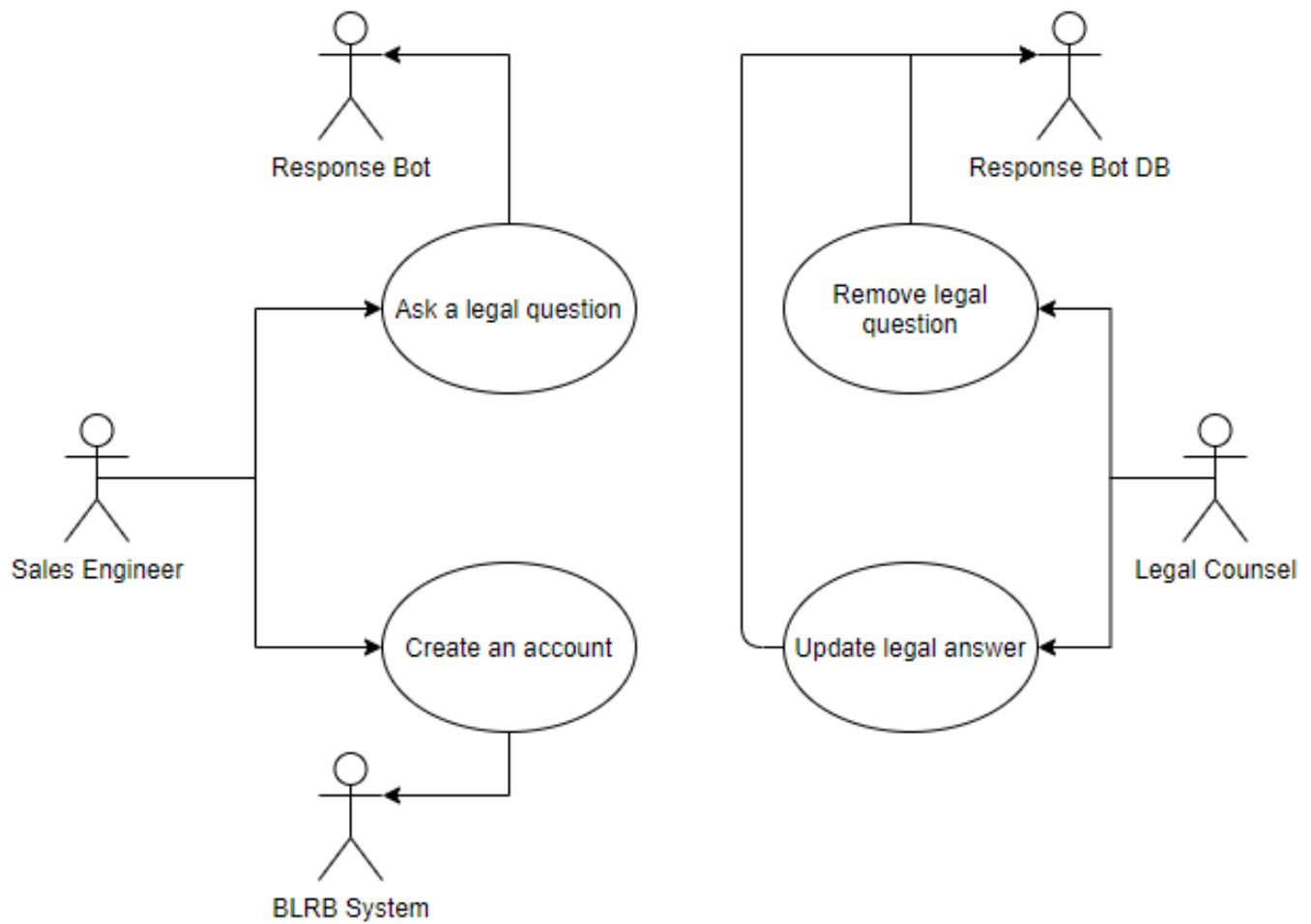
The documents all looked solid. Good work in my opinion. Let me know if you need anything specific from me. Nice Job!



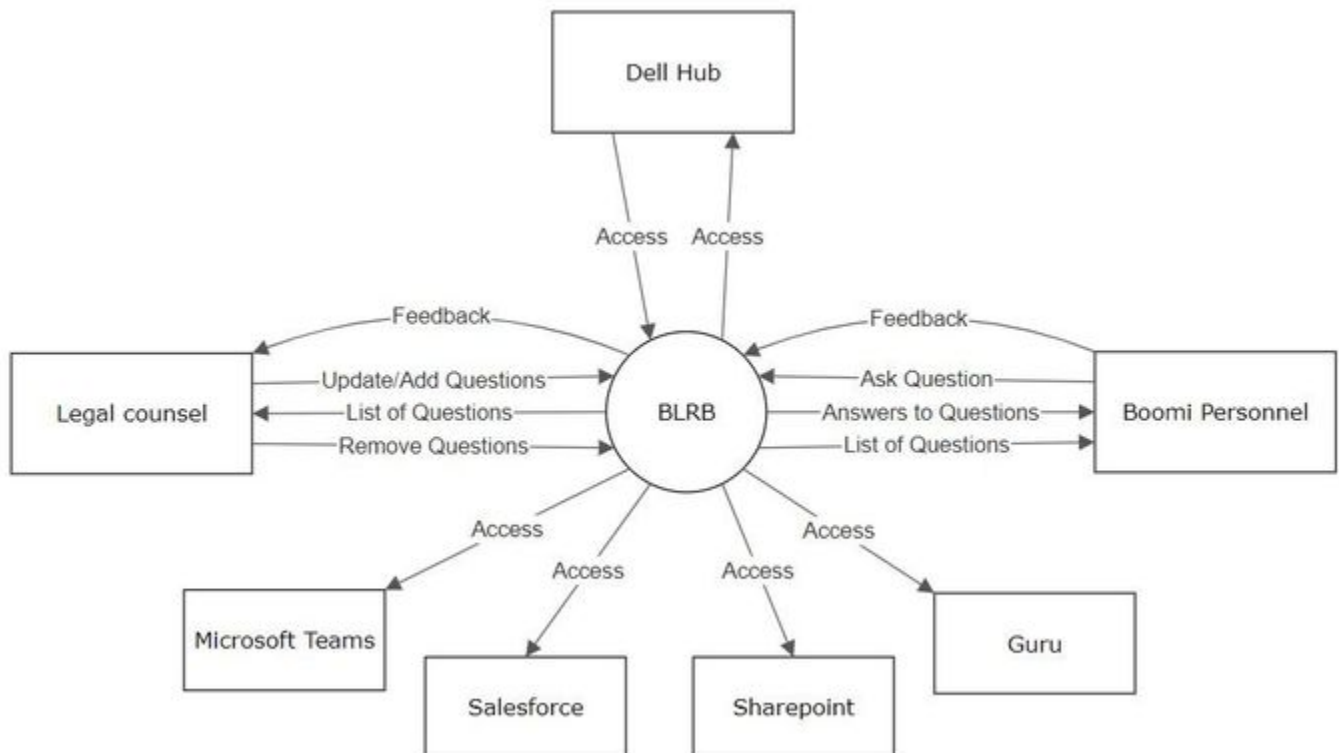
Modeling:

To visualize the requirements for the BLRB I created a Use case diagram and a Level 0 Data Flow diagram also know as a context diagram to depict the relationship and interaction of the BLRB with other systems.

Use case Diagram found here: [Use Cases and Use Case Diagram](#)



DFD found here: [Data Flow / Software Context Model](#)



Evidence of Critical Thinking -

I broke this down into general thoughts and specific thoughts for some requirements.

Thoughts throughout the elicitation and validation process:

Throughout the elicitation and analysis process, I had to critically think about how will these requirements conform to the rules, values, and principles of Dell Boomi as a whole. The problem came down to the legal counsels not having enough time to respond to important yet short legal questions, which dwindled to the goal being the need for more time to close imperative deals. Once we decided on a proposed system and began eliciting and creating requirements, I ran into an issue. Referencing back to what I had mentioned earlier, my requirements lack traceability due to a lack of user stories to link with the requirements. This led to me creating multiple requirements based on assumptions of how the legal counsels and users would want to interact with the BLRB itself. To help verify/validate these assumptions, I had to think about the user's and legal counsel's points of view. Would they want some features such as a feedback button, help button, question list views, or edit mode directly integrated within the BLRB itself? Additionally, Do the legal counsels have enough technical experience to alter a database without causing any issues? There could be a page full of thoughts and situations trying to place yourself as a user or legal counsel, but I just named a few. After creating/validating a few requirements at a time, I began to sculpt an idea of how I would image the BLRB to look like. This process of thought I set in place for requirements was assumptions, purpose, thought of point of view, concepts, information, and finally solve each requirement. More specific thoughts are provided below about some of the requirements.

Specific critical thinking related to requirements:

DB-47: BLRB shall permit legal counsels to remove legal answers to abide by current Boomi standards.

DB-43: BLRB shall permit legal counsels to update legal answers to avoid inaccurate responses

- Note: I created an assumption that the legal counsel must be able to update/remove legal answer if needed, but I noticed that this could be a risk as it could create unwanted consequences such as corruption of the database or vulnerabilities if some were to breach the system to cause harm. This led to the creation of another requirement as a solution by having other legal counsels check and confirm the changes. **DB-62:** If the legal counsel submits a change to the list of legal questions without any issues, then the BLRB shall prompt the legal counsel to wait for other's approval.

DB-57: The BLRB shall allow users to search for third-part products involved with Dell Boomi to depict correct legal information.

- Note: This was a requirement created directly from elicitation but I wanted to find the purpose initially as when it was described it diverted from the original rules and values that were placed when defining the properties of the BLRB (Evidence provided below). When implementing the DFD I had to display that this was a one-way interaction to avoid breaches and confusion from what was provided by the BLRB and the third-party system.

DB-63: The BLRB shall share the account information database with the Dell hub for single sign-on capabilities.

DB-65: When the legal info database is updated, the BLRB shall mirror the update to the Boomi Legal info back database in case of erros /corruption.

- For these requirements, I needed to find information on what are some shared software used by Boomi's employees and if they shared log-in credentials/requirements. Additionally, created an assumption of a hypothetical system to avoid corruption of the databases.

Here are some images showing elements of thought (assumption, information) when thinking about requirements (There are multiple more but finding logs would take some time, these were the first I could find)

Ok, that makes sense, but that gives me the impression that we will be allowing the customers to have access to the legal information provided by the BLRB instead of only having Boomi personnel. I could see third-party links helping Boomi's personnel when looking for legal information about another product involved with Boomi but I just want to be sure that this is only for Boomi personnel use and not customer use.

Good question. It's just Boomi personnel that would have access, as discussed.

No customer access would be involved.

Hey Ed, sorry for the late message (hopefully I didn't wake you), I was wondering if Dell Boomi has a designated system for all its employees to interact with such as logging in to complete some task. Identifying a current system and relating it back to the BLRB will help me identify relationships and functional requirements.

Sun, Mar 28, 10:17 AM

Hi there. We rely numerous software systems pending the use case (like most companies) but the ones that stand out are Microsoft Teams both for sharing documents and information and for communication, and we rely on Salesforce as a platform to host information regarding our various Customer opportunities, ongoing agreements, and renewals. We also rely on Sharepoint as a separate shared library for documents. And finally a we use Guru as a knowledge management tool — where various departments can host and update information (a bit like the bot we're discussing here).

I used to create judgments depending on what was the most optimal solution for a given problem without considering unexpected consequences. However, this class and my professor Vanselow Scott have taught me to evaluate and consider multiple possibilities and sources to find the true value and purpose of a situation to create an informed judgment. I tend to recognize ethical and professional responsibilities in engineering to create judgments by evaluating its problem, goal, conclusion, and any other elements of thought described. I place sustainability and the increased longevity of our planet as the main goals engineering solutions should strive for. Engineering situations that I would deem ethically and professionally valid must focus on the accessibility of a given solution worldwide, affordable/improve the economy, help the environment/ are sustainable, and improve social interaction. Engineering situations that neglect the safety, wealth and welfare of the public should be considered unfit unless they greatly outweigh any consequences they may cause (this situation may be extremely rare).