Project Management Capstone Project

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Automatic Handwriting Data Conversion and Verification with Optical Character Recognition (OCR) and Machine Learning (ML)

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1. Narrative Charter Statement

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a. Project Purpose and Justification

- *Automatic handwriting conversion to standard computer fonts to be recognizable for quick text/character searches*
- *Making paper-based information searchable in seconds, rather than hours [1]*
- *Reduce or eliminate costly data entry by automatically grabbing information you need from paper and putting it where it needs to go [1]*
- *Enabling entirely new ways to process documents that can eliminate "human touches", thereby reducing data entry errors and improving accuracy, increasing productivity and efficiency, reducing costs and dramatically reducing processing times [1]*
- *Many paper form data entry and processing are manual, time and cost intensive, prone to human errors, and over the years have shown high variances*

b. Measureable Project Objectives and Related Success Criteria

No	Project Objectives	Success Criteria
1	Automatic handwriting conversion	At least 90% accuracy and no more manual data entry
2	Reduce data entry errors	Reduce data entry errors by 80%
3	Reduce Costs	Reduce costs by at least 70%
4	Reduce processing time and increase productivity/efficiency	Automated processing time in seconds or real-time
5	Project cost should be no more than $300K	Project costs are $300K or less
6	Launch Date on May 3rd, 2021	Launch on May 3rd, 2021 without any critical issues

References: [1] https://www.ftdocs.com/new-blog/2018/7/10/why-you-need-ocr

1. Narrative Charter Statement

c. High-level Requirements

1. *Automatic handwriting conversion to standard computer fonts for quick information search*
2. *Better service and faster responses to our customers with real-time customer data availability*
3. *Lower costs can be passed down to our customers to make our services more competitive and affordable*
4. *Better customer experience and higher customer loyalty*
5. *Entice new customers to experience our superior quality services*

d. Assumptions and Constraints

- *The new program/tool must launch on May 3rd, 2021*
- *The project will cost no more than $300,000*
- *All resources will be produced in-house in order to keep costs down*
- *All resources will be available 100% to complete this project since this project is top priority*
- *All human resources are all experts in their own domain and familiar with the project requirements*
- *Full supports from executives and sponsors to remove any roadblocks*
- *Use of latest standard paper forms that have been widely used by many organizations*

e. High-level Risks

1. *The project is highly dependent on the skills and knowledge of a few individual experts so if one of the experts can not work on the project for any reasons during the allocated time, it may jeopardize the project success*
2. *Multiple versions/changes of standard paper forms that will need continuous multiple updates and validations to make it work correctly and consistently*
3. *Continuous user training/instruction updates to be provided to the users so they can enter their information in the forms correctly in order for our system to work effectively and efficiently*
4. *Server, website, storage and database capacity, and system need to be monitored, backed up and maintained routinely, and upgraded accordingly for uninterrupted continuous operations*

1. Narrative Charter Statement

f. Summary Milestone Schedule

1. *Complete survey collection and analysis of latest standard paper forms that will be used for the system and user requirements and expectations*
2. *Complete design and program user-friendly user interface (UI) and editable data/reports for best user experience (UX)*
3. *Complete design and program Optical Character Recognition (OCR) system*
4. *Complete design and program automatic handwriting conversion*
5. *Complete test and validate accuracy of machine learning algorithm and program on the automatic handwriting conversion*
6. *Complete final test-run of the system to check, validate and fix any issues*
7. *Complete lesson learned for future improvements and collect/organize all documentations, wrap up and release product*
8. *Complete Product launch*

g. Summary Budget

- *The overall budget for this project is no more than $300,000*

2. Work Breakdown Structure (WBS)

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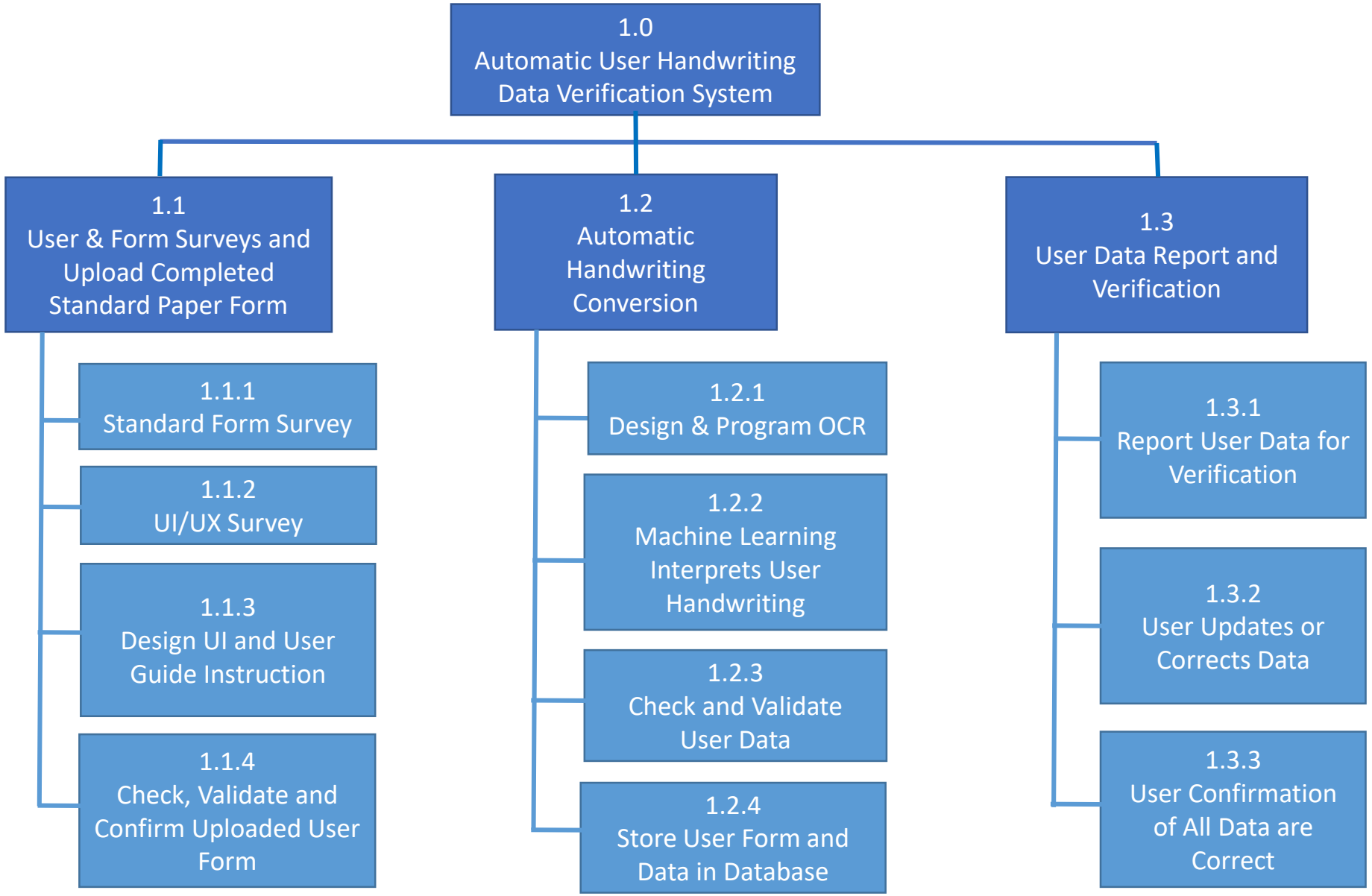

3. Sequence Project Activities

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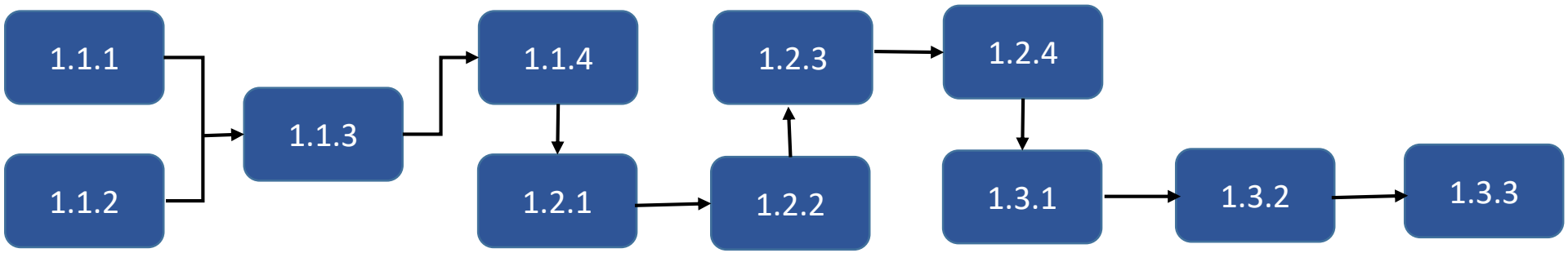
WBS ID	Activity/Task Name	Predecessor	Duration (Day)
1.1.1	Standard Form Survey		5
1.1.2	UI/UX Survey		5
1.1.3	Design UI and User Guide Instruction	1.1.1 & 1.1.2	10
1.1.4	Check, Validate, and Confirm User Uploaded Form	1.1.3	3
1.2.1	Design and Program OCR	1.1.4	15
1.2.2	Machine Learning Interprets User Handwriting	1.2.1	10
1.2.3	Check and Validate User Data	1.2.2	5
1.2.4	Store User Form and Data in Database	1.2.3	3
1.3.1	Report User Data for Verification	1.2.4	3
1.3.2	User Updates or Corrects Data	1.3.1	3
1.3.3	User Confirmation of All Data are Correct	1.3.2	3



4. Project Schedule

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WBS ID	Activity/Task Name	Predecessor	Duration (Day)	Start Date	Finish Date	Resources
1.0	**Automatic User Handwriting Verification System**		**60**	**4-Feb-2021**	**28-Apr-2021**	**Sponsor/Executive, PM, Marketing, BA, DS, DBA, Programmer**
1.1	**User & Form Survey and Upload Completed Form**		**23**	**4-Feb-2021**	**1-Mar-2021**	**PM, Marketing, BA, Programmer**
1.1.1	Standard Form Survey		5	4-Feb-2021	10-Feb-2021	Marketing, BA
1.1.2	UI/UX Survey		5	4-Feb-2021	10-Feb-2021	Marketing, BA
1.1.3	Design UI and User Guide Instruction	1.1.1 & 1.1.2	10	11-Feb-2021	24-Feb-2021	Marketing, BA, Programmer
1.1.4	Check, Validate, and Confirm User Uploaded Form	1.1.3	3	25-Feb-2021	1-Mar-2021	BA, Programmer
1.2	**Automatic Handwriting Conversion**		**33**	**2-Mar-2021**	**15-Apr-2021**	**PM, BA, Programmer, DS, DBA**
1.2.1	Design and Program OCR	1.1.4	15	2-Mar-2021	22-Mar-2021	Business Analyst, Programmer
1.2.2	Machine Learning Interprets User Handwriting	1.2.1	10	23-Mar-2021	5-Apr-2021	Data Scientist
1.2.3	Check and Validate User Data	1.2.2	5	6-Apr-2021	12-Apr-2021	Data Scientist
1.2.4	Store User Form and Data in Database	1.2.3	3	13-Apr-2021	15-Apr-2021	DBA, Programmer
1.3	**User Data Report and Verification**		**9**	**16-Apr-2021**	**28-Apr-2021**	**PM, DBA, Programmer**
1.3.1	Report User Data for Verification	1.2.4	3	16-Apr-2021	20-Apr-2021	DBA, Programmer
1.3.2	User Updates or Corrects Data	1.3.1	3	21-Apr-2021	23-Apr-2021	DBA, Programmer
1.3.3	User Confirmation of All Data are Correct	1.3.2	3	26-Apr-2021	28-Apr-2021	DBA, Programmer

Note:
BA = Business Analyst
DBA = Database Administrator
DS = Data Scientist
PM = Project Manager

5. Project Budget

5. Overall Project Budget

Weekly Budget (Estimated Cost)							
Week #	Labor Cost	Cloud Server Cost	Survey Cost	Marketing Cost	Training Cost	Overhead Cost	Total Cost
Week 1	$8,240	$750	$3,000		$300	$1,000	**$13,290**
Week 2	$20,600	$750	$5,000		$750	$1,000	**$28,100**
Week 3	$20,600	$750		$1,000	$750	$1,000	**$24,100**
Week 4	$20,600	$750		$1,000	$750	$1,000	**$24,100**
Week 5	$20,600	$750		$1,000	$750	$1,000	**$24,100**
Week 6	$20,600	$750		$1,000	$750	$1,000	**$24,100**
Week 7	$20,600	$750		$1,000	$750	$1,000	**$24,100**
Week 8	$20,600	$750		$1,000	$750	$1,000	**$24,100**
Week 9	$20,600	$750		$1,000	$750	$1,000	**$24,100**
Week 10	$20,600	$750		$1,000	$750	$1,000	**$24,100**
Week 11	$20,600	$750		$1,000	$750	$1,000	**$24,100**
Week 12	$20,600	$750		$1,000	$750	$1,000	**$24,100**
Week 13	$12,360	$750		$1,000	$500	$1,000	**$15,610**
Total	**$247,200**	**$9,750**	**$8,000**	**$11,000**	**$9,050**	**$13,000**	**$298,000**

- This weekly estimated cost (budget) is using analogous estimate approach from similar past project with current market value
- Week 1 only has two days since the project will start on Thursday, February 4th, 2021
- Week 13 only has three days since the project will end on Wednesday, April 28th, 2021
- Cloud server cost includes server backup, administration and maintenance services as well as server space scaled up as needed, so we don't have to worry about server capacity limitation
- Survey cost includes surveys for standard paper forms and user interface/user experience (UI/UX)
- Marketing cost includes advertising & promotion costs for our new product to keep current customers loyal & entice new customers
- Training cost includes cross training among employees for backup and new skill sets to improve their performance

5. Estimated Labor Cost Project Budget

Hourly Labor Cost		$125	$70	$80	$80	$80	$80	
Week #	**Hours**	**Project Manager**	**Marketing**	**Business Analyst**	**Data Scientist**	**Database Administrator**	**Programmer**	**Total Cost**
Week 1	16	$2,000	$1,120	$1,280	$1,280	$1,280	$1,280	**$8,240**
Week 2	40	$5,000	$2,800	$3,200	$3,200	$3,200	$3,200	**$20,600**
Week 3	40	$5,000	$2,800	$3,200	$3,200	$3,200	$3,200	**$20,600**
Week 4	40	$5,000	$2,800	$3,200	$3,200	$3,200	$3,200	**$20,600**
Week 5	40	$5,000	$2,800	$3,200	$3,200	$3,200	$3,200	**$20,600**
Week 6	40	$5,000	$2,800	$3,200	$3,200	$3,200	$3,200	**$20,600**
Week 7	40	$5,000	$2,800	$3,200	$3,200	$3,200	$3,200	**$20,600**
Week 8	40	$5,000	$2,800	$3,200	$3,200	$3,200	$3,200	**$20,600**
Week 9	40	$5,000	$2,800	$3,200	$3,200	$3,200	$3,200	**$20,600**
Week 10	40	$5,000	$2,800	$3,200	$3,200	$3,200	$3,200	**$20,600**
Week 11	40	$5,000	$2,800	$3,200	$3,200	$3,200	$3,200	**$20,600**
Week 12	40	$5,000	$2,800	$3,200	$3,200	$3,200	$3,200	**$20,600**
Week 13	24	$3,000	$1,680	$1,920	$1,920	$1,920	$1,920	**$12,360**
Total	**480**	**$60,000**	**$33,600**	**$38,400**	**$38,400**	**$38,400**	**$38,400**	**$247,200**

- Estimated hourly labor cost (budget) broken down by week and roles using current market rate in our area for expert level with many years of experience. The employees must have the necessary skill sets and ability to work in a team to ensure our project success
- Estimated labor cost includes salary with taxes and benefits

6. Responsibility Assignment Matrix (RAM)

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RAM (RACI) Chart	Role						
Work Package	Project Manager	Sponsor/ Executive	Marketing	Business Analyst	Data Scientist	Database Administrator	Programmer
1.0 Automatic User Handwriting Data Verification System	R	A	I	C	C	C	C
1.1 User & Form Survey and Upload Completed Form	A	I	C	R	I	I	C
1.1.1 Standard Form Survey	I	I	A	R	I	I	I
1.1.2 UI/UX Survey	I	I	A	R	I	I	I
1.1.3 Design UI and User Guide Instruction	I	I	C	A	I	I	R
1.1.4 Check, Validate, and Confirm User Uploaded Form	I	I	I	A	I	C	R
1.2 Automatic Handwriting Conversion	A	I	I	C	R	C	I
1.2.1 Design and Program OCR	A	I	I	C	C	C	R
1.2.2 Machine Learning Interprets User Handwriting	A	I	I	C	R	I	I
1.2.3 Check and Validate User Data	A	I	I	C	R	C	I
1.2.4 Store User Form and Data in Database	A	I	I	C	I	R	R
1.3 User Data Report and Verification	A	I	I	C	I	R	R
1.3.1 Report User Data for Verification	I	I	I	C	I	A	R
1.3.2 User Updates or Corrects Data	I	I	I	C	I	R	A
1.3.3 User Confirmation of All Data are Correct	I	I	I	C	I	A	R

R = Responsible A = Accountable C = Consult I = Inform

7. Identify Project Risks with Responses to Those Risks

7. Identify Project Risks with Responses to Those Risks

No	Risk	Mitigation	Contingency	Risk Impact	Risk Possibility	Overall Priority of the Risk
1	Project running ahead of schedule	1) Check to make sure our product quality is not compromised 2) Document what went well	1) Fix any potential issues to make sure our product quality is not compromised 2) Use the documentation to share with the stakeholders what went well so we can replicate it in the future projects	Low	Low	Low
2	Staff leaves the company	1) Cross train employees as backup 2) Well documentation of knowledge transfer 3) Ask for an in-house employee to help until a permanent replacement is found	1) Prioritize with replacement from internal employee that has similar task/job and worked with the team 2) Immediately hire a new employee that has the knowledge, experience and skill sets to do the job	High	Low	High
3	Staff is sick/unable to work	1) Cross train employees as backup 2) Well documentation of knowledge transfer	1) Prioritize with replacement from internal employee that has similar task/job and worked with the team 2) Ask for an in-house employee to help temporarily until the staff is back to work	Medium	Low	Medium
4	Incorrect standard paper forms	1) Continuous/daily check for latest update of standard paper forms	1) Set up auto-update/download of digital format of the latest standard paper forms	Medium	Low	Medium
5	Incorrect inputs/information or data error	1) Immediately alert/notify customer of error messages or potential incorrect/missing information thru auto-validate data type/date/ required length/format, etc.	1) Check and cross validate personal information thru DMV/credit agency/online	Medium	Low	Medium

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7. Identify Project Risks with Responses to Those Risks

No	Risk	Mitigation	Contingency	Risk Impact	Risk Possibility	Overall Priority of the Risk
6	Low accuracy on user handwriting conversion	1) Alert customer to immediately check their verification report and make any necessary updates/changes until accuracy is acceptable again	1) Update our library of handwriting list 2) Re-train and re-validate our machine language algorithm 3) Find the root cause of the issue, so we can fix it immediately and make sure it does not happen again	High	Low	High
7	Web/mobile/ technology error, users unable to reach our website/portal	1) Setup a message that we are working on the issue and provide estimated available time	1) Find the root cause of the issue, so we can fix it immediately and make sure it does not happen again in the future	High	Low	High
8	Project running behind due to lack of technical skills	1) Closely monitor the progress with daily status on where the project is vs the planned schedule 2) Get assistance from in-house employees with the required skills to get the project back to speed	1) Cross train employees so they can perform more effectively and efficiently 2) Get a consultant to assist with the solution	High	Medium	High
9	Unable to find the right resources to complete the project due to lack of experienced staff or funding	1) Do not start the project until we have all the right resources available	1) Immediately interview and hire people with the right expertise, skill sets and experience 2) Immediately find another source/sponsor of funding	High	Medium	High

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7. Identify Project Risks with Responses to Those Risks

No	Risk	Mitigation	Contingency	Risk Impact	Risk Possibility	Overall Priority of the Risk
10	Users unable to follow instructions to use our services due to system changes	1) Immediately set up a dedicated customer service to help with this issue	1) Update our user guide instructions to reflect any changes in our system 2) Post a message that we are working on the issue and provide estimated available time	High	Low	High
11	Scope Creep	1) Project Scope is defined clearly at the start of the project with all stakeholders 2) Document the scope creep and requirements	1) Approve all changes if there is no/very little impact to current schedule/budget/resources 2) Suggest for a future update/project after the completion of current project if there is any significant impact to current schedule/budget/resources	High	Medium	High
12	Unanticipated shift of priority from the sponsor/executive such as our funds are being pulled out or our team members are being pulled out for another urgent project	1) Immediately find another sponsor to support the project 2) Immediately find another staff that can take over the work until the team members back to our project 3) Cross train employees as backup 4) Well documentation of knowledge transfer	1) Prioritize with replacement from internal employee that has similar task/job and worked with the team 2) Ask for an in-house employee to help temporarily until the staff is back to work 3) If we are already in the middle of the project, cut back on hours/resources until we find a replacement fund/resources	High	Medium	High
13	Data Leakage	1) Immediately find the root cause of the data leakage 2) Immediately apply the patch until we can integrate the permanent solution into our system	1) Run thru a complete gap analysis to find any potential data leakage 2) Monitor the leakage process to make sure it does not happen again 3) Integrate a permanent solution into our system	High	Low	High