



TSP
The Solid Project

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Report #4

Client: Northrop Grumman

California State University San Marcos

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EXECUTIVE COMMUNICATION

Thomas Usrey
Northrop Grumman
16765 W. Bernardo Dr.
San Diego, CA 92127

Dear Mr. Usrey,

Thank you for meeting with us for Prototype II on April 10. Since our last meeting, we have made the appropriate revisions to our previous report. Phase IV concludes an updated project requirement list, a product breakdown structure in hierarchical form, and a work breakdown structure in hierarchical form. During this phase of the project, we began researching and developing the Shop Floor Visualization. Our goal for Phase V is to completely finalize the Administrator Mode and the Custom CSS feature for the workflow widget, research and develop the Shop Floor Visualization, and finalize the SRS, User Documentation, and Documented Code.

So far, Phase IV has a total cost of \$5,800.00, Phase V has a projected cost of \$3,364.00, and the overall project has an estimated completion cost of \$14,790.00.

If you have any questions or concerns regarding the project, please do not hesitate to contact us via email or Slack. We are very excited to deliver the final product to you and look forward to seeing you during the final presentation on May 15.

Sincerely,



Matthew Affa
Project Lead
solidprojectcsusm@gmail.com

CC: Dr. Shaun-Inn Wu

Stakeholder Approval

I _____(print), approve the current project and continuation under the predetermined terms by The Solid Project team, will provide any non-confidential materials that contributes to the overall success of the project, and will allow The Solid Project team to manage all deliverables set by the project sponsor.

Client Signature: _____ Date: ____/____/____

Application Development

Business Context

Northrop Grumman is an American global aerospace and defense technology company. They develop integrated Communications, Navigation and Identification systems for tactical aircraft, covert communications and tactical radio systems for the Department of Defense and other national security clients. Their product development involves mechanical, electrical, software, and engineering.

Business Problem

Northrop Grumman works on multiple projects that vary in size across multiple organizations. As they continue to grow, leaders are required to manage more projects and more people. The company currently uses homegrown workflow applications and data management solutions to manage their processes and need a software solution for collecting, analyzing, controlling data. Northrop Grumman would like to standardize their workflow and bring more interactive visualizations to increase tool efficiency while maintaining the best user experience for workflow, layout, and scheduling (Gantt).

Project Proposal

We propose a Web-based workflow visualization tool using a widget. This widget will be styled using CSS and have the functionalities that include adding multiple workflow objects, altering / adding workflow status, and displaying capabilities within Northrop Grumman's supported browsers.

Statement of Deliverables

- Working widget will be able to take in JSON information and display it in a workflow diagram.
- Widget will be dynamic so user can add (including insert), remove, edit and update existing workflow states.
- Workflow widget will have new features such as admin mode, zoom, node collapse/expansion, and have a new theme with custom options.
- Second working widget will display a visual representation of the Northrop Grumman manufacturing shop floor.
- Widget will work on IE11+, Firefox 45+, and on Edge.
- Documentation
- Source Code

What form or medium will your deliveries be in:

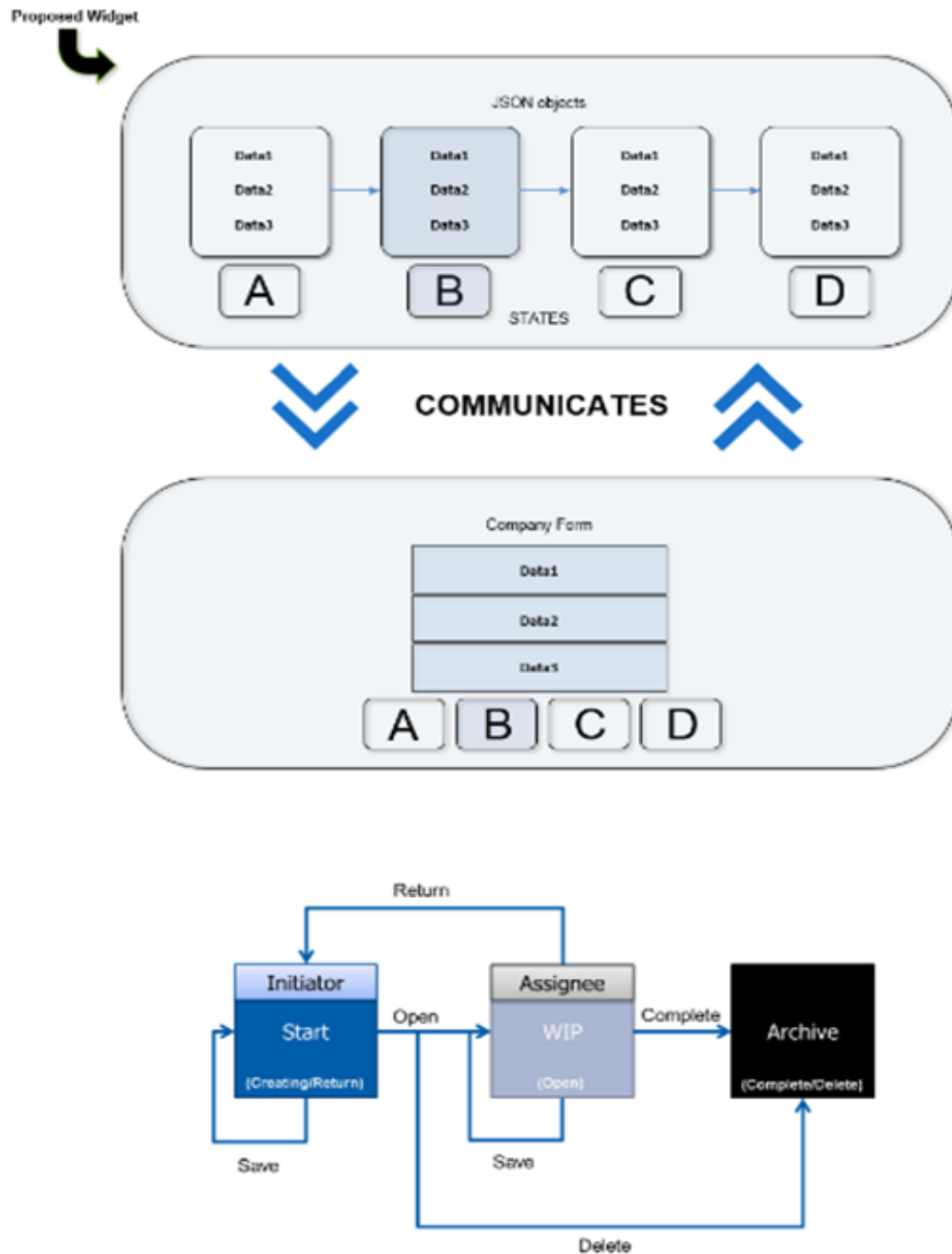
Executable source code customer can run on their local machine via web browser (IE+11, Firefox 45+, and Edge)

Project Measures of Success Outline

<u>Phase</u>	<u>Details</u>
1	<ul style="list-style-type: none"> ● Hold JAD1 meeting on site at. 2/8/18 <ul style="list-style-type: none"> ○ Discuss communication method. ○ Discuss the customer's problem. ○ Define project scope and requirements. ○ Request source code from previous group. ● Set up tools for project. <ul style="list-style-type: none"> ○ Slack for communication. ○ Google Drive for documentation. ○ Trello for task management. ○ Github for development platform.
2	<ul style="list-style-type: none"> ● Research & Review Vortek Solutions documents and source code. ● Hold JAD2 meeting on site. <ul style="list-style-type: none"> ○ Discuss issues and concerns. ○ Confirm project requirements. ○ Review Report 1. ● Finalize Report 1.
3	<ul style="list-style-type: none"> ● Download and Run Vortek Solutions source code ● Implement Admin Interface Prototype. ● Finalize Report 2. <ul style="list-style-type: none"> ○ Hold Prototype 1 meeting on site. ○ Present admin interface prototype. ○ Get feedback. ○ Discuss briefly next phase of the project. ● Make changes to admin interface prototype if needed.
4	<ul style="list-style-type: none"> ● Implement different themes for workflow diagram. ● Finalize Report 3. ● Hold Prototype 2 meeting on site. <ul style="list-style-type: none"> ○ Present themes for workflow diagram prototype. ○ Get feedback. ○ Discuss briefly next phase of the project. ● Make changes to workflow diagram prototype if needed.
5	<ul style="list-style-type: none"> ● Implement shop floor visualization. ● Thorough testing of all functionalities. ● Finalize Report 4.

- Present final product.

Visual Representation



Requirements Matrix

Requirement #	Requirement Description	Task ID	Implemented (Yes/No)
R1	Widgets will run on IE 11+.	50	YES
R2	Widgets will run on Firefox 45+.	50	YES
R3	Widgets will run on Edge.	50	YES
R4	Workflow widget will receive JSON data from source, including incomplete data. Must save in the same format as received.	50	YES
R5	Widget will render data in a workflow diagram.	50	YES
R6	Workflow widget will be interactive to the browser.	64	YES
R7	Widget will display a shop floor visualization.	67	NO
R8	Workflow widget will self contain D3 object.	50	NO
R9	Workflow widget theme can be styled with CSS.	53	NO
R10	Workflow widget will have an admin mode (edit, insert node, add branch)	40	NO
R11	Workflow widget will have zoom feature	55	YES
R12	Workflow widget will have node collapse/expand feature	54	YES

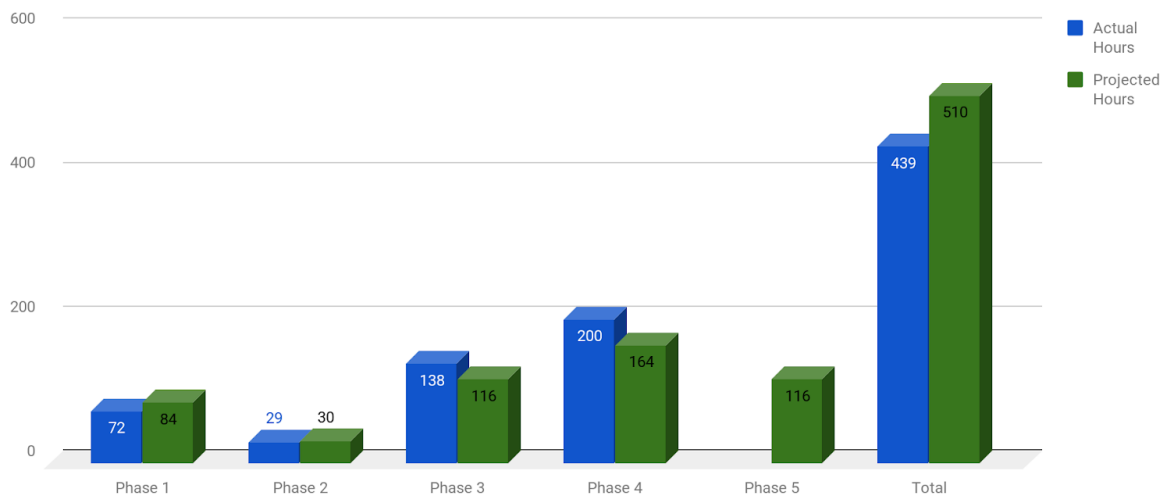
Project Management

Initial Project Cost Tracking Chart

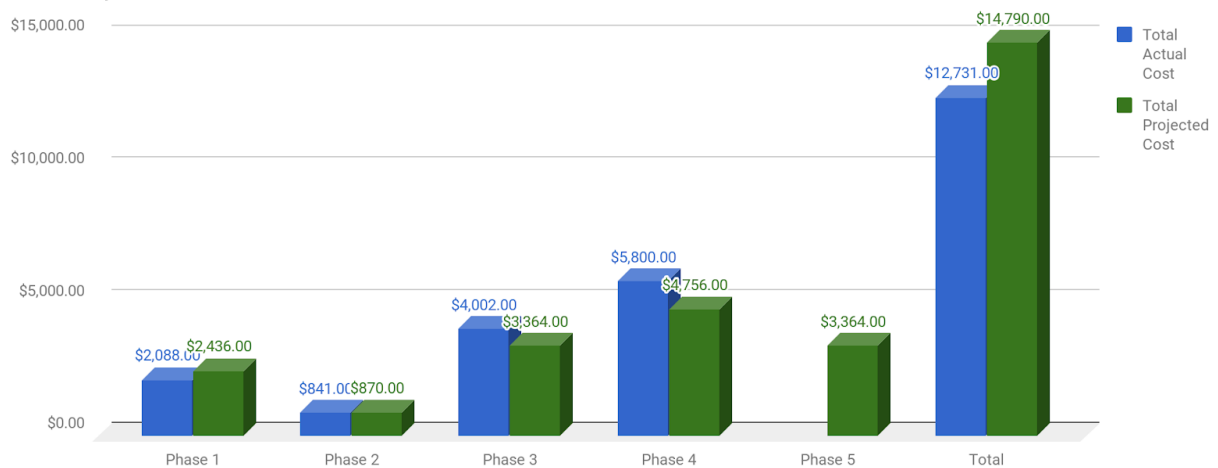
Actual Cost				Total Project Cost Estimate			
Phases	Actual Hours	Rate	Total Actual Cost	Phases	Projected Hours	Rate	Total Projected Cost
Phase 1	72	29	\$2,088.00	Phase 1	84	29	\$2,436.00
Phase 2	29	29	\$841.00	Phase 2	30	29	\$870.00
Phase 3	138	29	\$4,002.00	Phase 3	116	29	\$3,364.00
Phase 4	200	29	\$5,800.00	Phase 4	164	29	\$4,756.00
Phase 5				Phase 5	116	29	\$3,364.00
Total	439		\$12,731.00	Total	510		\$14,790.00

We are currently in Phase 5, the projected cost for this phase is \$3,364.00 and is due May 15, 2018.

Actual & Projected Hours



Actual & Projected Cost



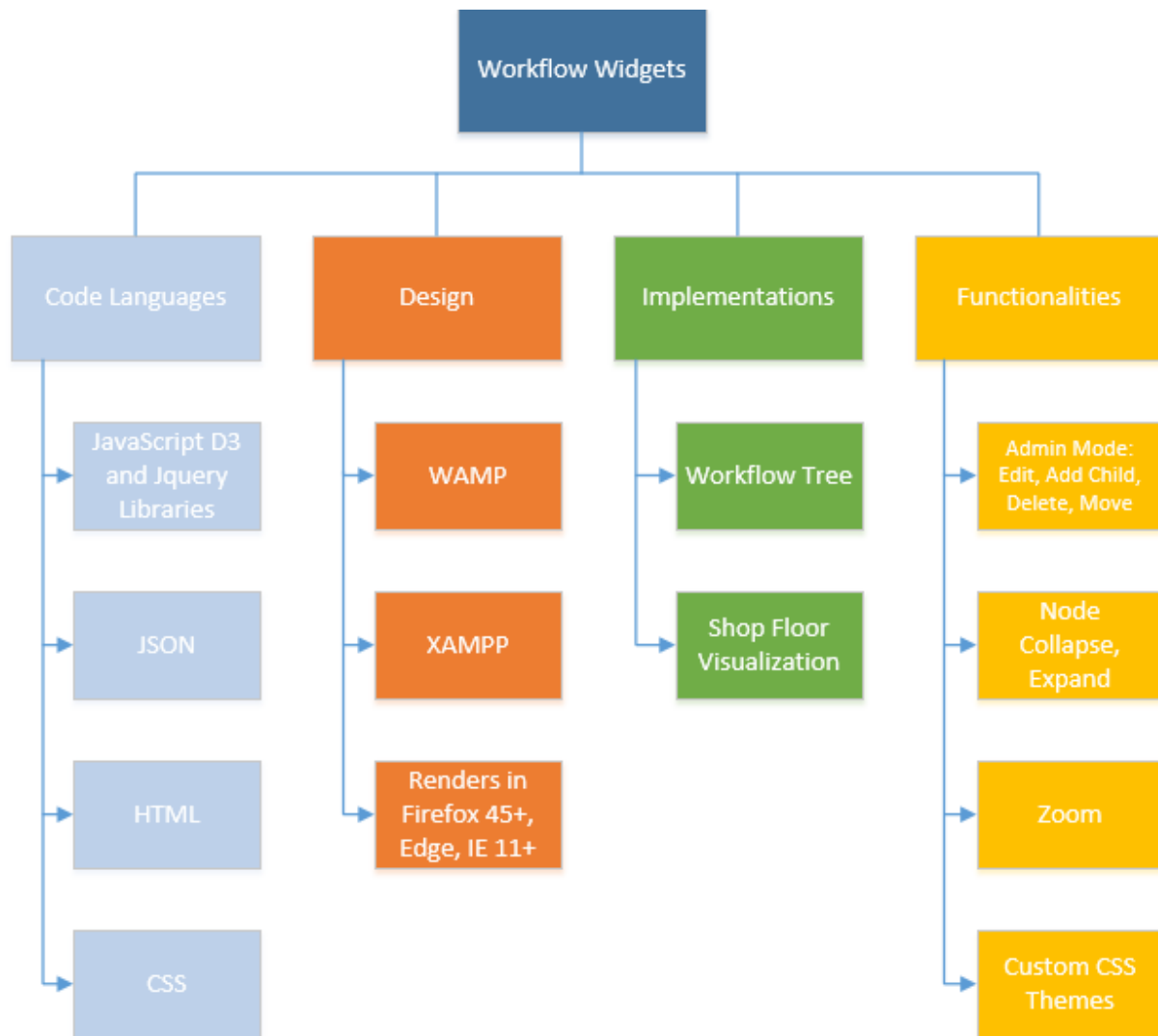
Schedule of Tasks

FINAL Task Schedule

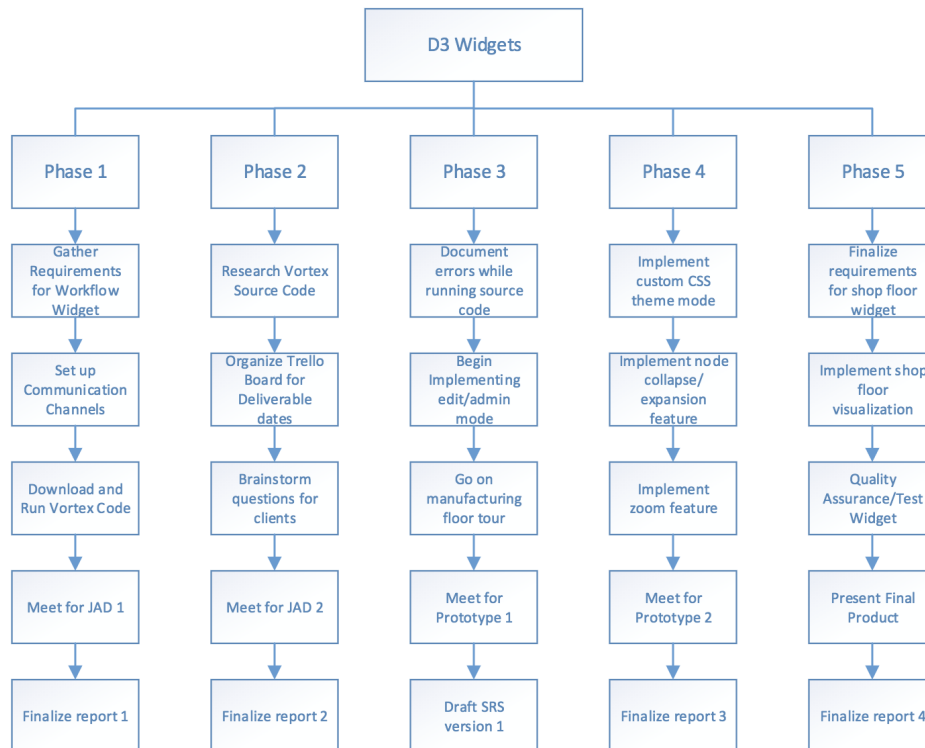
ID	TASK NAME	DURATION	START	FINISH	TEAM MEMBER	% COMPLETED
1	Phase 1 (Week 2- Week 5 ends 2/20)					
2	Design business logo & prepare business cards/ name tags	2	2/2/2018	2/3/2018	Crystele	100.00%
3	Finalize business cards	1	2/5/2018	2/5/2018	Crystele	100.00%
4	Purchase Avery Printable Template Paper for business cards, name tags, and name tag badges	2	2/6/2018	2/6/2018	Crystele, Henry	100.00%
5	Print business cards & name tags	0.5	2/7/2018	2/7/2018	Crystele	100.00%
6	Collect photos of each team member	0.5	2/6/2018	2/6/2018	Crystele	100.00%
7	Define and appoint team roles to each team member	2	2/1/2018	2/1/2018	All	100.00%
8	Obtain Project Management Software & Create Trello Board	1	2/1/2018	2/1/2018	Crystele	100.00%
9	Download MS Project from CSUSM apps	4	2/1/2018	2/1/2018	All	100.00%
10	Define mission & scope	4	2/5/2018	2/7/2018	All	100.00%
11	Draft possible company mission statement/objective, and team norms	8	2/5/2018	2/7/2018	All	100.00%
12	Schedule Initial meeting to obtain user requirements	1	2/6/2018	2/6/2018	Matt	100.00%
13	Documentation: Prepare JAD1 Meeting Agenda	2	2/6/2018	2/6/2018	Crystele	100.00%
14	JAD1: Think of specific questions for Client	8	2/6/2018	2/7/2018	All	100.00%
15	Meet with Client and Dr. Wu for JAD1	4	2/6/2018	2/6/2018	All	100.00%
16	Finalize JAD1 Agenda Meeting Notes and Email JAD1 Agenda to Client & Dr. Wu	2	2/6/2018	2/6/2018	Matt, Crystele	100.00%
17	Obtain Vortek Solution Source Code & GitHub Information and Upload to Team GitHub	2	2/13/2018	2/13/2018	Matt	100.00%
18	Set-Up Slack Communication & Give Team Members Access	1	2/1/2018	2/1/2018	Crystele	100.00%
19	Set-Up Google Drive & Give Team Members Access	1	2/1/2018	2/1/2018	Crystele	100.00%
20	Set-Up & Each Team member has access to the Trello Board to Manage Project	1	2/1/2018	2/1/2018	Crystele	100.00%
21	Set-Up GitHub for Development Platform	1	2/1/2018	2/1/2018	Henry	100.00%
22	Review & Research technologies used in previous project	12	2/13/2018	2/16/2018	All	100.00%
23	Meeting with Dr. Wu regarding JAD1 Meeting & Report 1 Draft	4	2/15/2018	2/15/2018	All	100.00%
24	Make Corrections to Report 1	8	2/15/2018	2/20/2018	All	100.00%
25	Phase 2 (Week 4 - Week 5 ends 2/20)					
26	Research and Review Vortek Solutions Documentation and Source Code	12	2/15/2018	2/20/2018	All	100.00%
27	Organize Trello board w/ due dates, documentation requirements, assigning task cards, etc	2	2/1/2018	5/15/2018	Crystele	100.00%
28	Documentation : Draft JAD2 Meeting Agenda	4	2/17/2018	2/18/2018	Matt, Crystele	100.00%
29	JAD2: Think of specific questions for Client	1	2/16/2018	2/16/2018	All	100.00%
30	Meet with Client and Dr. Wu for JAD2	4	2/19/2018	2/19/2018	All	100.00%
31	Finalize JAD2 Agenda Meeting notes and Email JAD2 Agenda to Client & Dr. Wu	2	2/19/2018	2/19/2018	Matt, Crystele	100.00%
32	Finalize Report 1 Corrections	4	2/19/2018	2/19/2018	All	100.00%
33	Phase 3 (Week 5 - Week 8)					
34	Download and Run Vortek Solutions source code	3	2/23/2018	2/25/2018	Henry,Matt,Victor	100.00%
35	Meeting with Broc from Vortek Solutions to obtain a better understanding of previous project	4	2/23/2018	2/23/2018	All	100.00%
36	Download all dependencies for source code	1	2/23/2018	2/25/2018	All	100.00%
37	Document any errors and successes in running source code	1	2/23/2018	2/25/2018	All	100.00%
38	Angular 2 Implement Admin Interface Prototype and document any roadblocks/errors, and successes	36	2/26/2018	3/13/2018	All	100.00%
39	Angular 2 Changes/Edit Admin Interface Prototype	16	2/26/2018	3/13/2018	All	100.00%
40	Documentation: Prepare & Draft Report 2	20	2/23/2018	2/26/2018	All	100.00%
41	Meeting with Dr. Wu regarding JAD2 Meeting & Report 2 Draft	4	3/1/2018	3/1/2018	All	100.00%
42	Make corrections to Report 2	8	3/2/2018	3/5/2018	All	100.00%
43	Finalize Report 2	4	3/5/2018	3/5/2018	All	100.00%
44	Schedule & Confirm manufacturing tour with client	1	2/26/2018	2/26/2018	Matt, Crystele	100.00%
45	Manufacturing Tour at NSC	4	3/6/2018	3/6/2018	All	100.00%
46	Schedule & Confirm Prototype I meeting	1	2/26/2018	2/26/2018	Matt, Crystele	100.00%
47	Draft SRS version 1	8	3/8/2018	3/16/2018	All	100.00%
48	Team Zoom Meeting	4	3/8/2018	3/8/2018	All	100.00%
49	Documentation & Team Meeting 3/11: Prepare & Draft Prototype I Meeting Agenda	18	3/10/2018	3/12/2018	All	100.00%
50	Meet with Client and Dr. Wu for Prototype I	4	3/13/2018	3/13/2018	All	100.00%
51	Finalize Prototype I Meeting Agenda Notes and Email Meeting Agenda to Client & Dr. Wu	1	3/13/2018	3/15/2018	Matt, Crystele	100.00%
52	Phase 4 (Week 9 - Week 12)					
53	Draft Implement Code different themes for workflow diagram	36	3/16/2018	3/24/2018	All	100.00%
54	Draft Implement Code node collapse/expansion feature	36	3/24/2018	3/29/2018	All	100.00%
55	Draft Implement Code zoom feature	36	3/29/2018	4/3/2018	All	100.00%
56	Research on rendering D3 Library & Research on other technologies/ applications/ tools	36	3/16/2018	3/30/2018	All	100.00%
57	Moving away from Angular 2: Implement Admin Interface & Change/Edit prototype	16	4/3/2018	4/6/2018	All	100.00%
58	Documentation: Prepare & Draft Report 3	16	3/15/2018	3/26/2018	All	100.00%
59	Meeting with Dr. Wu regarding Prototype I Meeting and Report 3 Draft Corrections	4	3/29/2018	3/29/2018	All	100.00%
60	Make Corrections to Report 3	8	3/29/2018	4/2/2018	All	100.00%
61	Finalize Report 3	4	4/2/2018	4/2/2018	All	100.00%
62	Schedule & Confirm Prototype II meeting	1	4/3/2018	4/5/2018	Matt, Crystele	100.00%
63	Documentation: Prepare & draft Prototype II Meeting Agenda	2	4/7/2018	4/8/2018	Matt, Crystele	100.00%
64	Meet with Client and Dr. Wu for Prototype II	4	4/10/2018	4/12/2018	All	100.00%
65	Finalize Prototype II Meeting Agenda Notes and Email Meeting Agenda to Client & Dr. Wu	1	4/10/2018	4/12/2018	Matt, Crystele	100.00%
66	Phase 5 (Week 13 - Week 16)					
67	Changes/ Edits after Prototype II meeting & Implement shop floor visualization	60	4/13/2018	4/20/2018	All	
68	Quality Assurance / Testing Widget	29.5	4/20/2018	4/23/2018	All	
69	Documentation: Prepare & Draft Report 4	16	4/16/2018	4/19/2018	All	
70	Meeting with Dr.Wu regarding Prototype II Meeting Agenda & Report 4 Draft Corrections	4	4/19/2018	4/19/2018	All	
71	Make Corrections to Report 4	8	4/20/2018	4/22/2018	All	
72	Finalize Report 4	4	4/23/2018	4/23/2018	All	
73	Prepare / Draft Final Product Presentation	16	4/26/2018	5/6/2018	All	
74	Change/Edit Final Product Presentation	8	5/9/2018	5/9/2018	All	
75	Present Final Product	4	5/15/2018	5/15/2018	All	

4/24/2018

Product Breakdown Structure



Work Breakdown Structure



Statement of Deliverables

Deliverables	Due Dates
Report 1	2/20/2018
Report 2	3/6/2018
Prototype 1	3/15/2018
Report 3	4/3/2018
Prototype 2	4/12/2018
Report 4	4/24/2018
Other Deliverables due on 5/15/2018 <ol style="list-style-type: none"> SRS Documented Code 	

- 3. User Documentation**
- 4. Working Examples**

Outline of Resources

What resources we will need from Northrop Grumman:

- They have provided us with the following material:
 1. Vortek Solutions Source Code
 2. Project Presentation
- Timely feedback on requirements clarification and approval.
- Northrop Grumman will not provide us with access to their network and production data.

What resources we need from the Instructor:

- The instructor needs to give us access to a group server for database, development, and testing.
- Timely response on questions regarding project and guidance.

What resources will TSP: The Solid Project supply:

- Open source software that is needed for development and research purposes
- Github Repository
- Testing environment to show the widget in production
- All research and developed material will be given to Northrop Grumman

Gantt Chart of Major Phases

