



# Vortek Solutions

A ***NORTHROP GRUMMAN*** Team

## JAD Report 2

Members:

Justin Goulet, Chris Larsen, Mikal Callahan, Brock Corbett

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San Marcos, CA 92096

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333 S. Twin Oaks Valley Rd.  
San Marcos, CA 92096

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

Dear Mr. Usrey,

Thank you for meeting us a second time to confirm your requirements and exemplifying details regarding our current project.

We also wish to thank you for allowing us to tour the manufacturing floor and learn about the core of Northrop's business and operations. We really enjoyed having the opportunity to learn about the various technological pieces that your organization helps to create, maintain and explore.

In the duration from our last meeting, we have been actively working on our Decision Matrix, as requested. The document is going to be updated accordingly as we work with our op choice.

As we have accomplished our wireframe design, reaffirmed variable themes may exist and confirmed we are designing both a workflow tree theme and a product structure tree theme, we may continue to work on our next phase. In order for our next phase to be successful, we must verify our decision matrix, install our top choice on a created test environment, and generate a simple design theme (not actually implemented).

Now that the first draft of our Decision Matrix is complete, we will start working on creating an extremely simple prototype - with a basic theme. In addition to this prototype, we will offer introductory documentation for handling the widget in various ways.

Meanwhile, while we learn the functionality and begin integrating with your example JSON structure, we may be required to update the Decision Matrix accordingly. We want to provide you with the best possible product - without hindering on your requirements.

So far, our project has incurred an approximate cost of \$925 and an estimated completion cost of \$9,500 (breakdown in following pages).

Thank You,  
Justin Goulet

Project Manager / Lead  
[VortekSolutions.CIS@gmail.com](mailto:VortekSolutions.CIS@gmail.com)

CC: Dr. Shaun-Inn Wu

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

Client Signature: \_\_\_\_\_

Date: \_\_\_\_ / \_\_\_\_ / \_\_\_\_

## Executive Communication

### Summary of Accomplishments:

- Further Defined Requirements:
  - Specific themes for what will be viewed (e.g. theme that just displays the name and the states, a theme that displays the description and more detail, etc)
  - Only required objects to pass are ID and name
  - Object being read in should be well defined, our job is to visualize that data
  - We will be designing both
    - Workflow tree theme: a simple visualization of their workflow
    - Product Structure Tree theme: a components list of each state
- Design Specs:
  - Should have a display for the number of current hours and total estimate hours of a state
  - Color always defines the quality of the state
- Follow IEEE SRS requirements

### For Successful Completion of phase:

- Find at least five libraries/frameworks to look at
  - Describe why we chose them
  - Order them by which seem most doable
  - Create a decision tree
- Decision matrix - with options and selection criteria defined
  - How we interpret requirements
  - Ability to theme out prototype (not an actual prototype but decision on how we are going to proceed)
- Create a live matrix what we are working towards, so we can go back and reiterate if necessary

### Accrued Cost for phase:

Consultation Fee (\$35/hour):

2 hours \* \$35 = \$70

Labor Fee (\$25/hour):

39 hours \* 25 = \$925 total

\$925/4 team members = \$231.25 per team member

### Estimated Cost for phase:

Consultation Fee (\$35/hour):

1.5 hours \* \$35 = \$52.5

Labor Fee (\$25/hour):

40 hours \* 25 = \$1000

\$1000/4 team members = \$250 per team member

### Cost to Date:

Consultation Fee (\$35/hour):

3 hours \* \$35 = \$105

Labor Fee (\$25/hour):

130 hours \* \$25/h = \$3250

\$3250/4 team members = \$812.50 per team member

## **Application Development**

### **Statement of Business Context:**

Northrop Grumman has existing systems related to their current manufacturing workflows. These systems run in a web browser showing statistics and information related to specific workflows. Created statistics are visualized in charts, or Visio style diagrams, which are not always easily read (especially on devices of various screen sizes such as the tablets used by upper management). The statistics and other pieces of information related to the workflows are then used in decision making at various levels throughout the organization.

### **Statement of the Customer's Business Problem:**

Northrop Grumman is in need of a versatile widget that would allow them to monitor their current workflow in an easy to process but highly descriptive manner. Currently the employees get this information printed out on a piece of a paper, which makes it inconvenient to deduce more information from. There's a lot more information that would be of use to the employees given that it was more accessible.

### **Statement of Project Proposal**

We propose a widget that will be able to receive multiple workflow objects and render it in the multiple browsers that Northrop Grumman supports. The widget will also be able to be styled using CSS and have the ability to add, update and edit a workflow's state.

### **Statement of Deliverables**

The deliverables will be:

- The final widget which will:
  - o Be an executable, locally run widget, which interprets JSON data containing information of a specific workflow
  - o Display workflows multiple workflows in a visual manner
  - o Run on IE11+, Firefox 45+ and Edge
- IEEE SRS Documentation
- Source Code

### **What Medium Will the Product Be Delivered In**

Source code that our clients at Northrop Grumman will be able to compile and run on their local machines via web browser (IE11+, Edge, Firefox 45)

### **Outline of Project Measures of Success**

JAD 1 - Establish Requirements

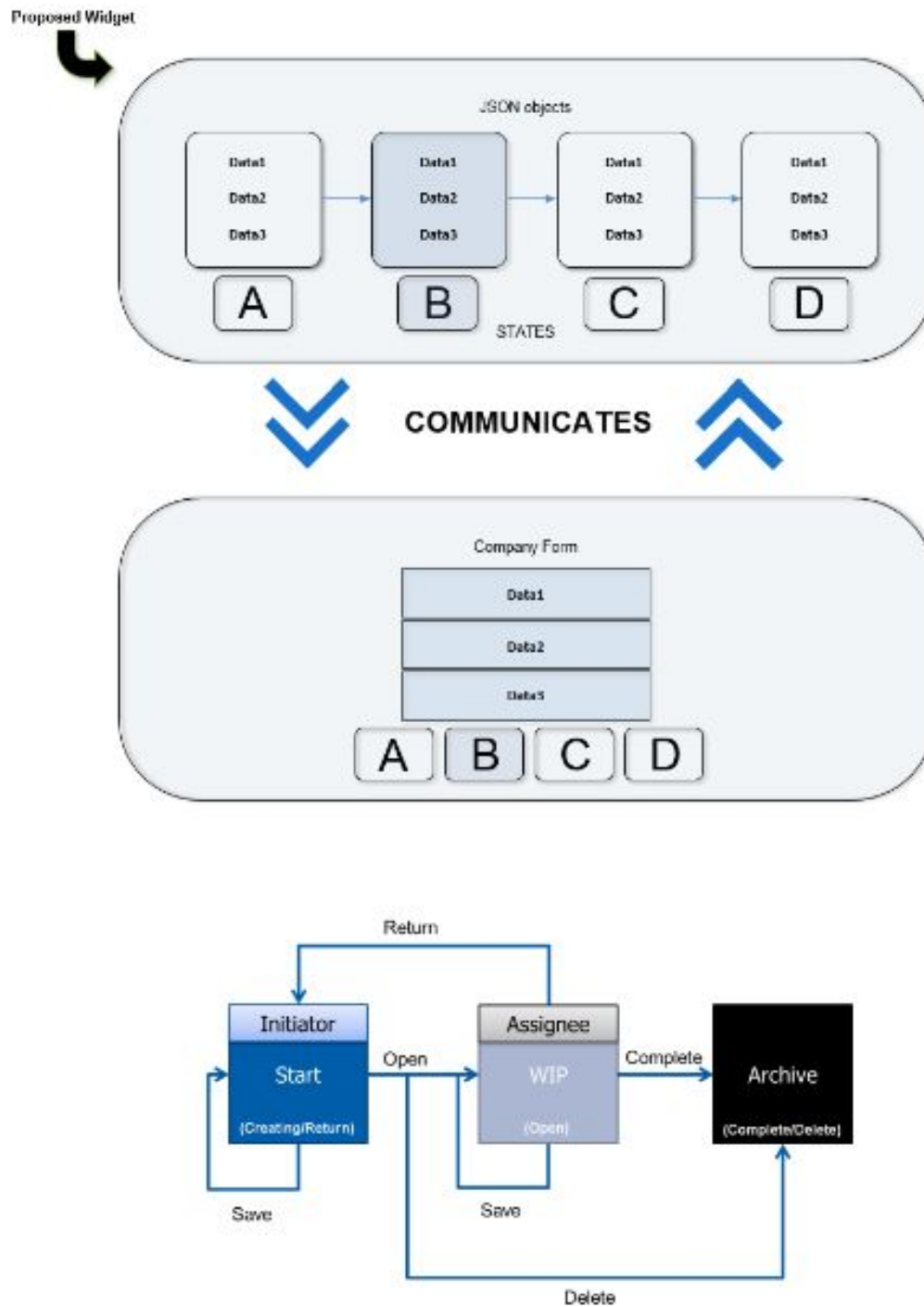
JAD 2 - Finalize Requirements

Prototype 1 - Basic widget implemented to receive JSON data

Prototype 2 - Static Widget (i.e. can manually update values of Workflow modules)

Final Deliverable - Dynamic Widget (i.e. widget is dynamically changed based on form input)

## Workflow Representation:





## Cost = Elapsed Hours/Standard Hours

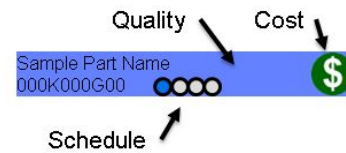
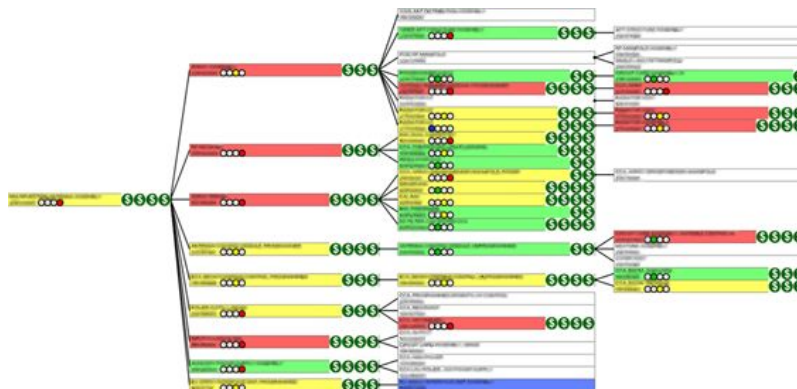
Elapsed hours are less than or equal to standard hours	\$	Perfect: Cost <= 100%
Elapsed hours 1x to 1.5x standard hours	\$ \$	Good: 100% < Cost <= 150%
Elapsed hours 1.5x to 2x standard hours	\$ \$ \$	Good: 150% < Cost <= 200%
Elapsed hours more than 2x standard hours	\$ \$ \$ \$	Bad: Cost > 200%

## Quality = WO's with QN/Total WO's

No WO's have a QN against them	Perfect: Quality = 0%
None to 25% of WO's have a QN against them	Good: 0% < Quality <= 25%
25% to 50% of WO's have a QN against them	Good: 25% < Quality <= 50%
More than 50% of WO's have a QN against them	Bad: Quality > 50%

## Schedule = Days of QN RW on a WO/Total Open Days of a WO

No days of RW operations related to a QN	Perfect: Schedule = 0%
0% to 10% of WO open days had RW operations	Good: 0% < Schedule <= 10%
10% to 20% of WO open days had RW operations	Good: 10% < Schedule <= 20%
More than 20% of WO open days had RW operations	Bad: Schedule > 20%





## Requirements Matrix

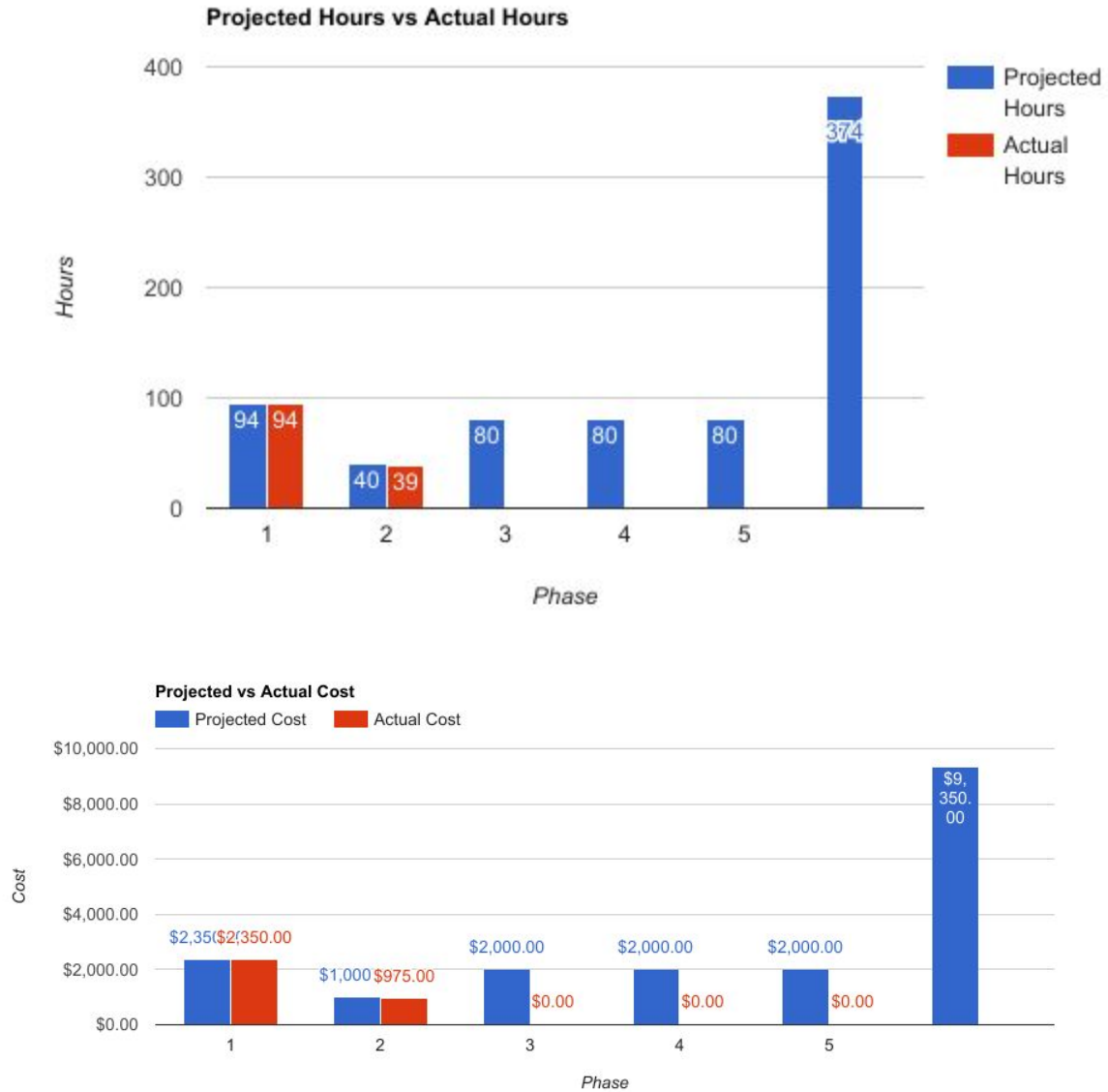
Requirements	Description	Task Number
<b>Research</b>	Explore Javascript libraries that will fulfill requirements and provide necessary functionality.	R1
<b>Design</b>	Define requirements for widget and construct basis for further development.	R2
<b>Development</b>	Widget will accept nested JSON inputs, UI will dynamically adjust to tree hierarchy and run on previously defined browsers.	R3
<b>Documentation</b>	Necessary documentation will be accustomed for future development on widget.	R4
<b>Error Handling</b>	Widget must be able to handle incomplete JSON data.	R5

## Task Schedule

Task	Task #	Implemented (Y/N)
<b>Research</b>	<b>R1</b>	
Analyze 5+ Javascript libraries	T1	Y
<b>Design</b>	<b>R2</b>	
Define requirements for proposed widget	T2	Y
Wireframe Development	T3	N
<b>Development</b>	<b>R3</b>	
Widget will be created with only ID and name passed to it	T4	N
Render projected workflow steps	T5	N
Render workflow info (project name, date started, etc)	T6	N
Render workflow step linkages	T7	N
Allow workflow's current state to be changed to a different state	T8	N
Allow additional state(s) to be added to the workflow	T9	N
Allow widget to be themed with CSS	T10	N
Allow states to be deleted	T11	N
The widget shall run on Microsoft Internet Explorer 11+, Edge, and Firefox 45+; with little variation in layout, style, or functionality	T12	N
<b>Documentation</b>	<b>R4</b>	
Develop User Manual for created portions	T13	N
Develop code-related documentation	T14	N
Systems Requirements Specifications	T15	N
<b>Error Handling</b>	<b>R5</b>	
Widget must be able to handle JSON objects with incomplete data	T16	N



## Initial Project Cost Tracking Chart



## Project Plan

~~Hold JAD 1 Meeting (2/8/17) Completed~~

### ~~On site~~

- ~~• Discuss communication methods~~
- ~~• Define customer requirements~~
- ~~• Interpret project priorities~~
- ~~• Discuss final product~~

~~Hold JAD 2 Meeting (2/22/17) Completed~~

### ~~On site~~

- ~~• Adjust requirements if needed~~
- ~~• Examine possible technologies to implement~~
- ~~• Finalize definition of workflow object~~

Hold JAD 3 Meeting (Deadline: 3/08/17)

### Virtual

- Discuss and finalize libraries we have chosen
- Wireframe for simple workflow in all its states
- Get feedback

Hold Prototype Meeting 1 (Deadline: 3/22/17)

### On site

- Widget can accept JSON objects
- Widget display implemented
- Get feedback

Hold Prototype Meeting 2 (Deadline: 4/13/17)

### On site

- Widget given more functionality (modify/delete)
- CSS themed
- Error-handling
- Get more feedback for final product

## Statement of the Deliverables

**For this phase**, our plan is to rank and come to a conclusion on which frameworks we will be using. A decision matrix for the product will be finished as well a live matrix of what we are working towards. We will also come out with wireframes for this project.



## Estimated Costs - Phase 3 Due Date: 3/08/17

Task	Hours	Bill Rate	Total Cost
Finish research and rank possible libraries	40	\$25.00	\$1,000.00
Create wireframes	40	\$25.00	\$1,000.00
<b>Total Hours:</b>	80	\$25.00	\$2,000.00

## Resources Outline

### What resources we will need from Northrop Grumman:

- Due to the nature of Northrop Grumman's industry/clientele we understand that we will have no access to Northrop's internal network and production data.
- Ty has provided us with:
  - o Sample workflow object data
  - o Application style guide
  - o List of commercial libraries that Northrop Grumman has access to

### What resources we are supplying:

- We will provide a test environment to mimic how the widget will be deployed in production
- Any open source software that is needed for research/development purposes
- Slack channel
- GitHub repository

### What resources we will need from the instructor:

- At this time we do not require anything of the instructor.

## Gantt Chart / Task List

Please see the attached document for the gantt chart and task breakdown.

## Team Norms

### Reliability

Vortek Solutions strives to perform all of our tasks carefully and diligently, while still working in a swift manner, providing unparalleled reliability of our products. We take pride in our work, and reliability is of utmost importance.

### Commitment

Vortek Solutions is committed to our clients. We put in every effort to ensure all of our client's needs are met, from the most prominent functional features to the smallest subtleties in design.

### Communication

At Vortek Solutions communication is key. We are in constant contact among each other and always ensure that the individual parts we are working on will amalgamate into one harmonious product. We also keep our clients up to date with our progress and send over updates as they come. We do not hesitate to ask any questions regarding our client's needs and we are always open to questions and comments from our clients.

### Common Goal

Vortek Solutions strives to provide a product that is not just functional, but both beautifully built and intelligently designed. The ending result is a well built and carefully crafted product that is sure to leave our clients satisfied.



ID	Task Name	Duration	Start	Finish	Predecessors	Resource Names	Actual Start	Jan 22, 17	Jan 29, 17	Feb 5, 17	Feb 12, 17	Feb 19, 17	Feb 26, 17	Mar 5, 17	Mar 12, 17	Mar 19, 17	Mar 26, 17	Apr 2, 17	Apr 9, 17	Apr 16, 17	Apr 23, 17	Apr 30, 17	May 7, 17	May 14, 17	May 21, 17	May 28, 17	Jun 4, 17
39	Feedback on Report 30 40 mins	1 hr	Thu 3/30/17	Thu 3/30/17		Shaun-im Wu,Vo	NA	SA	MTWTFSS	MTWTFSS	MTWTFSS	MTWTFSS	MTWTFSS	MTWTFSS	MTWTFSS	MTWTFSS	MTWTFSS	MTWTFSS	MTWTFSS	MTWTFSS	MTWTFSS	MTWTFSS	MTWTFSS	MTWTFSS	MTWTFSS	MTWTFSS	MTWTFSS
40	Submit Report 30	1 hr	Tue 4/4/17	Tue 4/4/17		Vorek Solutions	NA	NA																			
41	Project	10.75 days <sup>2</sup>	Wed 3/15/17	Wed 3/29/17		Justin Goulet	NA	NA																			
42	Update to current Docs 1 day	Wed 3/15/17	Wed 3/15/17	36		Mikal Callahan, Br	NA	NA																			
43	Working prototype of sil 10.75 days	Wed 3/15/17	Wed 3/28/17	36		Brock Corbett,Chi	NA	NA																			
44	Complete code for impl 10.75 days	Wed 3/15/17	Wed 3/28/17	36		Justin Goulet	NA	NA																			
45	Initial documentation to 10.75 days	Wed 3/15/17	Wed 3/29/17	36		Justin Goulet	NA	NA																			
46	ProtoType 2	22.75 days <sup>2</sup>	Tue 4/4/17	Thu 5/4/17			Tue 4/4/17																				
47	Meeting	1 day	Tue 4/4/17	Wed 4/5/17			Tue 4/4/17																				
48	Meeting Agenda	2 hrs	Tue 4/4/17	Tue 4/4/17		Justin Goulet	Tue 4/4/17																				
49	Have Meeting	8 hrs	Wed 4/5/17	Wed 4/5/17	48	Consultation	NA	NA																			
50	Meeting Notes	2 hrs	Wed 4/5/17	Wed 4/5/17	49	Justin Goulet	Wed 4/5/17																				
51	Report 4D	8 days <sup>2</sup>	Thu 4/13/17	Tue 4/25/17			NA																				
52	Create Report	4.75 days	Thu 4/13/17	Tue 4/18/17	7	Brock Corbett,10	NA	NA																			
53	Feedback on Report 4D 40 mins	Thu 4/20/17	Thu 4/20/17			Shaun-im Wu,Vo	NA	NA																			
54	Submit Report 4D	0 hrs	Tue 4/25/17	Tue 4/25/17		Vorek Solutions	NA	NA																			
55	Project	10.75 days	Thu 4/20/17	Thu 5/4/17			NA																				
56	Update to current Docs 10.75 days	Thu 4/20/17	Thu 5/4/17	53		Justin Goulet	NA	NA																			
57	Two or More working pr 10.75 days	Thu 4/20/17	Thu 5/4/17	53		Brock Corbett,Chi	NA	NA																			
58	Final Report	30.75 days	Wed 4/5/17	Wed 5/17/17		Justin Goulet	Wed 4/5/17																				
59	Report	29.75 days	Wed 4/5/17	Tue 5/16/17		Consultation,Sha	Wed 4/5/17																				
60	Final Report Paper	30.25 days	Wed 4/5/17	Tue 5/16/17		Vorek Solutions	Wed 4/5/17																				
61	Submit Report	0 days	Tue 5/16/17	Tue 5/16/17	60	Vorek Solutions	Tue 5/16/17																				
62	Presentation	1.75 days	Tue 5/16/17	Wed 5/17/17		Brock Corbett,10	Tue 5/16/17																				
63	Presentation Coaching	0.37 days	Tue 5/16/17	Wed 5/17/17	160	Shaun-im Wu,Vo	Tue 5/16/17																				
64	Present	0.25 days	Tue 5/16/17	Wed 5/17/17	160	Vorek Solutions	Tue 5/16/17																				



Northrop JS Widget									
ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names	Actual Start	% Complete
0	✓	Northrop JS Widget	81.75 days?	Tue 1/24/17	Wed 5/17/17			Tue 1/24/17	7%
1	✓	Introduction to Course	8.52 days	Tue 1/24/17	Fri 2/3/17		Vortek Solutions	Tue 1/24/17	100%
2	✓	Syllabus / Project Introduction	2 days	Tue 1/24/17	Fri 2/3/17		Vortek Solutions	Tue 1/24/17	100%
3	✓	Client Presentation / Team Formation	2 hrs	Tue 1/31/17	Wed 2/1/17		Vortek Solutions	Tue 1/31/17	100%
4	✓	JAD 1	11.75 days	Tue 2/7/17	Wed 2/22/17			Tue 2/7/17	100%
5	✓	Meeting Agenda	3 days	Wed 2/8/17	Fri 2/10/17			Tue 2/7/17	53%
6	✓	Meeting Agenda	2 hrs	Tue 2/7/17	Fri 2/10/17		Justin Goulet	Tue 2/7/17	100%
7	✓	Have Meeting	2 hrs	Wed 2/8/17	Wed 2/8/17		Consultation	Wed 2/8/17	100%
8	✓	Meeting Notes	2 hrs	Thu 2/9/17	Thu 2/9/17		Justin Goulet	Thu 2/9/17	100%
9	✓	Assigned Tasks	10.53 days	Wed 2/8/17	Wed 2/22/17			Wed 2/8/17	28%
10	✓	Setup Client Communications	2 hrs	Wed 2/8/17	Wed 2/8/17		Justin Goulet	Wed 2/8/17	100%
11	✓	Research Possible Workflow Solutions	6.25 days	Thu 2/9/17	Tue 2/14/17		Brook Corbett[10%],Chris Larsen[100%],Mikael Callahan[10%],Justin Goulet[10%]	Thu 2/9/17	16%
12	✓	Create Sketch of Proposed Solution	6 hrs	Wed 2/22/17	Wed 2/22/17		Mikael Callahan,Justin Goulet	Wed 2/22/17	100%
13	✓	Report 1D	4.67 days	Fri 2/10/17	Tue 2/16/17		Brook Corbett[10%],Chris Larsen[100%],Justin Goulet[10%],Mikael Callahan[10%]	Fri 2/10/17	100%
14	✓	Create Report	3 days	Fri 2/10/17	Tue 2/14/17		Shawn-im Wu,Vortek Solutions	Fri 2/10/17	100%
15	✓	Feedback on Report 1D	40 mins	Thu 2/16/17	Thu 2/16/17		Vortek Solutions	Thu 2/16/17	100%
16	✓	Submit Report 1D	1 hr	Thu 2/16/17	Thu 2/16/17			Tue 2/16/17	100%
17	✓	JAD 2	10.58 days	Tue 2/21/17	Tue 3/7/17			Tue 2/21/17	5%
18	✓	Meeting Agenda	1 day	Tue 2/21/17	Tue 2/21/17		Justin Goulet	Tue 2/21/17	100%
19	✓	Have Meeting	1 hr	Wed 2/22/17	Wed 2/22/17		Consultation	Tue 2/21/17	100%
20	✓	Meeting Notes	2 hrs	Thu 2/23/17	Thu 2/23/17		Justin Goulet	Wed 2/22/17	100%
21	✓	Report 2D	8 days	Thu 2/23/17	Mon 2/27/17			Thu 2/23/17	100%
22	✓	Create Report	3 days	Tue 2/28/17	Tue 2/28/17		Brook Corbett[10%],Chris Larsen[100%],Justin Goulet[10%],Mikael Callahan[10%]	NA	0%
23	✓	Feedback on Report 2D	40 mins	Tue 2/28/17	Tue 2/28/17		Vortek Solutions	NA	0%
24	✓	Decision Matrix	1 hr	Tue 2/28/17	Fri 2/24/17		Shawn-im Wu,Vortek Solutions	NA	0%
25	✓	D3/D4 & Others: Conf/Features	4 hrs	Tue 2/28/17	Wed 3/1/17			NA	0%
26	✓	Live Decision Matrix	5 days	Tue 2/28/17	Tue 3/7/17			NA	0%
27	✓	Product Creation	1 day	Tue 2/28/17	Wed 3/1/17			NA	0%
28	✓	User Manual	5 days	Tue 2/28/17	Wed 3/1/17			NA	0%
29	✓	Skeleton Product	1 day	Tue 2/28/17	Tue 3/7/17			NA	0%
30	✓	Proto Type 1	15 days?	Tue 3/14/17	Wed 3/15/17			Tue 3/14/17	1%
31	✓	Meeting Agenda	1 day	Tue 3/14/17	Tue 3/14/17		Justin Goulet	Tue 3/14/17	60%
32	✓	Have Meeting	2 hrs	Wed 3/15/17	Wed 3/15/17		Consultation,Shawn-im Wu,Vortek Solutions	Tue 3/14/17	0%
33	✓	Meeting Notes	3 days	Thu 3/23/17	Wed 3/23/17		Justin Goulet,Vortek Solutions	Wed 3/15/17	99%
34	✓	Create Report	5 days	Thu 3/23/17	Tue 3/28/17		Brook Corbett[10%],Chris Larsen[100%],Justin Goulet[10%],Mikael Callahan[10%]	NA	0%
35	✓	Feedback on Report 3D	40 mins	Tue 3/20/17	Tue 3/20/17		Shawn-im Wu,Vortek Solutions	NA	0%
36	✓	Submit Report 3D	1 hr	Tue 3/20/17	Tue 3/20/17		Vortek Solutions	NA	0%
37	✓	Project	10.75 days?	Wed 3/15/17	Wed 3/29/17		Justin Goulet	NA	0%
38	✓	Working prototype of simple theme	1 day	Wed 3/15/17	Wed 3/15/17		Justin Goulet	NA	0%
39	✓	Complete code for implementing prototype	10.75 days	Wed 3/15/17	Tue 3/28/17		Mikael Callahan,Brook Corbett,Chris Larsen	NA	0%
40	✓	Initial documentation for implementing prototype	10.75 days	Wed 3/15/17	Tue 3/28/17		Brook Corbett,Chris Larsen,Mikael Callahan	NA	0%
41	✓	Proto Type 2	22.75 days?	Tue 3/14/17	Wed 3/29/17		Justin Goulet	NA	0%
42	✓	Meeting Agenda	1 day	Tue 3/14/17	Wed 3/14/17		Justin Goulet	Tue 3/14/17	0%
43	✓	Have Meeting	2 hrs	Wed 3/15/17	Wed 3/15/17		Consultation	Tue 3/14/17	0%
44	✓	Meeting Notes	8 hrs	Wed 3/15/17	Wed 3/15/17		Justin Goulet	Tue 3/14/17	0%
45	✓	Report 4D	8 days?	Thu 4/13/17	Tue 4/25/17			Wed 4/5/17	0%
46	✓	Create Report	4.75 days	Thu 4/13/17	Tue 4/18/17		Brook Corbett[10%],Chris Larsen[100%],Justin Goulet[10%],Mikael Callahan[10%]	NA	0%
47	✓	Feedback on Report 4D	40 mins	Thu 4/20/17	Tue 4/25/17		Vortek Solutions	NA	0%
48	✓	Submit Report 4D	0 hrs	Thu 4/20/17	Thu 4/20/17			NA	0%
49	✓	Project	10.75 days	Thu 4/20/17	Thu 5/4/17		Justin Goulet	NA	0%
50	✓	Updates to current Docs	10.75 days	Thu 4/20/17	Thu 5/4/17		Brook Corbett,Chris Larsen,Justin Goulet,Mikael Callahan	NA	0%
51	✓	Two or More working prototypes	10.75 days	Wed 4/19/17	Wed 5/16/17		Justin Goulet	NA	0%
52	✓	Final Report	30.75 days	Wed 4/19/17	Wed 5/16/17		Consultation,Shawn-im Wu,Vortek Solutions	Wed 4/19/17	0%
53	✓	Submit Report Paper	29.75 days	Wed 4/19/17	Tue 5/16/17		Vortek Solutions	Wed 4/19/17	0%
54	✓	Presentation	0.25 days	Tue 5/16/17	Tue 5/16/17		Vortek Solutions	Wed 4/19/17	0%
55	✓	Presentation Coaching	1.75 days	Tue 5/16/17	Wed 5/17/17		Brook Corbett[10%],Chris Larsen[100%],Justin Goulet[10%],Mikael Callahan[10%]	Tue 5/16/17	99%
56	✓	Present	0.25 days	Tue 5/16/17	Wed 5/17/17		Shawn-im Wu,Vortek Solutions	Tue 5/16/17	0%
57	✓						Vortek Solutions	Tue 5/16/17	0%
58	✓								
59	✓								
60	✓								
61	✓								
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