Project Management Resource Document - John's Move

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Cert 3 Module2 Unit 2

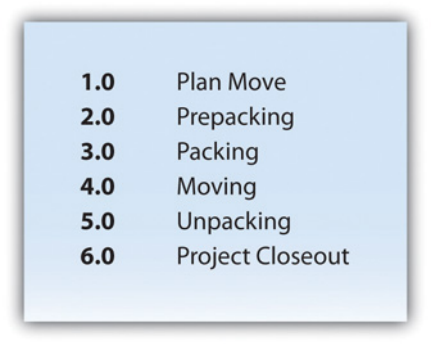
John's Move - Changing Jobs (01)

John has a small but important project. He has accepted a job in Atlanta and now has to move from Chicago to Atlanta and be there, ready to work, right after the Christmas holidays. If the furniture arrives in good condition at least two days before John starts work, and for less than Five thousand dollars, the project will be a success. The move to Chicago five years ago cost five thousand dollars, but John is smarter now and will use his friends to help, so he is confident he can stay within budget.

John's Move - Top-Level Activities in Move Planning (02)

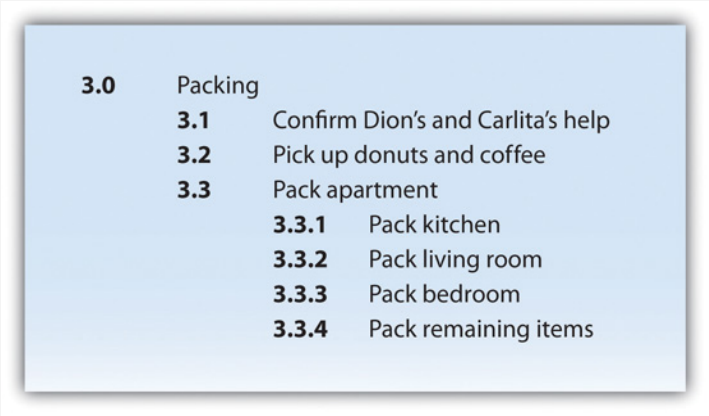
On John's move project, these top-level activities are numbered 1.0, 2.0, 3.0, and so on. For example, a plan for the move is the major deliverable from 1.0 Plan Move, as shown below.

Figure 8.3 *Top Level of WBS*



The work breakdown structure is then decomposed—broken down into smaller units. The 1.1, 1.2, and 1.3 numbers are the first subdivision of the work. For example, one of John's Summary Level Activities is Packing (3.0). Although some minor packing (delicate items: 2.4) are packed under another summary activity, 3.3 is the major packing and includes the coordination and support of labor (friends Dion and Carlita). The activity is then decomposed—separated into basic elements—to the next level by listing the individual rooms that need packed, as shown below.

Figure 8.4 *Major Activity Decomposed into Smaller Activities*

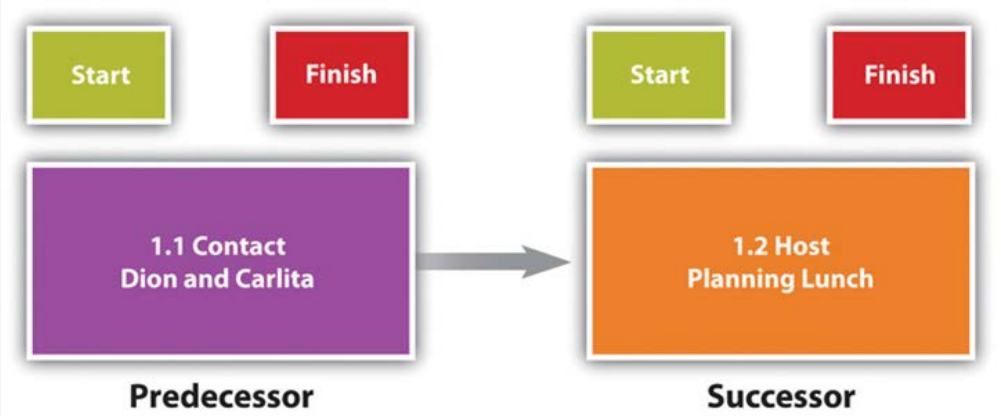


The WBS could be decomposed further to a greater level of detail by listing the tasks needed for each activity. For example activity 3.3.3, Pack Bedroom, can be decomposed into additional tasks, such as 3.3.3.1 Pack Closet, 3.3.3.2 Pack Drawers, and 3.3.3.3 Pack Blankets. This type of numbering of the activities is called intelligent numbering. In intelligent numbering, the numbering system has meaning so that a member of the project team knows something about the activity by the number of the activity. For example, any activity associated with packing begins with a 3; even picking up donuts can be an activity that supports packing. The donuts are a form of payment for the labor of Dion and Carlita.

Project Logic for John's Move (03)

In our example of John's move, contacting Dion and Carlita—activity 1.1—comes before the lunch meeting is scheduled. You must logically contact Dion and Carlita before you schedule your Host Planning Lunch—activity 1.2. Your conversation with Dion and Carlita will provide you with dates they are available and establish their commitment to help you move. Therefore, the conversation with Dion and Carlita is a predecessor to the Host Planning Lunch Activity. This relationship is diagramed below.

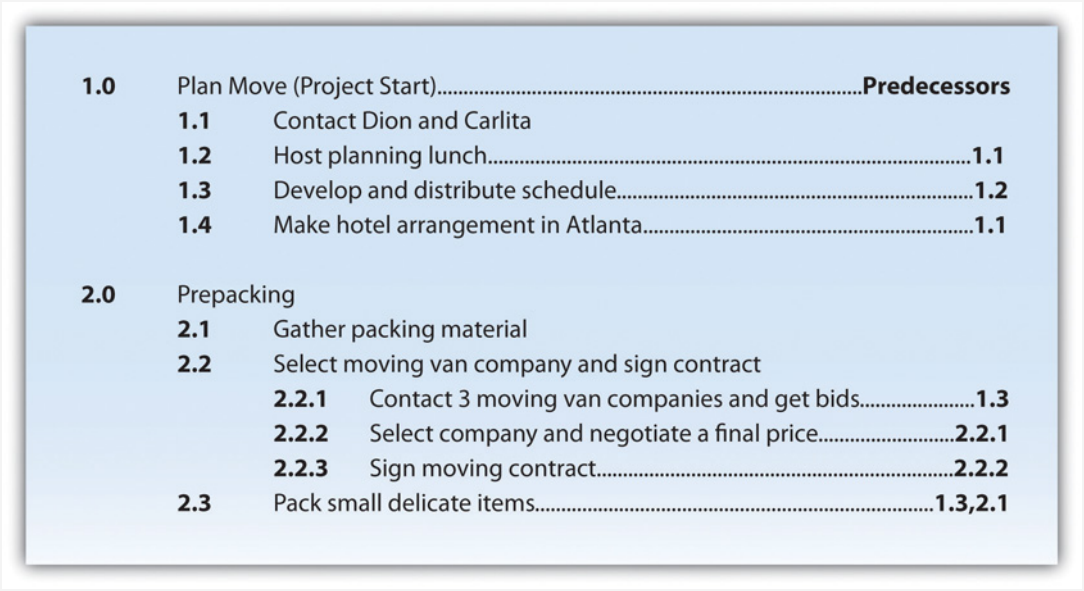
Figure 8.7 Relationship between Two Activities



Predecessor Relationships in John's Move (04)

The figure below shows the activities in John's move with the predecessors identified for the*Plan Move* and *Prepacking* groups of activities. Because the finish-start relationship is by far the most common, the type of relationship is assumed to be finish-start unless otherwise mentioned.

Figure 8.9 *Outline of Activities with Predecessors Identified*



		Predecessors
1.0	Plan Move (Project Start)	
1.1	Contact Dion and Carlita	
1.2	Host planning lunch	1.1
1.3	Develop and distribute schedule	1.2
1.4	Make hotel arrangement in Atlanta	1.1
2.0	Prepacking	
2.1	Gather packing material	
2.2	Select moving van company and sign contract	
2.2.1	Contact 3 moving van companies and get bids	1.3
2.2.2	Select company and negotiate a final price	2.2.1
2.2.3	Sign moving contract	2.2.2
2.3	Pack small delicate items	1.3,2.1

Lead Time in John's Move (05)

In John's move, you might begin separating the small and delicate items that will be packed in step 2.3 before you get the packing materials in step 2.1 so that when the materials are available, step 2.3 is already partially completed. If the preparing the small items for packing can overlap its predecessor and shortens the time it takes to accomplish both tasks by a day, it has a lead time of one day.

Cert 3 Module2 Unit 3

Forward Pass for John's Move (06)

John begins planning his move to Atlanta the same day he accepts the job. The start date in this example is Monday, November 29, 2010. Tasks 1.1 and 2.1 can both start on that day, so the early start dates for tasks 1.1 and 2.1 are November 29. John calculates the early start date for the activities. A partial list is provided below. Compare the figure below and the figure in the next sidebar. Observe that John is willing to work on weekends, but activity 2.2.3 is delayed by two days because one of the moving companies did not provide bids on the weekend. Observe that activity 2.3 has a lead time of one day, but that relationship is between activity 2.1 and 2.3. The network path from activity 1.3 is longer, so the lead time with activity 2.1 is not considered in calculating the early start date of 2.3.

Figure 8.16 *Early Start Dates Determined by a Forward Pass*

Code	Description	Predecessors	Relationships	Lead/Lag	Resources	Duration	Early Start Date
1.1	Contact Dion and Carlita	None		0	J,D,C .25 hr each	2 d	11/29
1.2	Host planning lunch	1.1	FS (Finish/Start)	0	J,D,C 2 hr each	1 d	12/1
1.3	Develop and distribute schedule	1.2	FS	0	J 2 hr	1 d	12/2
1.4	Make hotel arrangement in Atlanta	1.1	FS	0	J .5 hr	1 d	11/30
2.1	Gather packing material	None		0	D 2 hr	1 d	11/29
2.2.1	Contact van companies and get 3 bids	1.3	FS			2 d	12/3
2.2.2	Select company and get final price	2.2.1	FS	0	J .5 hr	1 d	12/7
2.2.3	Sign moving contract	2.2.2	FS			1 d	12/8
2.3	Pack small and delicate items	1.3 2.1	FS FS	-1	C 6 hr	1 d	12/3

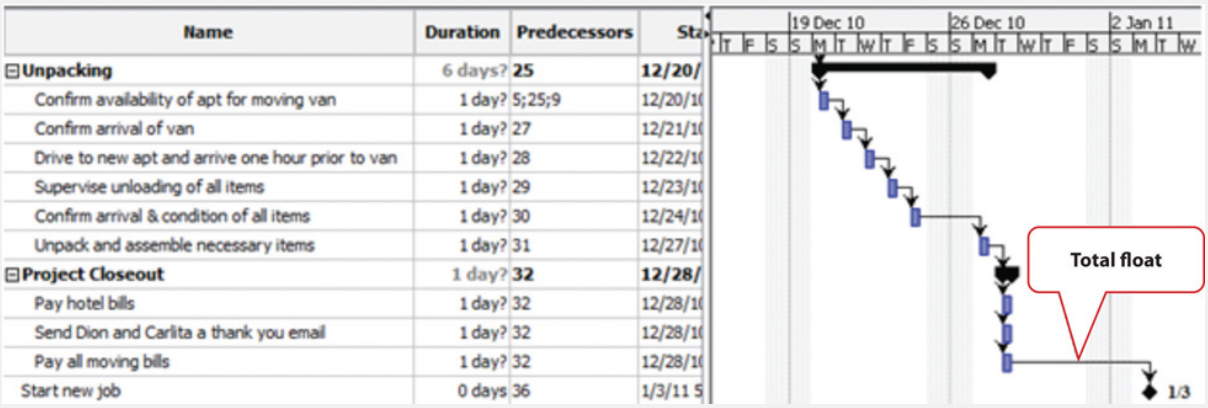
Start date delayed by nonworking weekend

Lead time does not apply to path from task 1.3, which is longer

Float in John's Move (07)

The last activity in John's move has an early start date of December 28 and a duration of one day. John could start work on Wednesday, December 29. John's first day at work is Monday, January 3, so the project has a total float of five days.

Figure 8.17Total Project Float



Cert 3 Module 3 Unit 1

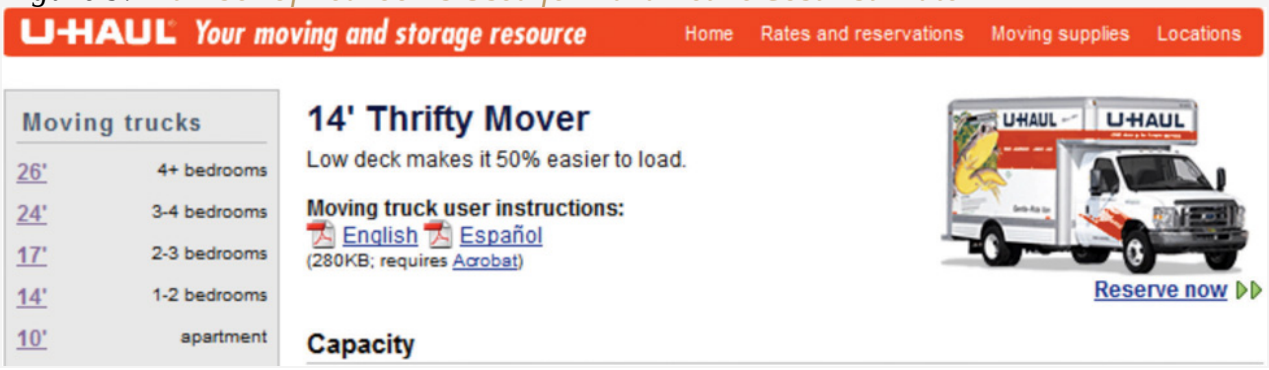
Analogous Estimate for John's Move (08)

In the John's move example, John asked a friend for advice about the cost of his move. His friend replied, "I moved from an apartment a little smaller than yours last year and the distance was about the same. I did it with a fourteen-foot truck. It cost about $575 for the truck rental, pads, hand truck, rope, boxes, and gas." Because of the similarity of the projects, John's initial estimate of the cost of the move was less than $700 and he decided that the cost would be affordable and the project could go forward.

Parametric Estimate for John's Move (09)

To estimate the size of the truck needed for John's move, the parameter used by a truck rental company is the number of bedrooms, as shown below.

Figure 9.1Number of Bedrooms Used for Parametric Cost Estimate



Estimate During the Initiation Phase of John's Move (10)

John recalled that his friend also told him how tiring it was to do all the packing, loading, and driving himself, and some items were damaged when the load shifted inside the truck during the trip. John decides to call in favors from two friends, Dion and Carlita, to help him pack in Chicago and to hire some of the skilled labor like that needed to load the truck properly.

Using RFPs to Make Estimates on John's Move (11)

John wants to find out how much it would cost to hire a skilled crew to load and secure the furniture in the truck and then have another crew from the same company meet him in Atlanta to unload the truck and help him unpack. He is not sure if any companies offer this option, so he decides to ask three moving companies for bids. He also decides to ask for bids on a standard move that includes all phases of packing, loading, transportation, and unloading as a comparison to see if his cost-saving plan is worth the extra effort.

Bottom-Up Estimate for John's Move (12)

After evaluating the bids by the moving companies, John decides the savings are worth his time if he can get the packing done with the help of his friends. He decides to prepare a detailed estimate of costs for packing materials and use of a rental truck. He looks up the prices for packing materials and truck rental costs on company Web sites and prepares a detailed list of items, quantities, and costs, as shown below.

Figure 9.2 *Detailed Cost Estimate*

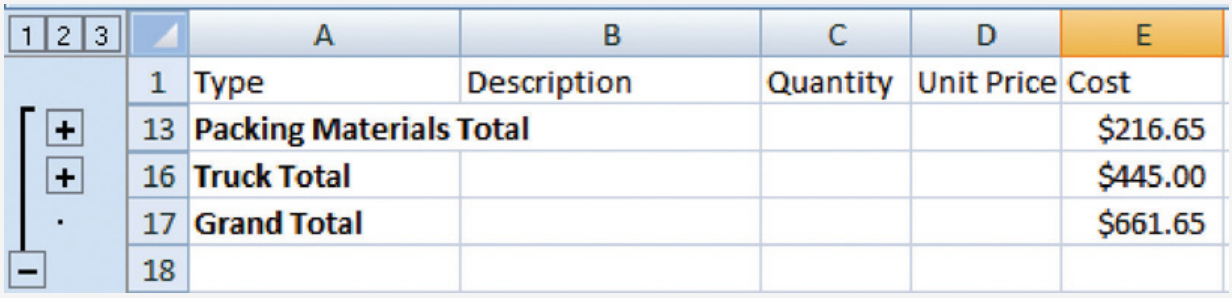
Category	Description	Quantity	Unit Price	Cost
Packing Materials	Small Boxes	10	$1.70	$17.00
Packing Materials	Medium Boxes	15	$2.35	$35.25
Packing Materials	Large Boxes	7	$3.00	$21.00
Packing Materials	Extra Large Boxes	7	$3.75	$26.25
Packing Materials	Short Hanger Boxes	3	$7.95	$23.85
Packing Materials	Box Tape	2	$3.85	$7.70
Packing Materials	Markers	2	$1.50	$3.00
Packing Materials	Mattress/Spring Bags	2	$2.95	$5.90
Packing Materials	Lift Straps per Pair	1	$24.95	$24.95
Packing Materials	Bubble Wrap	1	$19.95	$19.95
Packing Materials	Furniture Pads	4	$7.95	$31.80
Truck	Rental			$400.00
Truck	Gas at 10mpg	200	$2.25	$45.00

This type of estimate is typically more accurate than an analogous or parametric estimate. In this example, the sum of packing materials and truck expenses is estimated to be $661.25.

Rolling Up a Detailed Cost Estimate for John's Move (13)

For example, the subtotal feature could be used in Excel and collapsed to show the subtotals for the two categories of costs, as shown below.

Figure 9.3 *Sum of Detailed Costs by Type*



	A	B	C	D	E
1	Type	Description	Quantity	Unit Price	Cost
13	**Packing Materials Total**				$216.65
16	**Truck Total**				$445.00
17	**Grand Total**				$661.65
18					

Cert 3 Module 03 Unit 02

Reporting Budget Progress on John's Move (14)

In the John's move example, he estimated that the move would cost about $1,500 and take about sixteen days. Eight days into the project, John has spent $300. John tells his friends that the project is going well because he is halfway through the project but has only spent a fifth of his budget. John's friend Carlita points out that his report is not sufficient because he did not compare the amount spent to the budgeted amount for the activities that should be done by the eighth day.

Planned Value on Day Six of John's Move (15)

On day six of the project, John should have taken his friends to lunch and purchased the packing materials. The portion of the BCWS that should have been done by that date (the planned value) is listed in Figure 9.6 "Planned Value for Lunch and Packing Materials". This is the planned value for day six of the project.

Figure 9.6 *Planned Value for Lunch and Packing Materials*

Description	Quantity	Cost
Lunch	3	$45.00
Small Boxes	10	$17.00
Medium Boxes	15	$35.25
Large Boxes	7	$21.00
Extra Large Boxes	7	$26.25
Short Hanger Boxes	3	$23.85
Box Tape	2	$7.70
Markers	2	$3.00
Mattress/Spring Bags	2	$5.90
Lift Straps per Pair	1	$24.95
Bubble Wrap	1	$19.95
Furniture Pads	4	$31.80
	Total	$261.65

Comparing PV, EV, and AC in John's Move on Day Six (16)

Dion and Carlita were both trying to lose weight and just wanted a nice salad. Consequently, the lunch cost less than expected. John makes a stop at a store that sells moving supplies at discount rates. They do not have all the items he needs, but the prices are lower than those quoted by the moving company. They have a very good price on lifting straps so he decides to buy an extra pair. He returns with some of the items on his list, but this phase of the job is not complete by the end of day six. John bought half of the small boxes, all of five other items, twice as many lifting straps, and none of four other items. John is only six days into his project, and his costs and performance are starting to vary from the plan. Earned value analysis gives us a method for reporting that progress. Refer to the figure below.

Figure 9.7Planned Value, Earned Value, and Actual Cost

Project Earned Value Analysis—Day 6						
	Budgeted Cost of Work Scheduled (BCWS)		Budgeted Cost of Work Performed (BCWP)		Actual Cost (AC)	
Description	Quantity	Cost	Quantity	Cost	Quantity	Cost
Lunch	3	$45.00	3	$45.00	3	$35.00
Small Boxes	10	$7.00	5	$8.50	5	$9.50
Medium Boxes	15	$35.25	15	$35.25	15	$28.00
Large Boxes	7	$21.00				
Extra Large Boxes	7	$26.25				
Short Hanger Boxes	3	$23.85				
Box Tape	2	$7.70	2	$7.70	2	$5.50
Markers	2	$3.00	2	$3.00	2	$2.00
Mattress/Spring Bags	2	$5.90	2	$5.90	2	$7.50
Lift Straps per Pair	1	$24.95	1	$24.95	2	$38.50
Bubble Wrap	1	$19.95				
Furniture Pads	4	$31.80	4	$31.80	4	$28.50
	PV	$261.65	EV	$162.10	AC	$154.50

The original schedule called for spending $261.65 (PV) by day six. The amount of work done was worth $162.10 (EV) according to the estimates, but the actual cost was only $154.50 (AC).

Schedule Variance on John's Move (17)

Planning for John's move calls for spending $261.65 by day six, which is the planned value (PV). The difference between the planned value and the earned value is the scheduled variance (SV). The formula is SV = EV − PV. In this example, SV = $162.10 − $261.65 = $(99.55) A negative SV indicates the project is behind schedule.

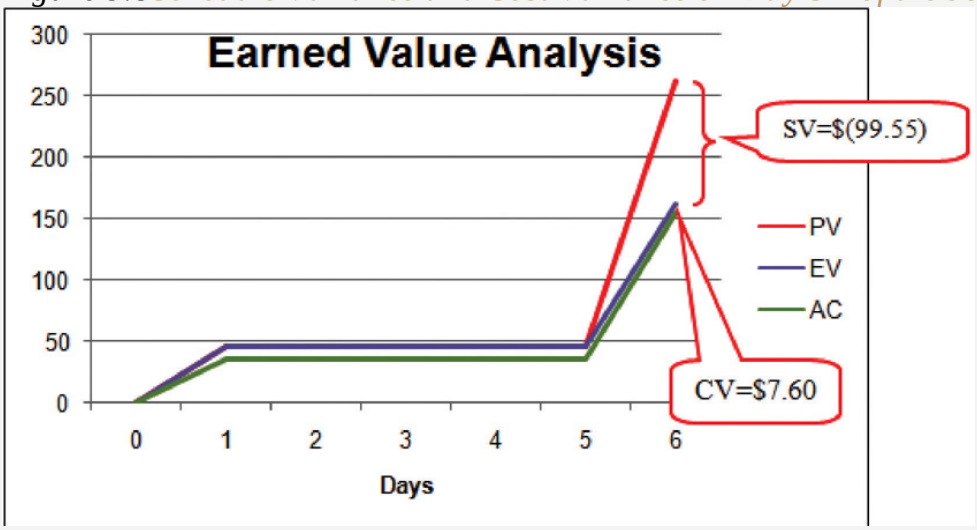
Cost Variance on John's Move (18)

The difference between the earned value of $162.10 and the actual cost of $154.50 is the cost variance (CV). The formula is CV = EV − AC. In this example, CV = $162.10 − $154.50 = $7.60.

Cost Performance Index of John's Move (19)

In the John's move example, CPI = $162.10/$154.50 = 1.05 A value greater than 1 indicates the project is under budget.

Figure 9.8 *Schedule Variance and Cost Variance on Day Six of the John's Move Project*



The cost variance of positive $7.60 and the CPI value of 1.05 tell John that he is getting more value for his money than planned for the tasks scheduled by day six. The schedule variance (SV) of negative $99.55 and the schedule performance index (SPI) of 0.62 tell him that he is behind schedule in adding value to the project.

Estimate to Complete John's Move (20)

In John's move, John was able to buy most of the items at a discount house that did not have a complete inventory and, he chose to buy an extra pair of lift straps. He knows that the planned values for packing materials were obtained from the price list at the moving company where he will have to buy the rest of the items, so those two factors are not likely to be typical of the remaining purchases. The reduced cost of lunch is unrelated to the future costs of packing materials, truck rentals, and hotel fees. John decides that the factors that caused the variances are atypical. He calculates that the estimate to complete (ETC) is the budget at completion ($1,534) minus the earned value at that point ($162.10), which equals $1,371.90. Expressed as a formula, ETC = $1,534 – $162.10 = $1,371.90.

Estimate at Completion for John's Move (21)

The revised estimate at completion (EAC) for John's move at this point in the process is EAC = $154.50 + $1,371.90 = $1,526.40.

Cert 04 Module 01 Unit 01

Quality of Furniture Packing in John's Move (22)

John has antique furniture that is in excellent condition that was left to him by his grandmother. The pieces are important to John for sentimental reasons and they are also valuable. John decides to hire movers (high-grade professionals) to load his furniture into the truck using appropriate padding and restraints to prevent dents and scratches during the long trip to Atlanta and then to unload the truck in Atlanta. John's standard for high quality is that no observable damage occurs to his large pieces of furniture, especially the antiques. If the furniture arrives in his new apartment without a single dent, scratch, or other damage, the activity will be of high quality.

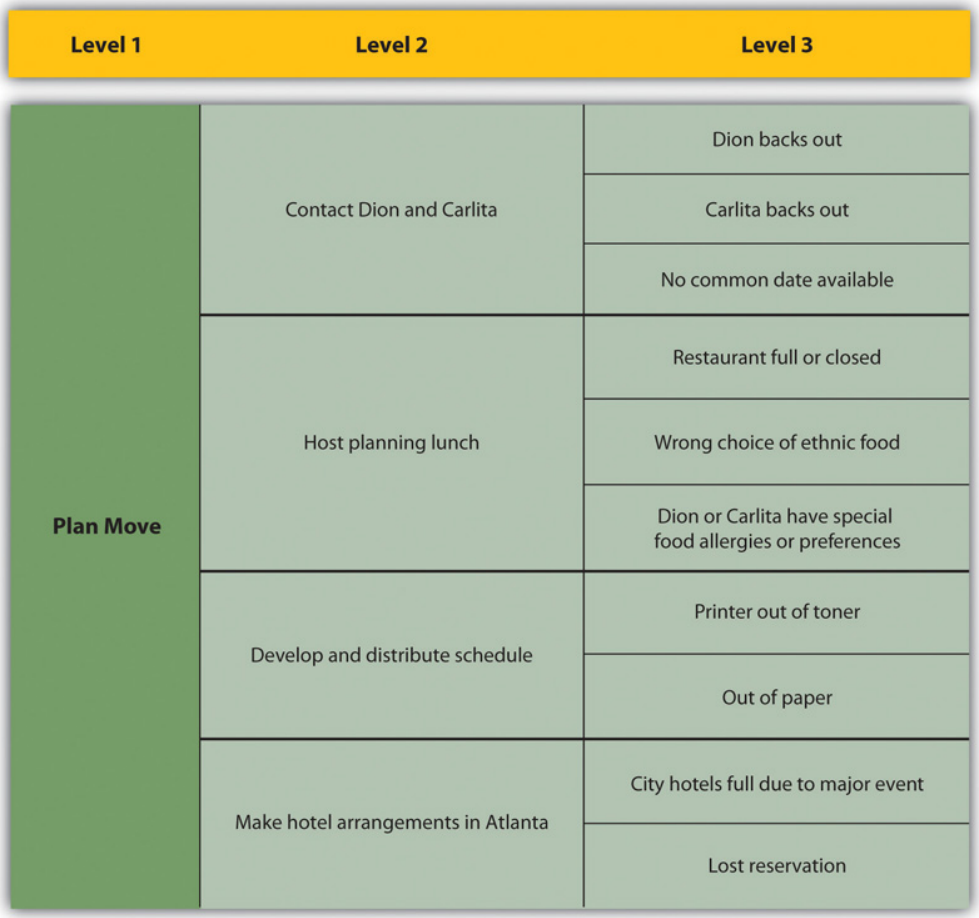
John's standard for packing his kitchen is lower. His dishes are old and cheap, so he decides to trust his inexperienced friends (low-grade amateurs) to help him pack his kitchen. If a few of the dishes or glassware are chipped or broken in the process, the savings in labor cost will more than make up for the loss, and the dishes can be easily replaced. If John has a few chipped dishes and a broken glass or two by the time he is unpacked in Atlanta, he will consider the kitchen packing to be of high quality.

Cert 04 Module 02 Unit 02

Risks in John's Move (23)

In John's move, John makes a list of things that might go wrong with his project and uses his work breakdown structure as a guide. A partial list for the planning portion of the RBS is shown below.

Figure 11.1Risk Breakdown Structure (RBS)



Cert 04 Module 02 Unit 03

Risks by Phase in John's Move (24)

In the initiation phase of John's move, John considers the risk of events that could affect the whole project. He identifies the following risks during the initiation phase that might have a high impact and rates the likelihood of their happening from low to high.

1. His new employer might change his mind and take back the job offer after he's given notice at his old job: Low.
2. The current tenants of his apartment might not move out in time for him to move in by the first day of work at the new job: Medium.
3. The movers might lose his furniture: Low.
4. The movers might be more than a week late delivering his furniture: Medium.
5. He might get in an accident driving from Chicago to Atlanta and miss starting his job: Low.

John considers how to mitigate each of the risks.

1. During his job hunt, John had more than one offer, and he is confident that he could get another job, but he might lose deposit money on the apartment and the mover. He would also lose wages during the time it took to find the other job. To mitigate the risk of his new employer changing his mind, John makes sure that he keeps his relationships with his alternate employers cordial and writes to each of them thanking for their consideration in his recent interviews.
2. John checks the market in Atlanta to determine the weekly cost and availability of extended-stay motels.
3. John checks the mover's contract to confirm that they carry insurance against lost items, but they require the owner to provide a detailed list with value estimates and they limit the maximum total value. John decides to go through his apartment with his digital camera and take pictures of all of his possessions that will be shipped by truck and to keep the camera with him during the move so he has a visual record and won't have to rely on his memory to make a list. He seals and numbers the boxes so he can tell if a box is missing.

4. If the movers are late, John can use his research on extended-stay motels to calculate how much it would cost. He checks the moving company's contract to see if they compensate the owner for late delivery, and he finds that they do not.
5. John checks the estimated driving time from Chicago to Atlanta using an Internet mapping service and gets an estimate of eleven hours of driving time. He decides that it would be too risky to attempt to make the drive by himself in one day, especially if he didn't leave until after the truck was packed. John plans to spend one night on the road in a motel to reduce the risk of an accident caused by driving while too tired.

John concludes that the high-impact risks can be mitigated and the costs from the mitigation would be acceptable in order to get a new job.

Risk Breakdown Structure for John's Move (25)

John decides to ask Dion and Carlita for their help during their first planning meeting to identify risks, rate their impact and likelihood, and suggest mitigation plans. They concentrate on the packing phase of the move. They fill out a table of risks, as shown below.

Figure 11.5 Risk Breakdown Structure (RBS) for Packing John's Apartment

Legend:
RA: Risk Avoidance RS: Risk Sharing RR: Risk Reduction RT: Risk Transfer

Level 1	Level 2	Level 3—Risks	Mitigation
Packing	Pack Kitchen	Cuts from handling sharp knives	Buy small boxes for packing knives (RR)
		Cuts from cracked glasses that break while being packed	Discard cracked glasses (RA)
		Transporting alcoholic beverages	Give opened bottles to Dion or Carlita (RA)
	Pack Living Room	Damage to antique furniture	Supervise wrapping and loading personally (RR) and require movers to insure against damage (RT)
		Lose parts while taking apart the entertainment center	Buy box of large freezer bags with a marker to bag and label parts (RR)
		Break most valuable electronics—TV, DVD, Tuner, Speakers	Buy boxes of the right size with sufficient bubble wrap (RR)
	Pack Bedroom	Break large mirror	Buy or rent a mirror-box with Styrofoam blocks at each corner (RR)
		Lose prescription drugs or pack them where they cannot be found quickly	Separate prescription drugs for transportation in the car (RA)
	Pack Remaining Items	Damage to house plants	Ask Carlita to care for them and bring them with her in her van when she visits in exchange for half of them (RS)
		Transportation of flammable liquids from charcoal grill	Give to Dion or Carlita and buy replacements in Atlanta (RA)

Risk Closeout on John's Move (26)

To close out the risk mitigation plan for John's move, John examines the risk breakdown structure and risk mitigation plan for items that need to be finalized. He makes a checklist to be sure all the risk mitigation plans are completed, as shown below.

Figure 11.6Closeout of Risk Mitigation Plan for John's Move

Risk	Mitigation	Closeout
Items lost by movers	Mover's insurance plus digital image inventory	Confirm all of the numbered boxes are present and still sealed
Antique furniture damaged	Mover's insurance plus personal supervision of wrapping and loading	Supervise unloading and unwrapping; visually inspect each piece
House plants	Ask Carlita to bring half of them in her van when she visits	Confirm that the plants are healthy and that Carlita brought about half of them

John's Move Budgeting Example terms and calculations

Term	Acronym	Description	Formula	John's Move
Actual Cost	AC	The money actually spent on projects up to the present		$154.50
Budget at Completion	BAC	Original budget for the project (same as BCWS)		$1,534.00
Cost Performance Index	CPI	Ratio of earned value to actual cost	CPI = EV / AC	1.05
Cost Variance	CV	Difference between earned value and actual cost	CV = EV - AC	$7.60
Earned Value	EV	Sum of estimates for work actually done up to the present		$162.10
Estimate at Completion	EAC	Revised estimate of total project cost	EAC = AC + ETC	$1,526.40
Estimate to Complete	ETC	Money to complete the project if early cost variance is atypical	ETC = BAC - EV	$1,371.90
Estimate to Complete	ETC	Money to complete the project if early cost variance is typical	ETC = (8AC - EV) / CPI	N/A
Planned Value	PV	Sum of the estimates for work done up to the present		$261.65
Schedule Performance Index	SP1	Ratio of earned value to planned value	SPI = EV / PV	0.62
Schedule Variance	SV	Difference between earned value and planned value	SV = EV - PV	$(99.55)

Quality of Gasoline Grades

Cert 4 Module 1 Unit 1

Quality of Gasoline Grades (01)

Petroleum refiners provide gasoline in several different grades based on the octane rating because higher octane ratings are suitable for higher compression engines. Gasoline must not be contaminated with dirt or water, and the actual performance of the fuel must be close to its octane rating. A shipment of low-grade gasoline graded as 87 octane that is free of water or other contaminants would be of high quality, while a shipment of high grade 93 octane gas that is contaminated with dirt would be of low quality.

Setting Control Limits in Gasoline Production (02)

A petroleum refinery produces large quantities of fuel in several grades. Samples of the fuels are extracted and measured at regular intervals. If a fuel is supposed to have an 87 octane performance, samples of the fuel should produce test results that are close to that value. Many of the samples will have scores that are different from 87. The differences are due to random factors that are difficult or expensive to control. Most of the samples should be close to the 87 rating and none of them should be too far off. The manufacturer has grades of 85 and 89, so they decide that none of the samples of the 87 octane fuel should be less than 86 or higher than 88.

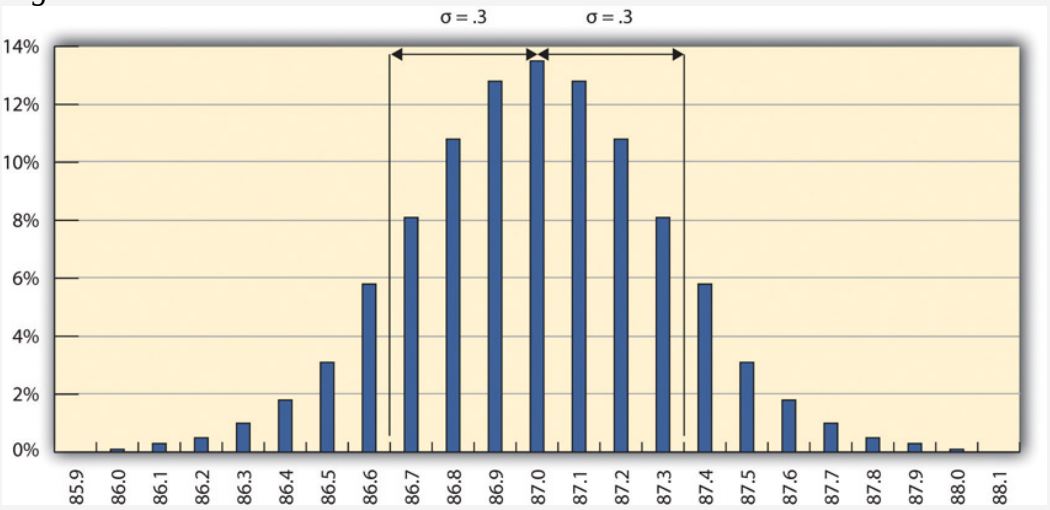
Normal Distribution of Gasoline Samples (03)

A refinery's quality control manager measures many samples of 87 octane gasoline, sorts the measurements by their octane rating into bins that are 0.1 octane wide, and then counts the number of measurements in each bin. Then she creates a frequency distribution chart of the data, as shown in Figure 10.1 "Normal Distribution of Measurements of Gasoline Samples".

Standard Deviation of Gasoline Samples (04)

The refinery's quality control manager uses the standard deviation function in his spreadsheet program to find the standard deviation of the sample measurements and finds that for his data, the standard deviation is 0.3 octane. She marks the range on the frequency distribution chart to show the values that fall within one sigma (standard deviation) on either side of the mean. See the figure below.

Figure 10.2

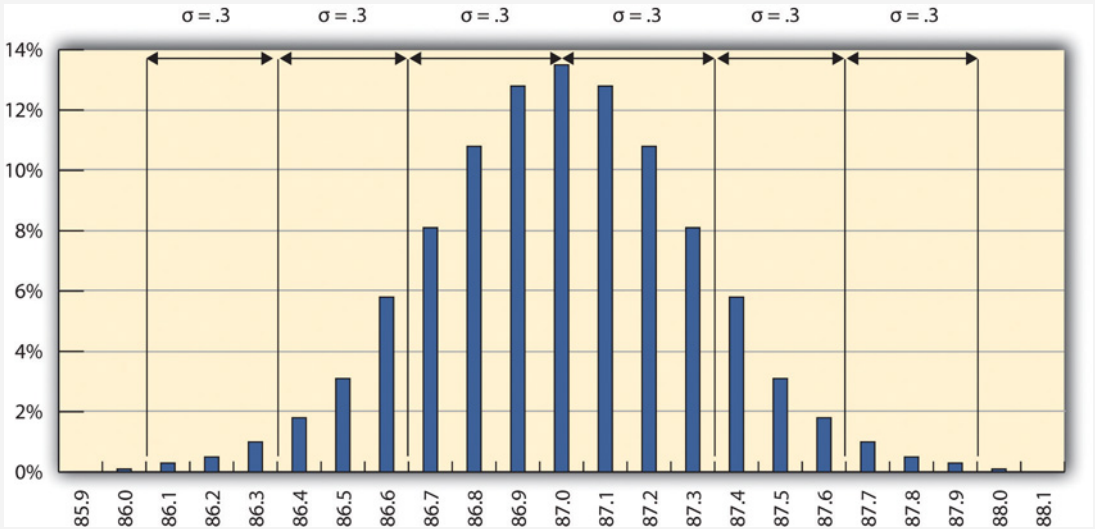


Most of the measurements are within 0.3 octane of 87.

Almost All Samples of Gasoline are Within Three STD (05)

The refinery's quality control manager marks the ranges included within two and three standard deviations, as shown below.

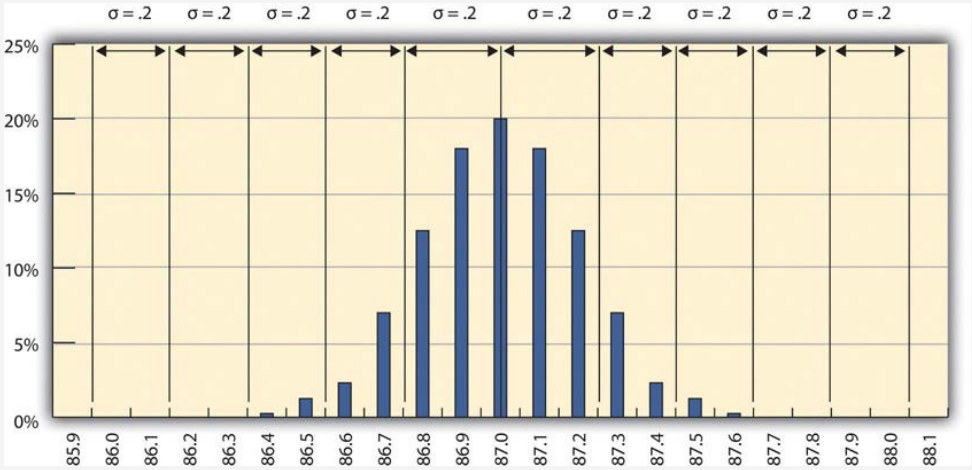
Figure 10.3 The 68-95-99.7 Rule



A Step Project Improves Quality of Gasoline (06)

A new refinery process is installed that produces fuels with less variability. The refinery's quality control manager takes a new set of samples and charts a new frequency distribution diagram, as shown below.

Figure 10.5 Smaller Standard Deviation



The refinery's quality control manager calculates that the new standard deviation is 0.2 octane. From this, he can use the 68-95-99.7 rule to estimate that 68.3 percent of the fuel produced will be between 86.8 and 87.2 and that 99.7 percent will be between 86.4 and 87.6 octane. A shorthand way of describing this amount of control is to say that it is a five-sigma production system, which refers to the five standard deviations between the mean and the control limit on each side

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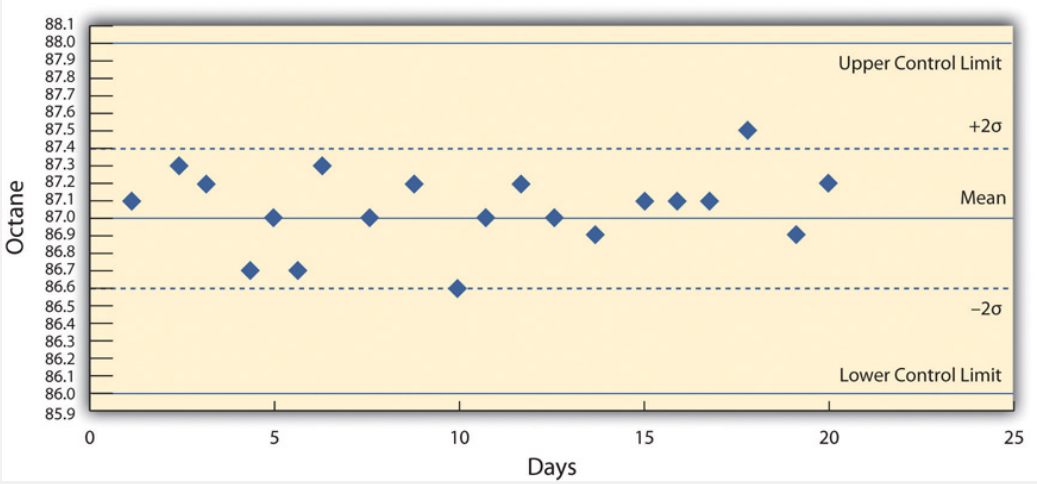
Control Chart Shows Production Variation of Gasoline (07)

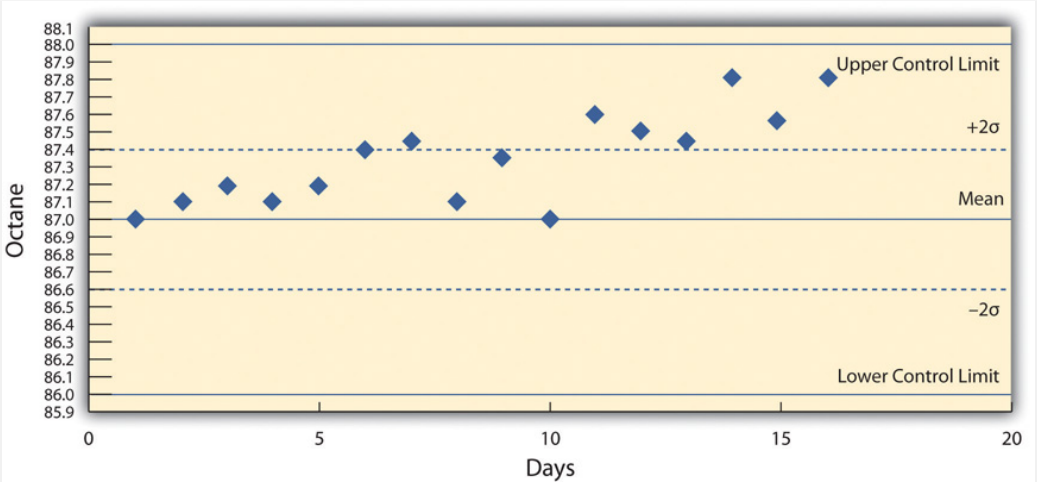
The refinery quality control manager takes samples each day of the 87 octane gasoline for twenty days and charts the data on a control chart, as shown below.

Figure 10.6 *Control Chart Displaying Variations Due to Chance Causes*



She recognizes that the highest and lowest measurements are not part of a trend and are probably due to chance causes. However, the control chart from the next twenty days, as shown below, indicates an upward trend that might be due to an assignable cause. She alerts the process manager to let him know that there is a problem that needs to be fixed before the product exceeds the upper control limit. This might indicate the need to initiate a project to fix the problem.

Figure 10.7 *Control Chart Displaying Variations That Might Be Due to an Assignable Cause*



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Tolerance in Gasoline Production (08)

The petroleum refinery chose to set its control limits for 87 octane gasoline at 86 and 88 octane. The tolerance is 87 ± 1.