CP1402/CP5631 - Procurement

The Weighted Decision Matrix

A weighted decision matrix (WDM) is a decision making tool that is used to compare similar items and pick the option that is best suited to the situation. Let's say you want to buy two toasters; one for home, one for work (because you're a nice person). It's very possible that you'd buy two different products instead of the same model because the scenarios are different. You may want something fancy for home use for a luxurious toasting experience, but only a cheap-and-easy toast at work.

The weighted decision matrix basically gives each product a score that changes, based on how the product meets the requirements of the specific situation.

To follow on with the toast example, a WDM will be constructed to choose between two products: the 'Mr Burny' budget toaster, and the more expensive and elegant 'Le Bistro'. The situation in this case will be for home use.

Step 1 - Identify Requirements

Firstly, you need to know what aspects you're looking for when you make your decision. These factors will vary in accordance with situation, type of product, etc. Just write down feature of the product that may influence your decision. Cost is almost always a factor that needs to be considered, but that doesn't mean it's the most important.

The first step is to make a list of these requirements that cater to the current situation.

Example

Requirement	**Description**
Cost	Price is less than $100
Function 1	Crumpet mode
Function 2	Four toasting slots
Cabling	Long power cable >2m
Visual	Chrome finish

Step 2 - Establish Importance of Requirements

Not all requirements are made equal. This step assigns a value of importance to each requirement for the specific situation. The **"weight"** of each requirement is a numerical value.

A good rule of thumb is to use odd values (and zero) up to 5 to describe the importance of the requirement. The higher the number, the more important the requirement is.

0	The requirement does not apply to this scenario

1	The requirement is not very important
3	The requirement must be met
5	The requirement is critical

Example

We're buying a toaster for home use, where money is not an object and luxury reigns supreme. (Weightings have been exaggerated to prove a point)

Requirement	**Description**	**Weight**
Cost	Price is less than $100	1
Function 1	Crumpet mode	3
Function 2	Four toasting slots	5
Cabling	Long power cable	0
Visual	Chrome finish	3

The power cable may be important in the workplace, but it does not matter at home.

Step 3 - Assess the Options

Now we assess each item to see how well it meets our requirements by giving it a **score**. Just like the priority value, the score is an arbitrary numerical value.

For scoring, it's good to stick to even numbers to avoid confusion with priority values. We'll be using scoring values between 0 and 6.

0	The requirement isn't met at all
2	The requirement is partially met, but not completely
4	The requirement has been met
6	The item exceeds the requirement

Example

Requirement	Cost	Function 1	Function 2	Cabling	Visual
Description	< $100	Crumpet mode	>= 4 slots	<3m cable	Chrome finish
Weight	1	3	5	0	3
Score - Burny	6	0	2	4	0

Score - Bistro	4	4	4	2	4

Step 4 - Calculate Scores

The score for each requirement is multiplied by its weight to find the '**weighted score**'. The total of this field indicates the overall performance of the product, based on our needs.

Example

Requirement	Cost	Function 1	Function 2	Cabling	Visual	Total Weighted Score
Description	< $100	Crumpet mode	>= 4 slots	<3m cable	Chrome finish	
Weight	1	3	5	0	3	
Score - Burny	6	0	2	4	0	
Weighted score	6	0	10	0	0	**16**
Score - Bistro	4	4	4	2	4	
Weighted score	4	12	20	0	12	**48**

Example: Le Bistro

Total weighted score = $(\text{weight}_1 \times \text{score}_1) + (\text{weight}_2 \times \text{score}_2) + \ldots$

Total weighted score = $(\text{weight}_{\text{cost}} \times \text{score}_{\text{cost}}) + (\text{weight}_{\text{function 1}} \times \text{score}_{\text{function 1}}) + \ldots$

Total weighted score = $(1 \times 4) + (3 \times 4) + (5 \times 4) + (0 \times 2) + (3 \times 4)$

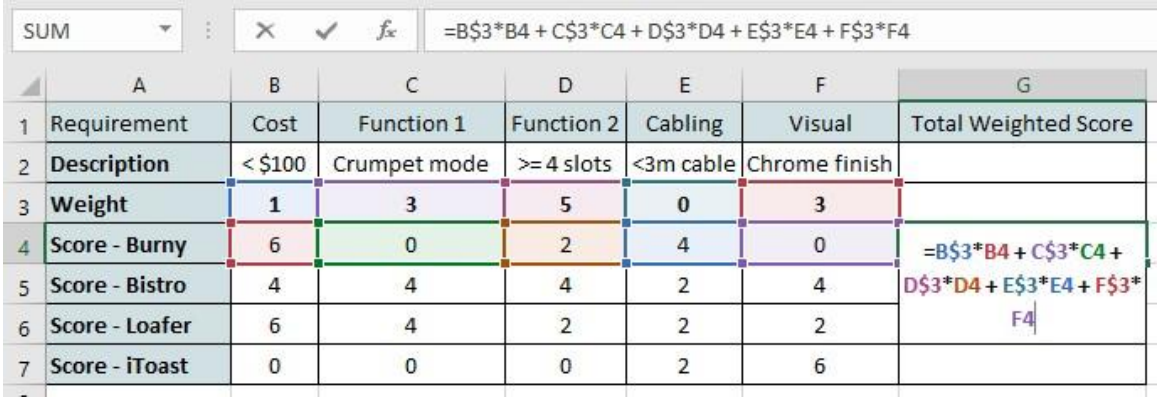
Total weighted score = 4 + 12 + 20 + 0 + 12 Total weighted score = 48

The product with the highest score wins, making Le Bistro the victor.

Of course, we can use IT so we don't have to do the calculations by hand. Let's add some more toasters and use a spreadsheet, Excel or Google Sheets, to do the calculations.

We can use the formula below to calculate the weighted score for *Mr. Burny*, and then use the **fill down** (Ctrl+D) operation to copy it to the other cells. The $ notation makes sure the weights always come from row 3.

= B$3*B4 + C$3*C4 + C$3*C4 + D$3*D4 + E$3*E4 + F$3*F4



This example is available on LearnJCU as an Excel file.

Requirement	Cost	Function 1	Function 2	Cabling	Visual	Total Weighted Score
Description	< $100	Crumpet mode	>= 4 slots	<3m cable	Chrome finish	
Weight	**1**	**3**	**5**	**0**	**3**	
Score - Burny	6	0	2	4	0	16
Score - Bistro	4	4	4	2	4	60
Score - Loafer	6	4	2	2	2	46
Score - iToast	0	0	0	2	6	18

Networking Example 1

Picture this scenario: You work in an office where the old network switch has just died (it happens). As the resident IT expert, your boss says the company can spare $600 for a new switch or switches , but would prefer something under the $300 mark. The new hardware must be able to support your office of 39 computers and one server. Also as the resident IT expert, other employees often complain to you that copying files across the server takes too long (the old switch used 100Mbit ports). If you could also speed up the network while you're at it, that'd be great.

Don't worry about managed vs. unmanaged switches for this case.

1) Requirements:
    a. Cost **under** $600
    b. Cost **under** $300
    c. **Minimum** of 40 ports
    d. **Faster than** 100Mbit ports (Gigabit)
    e. Managed/unmanaged (not needed, but we show that we thought about it)

2) Importance:
    a. Cost **under** $600 – 5 - critical
    b. Cost **under** $300 – 3 - important
    c. **Minimum** of 40 ports – 5 - critical
    d. **Faster than** 100Mbit ports (Gigabit) – 1 not very important
    e. Managed/unmanaged – 0 – not important

3) Assessing the options:

    There are many brands that manufacture switches with literally hundreds of models out there. For the sake of this example, let's narrow it down to 3. Because we need at least 40 ports, we double up on two of the models. See the table below for their summarised information:

Model	No. Ports	Speed (Mbps)	Cost ($)	Managed?
Cisco SF 300-24 x 2	24 x 2 = 48	100	259.00 x 2 = 518.00	Yes
Dlink DGS-1210-52	48 + 4 SFP	1000	495.00	No
Netgear JGS524AU x 2	24 x 2 = 48	1000	152.00 x 2 = 304.00	No

Task 1 - Complete the above example

1. Create the matrix in a new Excel spreadsheet
2. Assign scores for each of the criteria, as per the toaster example.
3. Fill in the formulas to calculate the weighted scores.
4. Check with your prac supervisor to see that completed the task successfully.

Networking Example 2

You've been hired as a networking consultant for a small business firm. So far, the business has been operating out of a single office, using a chain of Ethernet hubs to connect 20 computers and a single server. The current network is plagued by congestion issues, which is drastically decreasing the company's performance and office morale. The business also has plans to expand its operations by leasing out another office across town and hiring more staff. Seeing the expansion as a convenient time for a network overhaul, the task falls to you to network the two offices together and support the new offices.

After the expansion, there are two offices: A and B. They have the following structures:

- Office A (new):
  - Floor 1: 12 computers + 2 file servers ○ Floor 2: 28 computers
- Office B (old):
  - Floor 1: 20 computers + 1 server

Office A will be getting completely new computers with Gigabit NICs. Office B will continue to use its existing hardware, which **contain only 100 Mbit NICs**.

Each office requires switches to connect the local network, plus a router to link the two offices together.

Task 2

- You have a maximum of $3000
- Use Google to find three router models to compare, and **three** switch models to compare. We're looking for **enterprise equipment** not home or gaming models. You can start looking at http://www.umart.com.au if you want
- Prepare weighted decision matrices to compare the models. Note that it may be more economical to use multiple switches in an office, rather than choose a switch with a high number of ports.
- Make the network as fast as possible without going over budget.

Assignment

Part 3 of your assignment requires you to procure routers, switches, and wireless access points for a site given in the scenario. You are expected to compare four models for each of the three types of devices and use well-justified attributes for your WDMs. Make sure to consider the number of workstations at the procurement site to determine the specifications required.

Use the time you have left to brainstorm the different attributes you should consider for your WDMs and begin researching router, switch, and access point models. For enterprise routers and switches, Cisco, Juniper, and HPE are good vendors to look into. You may wish to take into account speed metrics like throughput, number of ports, security features etc. and should justify the attributes that you choose. **This is NOT a group task**. You may discuss

the assignment generally with your fellow students, but you may not work together on the specifics of this task, or show your work to others.