METHODOLOGICAL FRAMEWORK

LINKING CAREER LADDERS FOR CONNECTICUT'S TOP 100 GREEN JOBS

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COMPETITIVENESS

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GETTING STARTED

Before you start this process there are a few things you should know.

1. This is a multi-stage process that requires a fair amount of downloading, saving, calculating and repasting of data. You will not be able to complete the whole process in one sitting. It is recommended that you break the task out over several 2 to 3-hour increments.
2. Before you start, please determine where your files will be saved. At some stages, the files will need to "communicate" with each other through links. In these cases, your process could be slowed if the files are in different file locations (say one on your internal organizational drive and the other on your desktop).

GATHERING DATA FROM ROOT SOURCES

INITIAL DATA COLLECTION

Step 1: Identify Your Green Sectors

- TPMA referenced the green economy sectors identified by O*NET. These included:
  - Agriculture & Forestry
  - Energy & Carbon Capture & Storage
  - Energy Efficiency
  - Energy Trading
  - Environment Protection
  - Governmental & Regulatory Administration
  - Green Construction
  - Manufacturing
  - Recycling & Waste Reduction
  - Renewable Energy Generation
  - Research, Design, and Consulting Services
  - Transportation

See link: https://www.onetcenter.org/initiatives.html#green-occupations

Step 2: Review HWOL Data

- CTDOL provided Help Wanted Online (HWOL) data from Burning Glass comprised of green jobs from December 2019 – November 2019.
- TPMA reviewed the data and look at green jobs based on skills
- HWOL provided TPMA with a more filtered data sheet of skills of green jobs based on TPMA's determination of what were technically "green" jobs

Step 3: Organize Green Occupational Data

- TPMA organized the HWOL data into three tiers: very green jobs, somewhat green jobs, and not so green jobs
- TPMA collected additional data through EMSI to provide additional insights for CTDOL, such as 2019 employment, 2024 employment, job change, and earnings
- Referencing the definitions of the above-mentioned green sectors in Step 1, organize the green occupations into the appropriate sector classification into an Excel spreadsheet. See example below:

	A	B	C	D	E	F	G
1	Green Construction						
2	Occupations		CT Green Jobs	2019 Employment	2024 Employment	2019-2024 Job Change	Earnings
3	17-2051.00	Civil Engineers	82	3,625	3,713	88	$45.02
4	47-2061.00	Construction Laborers	17	8,138	8,369	231	$23.89
5	17-2071.00	Electrical Engineers	89	2,838	2,890	52	$47.26
6	47-2111.00	Electricians	70	7,432	7,599	167	$28.61
7	17-2199.03	Energy Engineers	115	1,031	1,067	36	$48.19
8	49-9021.01	Heating and Air Conditioning Mechanics and Installers	94	4,237	4,467	230	$30.86
9	47-2073.00	Operating Engineers and Other Construction Equipment Operators	7	3,097	3,172	75	$34.16
10	47-2152.01	Pipe Fitters and Steamfitters	1	5,050	5,409	359	$30.67
11	47-2152.02	Plumbers	1	5,050	5,409	359	$30.67

*Note: some of your identified occupations will not be an exact fit into the green sectors – this will take a little objectivity to make the best determination. Also, for the purposes of this project, some sectors were combined due to a limited number of occupations in that sector. Those sectors were grouped accordingly by definitions.

UNDERSTANDING YOUR DATASETS

The following datasets must be collected to create the most efficient pathway. Data pulls from O*NET and Emsi must include 100 critical occupations.

O*NET Data Sets

Download the full list of Importance and Attribute Scores for each KSA:

- Knowledge (K)
- Skills (S)
- Abilities (A)

As well as some affiliated data:

- Career Changers Matrix
- Career Starters Matrix

EMSI Datasets (Top 50 for each category):

Download the names of each of the following items along with the percentage of postings that contain each of the following:

- Common Skills
- Hard Skills
- Qualifications

DEVELOP ANALYTICS FRAMEWORK FOR CAREER PATHWAYS ARTICULATION

The purpose of this part is, firstly, to combine data from Connecticut's 2019 Critical Occupations list with the O*NET data (KSA data) and Competency data from Emsi (Emsi data) into a single spreadsheet. Then, develop correlation matrices to analyze career pathways options.

One important thing to note at this stage is that the Emsi data and the KSA data will be structured very differently, so different processes are necessary for each of these datasets.

PART III: CONSOLIDATING EMSI DATA

We will start with the Emsi data first. During Part II you will have downloaded 100 individual Job Posting Analytics spreadsheets with 18 different tabs. The tabs you will be using are at the end of the list and are titled "Top Hard Skills," "Top Common Skills" and "Top Qualifications." The structure of each tab is similar. See below for example.

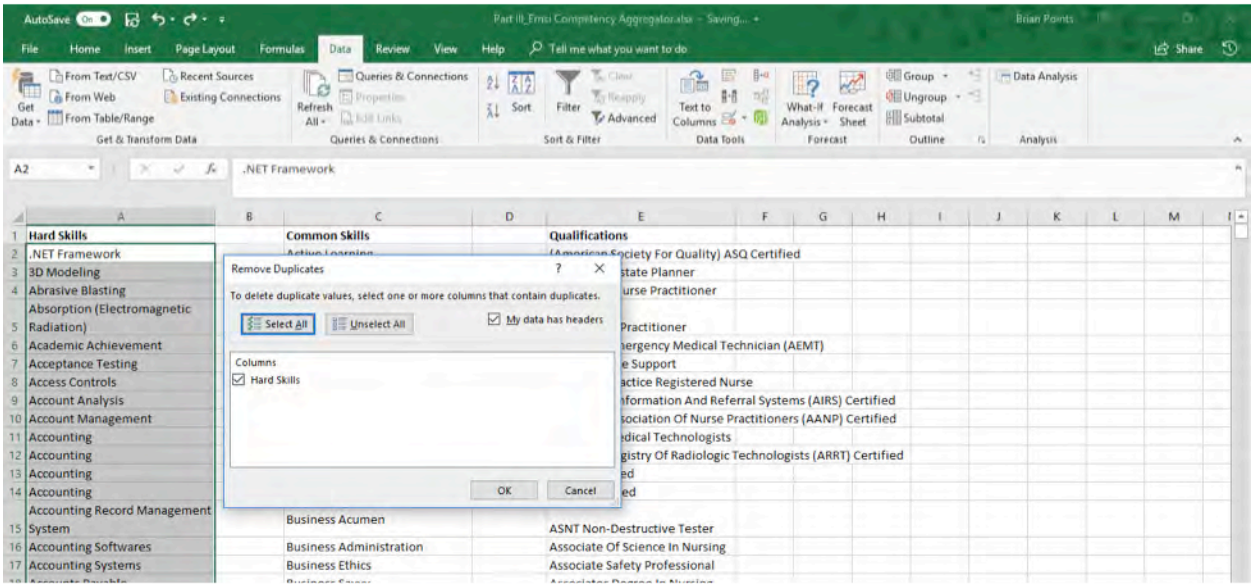
The following provides insight into the supply and demand of relevant skills by comparing the frequ

Top Hard Skills

Skill	Frequency in Postings	Postings with Skill / Total Postings (Sep 2016 - Apr 2018)	Frequency in Profiles	Profiles with Skill / Total Profiles (2016 - 2018)
Restaurant Operati	32%	2,177 / 6,711	2%	818 / 33,906
Accounting	19%	1,257 / 6,711	3%	894 / 33,906
Food Services	18%	1,206 / 6,711	1%	378 / 33,906
Labour Laws	18%	1,183 / 6,711	0%	68 / 33,906
Employee Handboc	17%	1,167 / 6,711	0%	22 / 33,906
Conflict Resolution	16%	1,052 / 6,711	1%	178 / 33,906
Operations Manage	15%	993 / 6,711	15%	5,140 / 33,906
Merchandising	12%	805 / 6,711	5%	1,584 / 33,906
Customer Satisfact	9%	584 / 6,711	6%	2,088 / 33,906

Step One: To ease the process of analyzing the data, the first step is to move the relevant statistics from the 100 spreadsheets to a single spreadsheet which will be called “Emsi Competency Aggregator.” When you create this file, create four tabs titled “hard”, “common”, “quals” and “deduplicator.” From here proceed through the following steps.

Step Two: Be forewarned, this step is fairly labor intensive. You will need to compile three deduplicated lists of the Top Hard Skills, Top Common Skills and Top Qualifications, which means you need to open up each individual occupation file, copy and paste all the hard skills, common skills and qualifications into your “Emsi Competency Aggregator”’ spreadsheet. After pasting all data into a list, you need to use the “remove duplicates” feature in excel to trim the list to just one record of each competency.
Note, the length of each list could reach several 10,000’s long. If the list becomes unwieldy and hard to keep track of you can de-duplicate in the middle of the process without doing any harm. See below, for example:



Step Three: Using “Hard Skills” for example, paste the deduplicated list of hard skills into the far-left column. Then in the top row of this spreadsheet enter in the SOC codes for each of the 100 critical skills. These will serve as the headers of your spreadsheet. Note, prior to entering in the SOC code add an apostrophe to prevent excel from auto-formatting the SOC code as a date (for example: ’11-1021). For example, see below:

	Skill	11-302	11-303	11-902	11-904	11-911	11-102	13-102	13-102	13-105	13-108	13-111
2	Accounting	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
3	Auditing	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
4	Financial Statements	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
5	Loans	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
6	Budgeting	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
7	Investments	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
8	Generally Accepted Accounting Princi	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
9	Forecasting	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
10	Internal Controls	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
11	Business Development	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
12	Mortgage Loans	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
13	Collections	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
14	Financial Analysis	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
15	Selling Techniques	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
16	Underwriting	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
17	Accounts Payable	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
18	Accounts Receivable	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

Step Four: Use the following VLOOKUP formula to pull in the statistics from the individual occupation files:

=VLOOKUP($A3,'[11-3021.xls]Top Hard Skills'!$A$5:$E$55,2,FALSE)

After entering this formula drag it all the way down to the bottom of the list of hard skills. This will populate the list with the frequency of posting score for each hard skill. Note, for the time being, all the values will be listed as "#N/A." Don't worry about this. It's by design.

Step Five: Drag this formula to the next column, in this case SOC 11-3031. You can keep the syntax of the formula the same, but you need to update the SOC value to "11-3021". Then drag the formula down the list, as with the first occupation. Then repeat this step for each of the 100 critical occupations.

Step Six: You should now have a matrix full of "#N/A" records. To activate these formulas, you will need to consecutively open each of the Emsi Job Posting Analytics files. As you do so, you will see the data populate into the "hard" tab. Some cells will still be "#N/A". This is because Emsi only provides the top 50 hard skills, common skills and qualifications for any given occupation. Hence, in many cases there will be no record for a particular aptitude. As long as some of the cells contain real data, you are doing things correctly. It is recommended that you open 10 to 15 files at a time to do this migration process. Attempting to open all 100 at the same time would likely be overly taxing to your computer's RAM. Also, opening a discrete number of files routinely will make it easier to keep track of which occupations you have transferred data for and which ones you have not.

Step Seven: Once you have opened 10 to 15 Emsi Job Posting Analytics files and verified that the data have transferred, you will need to copy and paste values for those occupations, while the corresponding file is open. If you close a file before copying and pasting, you will lose the data and it will revert to "#N/A". Repeat this process for all 100 critical occupations.

PART IV: CONSOLIDATING KSA DATA

As noted above, the KSA data from O*NET will be in a single file rather than 100 individual files as with the Emsi Job Posting Analytics data. There are, however, many other data points in this file so you will need to pare down and consolidate it.

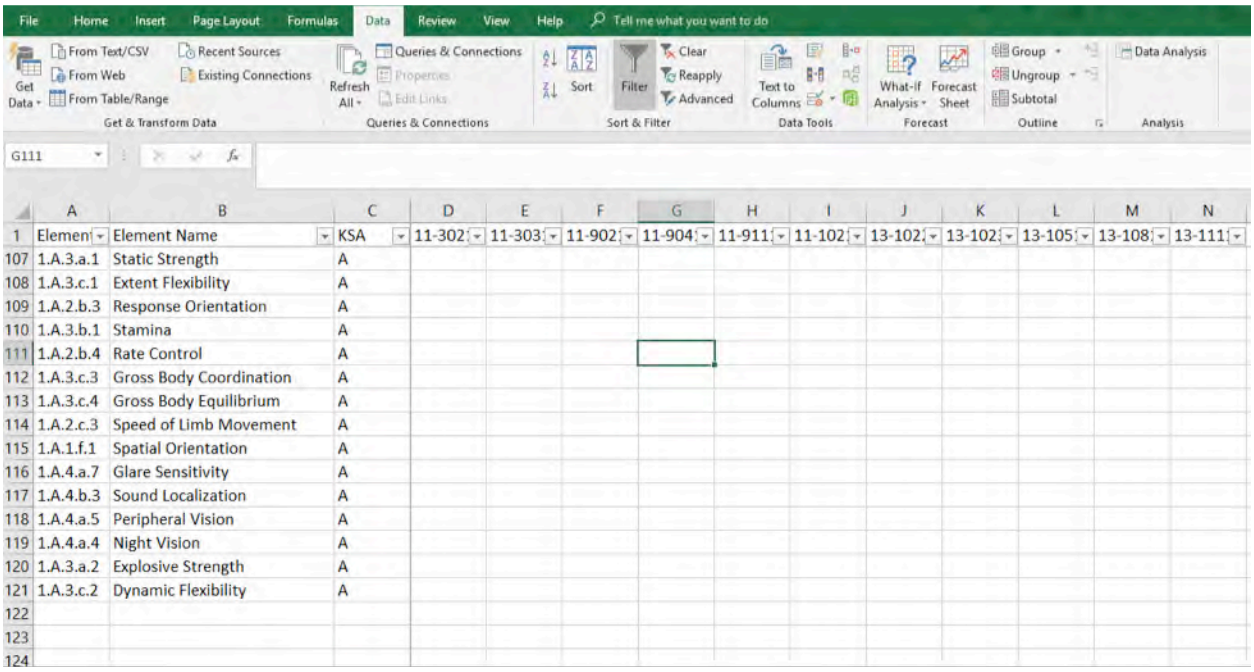
Step One: Open up the KSA Full Data sheet that you created during Part I. Now, create a new spreadsheet called "KSA Translator." You will need to paste in all the KSA Element IDs and Element names into columns A and B of this spreadsheet. Unlike the Emsi Data Consolidation process, you will not need to open lots of individual files and transfer a deduplicated list of skills. In fact, all of the O*NET SOC codes have a score for every one of the 120 O*NET element IDs. Hence, after pasting these data into the spreadsheet you will have a list that is 121 rows long (the first row is for the headers). You will need to append this list with one more labeling column in column C. To keep clear what type of element you are looking at in each row, add K, S or A into this column. It is easiest to do this prior to doing any resorting of the data. To error check yourself, there are 33 K's, 35 S's, and 39 A's. At this point, your spreadsheet should resemble the image below:

	A	B	C	D
1	Element ID	Element Name	KSA	
2	2.C.3.a	Computers and Electronics	K	
3	1.A.1.a.1	Oral Comprehension	A	
4	2.C.7.a	English Language	K	
5	1.A.1.b.3	Problem Sensitivity	A	
6	2.A.1.b	Active Listening	S	
7	2.A.2.a	Critical Thinking	S	
8	1.A.1.b.4	Deductive Reasoning	A	
9	1.A.1.a.2	Written Comprehension	A	
10	2.A.1.a	Reading Comprehension	S	
11	1.A.1.a.3	Oral Expression	A	
12	1.A.4.a.1	Near Vision	A	
13	2.A.1.d	Speaking	S	
14	1.A.1.b.5	Inductive Reasoning	A	
15	1.A.1.b.6	Information Ordering	A	
16	2.B.4.g	Systems Analysis	S	
17	1.A.4.b.4	Speech Recognition	A	

Sheet1

Ready

Step Two: Lastly, add each of the 100 SOC code's as the column headers for columns D through CY. As previously, please use the ' mark in front of each SOC code, as this will prevent excel from auto-formatting it as a date. Once, complete your spreadsheet will now resemble the snapshot below:



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Elemen	Element Name	KSA	11-302	11-303	11-902	11-904	11-911	11-102	13-102	13-102	13-105	13-108	13-111
107	1.A.3.a.1	Static Strength	A											
108	1.A.3.c.1	Extent Flexibility	A											
109	1.A.2.b.3	Response Orientation	A											
110	1.A.3.b.1	Stamina	A											
111	1.A.2.b.4	Rate Control	A											
112	1.A.3.c.3	Gross Body Coordination	A											
113	1.A.3.c.4	Gross Body Equilibrium	A											
114	1.A.2.c.3	Speed of Limb Movement	A											
115	1.A.1.f.1	Spatial Orientation	A											
116	1.A.4.a.7	Glare Sensitivity	A											
117	1.A.4.b.3	Sound Localization	A											
118	1.A.4.a.5	Peripheral Vision	A											
119	1.A.4.a.4	Night Vision	A											
120	1.A.3.a.2	Explosive Strength	A											
121	1.A.3.c.2	Dynamic Flexibility	A											
122														
123														
124														

Step Three: Next, you will need to use a formula to transfer the values for each occupation into the KSA Translator file. The secret to this step is an INDEX MATCH formula. In the first cell that will house the KSA data, cell D2, paste the following formula:

{=INDEX([KSAs.xlsx]All!$H$2:$H$29111,MATCH(1,([KSAs.xlsx]All!$F$2:$F$29111="IM")*([KSAs.xlsx]All!$D$2:$D$29111=$A2)*([KSAs.xlsx]All!$A$2:$A$29111=D$1),0))}

Note the brackets at the beginning and end of the formula. These can be simultaneously pressing the Ctrl+Shift+Enter keys on your keyboard. This is called an array formula. Excel requires array formulas when it is performing multiple calculations on different components of data at the same time. This formula is telling excel to identify the correct value in column H of the KSAs spreadsheet based on the combination of Element ID, SOC code, and Importance contained in the array formula. Once entered, this formula can easily be dragged through the remainder of the spreadsheet. The final result will look like the example on the following page.

Elemen	Element Name	KSA	17-211	17-214	17-217	17-302	17-302	17-302	17-302
2.C.1.a	Administration and Manageme	K	3.45	3.13	3.56	3.57	2.11	2.83	2.56
2.C.1.b	Clerical	K	2.89	3	2.6	3.65	2.53	2.63	2.58
2.C.1.c	Economics and Accounting	K	2.17	2.49	3.49	2.42	1.5	1.87	2.06
2.C.1.d	Sales and Marketing	K	2.05	2.34	2.11	1.55	1.6	1.96	1.91
2.C.1.e	Customer and Personal Service	K	3.22	3.31	1.8	3.52	3.28	3.54	3.12
2.C.1.f	Personnel and Human Resourc	K	2.18	2.22	2.39	2.9	1.91	2.3	1.82
2.C.10	Transportation	K	2.33	2.09	2.06	3.27	1.46	2.2	1.45
2.C.2.a	Production and Processing	K	4.37	3.73	2.45	2.61	3.15	2.79	3.68
2.C.2.b	Food Production	K	1.02	1.08	1	1	1.09	1.05	1.51
2.C.3.a	Computers and Electronics	K	3.47	3.8	3.8	3.53	4.1	2.83	3.45
2.C.3.b	Engineering and Technology	K	4.42	4.89	4.78	4.47	4.36	3.71	4.06
2.C.3.c	Design	K	3.81	4.59	2.9	4.15	3.31	2.89	3.51
2.C.3.d	Building and Construction	K	2.06	2.44	1.99	4.18	1.86	2.95	2.06
2.C.3.e	Mechanical	K	3.95	4.36	2.89	3.45	3.18	3.23	4.41
2.C.4.a	Mathematics	K	4.08	4.68	4.25	4.24	3.07	3.57	3.56
2.C.4.b	Physics	K	2.87	4.35	3.93	3.02	2.65	3.21	3.36

PART V: CREATING A CORRELATIONS MATRIX

The steps above are sufficient for reporting the KSA and Emsi Competency Data in two simplified spreadsheets. However, the task of this analysis is not just to report a list of skills data, but to provide a framework for judging skills compatibility between different occupations. To accomplish this, you must create a matrix that demonstrates the skill set correlations between each occupation and the other 99 occupations on the list.

Correlation metrics (or sometimes called Pearson correlation coefficients) are a useful tool for data analysts to compare several categories of data to determine similarities and differences. It would be quite tedious to review the skill profiles for each individual occupation and determine how similar each critical occupation is with the other 99. But, by developing a correlations matrix, we are developing a statistically reliable shortcut for achieving this end. In statistical terns, correlation demonstrates how much variability in one thing is explained by the variability in another thing. The scale of the correlation score used in this analysis is from 1.00 to -1.00. The higher the number the more similar the skill sets. The lower the number the more the skill sets move in opposite directions. To use an example, it is instinctively clear that the following two occupations are very similar in terms of skill sets: Accountants & Auditors, and Financial Managers. Since these occupations are very similar, it is not surprising that they have a very high correlation metric of 0.85. Conversely, when looking at two occupations that are very different: Personal Financial Advisors and Software Developers, Applications, it is not surprising that the correlation is very low, -0.02.

One last note on the data before we go dive into producing the correlations matrix. Each of the three different data categories utilized in this step tell very different stories, i.e.: O*NET KSAs, Hard Skills

and Common Skills. Just as importantly for statistical analysis, these categories also possess varied distributions. In other words, the way the data are scattered between the highest and lowest options are not consistent across the three data sets. For this reason, it is not advisable to merge the three datasets together prior to producing the correlations matrix. Unfortunately, this means that you will be working with three different correlation matrices when producing career ladders. How to use these three matrices in this process will be covered in the Part VI: Ladder Creation section that follows.

Step One: Create a spreadsheet that lists the SOC codes on both the top row and along the first column. There will be no data in this spreadsheet to begin with. You have simply set up a frame for the data that will fill in the matrix that is 100 columns by 100 rows. Label this tab "hard," for Hard Skills; do the same two more times and name the tabs "common," and "KSAs." At this stage your spreadsheet will resemble the snapshot below:

Step Two: Starting with the "hard" tab paste the following formula into cell B2.

=CORREL([Emsi Competency Aggregator]hard!$B$3:$B$1571,[Emsi Competency Aggregator] hard!B$3:B$1571)

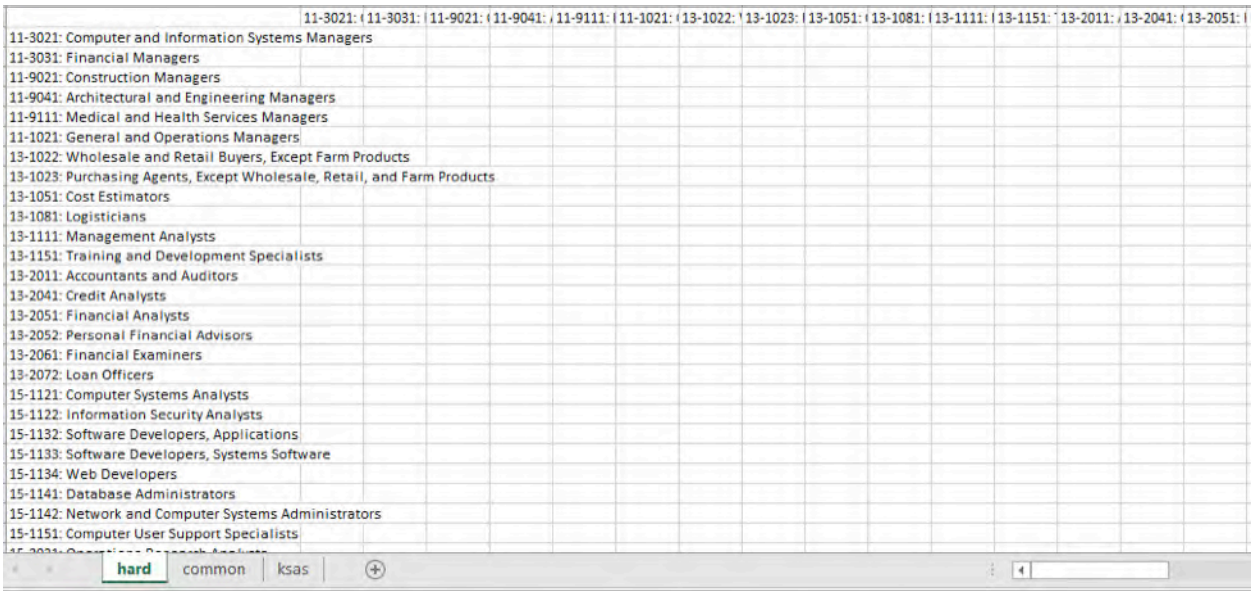
Then drag this formula rightward all the way to the end of the list of occupations, which will be column CW. If done correctly, you should notice a few things. Firstly, the value in cell B2 is 1.00. Secondly, the values vary within the range of -1.00 and 1.00 across the remaining cells. The reason the first cell is equal to 1.00 is that the formula is literally correlating the skills of the first occupation, 11-3021: Computer and Information Systems Managers, with itself. Naturally, there is no variation in those two sets of data and the correlation. Hence, the metric finds a perfect match, equal to 1.00. As you work through these remaining rows, you will see the same phenomenon in the diagonal cells across the matrix.

Step Three: Now skip down one row, and over one column and start with cell C3, paste in the following formula:

=CORREL([Emsi Competency Aggregator]hard!C$3:$C$1571,[Emsi Competency Aggregator] hard!!C$3:C$1571)

Note that the formula is very similar to the first, except that references have skipped from column B to column C. This is because you now want to compare all other occupations to the second occupation on your list, 11-3031: Financial Managers. As before, drag this formula across the entire length of the spreadsheet until you reach column CW. However, in this case, you will note that the cell B3 has been left blank. Don't worry about this for the moment, it is by design. At this point, your spreadsheet should

resemble the snapshot below (remember, this is merely an example of the layout).

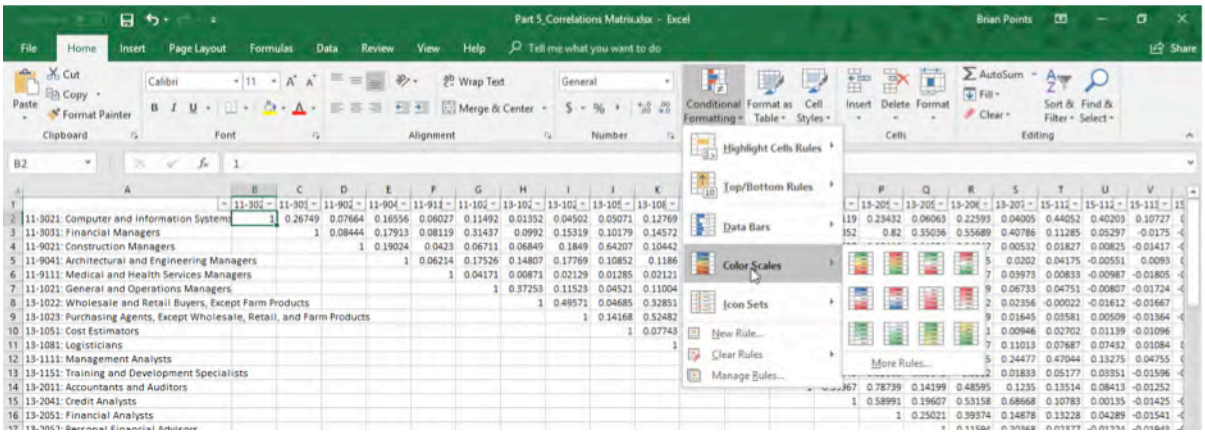


	11-3021: (	11-3031: (	11-9021: (	11-9041: (	11-9111: (	11-1021: (	13-1022: (	13-1023: (	13-1051: (	13-1081: (	13-1111: (	13-1151: (	13-2011: (	13-2041: (	13-2051: (
11-3021: Computer and Information Systems Managers															
11-3031: Financial Managers															
11-9021: Construction Managers															
11-9041: Architectural and Engineering Managers															
11-9111: Medical and Health Services Managers															
11-1021: General and Operations Managers															
13-1022: Wholesale and Retail Buyers, Except Farm Products															
13-1023: Purchasing Agents, Except Wholesale, Retail, and Farm Products															
13-1051: Cost Estimators															
13-1081: Logisticians															
13-1111: Management Analysts															
13-1151: Training and Development Specialists															
13-2011: Accountants and Auditors															
13-2041: Credit Analysts															
13-2051: Financial Analysts															
13-2052: Personal Financial Advisors															
13-2061: Financial Examiners															
13-2072: Loan Officers															
15-1121: Computer Systems Analysts															
15-1122: Information Security Analysts															
15-1132: Software Developers, Applications															
15-1133: Software Developers, Systems Software															
15-1134: Web Developers															
15-1141: Database Administrators															
15-1142: Network and Computer Systems Administrators															
15-1151: Computer User Support Specialists															

hard common ksas

Step Four: Repeat this process for all of the remaining rows. With each row, skip down by one row and over by one column and simply change the references one letter in the alphabet later than the prior reference. For example, the formula in row 3 will include the letter D, row 4 will include the letter E, and so on. Please note, this part of the process is not hard, but it is somewhat time-intensive. Pay close attention to your cell references so you don't have to come back and fix them later.

Step Five: At this point, the data are somewhat hard to interpret. You will use Excel's conditional formatting feature to get the interesting data points to pop out. To do this, select your whole range of data, excluding the header rows and columns. Go to the "Home" section of the banner in excel, and find the tab titled "Conditional Formatting" button, as shown below:



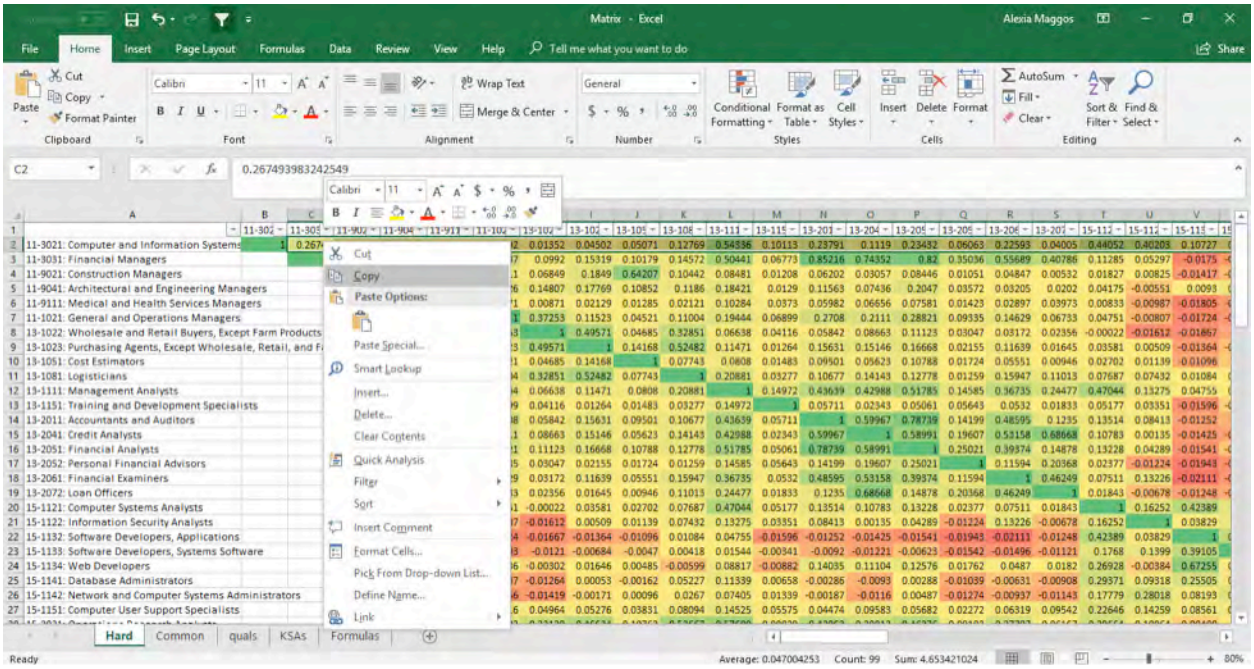
Then select the “color scales” option and select the first option with gradients of red and green. Once completed, your spreadsheet will look like the snapshot below.

	11-302	11-303	11-902	11-904	11-911	11-102	13-102	13-102	13-105	13-108	13-111	13-115
11-3021: Computer and Information Systems	1	0.26749	0.07664	0.16556	0.06027	0.11492	0.01352	0.04502	0.05071	0.12769	0.54336	0.10113
11-3031: Financial Managers		1	0.08444	0.17913	0.08119	0.31437	0.0992	0.15319	0.10179	0.14572	0.50441	0.06773
11-9021: Construction Managers			1	0.19024	0.0423	0.06711	0.06849	0.1849	0.64207	0.10442	0.08481	0.01208
11-9041: Architectural and Engineering Managers				1	0.06214	0.17526	0.14807	0.17769	0.10852	0.1186	0.18421	0.0129
11-9111: Medical and Health Services Managers					1	0.04171	0.00871	0.02129	0.01285	0.02121	0.10284	0.0373
11-1021: General and Operations Managers						1	0.37253	0.11523	0.04521	0.11004	0.19444	0.06899
13-1022: Wholesale and Retail Buyers, Except Farm Products							1	0.49571	0.04685	0.32851	0.06638	0.04116
13-1023: Purchasing Agents, Except Wholesale, Retail, and Farm Products								1	0.14168	0.52482	0.11471	0.01264
13-1051: Cost Estimators									1	0.07743	0.0808	0.01483
13-1081: Logisticians										1	0.20881	0.03277
13-1111: Management Analysts											1	0.14972
13-1151: Training and Development Specialists												1
13-2011: Accountants and Auditors												

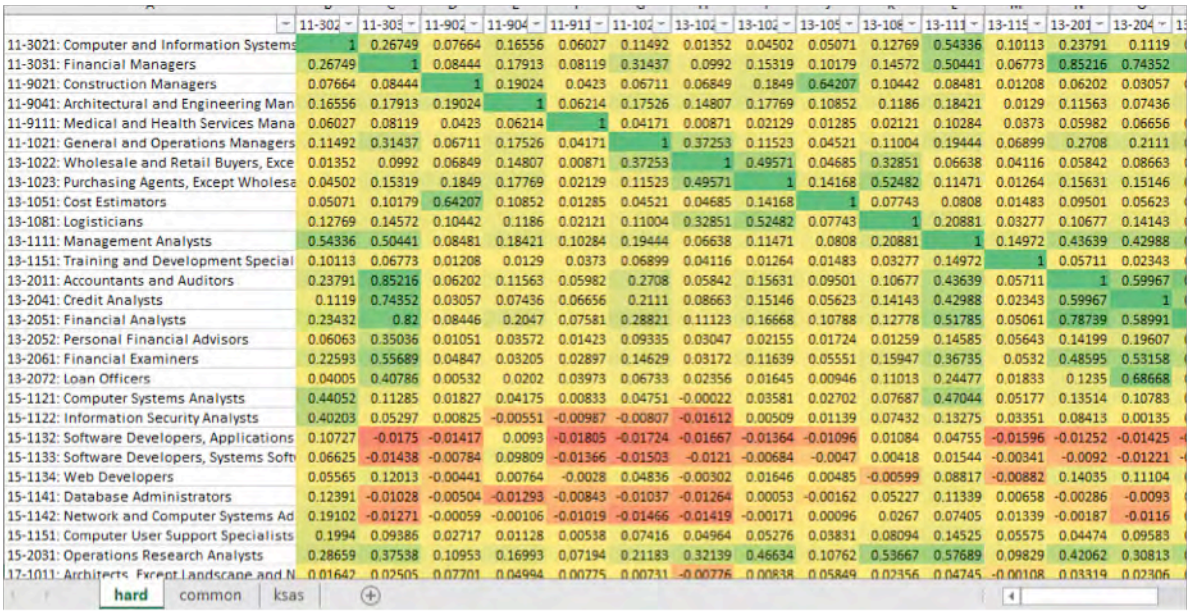
Step Six: At this point you will have half of your matrix complete but there are two issues. Firstly, the data are all linked and if you resort any of the data it is likely to lose the appropriate cell references. Secondly, the lower left side of the matrix is entirely blank. To resolve both issues, create a new spreadsheet called “Correlations Matrix No Formulas” and paste just the values into the first tab and label it “hard.”

Now highlight the first row of data (row 2) and copy and paste transpose these values into the first column (column B). As shown in the figure below, place your cursor in cell B3, and transpose (4th option in the Paste Options) into cell B3 (it will copy Row 2 and mirror it within column B). The values have now been flipped by 90 degrees.

Over time your spreadsheet will begin to resemble the snapshot below. You will need to repeat this process 100 times to get all of the cells to transpose in the correct location.



Step Seven: Repeat the same process listed for Hard Skills for Common Skills, and KSAs. Note that as you do so, you may run into some "#N/A" responses to your formulas. This is because in some of these cases there are less data for the formulas to work with. As long as you see this to only a limited degree, there is nothing to worry about. If you see "#N/A" in many places you may have generated an error in your formulas. Your final result will look as the snapshot below.



	11-302	11-303	11-902	11-904	11-911	11-102	13-102	13-102	13-105	13-108	13-111	13-115	13-201	13-204
11-3021: Computer and Information Systems	1	0.26749	0.07664	0.16556	0.06027	0.11492	0.01352	0.04502	0.05071	0.12769	0.54336	0.10113	0.23791	0.1119
11-3031: Financial Managers	0.26749	1	0.08444	0.17913	0.08119	0.31437	0.0992	0.15319	0.10179	0.14572	0.50441	0.06773	0.85216	0.74352
11-9021: Construction Managers	0.07664	0.08444	1	0.19024	0.0423	0.06711	0.06849	0.1849	0.64207	0.10442	0.08481	0.01208	0.06202	0.03057
11-9041: Architectural and Engineering Man	0.16556	0.17913	0.19024	1	0.06214	0.17526	0.14807	0.17769	0.10852	0.1186	0.18421	0.0129	0.11563	0.07436
11-9111: Medical and Health Services Mana	0.06027	0.08119	0.0423	0.06214	1	0.04171	0.00871	0.02129	0.01285	0.02121	0.10284	0.0373	0.05982	0.06656
11-1021: General and Operations Managers	0.11492	0.31437	0.06711	0.17526	0.04171	1	0.37253	0.11523	0.04521	0.11004	0.19444	0.06899	0.2708	0.2111
13-1022: Wholesale and Retail Buyers, Exce	0.01352	0.0992	0.06849	0.14807	0.00871	0.37253	1	0.49571	0.04685	0.32851	0.06638	0.04116	0.05842	0.08663
13-1023: Purchasing Agents, Except Wholesa	0.04502	0.15319	0.1849	0.17769	0.02129	0.11523	0.49571	1	0.14168	0.52482	0.11471	0.01264	0.15631	0.15146
13-1051: Cost Estimators	0.05071	0.10179	0.64207	0.10852	0.01285	0.04521	0.04685	0.14168	1	0.07743	0.0808	0.01483	0.09501	0.05623
13-1081: Logisticians	0.12769	0.14572	0.10442	0.1186	0.02121	0.11004	0.32851	0.52482	0.07743	1	0.20881	0.03277	0.10677	0.14143
13-1111: Management Analysts	0.54336	0.50441	0.08481	0.18421	0.10284	0.19444	0.06638	0.11471	0.0808	0.20881	1	0.14972	0.43639	0.42988
13-1151: Training and Development Special	0.10113	0.06773	0.01208	0.0129	0.0373	0.06899	0.04116	0.01264	0.01483	0.03277	0.14972	1	0.05711	0.02343
13-2011: Accountants and Auditors	0.23791	0.85216	0.06202	0.11563	0.05982	0.2708	0.05842	0.15631	0.09501	0.10677	0.43639	0.05711	1	0.59967
13-2041: Credit Analysts	0.1119	0.74352	0.03057	0.07436	0.06656	0.2111	0.08663	0.15146	0.05623	0.14143	0.42988	0.02343	0.59967	1
13-2051: Financial Analysts	0.23432	0.82	0.08446	0.2047	0.07581	0.28821	0.11123	0.16668	0.10788	0.12778	0.51785	0.05061	0.78739	0.58991
13-2052: Personal Financial Advisors	0.06063	0.35036	0.01051	0.03572	0.01423	0.09335	0.03047	0.02155	0.01724	0.01259	0.14585	0.05643	0.14199	0.19607
13-2061: Financial Examiners	0.22593	0.55689	0.04847	0.03205	0.02897	0.14629	0.03172	0.11639	0.05551	0.15947	0.36735	0.0532	0.48595	0.53158
13-2072: Loan Officers	0.04005	0.40786	0.00532	0.0202	0.03973	0.06733	0.02356	0.01645	0.00946	0.11013	0.24477	0.01833	0.1235	0.68668
15-1121: Computer Systems Analysts	0.44052	0.11285	0.01827	0.04175	0.00833	0.04751	-0.00022	0.03581	0.02702	0.07687	0.47044	0.05177	0.13514	0.10783
15-1122: Information Security Analysts	0.40203	0.05297	0.00825	-0.00551	-0.00987	-0.00807	-0.01612	0.00509	0.01139	0.07432	0.13275	0.03351	0.08413	0.00135
15-1132: Software Developers, Applications	0.10727	-0.0175	-0.01417	0.0093	-0.01805	-0.01724	-0.01667	-0.01364	-0.01096	0.01084	0.04755	-0.01596	-0.01252	-0.01425
15-1133: Software Developers, Systems Soft	0.06625	-0.01438	-0.00784	0.09809	-0.01366	-0.01503	-0.0121	-0.00684	-0.0047	0.00418	0.01544	-0.00341	-0.0092	-0.01221
15-1134: Web Developers	0.05565	0.12013	-0.00441	0.00764	-0.0028	0.04836	-0.00302	0.01646	0.00485	-0.00599	0.08817	-0.00882	0.14035	0.11104
15-1141: Database Administrators	0.12391	-0.01028	-0.00504	-0.01293	-0.00843	-0.01037	-0.01264	0.00053	-0.00162	0.05227	0.11339	0.00658	-0.00286	-0.0093
15-1142: Network and Computer Systems Ad	0.19102	-0.01271	-0.00059	-0.00106	-0.01019	-0.01466	-0.01419	-0.00171	0.00096	0.0267	0.07405	0.01339	-0.00187	-0.0116
15-1151: Computer User Support Specialists	0.1994	0.09386	0.02717	0.01128	0.00538	0.07416	0.04964	0.05276	0.03831	0.08094	0.14525	0.05575	0.04474	0.09583
15-2031: Operations Research Analysts	0.28659	0.37538	0.10953	0.16993	0.07194	0.21183	0.32139	0.46634	0.10762	0.53667	0.57689	0.09829	0.42062	0.30813
17-1011: Architects, Except Landscape and N	0.01642	0.02505	0.07701	0.04994	0.00775	0.00731	-0.00776	0.00838	0.05849	0.02356	0.04745	-0.00108	0.03319	0.02306

hard | common | ksas

CREATING CAREER PATHWAYS AND CAREER LADDERS

PART VI: CREATING THE CRITICAL OCCUPATIONS CAREER MAP SPREADSHEET

The purpose of the Critical Occupations Career Map spreadsheet is to put all of the data you need to know about this group of occupations into one place that can be referenced for creating the career ladders, as well as communicating other important information to external audiences. It will pull from numerous of the data sources previously mentioned in this document.

Step One: In a new excel sheet titled "Critical Occupations Career Map" you will need to add the following column headers in columns A1 through AG1:

- SOC
- Title
- 2019 Jobs
- 2024 Jobs
- Change (2019 - 2024)
- Median Hourly Earnings
- Annual Openings
- Apr 2019 Unique Postings
- Typical Entry Level Education
- Work Experience Required
- Typical On-The-Job Training
- Career Phase
- % of Workers with HS Diploma or Less
- % of Workers with Associate's, Certificate or Some College
- % of Workers with Bachelor's or Above
- Common Job Title 1
- Common Job Title 2
- Common Job Title 3
- Common Job Title 4
- Knowledge 1
- Knowledge 2
- Knowledge 3
- Knowledge 4
- Knowledge 5
- Skill 1
- Skill 2
- Skill 3

- Skill 4
- Skill 5
- Skill 6
- Skill 7
- Skill 8
- Skill 9
- Skill 10
- Hard Skill 1
- Hard Skill 2
- Hard Skill 3
- Hard Skill 4
- Hard Skill 5
- Hard Skill 6
- Hard Skill 7
- Hard Skill 8
- Hard Skill 9
- Hard Skill 10
- Certification
- Certification 2
- Certification 3
- Certification 4

All of the above information can be directly copy and pasted from the 100 Critical Occupation except the % of Workers by Educational Level

Step Two: % of Workers by Educational Level

- First go to the following website to download the latest information from the Bureau of Labor Statistics on educational level for adult workers, aged 25+: https://www.bls.gov/emp/tables/educational-attainment.htm. Download the spreadsheet to the location of your working files.
- Within this spreadsheet, create three custom columns called “HS Diploma or Less,” “Associate’s, Certificate or Some College,” and “Bachelor’s or Above”. Total the appropriate values for each column into these new columns. The total for each row should be approximately 100%. It will vary somewhat due to rounding in the BLS spreadsheet. To check yourself, create a header in column M called “Total.” See snapshot:

SOC Code	Title	Less than high school	High school diploma or	Some college, no degree	Associate's degree	Bachelor's degree	Master's degree	Doctoral or professional	HS Diploma or Less	Associate's, Certificate or Some College	Bachelors or Above	Total
00-0000	Total, all occupations	8.6	23.9	21	9.4	22.8	9.9	4.2	32.5	30.4	36.9	99.8
11-1011	Chief executives(1)	1.5	9	14.7	5.4	39.8	22.3	7.4	10.5	20.1	69.5	100.1
11-1021	General and operations managers	2.6	17.1	25.4	9.4	33	11.1	1.5	19.7	34.8	45.6	100.1
11-1031	Legislators(1)	1.5	9	14.7	5.4	39.8	22.3	7.4	10.5	20.1	69.5	100.1
11-2011	Advertising and promotions managers	0.7	5	11.1	4.4	62.7	13.3	2.8	5.7	15.5	78.8	100
11-2021	Marketing managers(1)	0.9	7.4	15.7	6.5	50.5	17.4	1.6	8.3	22.2	69.5	100
11-2022	Sales managers(1)	0.9	7.4	15.7	6.5	50.5	17.4	1.6	8.3	22.2	69.5	100
11-2031	Public relations and fundraising mana	0.2	1.5	7.6	2.8	58.5	25.5	3.8	1.7	10.4	87.8	99.9
11-3011	Administrative services managers	2.1	17.9	26.1	12.1	29.7	10.3	1.7	20	38.2	41.7	99.9
11-3021	Computer and information systems m	0.4	4	14	7.7	46.1	25.2	2.6	4.4	21.7	73.9	100

- You will use a VLOOKUP formula in the "Critical Occupations Career Map" to bring in the % of Workers by Educational Level for three different categories you created. The final result will look as follows:

SOC	Title	% of Workers with HS Diploma or Less	% of Workers with Associate's, Certificate or Some College	% of Workers with Bachelor's or Above	E
29-1141	Registered Nurses	1.3%	38.0%	60.6%	H
11-1021	General and Operations Managers	19.7%	34.8%	45.6%	C
53-3032	Heavy and Tractor-Trailer Truck Drivers	63.9%	29.6%	6.6%	T D

Step Three: Quality Control

- The process of generating this data, to this point, has not required a lot of human intervention. But at this point you should step back and look at the data to make sure that it actually makes sense in the real-world. Some knowledge, skills or qualifications data could be faulty due to EMSI's machine learning process. If anything looks off, consider removing it from the list and replacing it with the next competency down your list that does make sense.

PART VII: CREATING PATHWAYS AND LADDERS

Spreadsheets you need:

- Matrix
- New Excel Sheet
- Critical Occupation Career Map
- KSA Translator (possibly)

To start ladder creation, go to the Matrix spreadsheet. Of the five tabs, go to the 'KSAs' tab.

Once there, open up the Critical Occupations Career Map Dataset created in Part VI.
Then filter the education level based on the career phase.

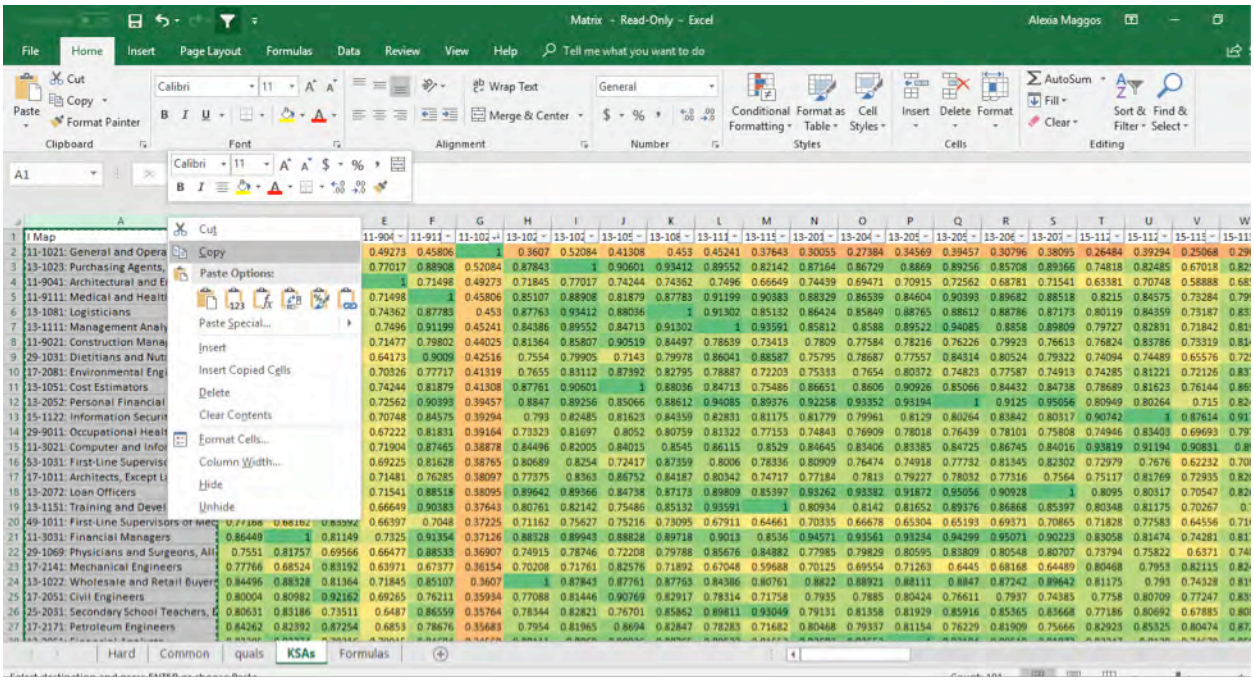
- This will allow you to see where your entry level positions start, and how they begin to progress to advanced positions

Create a new tab in your spreadsheet and title it KSA. Next, refer to the Matrix spreadsheet for the following:

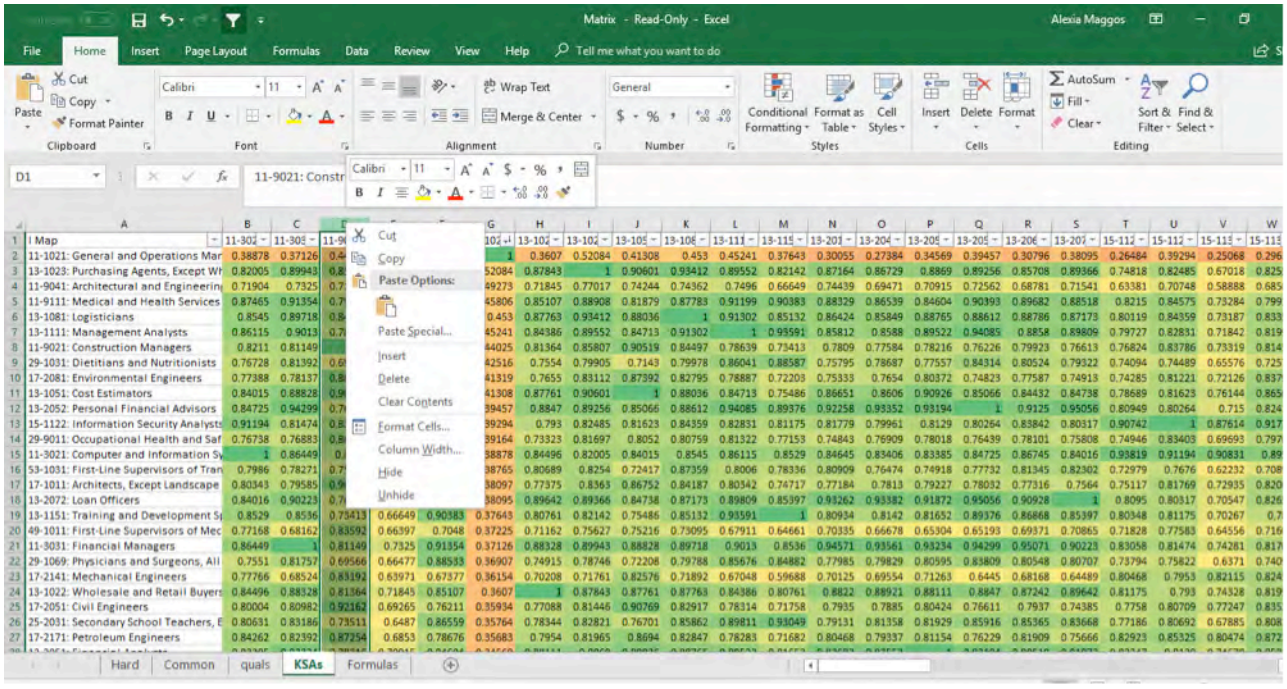
- Go to the KSA tab in the Matrix spreadsheet
- Then, copy over Column A from the Matrix spreadsheet to your new excel sheet and paste in the KSA tab in your new spreadsheet.

(see images below for copying the data from the Matrix into the new spreadsheet).

A	B	C	D	E	F	G	H	I	J	K	L	M
l Map	11-302	11-303	11-902	11-904	11-911	11-102	13-102	13-102	13-105	13-108	13-111	13-115
11-1021: General and Operations Mar	0.38878	0.37126	0.44025	0.49273	0.45806	1	0.3607	0.52084	0.41308	0.453	0.45241	0.376
13-1023: Purchasing Agents, Except Wh	0.82005	0.89943	0.85807	0.77017	0.88908	0.52084	0.87843	1	0.90601	0.93412	0.89552	0.821
11-9041: Architectural and Engineering	0.71904	0.7325	0.71477	1	0.71498	0.49273	0.71845	0.77017	0.74244	0.74362	0.7496	0.666
11-9111: Medical and Health Services	0.87465	0.91354	0.79802	0.71498	1	0.45806	0.85107	0.88908	0.81879	0.87783	0.91199	0.903
13-1081: Logisticians	0.8545	0.89718	0.84497	0.74362	0.87783	0.453	0.87763	0.93412	0.88036	1	0.91302	0.851
13-1111: Management Analysts	0.86115	0.9013	0.78639	0.7496	0.91199	0.45241	0.84386	0.89552	0.84713	0.91302	1	0.935
11-9021: Construction Managers	0.8211	0.81149	1	0.71477	0.79802	0.44025	0.81364	0.85807	0.90519	0.84497	0.78639	0.734
29-1031: Dietitians and Nutritionists	0.76728	0.81392	0.69389	0.64173	0.9009	0.42516	0.7554	0.79905	0.7143	0.79978	0.86041	0.885
17-2081: Environmental Engineers	0.77388	0.78137	0.88653	0.70326	0.77717	0.41319	0.7655	0.83112	0.87392	0.82795	0.78887	0.722
13-1051: Cost Estimators	0.84015	0.88828	0.90519	0.74244	0.81879	0.41308	0.87761	0.90601	1	0.88036	0.84713	0.754
13-2052: Personal Financial Advisors	0.84725	0.94299	0.76226	0.72562	0.90393	0.39457	0.8847	0.89256	0.85066	0.88612	0.94085	0.893
15-1122: Information Security Analysts	0.91194	0.81474	0.83786	0.70748	0.84575	0.39294	0.793	0.82485	0.81623	0.84359	0.82831	0.811
29-9011: Occupational Health and Saf	0.76738	0.76883	0.86034	0.67222	0.81831	0.39164	0.73323	0.81697	0.8052	0.80759	0.81322	0.771
11-3021: Computer and Information Sy	1	0.86449	0.8211	0.71904	0.87465	0.38878	0.84496	0.82005	0.84015	0.8545	0.86115	0.85
53-1031: First-Line Supervisors of Tran	0.7986	0.78271	0.75536	0.69225	0.81628	0.38765	0.80689	0.8254	0.72417	0.87359	0.8006	0.783
17-1011: Architects, Except Landscape	0.80343	0.79585	0.90937	0.71481	0.76285	0.38097	0.77375	0.8363	0.86752	0.84187	0.80342	0.747
13-2072: Loan Officers	0.84016	0.90223	0.76613	0.71541	0.88518	0.38095	0.89642	0.89366	0.84738	0.87173	0.89809	0.853
13-1151: Training and Development Sp	0.8529	0.8536	0.73413	0.66649	0.90383	0.37643	0.80761	0.82142	0.75486	0.85132	0.93591	
49-1011: First-Line Supervisors of Mec	0.77168	0.68162	0.83592	0.66397	0.7048	0.37225	0.71162	0.75627	0.75216	0.73095	0.67911	0.646
11-3031: Financial Managers	0.86449	1	0.81149	0.7325	0.91354	0.37126	0.88328	0.89943	0.88828	0.89718	0.9013	0.85
29-1069: Physicians and Surgeons, All	0.7551	0.81757	0.69566	0.66477	0.88533	0.36907	0.74915	0.78746	0.72208	0.79788	0.85676	0.848
17-2141: Mechanical Engineers	0.77766	0.68524	0.83192	0.63971	0.67377	0.36154	0.70208	0.71761	0.82576	0.71892	0.67048	0.596
13-1022: Wholesale and Retail Buyers	0.84496	0.88328	0.81364	0.71845	0.85107	0.3607	1	0.87843	0.87761	0.87763	0.84386	0.807
17-2051: Civil Engineers	0.80004	0.80982	0.92162	0.69265	0.76211	0.35934	0.77088	0.81446	0.90769	0.82917	0.78314	0.717
25-2031: Secondary School Teachers, E	0.80631	0.83186	0.73511	0.6487	0.86559	0.35764	0.78344	0.82821	0.76701	0.85862	0.89811	0.930
17-2171: Petroleum Engineers	0.84262	0.82392	0.87254	0.6853	0.78676	0.35683	0.7954	0.81965	0.8694	0.82847	0.78283	0.716



- Refer back to the Matrix spreadsheet, specifically the KSA tab. Across the top of the KSA tab in the Matrix spreadsheet, the SOC codes (11-3021, 11-3031, 11-9021, etc.) are laid out.
- Highlight the column you wish to copy over from the Matrix to the new spreadsheet
- When you paste, make sure to choose the option that allows you to paste the data validation (green through red progression colors) with it.

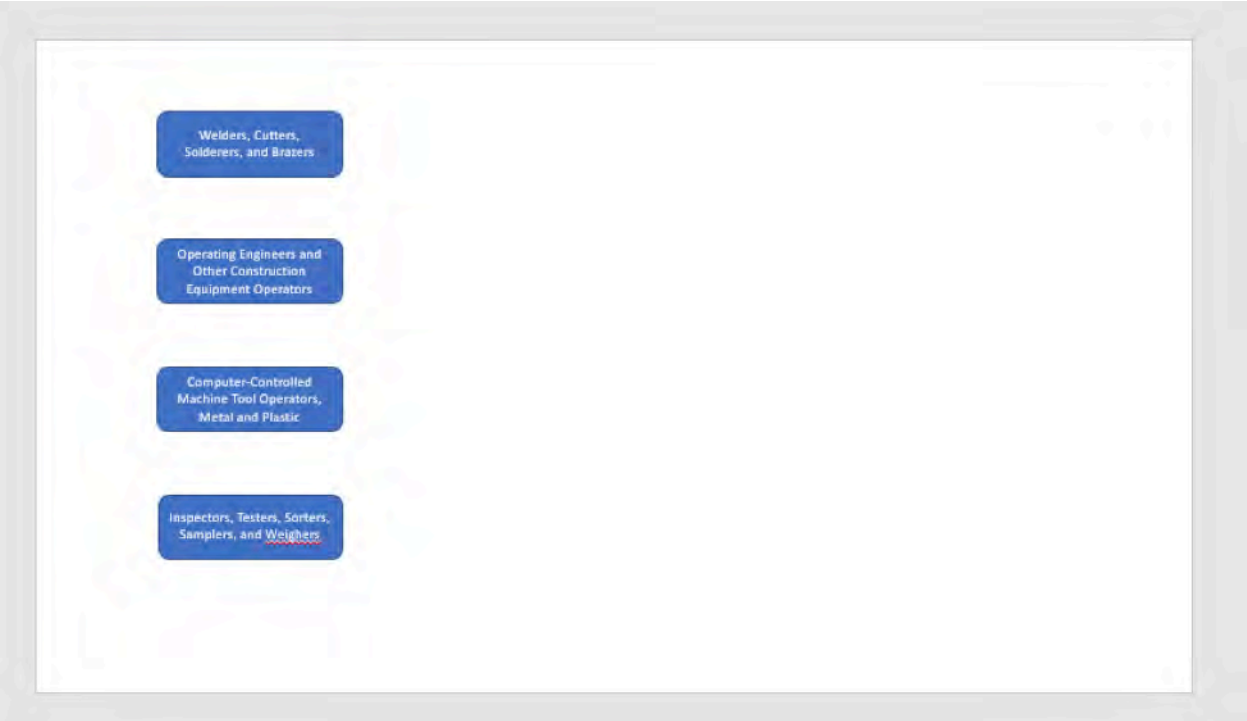


Repeat for the remainder of the SOC codes that are laid out in the Occupation Data Tab.

Now, you must determine alignment among the occupations. To do so, you must compare the top line (Row 2) which is stated as "1" because this is the occupation you are focusing on (in this case, 11-9021).

- Follow Row 2 and begin to identify which occupations share similar KSA's as the occupation chosen. This means that, with an aggregate of KSAs, these are the positions that are most closely aligned based on occupational data. The higher the decimal (.9, .8, .7), the more aligned an occupation is (and is typically a greener color). The lower the decimal (.2, .3, .4), the less aligned an occupation is (and is typically a redder color).

Once you have sorted your new spreadsheet accordingly, click back over to the Occupational Data tab in your new spreadsheet. Create a PowerPoint with your choosing of shapes, see below.



As you place the occupations, place mid-career in the middle portion of the PowerPoint slide and Advanced occupations at the far-right side.

This next step requires a mix of data and conceptual thinking.

Return to the excel sheet with the Occupational Data tab.

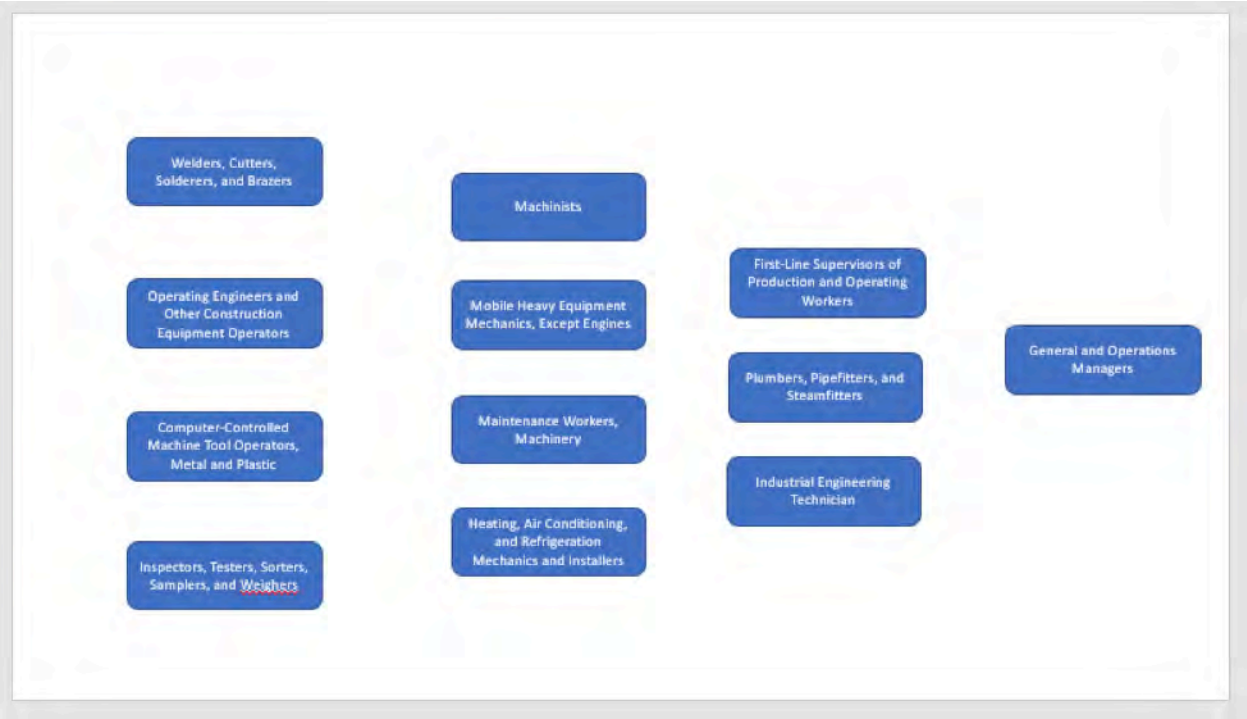
	A	B	I	J	K	V	
1	SOC	Title	Typical Entry Level Education	Work Experience Required	Typical On-The-Job Training	Career Phase	Ele
2	11-1021	General and Operations	Bachelor's degree	5 years or more	None	Advanced	2.C.
3	51-1011	First-Line Supervisors of	High school diploma or equivalent	Less than 5 years	None	Advanced	2.C.
4	49-9021	Heating, Air Conditionin	Postsecondary nondegree award	None	Long-term on-the-job training	Mid Career	2.C.
5	49-9043	Maintenance Workers, M	High school diploma or equivalent	None	Long-term on-the-job training	Mid Career	2.C.
6	49-3042	Mobile Heavy Equipmen	High school diploma or equivalent	None	Long-term on-the-job training	Mid Career	2.C.
7	51-4041	Machinists	High school diploma or equivalent	None	Long-term on-the-job training	Mid Career	2.C.
8	47-2152	Plumbers, Pipefitters, ar	High school diploma or equivalent	None	Apprenticeship	Mid Career	2.C.
9	51-4121	Welders, Cutters, Solder	High school diploma or equivalent	None	Moderate-term on-the-job training	Entry Level	1.A
10	47-2073	Operating Engineers and	High school diploma or equivalent	None	Moderate-term on-the-job training	Entry Level	1.A
11	51-4011	Computer-Controlled Ma	High school diploma or equivalent	None	Moderate-term on-the-job training	Entry Level	2.C.
12	51-9061	Inspectors, Testers, Sort	High school diploma or equivalent	None	Moderate-term on-the-job training	Entry Level	1.A
13							

- You may begin to see patterns based on career phase. As shown in the image above, for Construction, entry level positions typically require a high school diploma or equivalent. The mid-career positions are similar.

Once all occupations have been put on the PowerPoint slide, what you may notice when looking at your ladder is clutter. In this example, there is clutter with the mid-career occupations. In this, we refer back to the Occupational Data tab, and begin to see where we can create layers within the mid-career occupations.

Knowing that 1-1011: First-Line Supervisors of Production and Operating Workers methodologically was an advanced career phase, but we found it better suited to be a mid-career occupation, that is an example of an occupation that could be staggered our ladder (see image below for staggering). In addition, when we look at the Occupational Data tab, we see that 47-2152: Plumbers, Pipefitters, and Steamfitters requires typically requires an apprenticeship, which is more training than a standard high school diploma. Additionally, 17-3026: Industrial Engineering Technician requires an associate's degree, which is more training than a standard high school diploma. Therefore, these are three occupations that require more training, and can be progressed/staggered within our ladder (see image below).

To de-clutter the ladder based on career phase/educational attainment, we adjust our PowerPoint document as follows:



Now that the ladder is less cluttered and follows a stronger educational pathway, it's time to create pathways.

Go to the KSA tab in your spreadsheet and add a filter across the top row.

- Then, filer the first SOC code (e.g. 51-4011) from "Largest to Smallest"

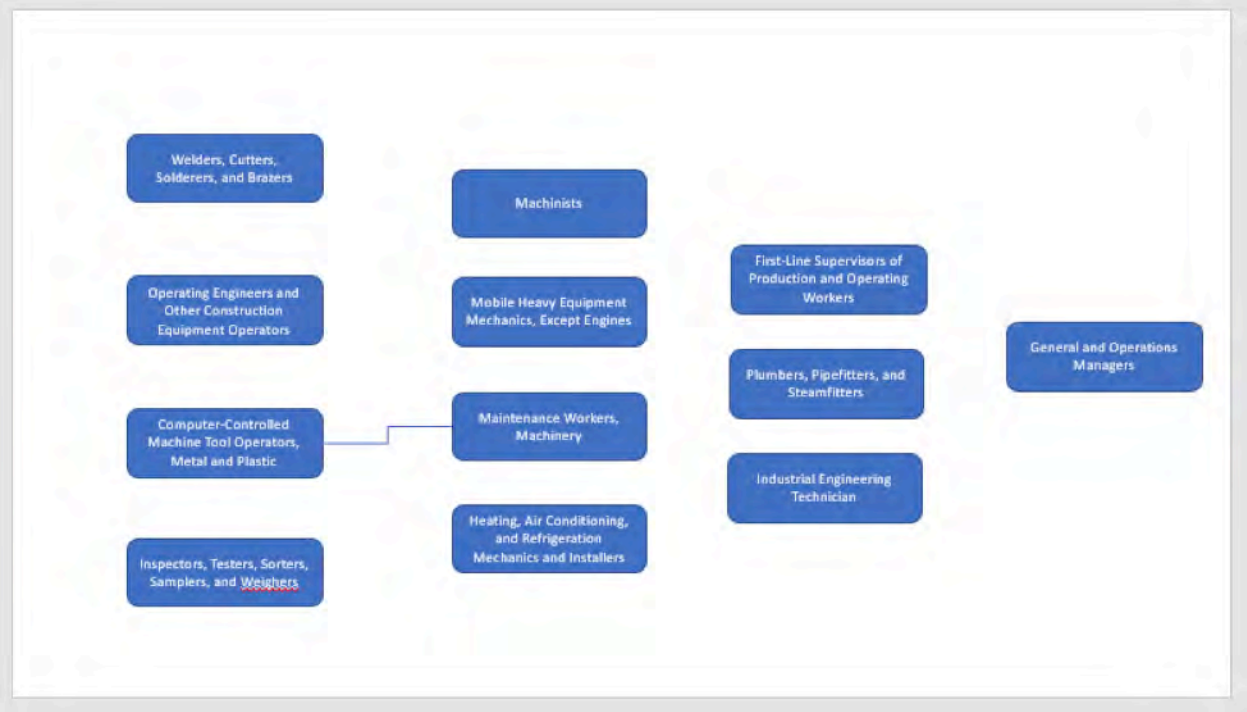
The data will filter, and you can begin to see pathways emerge.

- Look at cell B2, 51-4011: Computer-Controlled Machine Tool Operators, Metal and Plastic. Follow Row 2 across to the mid-career occupations. You can begin to identify pathway progression.
  - 51-4011 is closely aligned with 49-9043 (as a rule, we want to create connections where pathways are .8 or greater). In addition, based on industry knowledge, we know that this is a common pathway progression as well.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	I Map	51-4011	51-9061	47-2073	51-4121	51-4041	49-3042	49-9043	49-9021	17-3026	47-2152	51-1011	11-1021
2	51-4011: Computer-Controlled Machin	1	0.767222	0.761475	0.817039	0.867884	0.798699	0.809032	0.756431	0.683157	0.752837	0.661276	-0.055128
3	51-4041: Machinists	0.867884	0.8065	0.770208	0.88175	1	0.845119	0.838592	0.762222	0.64453	0.838801	0.696573	-0.141295
4	49-9041: Industrial Machinery Mechar	0.864645	0.631458	0.81494	0.815246	0.862641	0.880209	0.912473	0.821494	0.535655	0.802847	0.577931	-0.098353
5	47-5013: Service Unit Operators, Oil, G	0.847797	0.708035	0.818843	0.839448	0.805929	0.820971	0.805491	0.794461	0.550489	0.817993	0.657085	-0.013722
6	51-4121: Welders, Cutters, Solderers,	0.817039	0.753291	0.839897	1	0.88175	0.809474	0.809222	0.753239	0.581998	0.895742	0.672318	-0.13663
7	49-9043: Maintenance Workers, Machi	0.809032	0.683178	0.816971	0.809222	0.838592	0.867089	1	0.831982	0.557877	0.817055	0.616575	-0.093537
8	49-3042: Mobile Heavy Equipment Me	0.798699	0.637672	0.809085	0.809474	0.845119	1	0.867089	0.854306	0.488353	0.821904	0.527578	-0.196472
9	49-3031: Bus and Truck Mechanics and	0.798685	0.66716	0.809512	0.805554	0.786944	0.872798	0.871334	0.815626	0.547632	0.783745	0.608604	-0.067828
10	49-3021: Automotive Body and Relatec	0.793682	0.755283	0.742788	0.8376	0.827285	0.836422	0.825039	0.757671	0.585683	0.762939	0.664168	-0.103557
11	51-9061: Inspectors, Testers, Sorters, S	0.767222	1	0.619635	0.753291	0.8065	0.637672	0.683178	0.633068	0.784892	0.70437	0.830122	0.01929
12	47-5012: Rotary Drill Operators, Oil an	0.763655	0.753191	0.833507	0.803646	0.811032	0.7826	0.806572	0.695076	0.560497	0.816728	0.73095	-0.051249
13	47-2073: Operating Engineers and Oth	0.761475	0.619635	1	0.839897	0.770208	0.809085	0.816971	0.704526	0.437939	0.814677	0.568567	-0.129447
14	49-9021: Heating, Air Conditioning, an	0.756431	0.633068	0.704526	0.753239	0.762222	0.854306	0.831982	1	0.590639	0.82225	0.566219	0.020672
15	47-2152: Plumbers, Pipefitters, and Ste	0.752837	0.70437	0.814677	0.895742	0.838801	0.821904	0.817055	0.82225	0.60892	1	0.647372	-0.094402
16	17-3023: Electrical and Electronics Eng	0.745166	0.793621	0.542389	0.615942	0.719036	0.618059	0.675035	0.668517	0.87826	0.603929	0.777747	0.170224
17	51-8031: Water and Wastewater Treat	0.734407	0.729383	0.715736	0.712684	0.709995	0.702257	0.784121	0.73867	0.690887	0.738557	0.652995	0.114816
18	47-5011: Derrick Operators, Oil and Ga	0.733952	0.641861	0.837917	0.808952	0.764926	0.829247	0.772858	0.682547	0.360918	0.801222	0.544663	-0.228857
19	47-2111: Electricians	0.732543	0.686283	0.723227	0.798329	0.781082	0.813746	0.818993	0.887083	0.646648	0.864853	0.637859	0.005978
20	49-9051: Electrical Power-Line Installe	0.727141	0.709104	0.796076	0.773238	0.791256	0.815628	0.814008	0.767142	0.528201	0.811723	0.660164	-0.129464
21	19-4031: Chemical Technicians	0.711011	0.83647	0.514609	0.598195	0.713984	0.653899	0.611091	0.620622	0.786359	0.610783	0.737353	0.04041
22	17-3025: Environmental Engineering T	0.698483	0.800316	0.597137	0.656815	0.651923	0.596453	0.630486	0.65761	0.870254	0.680481	0.766111	0.165279
23	17-3026: Industrial Engineering Techn	0.683157	0.784892	0.437939	0.581998	0.64453	0.488353	0.557877	0.590639	1	0.60892	0.805254	0.227819
24	47-2031: Carpenters	0.663183	0.666313	0.730618	0.844506	0.748615	0.728757	0.747481	0.778117	0.558564	0.871507	0.592982	-0.005824
25	51-1011: First-Line Supervisors of Prod	0.661276	0.830122	0.568567	0.672318	0.696573	0.527578	0.616575	0.566219	0.805254	0.647372	1	0.270738
26	49-1011: First-Line Supervisors of Mec	0.658706	0.73721	0.593966	0.634132	0.608365	0.556704	0.63873	0.68853	0.801284	0.671814	0.862051	0.37225
27	47-1011: First-Line Supervisors of Cons	0.650785	0.779085	0.662537	0.711723	0.647288	0.559869	0.63152	0.653901	0.78508	0.735836	0.861968	0.316422
28	17-2112: Industrial Engineers	0.624491	0.788802	0.433578	0.567035	0.593457	0.384382	0.48661	0.478011	0.906103	0.553132	0.827866	0.315167

Once the pathway has been identified as a strong lateral move, go to the PowerPoint Document and create a pathway.

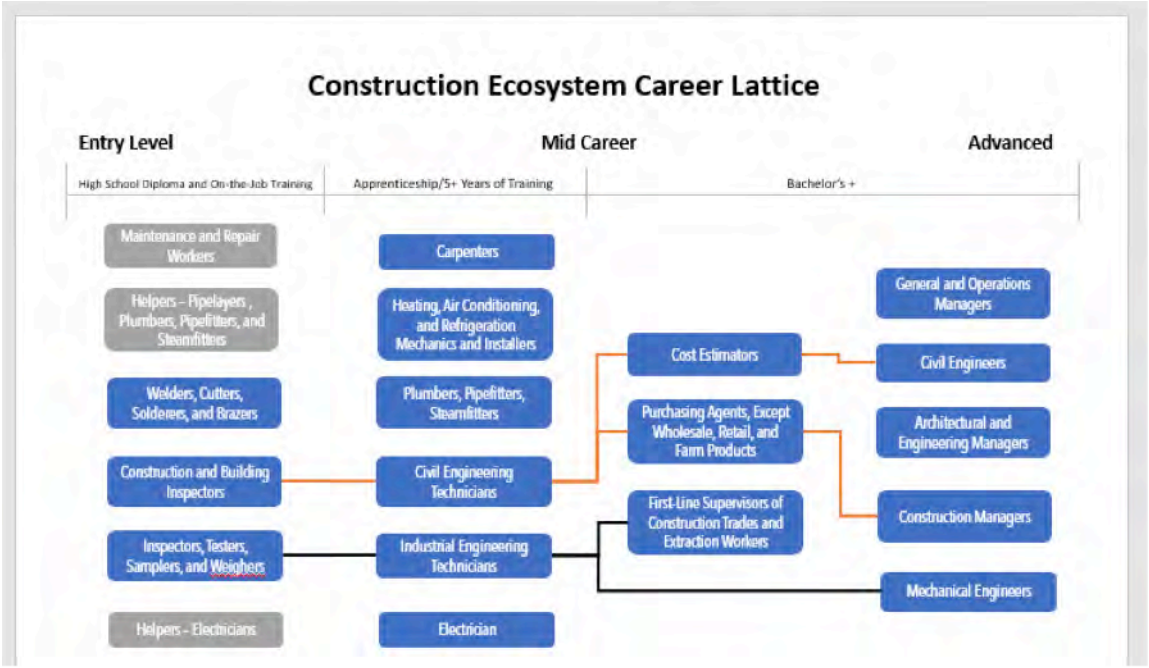
- Insert → Shapes → Connector Elbow



Next, sort 49-9043: Maintenance Workers, Machinery, as this was the occupation that 51-4011: Computer-Controlled Machine Tool Operators, Metal and Plastic was most closely aligned with.

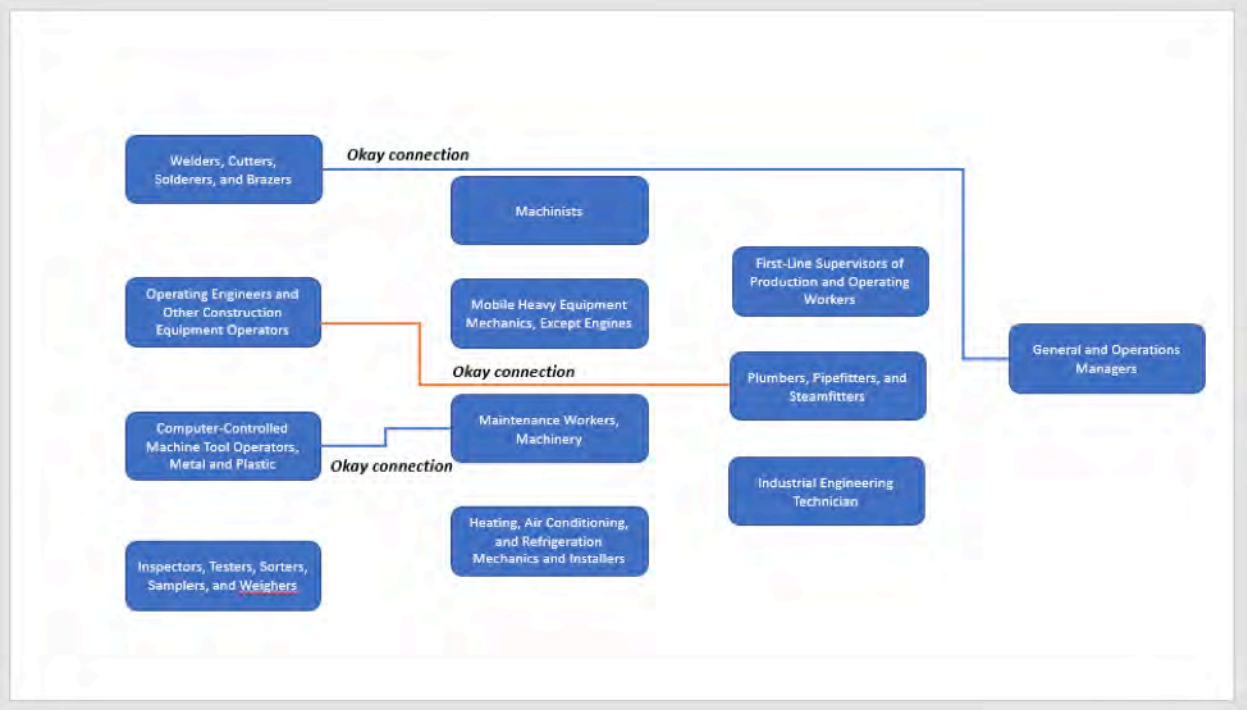
	A	B	C	D	E	F	G	H	I	J	K	L	M
1	l Map	51-4011	51-9061	47-2073	51-4121	51-4041	49-3042	49-9043	49-9021	17-3026	47-2152	51-1011	11-1021
2	49-9043: Maintenance Workers, Machi	0.809032	0.683178	0.816971	0.809222	0.838592	0.867089	1	0.831982	0.557877	0.817055	0.616575	-0.093537
3	49-9041: Industrial Machinery Mechar	0.864645	0.631458	0.81494	0.815246	0.862641	0.880209	0.912473	0.821494	0.535655	0.802847	0.577931	-0.098353
4	49-3031: Bus and Truck Mechanics and	0.798685	0.66716	0.809512	0.805554	0.786944	0.872798	0.871334	0.815626	0.547632	0.783745	0.608604	-0.067828
5	49-3042: Mobile Heavy Equipment Me	0.798699	0.637672	0.809085	0.809474	0.845119	1	0.867089	0.854306	0.488353	0.821904	0.527578	-0.196472
6	51-4041: Machinists	0.867884	0.8065	0.770208	0.88175	1	0.845119	0.838592	0.762222	0.64453	0.838801	0.696573	-0.141295
7	49-9021: Heating, Air Conditioning, an	0.756431	0.633068	0.704526	0.753239	0.762222	0.854306	0.831982	1	0.590639	0.82225	0.566219	0.020672
8	49-3021: Automotive Body and Related	0.793682	0.755283	0.742788	0.8376	0.827285	0.836422	0.825039	0.757671	0.585683	0.762939	0.664168	-0.103557
9	47-2111: Electricians	0.732543	0.686283	0.723227	0.798329	0.781082	0.813746	0.818993	0.887083	0.646648	0.864853	0.637859	0.005978
10	47-2152: Plumbers, Pipefitters, and Ste	0.752837	0.70437	0.814677	0.895742	0.838801	0.821904	0.817055	0.82225	0.60892	1	0.647372	-0.094402
11	47-2073: Operating Engineers and Oth	0.761475	0.619635	1	0.839897	0.770208	0.809085	0.816971	0.704526	0.437939	0.814677	0.568567	-0.129447
12	49-9051: Electrical Power-Line Installe	0.727141	0.709104	0.796076	0.773238	0.791256	0.815628	0.814008	0.767142	0.528201	0.811723	0.660164	-0.129464
13	51-4121: Welders, Cutters, Solderers, a	0.817039	0.753291	0.839897	1	0.88175	0.809474	0.809222	0.753239	0.581998	0.895742	0.672318	-0.13663
14	51-4011: Computer-Controlled Machin	1	0.767222	0.761475	0.817039	0.867884	0.798699	0.809032	0.756431	0.683157	0.752837	0.661276	-0.055128
15	47-5012: Rotary Drill Operators, Oil an	0.763655	0.753191	0.833507	0.803646	0.811032	0.7826	0.806572	0.695076	0.560497	0.816728	0.73095	-0.051249
16	47-5013: Service Unit Operators, Oil, G	0.847797	0.708035	0.818843	0.839448	0.805929	0.820971	0.805491	0.794461	0.550489	0.817993	0.657085	-0.013722
17	51-8031: Water and Wastewater Treat	0.734407	0.729383	0.715736	0.712684	0.709995	0.702257	0.784121	0.73867	0.690887	0.738557	0.652995	0.114816
18	47-5011: Derrick Operators, Oil and Ga	0.733952	0.641861	0.837917	0.808952	0.764926	0.829247	0.772858	0.682547	0.360918	0.801222	0.544663	-0.228857
19	47-2031: Carpenters	0.663183	0.666313	0.730618	0.844506	0.748615	0.728757	0.747481	0.778117	0.558564	0.871507	0.592982	-0.005824
20	51-9061: Inspectors, Testers, Sorters, S	0.767222	1	0.619635	0.753291	0.8065	0.637672	0.683178	0.633068	0.784892	0.70437	0.830122	0.01929
21	17-3023: Electrical and Electronics Eng	0.745166	0.793621	0.542389	0.615942	0.719036	0.618059	0.675035	0.668517	0.87826	0.603929	0.777747	0.170224
22	49-1011: First-Line Supervisors of Mec	0.658706	0.73721	0.593966	0.634132	0.608365	0.556704	0.63873	0.68853	0.801284	0.671814	0.862051	0.37225
23	47-1011: First-Line Supervisors of Cons	0.650785	0.779085	0.662537	0.711723	0.647288	0.559869	0.63152	0.653901	0.78508	0.735836	0.861968	0.316422
24	17-3025: Environmental Engineering T	0.698483	0.800316	0.597137	0.656815	0.651923	0.596453	0.630486	0.65761	0.870254	0.680481	0.766111	0.165279
25	51-1011: First-Line Supervisors of Prod	0.661276	0.830122	0.568567	0.672318	0.696573	0.527578	0.616575	0.566219	0.805254	0.647372	1	0.270738
26	53-3032: Heavy and Tractor-Trailer Tru	0.600633	0.503961	0.793628	0.675177	0.604735	0.706635	0.613072	0.54285	0.24464	0.631648	0.409937	-0.203183
27	19-4031: Chemical Technicians	0.711011	0.83647	0.514609	0.598195	0.713984	0.653899	0.611091	0.620622	0.786359	0.610783	0.737353	0.04041
28	33-2011: Firefighters	0.464051	0.480877	0.658267	0.590408	0.466876	0.545871	0.575793	0.515825	0.331737	0.62326	0.441946	-0.023415

As you move along pathway creation, some occupations may have pathways to multiple occupations. It is okay to create multiple pathways from one occupation others (see image below – one color line indicates one pathway).



Once a pathway has been created from entry-level to an advanced position, start again with a new entry level position. Filter the next entry level SOC code on the KSA tab in your new spreadsheet (e.g. C2 in the example below).

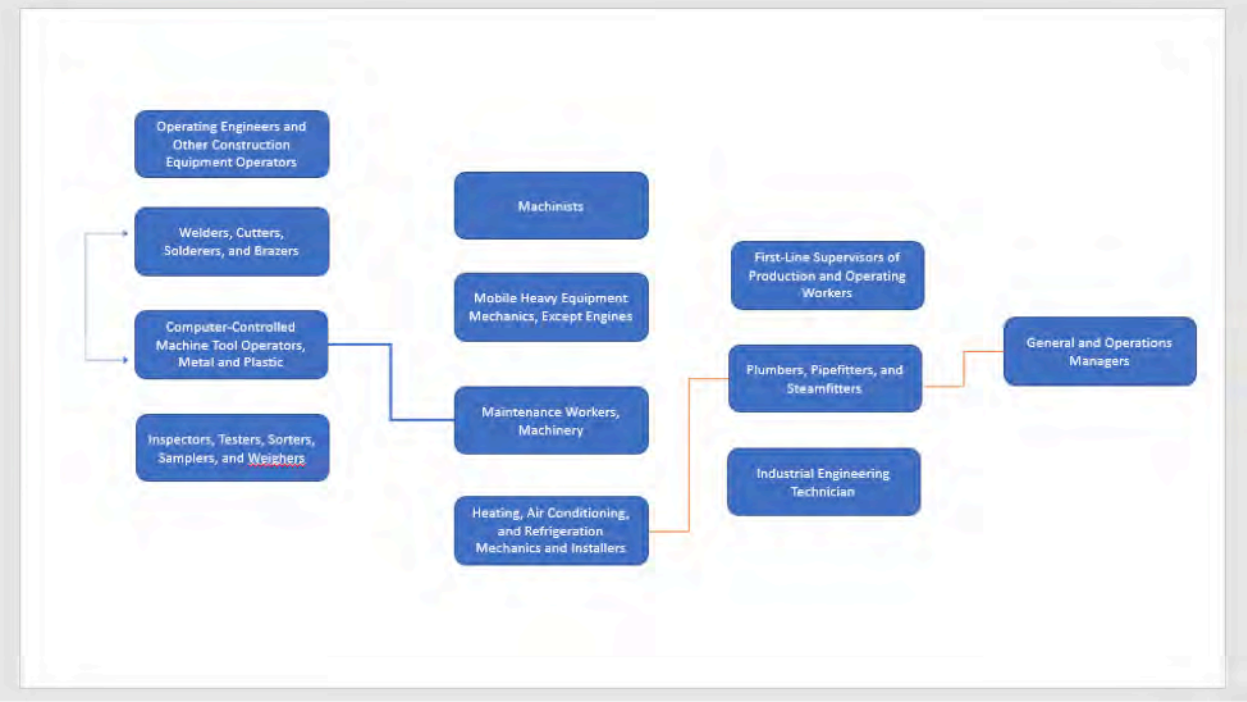
	A	B	C	D	E	F	G	H	I	J	K	L	M
1	l Map	51-4011	51-9061	47-2073	51-4121	51-4041	49-3042	49-9043	49-9021	17-3026	47-2152	51-1011	11-1021
2	51-9061: Inspectors, Testers, Sorters, S	0.767222	1	0.619635	0.753291	0.8065	0.637672	0.683178	0.633068	0.784892	0.70437	0.830122	0.01929
3	19-4031: Chemical Technicians	0.711011	0.83647	0.514609	0.598195	0.713984	0.653899	0.611091	0.620622	0.786359	0.610783	0.737353	0.04041
4	51-1011: First-Line Supervisors of Prod	0.661276	0.830122	0.568567	0.672318	0.696573	0.527578	0.616575	0.566219	0.805254	0.647372	1	0.270738
5	51-4041: Machinists	0.867884	0.8065	0.770208	0.88175	1	0.845119	0.838592	0.762222	0.64453	0.838801	0.696573	-0.141295
6	17-3025: Environmental Engineering T	0.698483	0.800316	0.597137	0.656815	0.651923	0.596453	0.630486	0.65761	0.870254	0.680481	0.766111	0.165279
7	17-3023: Electrical and Electronics Eng	0.745166	0.793621	0.542389	0.615942	0.719036	0.618059	0.675035	0.668517	0.87826	0.603929	0.777747	0.170224
8	29-2031: Cardiovascular Technologists	0.577679	0.793488	0.470492	0.514781	0.589676	0.515907	0.55014	0.526673	0.668788	0.513612	0.708436	0.100592
9	29-2012: Medical and Clinical Laborat	0.615068	0.791136	0.452128	0.51218	0.60713	0.551015	0.57219	0.548081	0.729004	0.532949	0.689386	0.115353
10	17-2112: Industrial Engineers	0.624491	0.788802	0.433578	0.567035	0.593457	0.384382	0.48661	0.478011	0.906103	0.553132	0.827866	0.315167
11	29-2052: Pharmacy Technicians	0.433483	0.785428	0.303915	0.45584	0.46948	0.326967	0.367211	0.415914	0.66094	0.452877	0.696064	0.176032
12	17-3026: Industrial Engineering Techn	0.683157	0.784892	0.437939	0.581998	0.64453	0.488353	0.557877	0.590639	1	0.60892	0.805254	0.227819
13	47-1011: First-Line Supervisors of Cons	0.650785	0.779085	0.662537	0.711723	0.647288	0.559869	0.63152	0.653901	0.78508	0.735836	0.861968	0.316422
14	29-2056: Veterinary Technologists anc	0.543808	0.778778	0.408277	0.525895	0.568858	0.483969	0.487955	0.520013	0.662983	0.532291	0.694379	0.11043
15	29-2081: Opticians, Dispensing	0.520395	0.777337	0.415604	0.53288	0.56193	0.394543	0.447071	0.500436	0.733093	0.522433	0.789818	0.270267
16	29-2035: Magnetic Resonance Imaging	0.547377	0.774611	0.440545	0.478092	0.554692	0.439385	0.501624	0.485349	0.704338	0.511862	0.704345	0.166318
17	29-2011: Medical and Clinical Laborat	0.607762	0.769747	0.42317	0.48829	0.586477	0.508302	0.536182	0.526929	0.732263	0.497556	0.696772	0.144896
18	51-4011: Computer-Controlled Machin	1	0.767222	0.761475	0.817039	0.867884	0.798699	0.809032	0.756431	0.683157	0.752837	0.661276	-0.055128
19	15-1151: Computer User Support Speci	0.551109	0.764876	0.396642	0.499234	0.582396	0.505381	0.524631	0.571057	0.731029	0.495842	0.77665	0.206628
20	49-3021: Automotive Body and Relatec	0.793682	0.755283	0.742788	0.8376	0.827285	0.836422	0.825039	0.757671	0.585683	0.762939	0.664168	-0.103557
21	51-4121: Welders, Cutters, Solderers, a	0.817039	0.753291	0.839897	1	0.88175	0.809474	0.809222	0.753239	0.581998	0.895742	0.672318	-0.13663
22	47-5012: Rotary Drill Operators, Oil an	0.763655	0.753191	0.833507	0.803646	0.811032	0.7826	0.806572	0.695076	0.560497	0.816728	0.73095	-0.051249
23	19-4041: Geological and Petroleum Te	0.552446	0.74927	0.403506	0.508697	0.512705	0.371516	0.473427	0.503063	0.789072	0.500922	0.68394	0.271156
24	47-4011: Construction and Building Ins	0.524115	0.746447	0.497779	0.570837	0.523631	0.434626	0.496447	0.596778	0.815329	0.654892	0.727835	0.242839
25	15-1121: Computer Systems Analysts	0.518425	0.740915	0.26834	0.395629	0.503744	0.351933	0.38795	0.450027	0.789898	0.385399	0.748468	0.264842
26	29-2032: Diagnostic Medical Sonograp	0.515561	0.737303	0.450087	0.483281	0.539031	0.453863	0.518013	0.49569	0.648044	0.498253	0.696847	0.146092
27	49-1011: First-Line Supervisors of Mec	0.658706	0.73721	0.593966	0.634132	0.608365	0.556704	0.63873	0.68853	0.801284	0.671814	0.862051	0.37225
28	17-2071: Electrical Engineers	0.573953	0.733826	0.320561	0.456993	0.531861	0.371639	0.468535	0.500948	0.913697	0.47192	0.771367	0.328508



(The examples above are to show connections that can take place across various career phases, the connections are merely for example and are not based on the methodology presented above with the expected of Computer Controlled Machine Tool Operators).

Career Phases that Do Not have a Connecting Pathway

As shown in the ladder below, Heating, Air Conditioning, and Refrigeration Mechanics and Installers is a mid-career occupation that does not have an entry-level position that connects to it.



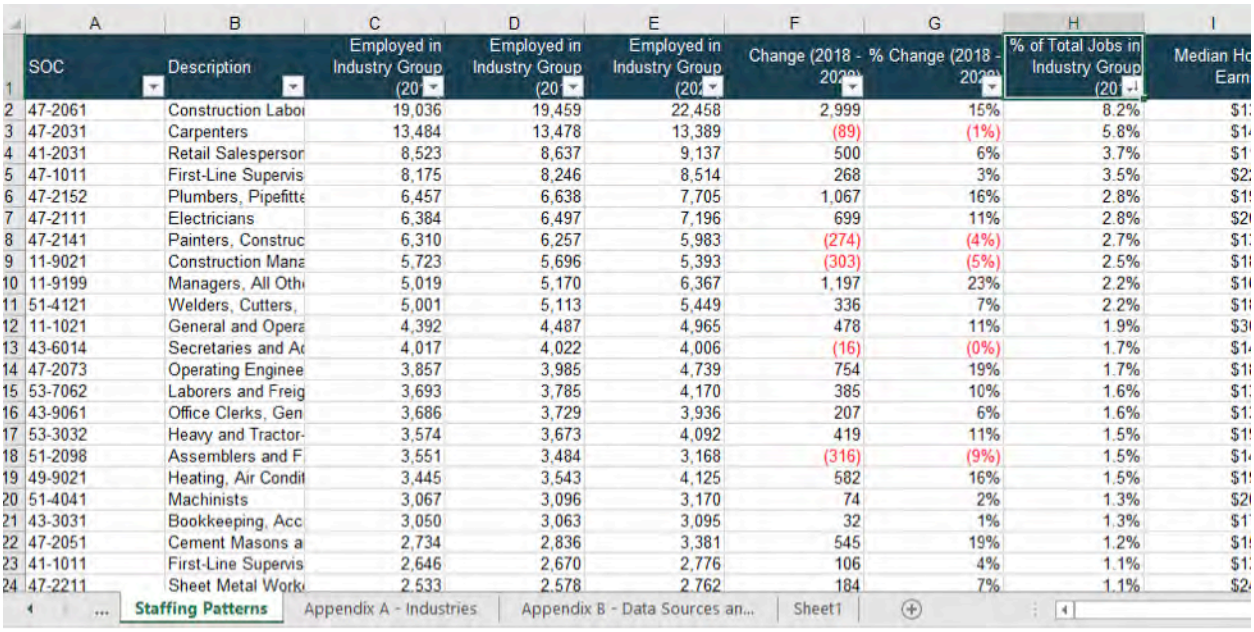
While we mentioned above that there can be connections from entry to advance careers, we want to be conscious that we are creating viable pathways that have progression at every level. **Therefore, we want to ensure that (if possible) all mid and advanced careers have an entry level position pathway in the ladder.** If there is no entry-level position in the ladder, we can pull a staffing pattern on EMSI to download all occupations within the ecosystem (outside of the 100 critical occupations).

- Go to EMSI, choose Industry, then choose Staffing Pattern.

Based on the Ecosystem Industries spreadsheet (provided internally), you will search each NAICS code within the staffing pattern.

- When you hit run, make sure there is a 10-year projection filtered for the timeline (this matches the 100 Critical Occupations data).

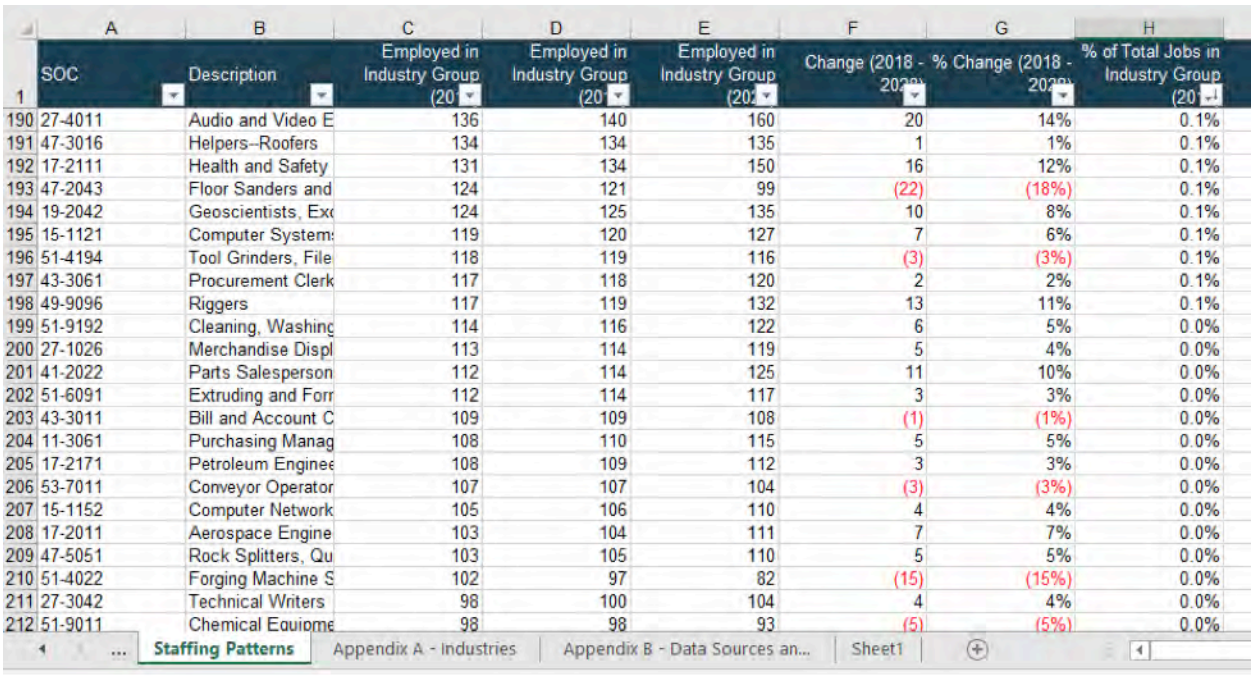
Once all NAICS codes have been inputted, hit “Download,” and a spreadsheet like the following will populate.



	A	B	C	D	E	F	G	H	I
1	SOC	Description	Employed in Industry Group (20	Employed in Industry Group (20	Employed in Industry Group (20	Change (2018 - 2024)	% Change (2018 - 2024)	% of Total Jobs in Industry Group (20	Median Ho Earn
2	47-2061	Construction Labo	19,036	19,459	22,458	2,999	15%	8.2%	$1
3	47-2031	Carpenters	13,484	13,478	13,389	(89)	(1%)	5.8%	$1
4	41-2031	Retail Salesperson	8,523	8,637	9,137	500	6%	3.7%	$1
5	47-1011	First-Line Supervis	8,175	8,246	8,514	268	3%	3.5%	$2
6	47-2152	Plumbers, Pipefitte	6,457	6,638	7,705	1,067	16%	2.8%	$1
7	47-2111	Electricians	6,384	6,497	7,196	699	11%	2.8%	$2
8	47-2141	Painters, Construc	6,310	6,257	5,983	(274)	(4%)	2.7%	$1
9	11-9021	Construction Mana	5,723	5,696	5,393	(303)	(5%)	2.5%	$1
10	11-9199	Managers, All Oth	5,019	5,170	6,367	1,197	23%	2.2%	$1
11	51-4121	Welders, Cutters,	5,001	5,113	5,449	336	7%	2.2%	$1
12	11-1021	General and Opera	4,392	4,487	4,965	478	11%	1.9%	$3
13	43-6014	Secretaries and Ac	4,017	4,022	4,006	(16)	(0%)	1.7%	$1
14	47-2073	Operating Enginee	3,857	3,985	4,739	754	19%	1.7%	$1
15	53-7062	Laborers and Freig	3,693	3,785	4,170	385	10%	1.6%	$1
16	43-9061	Office Clerks, Gen	3,686	3,729	3,936	207	6%	1.6%	$1
17	53-3032	Heavy and Tractor-	3,574	3,673	4,092	419	11%	1.5%	$1
18	51-2098	Assemblers and F	3,551	3,484	3,168	(316)	(9%)	1.5%	$1
19	49-9021	Heating, Air Condit	3,445	3,543	4,125	582	16%	1.5%	$1
20	51-4041	Machinists	3,067	3,096	3,170	74	2%	1.3%	$2
21	43-3031	Bookkeeping, Acc	3,050	3,063	3,095	32	1%	1.3%	$1
22	47-2051	Cement Masons a	2,734	2,836	3,381	545	19%	1.2%	$1
23	41-1011	First-Line Supervis	2,646	2,670	2,776	106	4%	1.1%	$1
24	47-2211	Sheet Metal Work	2,533	2,578	2,762	184	7%	1.1%	$2

... Staffing Patterns | Appendix A - Industries | Appendix B - Data Sources an... | Sheet1

There are hundreds of occupations listed, and you will need to cut it down. This can be done by filtering % of Total Jobs in Industry Group (column H) by "Smallest to Largest." You will see 0.0%, 0.1%, etc. Delete the lowest percentages off of the spreadsheet. *(As a suggestion, delete any % of Total Jobs in Industry group that is less than .5%)*

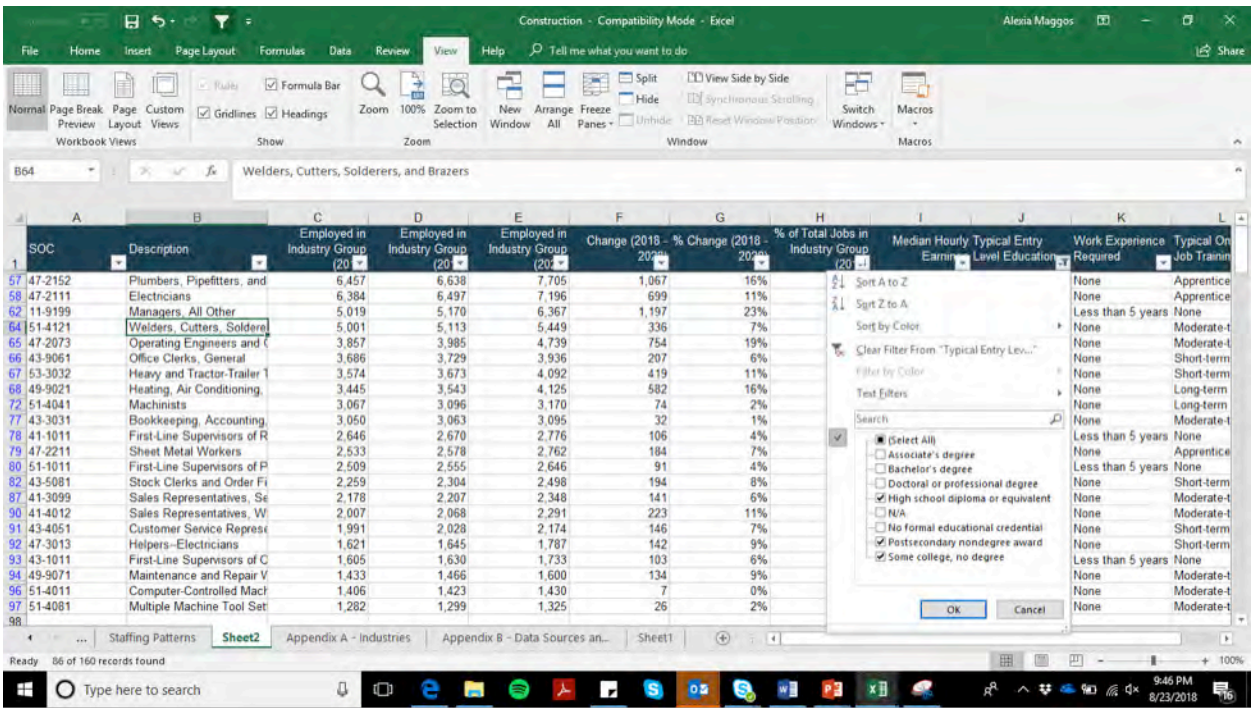


	A	B	C	D	E	F	G	H
1	SOC	Description	Employed in Industry Group (20	Employed in Industry Group (20	Employed in Industry Group (20	Change (2018 - 2024)	% Change (2018 - 2024)	% of Total Jobs in Industry Group (20
190	27-4011	Audio and Video E	136	140	160	20	14%	0.1%
191	47-3016	Helpers--Roofers	134	134	135	1	1%	0.1%
192	17-2111	Health and Safety	131	134	150	16	12%	0.1%
193	47-2043	Floor Sanders and	124	121	99	(22)	(18%)	0.1%
194	19-2042	Geoscientists, Exc	124	125	135	10	8%	0.1%
195	15-1121	Computer System	119	120	127	7	6%	0.1%
196	51-4194	Tool Grinders, File	118	119	116	(3)	(3%)	0.1%
197	43-3061	Procurement Clerk	117	118	120	2	2%	0.1%
198	49-9096	Riggers	117	119	132	13	11%	0.1%
199	51-9192	Cleaning, Washing	114	116	122	6	5%	0.0%
200	27-1026	Merchandise Displ	113	114	119	5	4%	0.0%
201	41-2022	Parts Salesperson	112	114	125	11	10%	0.0%
202	51-6091	Extruding and Forr	112	114	117	3	3%	0.0%
203	43-3011	Bill and Account C	109	109	108	(1)	(1%)	0.0%
204	11-3061	Purchasing Manag	108	110	115	5	5%	0.0%
205	17-2171	Petroleum Enginee	108	109	112	3	3%	0.0%
206	53-7011	Conveyor Operator	107	107	104	(3)	(3%)	0.0%
207	15-1152	Computer Network	105	106	110	4	4%	0.0%
208	17-2011	Aerospace Engine	103	104	111	7	7%	0.0%
209	47-5051	Rock Splitters, Qu	103	105	110	5	5%	0.0%
210	51-4022	Forging Machine S	102	97	82	(15)	(15%)	0.0%
211	27-3042	Technical Writers	98	100	104	4	4%	0.0%
212	51-9011	Chemical Equipme	98	98	93	(5)	(5%)	0.0%

... Staffing Patterns | Appendix A - Industries | Appendix B - Data Sources an... | Sheet1

Then, filter "Change (2019-2024)" by smallest to largest. You will see red, negative numbers appear at the top. (As a suggestion, delete any change in occupation that is negative and/or less than a change of 100 occupational growth over the next ten years).

You will be left with a list that is shortened and will require further shortening. For the next level of determination for which occupation should go into your ladder, determine education levels (Column J). If you are specifically looking for entry level positions, filter the typical entry level position to match the needs of the career phase you are creating a pathway for.



Once you have the education filtered, continue process of narrowing down based on % of occupations in the industry and the number of change within the occupation. Narrow your list to 20 occupations that have higher percentages within the industry, but also have strong occupational growth over the next ten years (See below).

SOC	Description	Employed in Industry Group (20	Employed in Industry Group (20	Employed in Industry Group (20	Change (2018 - 20	% Change (2018 - 20	% of Total Jobs in Industry Group (20	Median Hourly Earnin	Typical Entry Level Education	Work Expe Required
47-2152	Plumbers, Pipefitters, and	6,457	6,638	7,705	1,067	16%	2.8%	$19.52	High school diplom	None
47-2111	Electricians	6,384	6,497	7,196	699	11%	2.8%	$20.67	High school diplom	None
11-9199	Managers, All Other	5,019	5,170	6,367	1,197	23%	2.2%	$16.48	Bachelor's degree	Less than 5
51-4121	Welders, Cutters, Soldere	5,001	5,113	5,449	336	7%	2.2%	$18.88	High school diplom	None
47-2073	Operating Engineers and (	3,857	3,985	4,739	754	19%	1.7%	$18.08	High school diplom	None
43-9061	Office Clerks, General	3,686	3,729	3,936	207	6%	1.6%	$13.00	High school diplom	None
53-3032	Heavy and Tractor-Trailer T	3,574	3,673	4,092	419	11%	1.5%	$19.43	Postsecondary no	None
49-9021	Heating, Air Conditioning,	3,445	3,543	4,125	582	16%	1.5%	$19.10	Postsecondary no	None
51-4041	Machinists	3,067	3,096	3,170	74	2%	1.3%	$20.51	High school diplom	None
43-3031	Bookkeeping, Accounting,	3,050	3,063	3,095	32	1%	1.3%	$17.31	Some college, no	None
41-1011	First-Line Supervisors of R	2,646	2,670	2,776	106	4%	1.1%	$13.27	High school diplom	Less than 5
47-2211	Sheet Metal Workers	2,533	2,578	2,762	184	7%	1.1%	$24.42	High school diplom	None
51-1011	First-Line Supervisors of P	2,509	2,555	2,646	91	4%	1.1%	$25.12	High school diplom	Less than 5
43-5081	Stock Clerks and Order Fi	2,259	2,304	2,498	194	8%	1.0%	$11.37	High school diplom	None
41-3099	Sales Representatives, Se	2,178	2,207	2,348	141	6%	0.9%	$20.44	High school diplom	None
41-4012	Sales Representatives, W	2,007	2,068	2,291	223	11%	0.9%	$21.67	High school diplom	None
43-4051	Customer Service Represe	1,991	2,028	2,174	146	7%	0.9%	$14.67	High school diplom	None
47-3013	Helpers--Electricians	1,621	1,645	1,787	142	9%	0.7%	$16.76	High school diplom	None
43-1011	First-Line Supervisors of C	1,605	1,630	1,733	103	6%	0.7%	$22.86	High school diplom	Less than 5
49-9071	Maintenance and Repair W	1,433	1,466	1,600	134	9%	0.6%	$15.84	High school diplom	None
51-4011	Computer-Controlled Mach	1,406	1,423	1,430	7	0%	0.6%	$18.48	High school diplom	None
51-4081	Multiple Machine Tool Set	1,282	1,299	1,325	26	2%	0.6%	$15.86	High school diplom	None

What you will start to notice is that some of the occupations on the list are already within the ladder (based on the 100 critical occupation list). This allows you to validate the 100 Critical Occupations, but also see other strong occupations within the industry.

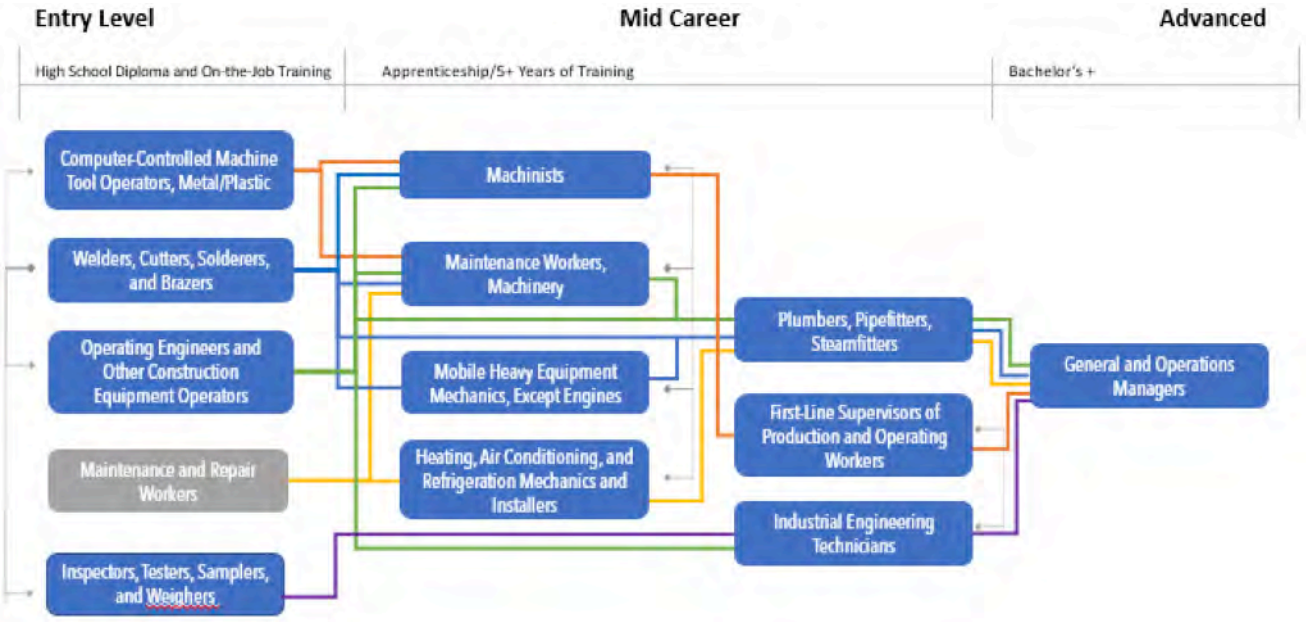
Making Connections to Transferable Jobs

Once all of the pathways have been created, we must now create transferable pathways. Starting back at the beginning of the excel sheet with the copied over KSAs and Occupational Data, go to your KSA tab and start at the beginning of the entry level occupations. Filter the first SOC code (see below).

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	I Map	51-4011	47-2073	51-9061	51-4121	51-4041	49-3042	49-9043	49-9021	17-3026	47-2152	51-1011	11-1021
2	51-4011: Computer-Controlled Machin	1	0.761475	0.767222	0.817039	0.867884	0.798699	0.809032	0.756431	0.683157	0.752837	0.661276	-0.055128
3	51-4041: Machinists	0.867884	0.770208	0.8065	0.88175	1	0.845119	0.838592	0.762222	0.64453	0.838801	0.696573	-0.141295
4	49-9041: Industrial Machinery Mechar	0.864645	0.81494	0.631458	0.815246	0.862641	0.880209	0.912473	0.821494	0.535655	0.802847	0.577931	-0.098353
5	47-5013: Service Unit Operators, Oil, G	0.847797	0.818843	0.708035	0.839448	0.805929	0.820971	0.805491	0.794461	0.550489	0.817993	0.657085	-0.013722
6	51-4121: Welders, Cutters, Solderers, a	0.817039	0.839897	0.753291	1	0.88175	0.809474	0.809222	0.753239	0.581998	0.895742	0.672318	-0.13663
7	49-9043: Maintenance Workers, Machi	0.809032	0.816971	0.683178	0.809222	0.838592	0.867089	1	0.831982	0.557877	0.817055	0.616575	-0.093537
8	49-3042: Mobile Heavy Equipment Me	0.798699	0.809085	0.637672	0.809474	0.845119	1	0.867089	0.854306	0.488353	0.821904	0.527578	-0.196472
9	49-3031: Bus and Truck Mechanics and	0.798685	0.809512	0.66716	0.805554	0.786944	0.872798	0.871334	0.815626	0.547632	0.783745	0.608604	-0.067828
10	49-3021: Automotive Body and Related	0.793682	0.742788	0.755283	0.8376	0.827285	0.836422	0.825039	0.757671	0.585683	0.762939	0.664168	-0.103557
11	51-9061: Inspectors, Testers, Sorters, S	0.767222	0.619635	1	0.753291	0.8065	0.637672	0.683178	0.633068	0.784892	0.70437	0.830122	0.01929
12	47-5012: Rotary Drill Operators, Oil an	0.763655	0.833507	0.753191	0.803646	0.811032	0.7826	0.806572	0.695076	0.560497	0.816728	0.73095	-0.051249
13	47-2073: Operating Engineers and Oth	0.761475	1	0.619635	0.839897	0.770208	0.809085	0.816971	0.704526	0.437939	0.814677	0.568567	-0.129447
14	49-9021: Heating, Air Conditioning, an	0.756431	0.704526	0.633068	0.753239	0.762222	0.854306	0.831982	1	0.590639	0.82225	0.566219	0.020672
15	47-2152: Plumbers, Pipefitters, and Ste	0.752837	0.814677	0.70437	0.895742	0.838801	0.821904	0.817055	0.82225	0.60892	1	0.647372	-0.094402
16	17-3023: Electrical and Electronics Eng	0.745166	0.542389	0.793621	0.615942	0.719036	0.618059	0.675035	0.668517	0.87826	0.603929	0.777747	0.170224
17	51-8031: Water and Wastewater Treat	0.734407	0.715736	0.729383	0.712684	0.709995	0.702257	0.784121	0.73867	0.690887	0.738557	0.652995	0.114816
18	47-5011: Derrick Operators, Oil and Ga	0.733952	0.837917	0.641861	0.808952	0.764926	0.829247	0.772858	0.682547	0.360918	0.801222	0.544663	-0.228857
19	47-2111: Electricians	0.732543	0.723227	0.686283	0.798329	0.781082	0.813746	0.818993	0.887083	0.646648	0.864853	0.637859	0.005978
20	49-9051: Electrical Power-Line Installe	0.727141	0.796076	0.709104	0.773238	0.791256	0.815628	0.814008	0.767142	0.528201	0.811723	0.660164	-0.129464
21	19-4031: Chemical Technicians	0.711011	0.514609	0.83647	0.598195	0.713984	0.653899	0.611091	0.620622	0.786359	0.610783	0.737353	0.04041
22	17-3025: Environmental Engineering T	0.698483	0.597137	0.800316	0.656815	0.651923	0.596453	0.630486	0.65761	0.870254	0.680481	0.766111	0.165279
23	17-3026: Industrial Engineering Techn	0.683157	0.437939	0.784892	0.581998	0.64453	0.488353	0.557877	0.590639	1	0.60892	0.805254	0.227819
24	47-2031: Carpenters	0.663183	0.730618	0.666313	0.844506	0.748615	0.728757	0.747481	0.778117	0.558564	0.871507	0.592982	-0.005824
25	51-1011: First-Line Supervisors of Prod	0.661276	0.568567	0.830122	0.672318	0.696573	0.527578	0.616575	0.566219	0.805254	0.647372	1	0.270738
26	49-1011: First-Line Supervisors of Mec	0.658706	0.593966	0.73721	0.634132	0.608365	0.556704	0.63873	0.68853	0.801284	0.671814	0.862051	0.37225
27	47-1011: First-Line Supervisors of Cons	0.650785	0.662537	0.779085	0.711723	0.647288	0.559869	0.63152	0.653901	0.78508	0.735836	0.861968	0.316422

Now, compare cell B2 with the other entry level occupations in Row 2. As shown above, 51-4011: Computer-Controlled Machine Tool Operators, Metal and Plastic and 51-4121: Welders, Cutters, Solderers, and Brazers are similarly aligned (being that they are .8 or above, using the same methodology as above with the pathway creation). Now, we create a pathway to a transferable occupation on PowerPoint.

By the time you've created all connections to different pathways and transferable occupations, your ladder should look similar to the image below (the image below is reflective of methodology and industry knowledge). As shown, the gray pathways at each career phase show transferability among similar competencies and allow for progression among various pathways.

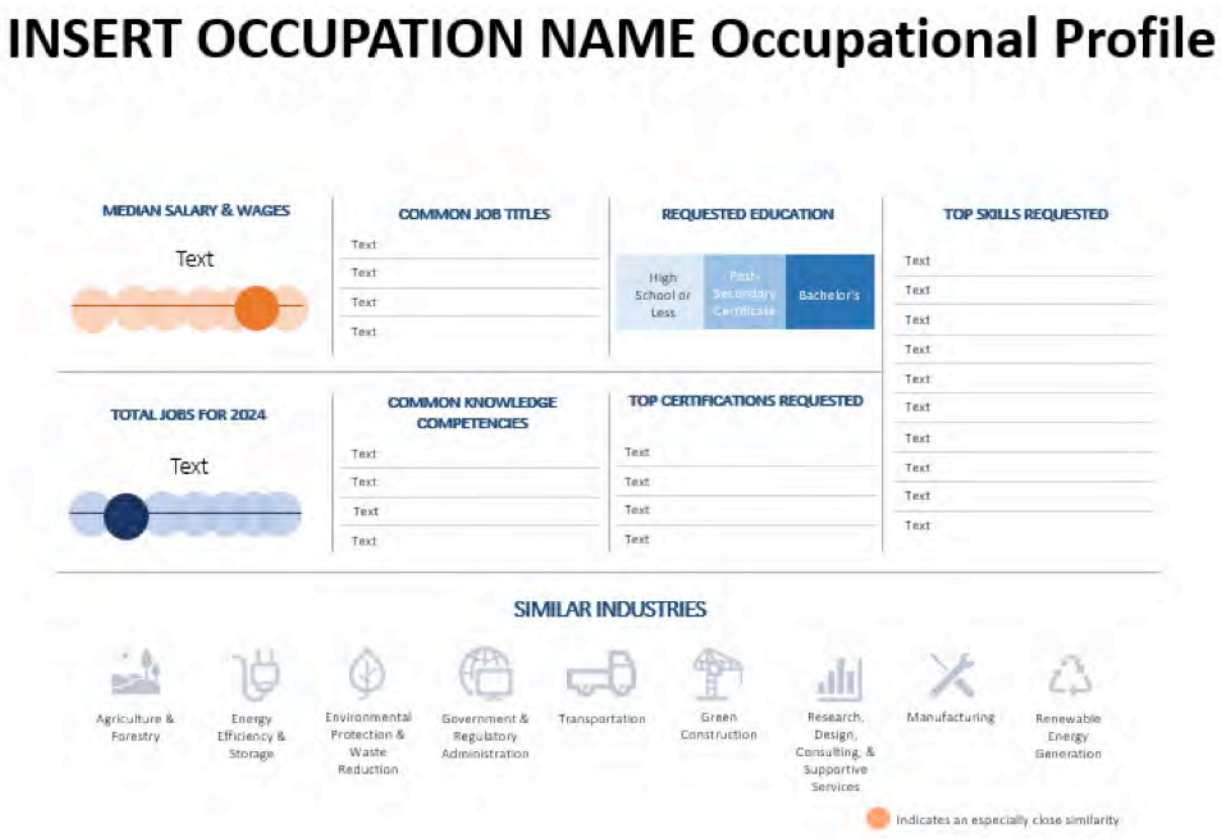


Creation of the Occupational Profile

Once the ladders have been created, there must be complimentary occupational data pulled for the occupational profile.

Step One: Open the Career Map created in Part VI, because all of the information is housed here for the Occupational Profiles.

Step Two: Open a blank Occupational Profile template in PowerPoint.



Step Three: Referring to the Career Map dataset created in Part VI, begin inputting information according to the occupation. (e.g. for 51-1011, input Cell D2 for Total Jobs for 2024, $25,56 for Median Hourly Earnings, etc.)

Manipulating Data in the Occupational Profiles: Once all of the text has been implemented, there are four pieces of information that still need to be manipulated in the profiles:

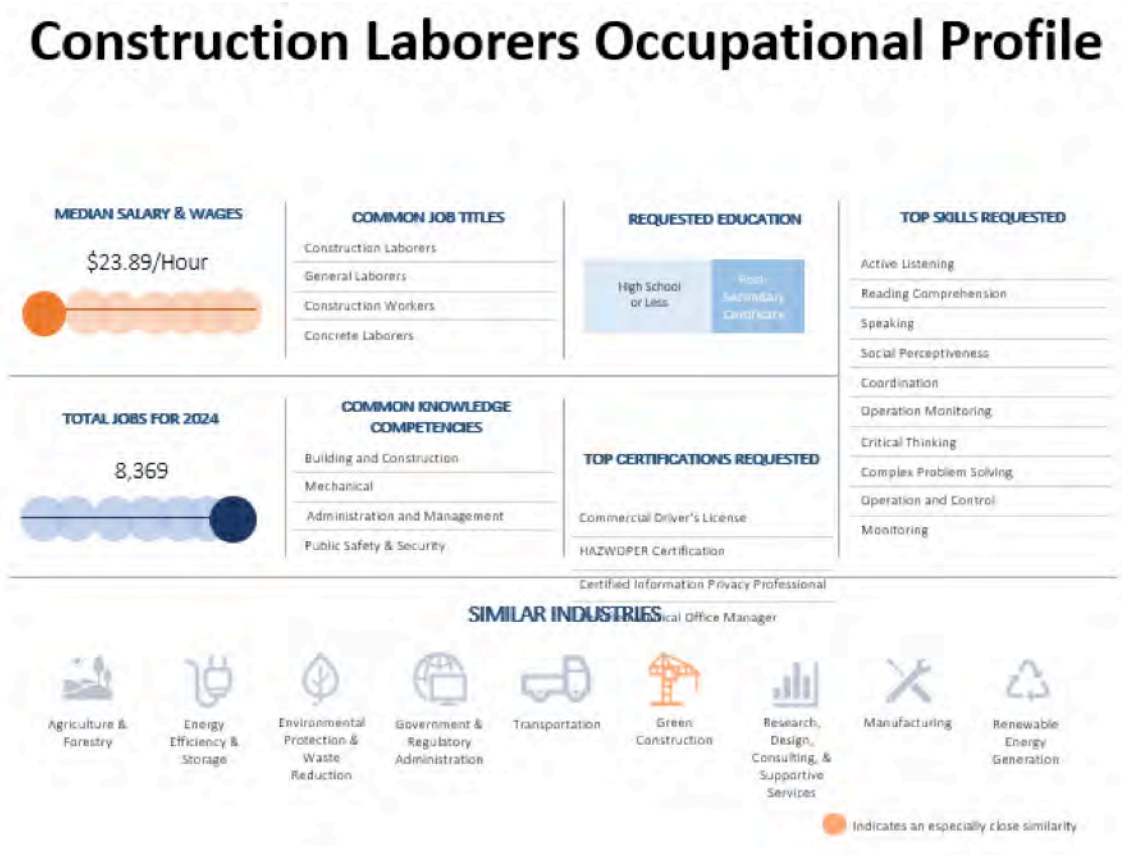
1. The Orange bubbles within Median Salary
2. Blue bubbles in Total Jobs for 2024
3. Requested Education
4. Similar Industries

First Manipulation: Median Salary and Total Jobs for 2024 Bubbles:

- Once you've created all the profiles for the occupations in the ladder, manipulate each bubble for Median Salary and Total Jobs (this will be based on your eye-balling of where the bubble should go)
- Repeat this process for all 100 Critical Occupations.

Second Manipulation: The process for the Median Salary/Wages is the exact same for Total Jobs (the lesser amount of jobs will be to the very left of the blue line, while the higher total jobs will be to the very right). Repeat the same process as above for Total Jobs within the blue bubble (histogram).

Third Manipulation: the boxes in the Requested Education section must be manipulated. This, again, is based on eye-balling where the lines must go.



The previous image illustrates what it will look like after you manipulate the boxes to their approximate size based on the education level.

EDUCATIONAL & TRAINING INSTITUTIONS

Leveraging the crosswalk list of education and training programs by institutions in Connecticut (organized by CIP code), you will need to sort CIP codes by SOC codes of our selected occupations. See example below.

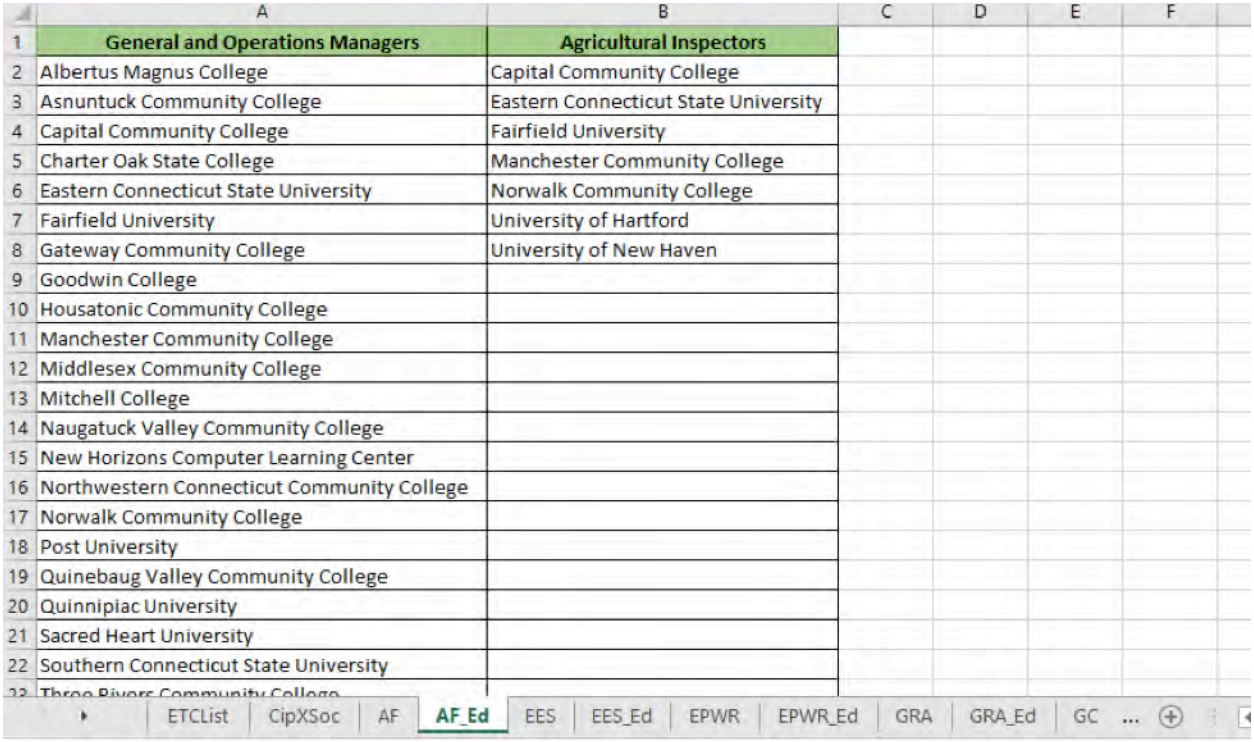
	A	B	C	D	E
1	Cip Code	CIPTitle	SOCCode	SOC-ONETCode	SOCTitle
2	440401	Public Administration	111011	11-1011.00	Chief Executives
3	520101	Business/Commerce, General	111011	11-1011.00	Chief Executives
4	520201	Business Administration and Management, G	111011	11-1011.00	Chief Executives
5	520701	Entrepreneurship/Entrepreneurial Studies	111011	11-1011.00	Chief Executives
6	521101	International Business/Trade/Commerce	111011	11-1011.00	Chief Executives
7	521301	Management Science	111011	11-1011.00	Chief Executives
8	520701	Entrepreneurship/Entrepreneurial Studies	111011	11-1011.03	Chief Sustainability Officers
9	520801	Finance, General	111011	11-1011.03	Chief Sustainability Officers
10	521101	International Business/Trade/Commerce	111011	11-1011.03	Chief Sustainability Officers
11	521301	Management Science	111011	11-1011.03	Chief Sustainability Officers
12	310399	Parks, Recreation and Leisure Facilities Mana	111021	11-1021.00	General and Operations Managers
13	440401	Public Administration	111021	11-1021.00	General and Operations Managers
14	520101	Business/Commerce, General	111021	11-1021.00	General and Operations Managers
15	520201	Business Administration and Management, G	111021	11-1021.00	General and Operations Managers
16	520212	Retail Management	111021	11-1021.00	General and Operations Managers
17	520701	Entrepreneurship/Entrepreneurial Studies	111021	11-1021.00	General and Operations Managers
18	520801	Finance, General	111021	11-1021.00	General and Operations Managers
19	521101	International Business/Trade/Commerce	111021	11-1021.00	General and Operations Managers
20	521301	Management Science	111021	11-1021.00	General and Operations Managers

Next, add a new tab in this pre-generated spreadsheet (thanks to CTDOL) and organize education and training programs as appropriate for each sector and occupation. For each sector, create two tabs: one listing the CIP codes for each occupation (see below)…

	A	B	C	D	E	F	G	H	I	J	K
1	Agriculture & Forestry										
2	SOC	Occupations	CIP								
3	11-1021.00	General and Operations Managers	310399	440401	520101	520201	520212	520701	520801	521101	521301
4	19-4099.02	Precison Agriculture Technicans	410000	410399	419999						
5	37-2021	Pest Control Workers									
6	45-2011.00	Agricultural Inspectors	010401								
7	45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse									
8	45-2093	Farmworkers, Farm, Ranch, and Aquacultural Animals									
9	45-4021	Fallers									
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											

ETCList | CipXSoc | AF | AF_Ed | EES | EES_Ed | EPWR | EPWR_Ed | GRA | GRA_Ed | GC ...

…and one for education and training programs for that respective sector (see below).



	A	B	C	D	E	F
1	**General and Operations Managers**	**Agricultural Inspectors**				
2	Albertus Magnus College	Capital Community College				
3	Asnuntuck Community College	Eastern Connecticut State University				
4	Capital Community College	Fairfield University				
5	Charter Oak State College	Manchester Community College				
6	Eastern Connecticut State University	Norwalk Community College				
7	Fairfield University	University of Hartford				
8	Gateway Community College	University of New Haven				
9	Goodwin College					
10	Housatonic Community College					
11	Manchester Community College					
12	Middlesex Community College					
13	Mitchell College					
14	Naugatuck Valley Community College					
15	New Horizons Computer Learning Center					
16	Northwestern Connecticut Community College					
17	Norwalk Community College					
18	Post University					
19	Quinebaug Valley Community College					
20	Quinnipiac University					
21	Sacred Heart University					
22	Southern Connecticut State University					
23	Three Rivers Community College					

ETCList | CipXSoc | AF | **AF_Ed** | EES | EES_Ed | EPWR | EPWR_Ed | GRA | GRA_Ed | GC ...