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Tools & Visualization Techniques Available to Support the Operations Manager

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Engineering and Operations Management Lunch & Learn Webinar Series

16 February 2022

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College of Engineering & Industrial Engineering Programs

- <u>Master of Science</u>
  - Operations Management
  - Engineering Management
  - Engineering
- <u>Graduate Certificates</u>
  - Project Management
  - Lean Six Sigma
  - Homeland Security
  - Operations Management
  - Engineering Management

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Welcome!

Moderator: Karin Hickenbotham

Please save all questions until the end of the presentation.

We ask all questions will be typed in the Chat Box at the end of the presentation.
This webinar is being recorded and will be posted on ScholarWorks@UARK
in our Operations Management collection of presentations.

THANK YOU!

LET'S GET STARTED!

Today's Presenter

- Retired Navy Surface Warfare Officer, government acquisition analyst
- Retired Lockheed Martin Fellow
- Now owns his own consulting company.
- Previous President for a national professional society MORS (Military Operations Research Society), is a current Fellow, and received the lifetime achievement award for an operations research analyst practitioner.
- Major analytical projects included determining the Navy ship force structure for the first Quadrennial Defense Review, developing Lockheed Martin's experimentation process with analytical rigor, and incorporating analysis into the government and industry affordability efforts.
- Kirk has been an instructor for the MSOM graduate program since August 2015
  - Past: Decision Models / Decision Analysis, Economic Decision Making, Project Management for Operations Managers.
  - Current: Teaching Introduction & Advanced Decision Support Tools for Operations Managers, Basic & Advanced Lean Six Sigma Green Belt.

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College of Engineering
Master of Science in Operations Management

Tools & Visualization Techniques Available to Support the Operations Manager

Agenda

- Role of the Operations Manager

- MSOM Program and Excel

- Operations Manager Needs

- New Advanced Decision Support Tools & Visualization for the Operations Manager course

- Proposed Decision Models Micro Certificate

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The Role of the Operations Manager

- Find data and then review the dataset
- Sort, filter, and lookup data in datasets
- Use formulas in books, reports, and articles
- Conduct basic statistical analysis
- Conduct some preliminary "what if" analysis and simulations
- Create charts to visualize the data / analysis
- Perform some basic financial analysis
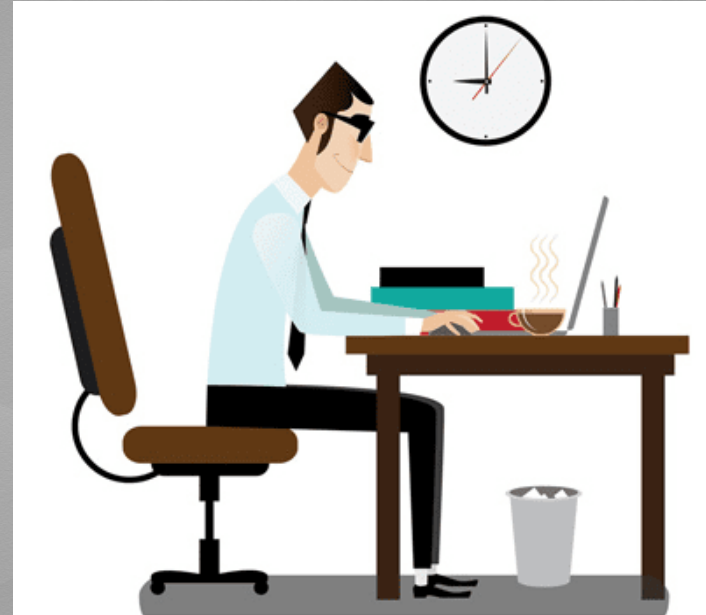
Operations Management Problems

1. You have customer data in one file and a list of zip codes affected by winter storms in another file. How can you get a visualization of which customers are most affected by the weather, and then create a prioritized list of which customer to call first?

2. You do detailed customer complaint interviews with your largest accounts. How can you capture the complaint information in a structured manner, ensuring you don't miss any questions, and then readily create a chart showing the top 3 causes of complaints?

3. You need to create something that all five locations in your company can use to quickly view sales, inventory, and issues. Emailing a spreadsheet around results in too many versions, and you need a single version of the truth.

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Excel in MSOM Program

- Most organizations provide their employees the Microsoft Office Tool Suite

- The Master of Science in Operations Program has included Excel as a foundational aspect of the program

- With 8-week terms, there is not a lot of time for Excel during the courses

- Everyone must take as a prerequisite course or pass a proficiency exam
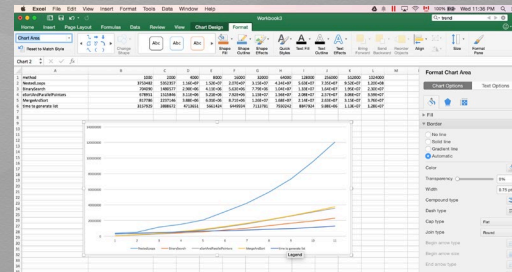
OMGT 4853 Introduction to Decision Support Tools (Excel)

- Basic Excel – functions, formatting, operator order, references

- Statistics – mean, median, mode, variance, standard deviation, range

- Charts – pie, line, bar, column, control, histogram, scatterplot, Pareto chart

- Data Query – logic, logical math, lookup, pivot tables

- Probability & Simulations – uniform, normal, monte carlo simulation

- Analysis – goal seek, solver

- Finance – time value of money functions

- Data Management – sorting, filtering, import / export

But as an Operations Manager, you Still Have Questions

- What about working with text, dates, and times?

- Are there other charts available to visualize data?

- How can I manage my time and budget?

- How can I work more efficiently for common, frequent tasks?

- Are there advanced data query capabilities?

- How can you do sensitivity analysis?

- Is there a way to provide a high-level summary of information?

- How do you ensure the work done by your team is ethical?

What tool(s) can be used to do these tasks?

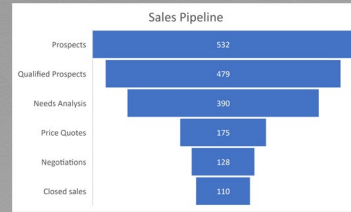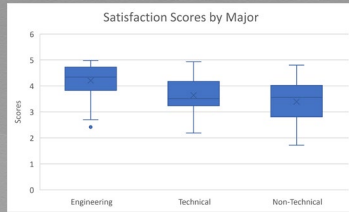# NEW OMGT 5833 Advanced Decision Support Tools & Visualization for Ops Mgrs

- The capabilities in Excel have improved dramatically in the last 5-10 years

- Tableau is growing as a tool organizations use for business intelligence visualization

- New OMGT 5833 Advanced Decision Support Tools & Visualization for Operations Managers course created

  - This course covers advanced decision support tools and visualization used in engineering and operations management including functions and techniques for data manipulation and error testing, charts and chart templates, data query and pivot tables, templates and forms, probability, "What If" sensitivity analysis, and dashboards.

  - The decision support tools covered are Microsoft Excel and Tableau.

  - Provides practice communicating to senior stakeholders and decision-makers.

You Need Data – What Can You Do?

- Importing and cleaning datasets
- Finding, replacing, and substituting data
- Moving, copying, and inserting data
- Joining data and separating into different columns
- Transposing the data
- Removing unwanted spaces and duplicate records
- Flash filling columnar data
- Changing the case (lower, upper, all capital letters)
- Creating lists to select data
- Checking for errors

What Other Charts are Available?
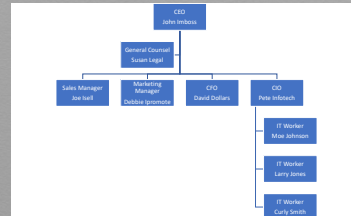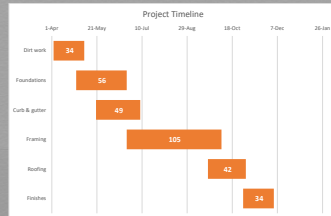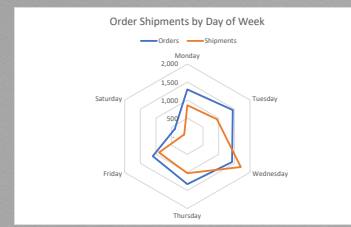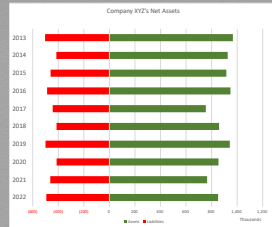
- Analysis Charts
  - Boxplot, Funnel Chart, Waterfall Chart, Tornado Chart, Radar / Spider Chart, Surface Plot, and Tree Map

- Project Management Charts
  - Gantt Chart, "S" Curve Chart, and Organization Chart

What to do with Common, Frequent Tasks?

- Chart Templates

- Templates

- Forms

What Advanced Data Query Capabilities are Available?

- Advanced lookup capabilities to overcome limitations of VLOOKUP & HLOOKUP

- Ability to conduct calculations in pivot tables, create pivot tables from different sources, highlight pivot table data with slicers, and create PivotCharts

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What About Data, Probability, and Analysis?

- The arithmetic and statistical analysis for the different types of data

- Poisson, exponential, and binomial distributions, plus additional information on percentiles and quartiles

- Ability to conduct analysis (maximums, minimums, averages, sums, and counts) on different combinations of data in datasets

- More "what if" analysis capabilities with data tables and scenarios

Data Type	Features
Nominal	Numbers are identifiers Arithmetic on numbers makes no sense Can work with frequencies of categories
Ordinal	Number signifies amount of a property, but not units of measure Differences among numbers don't make sense
Interval	Units of measure Differences among numbers make sense No meaningful zero-point
Ratio	All the features of interval data, plus a meaningful zero-point Statements like "twice as much" make sense

H	I	J	K	L
Rating				
2		=averageIFS(G:G,E:E,K2,H:B,5,D:D,">9")	Full Time	
	AVERAGEIFS(average_range, **criteria_range1**, criteria1, [criteria_range2, criteria2], [criteria_range3, criteria3], [criteria_range4, criteria4], ...)			
1			Contrast	

| $67,175.94	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
2,500	$55,047.51	$60,743.42	$67,175.94	$74,445.20	$82,664.89	$91,963.98	$102,488.73	$114,404.91	$127,900.30	$143,187.50
3,000	$66,057.01	$72,892.11	$80,611.12	$89,334.24	$99,197.86	$110,356.77	$122,986.48	$137,285.89	$153,480.36	$171,825.00
3,500	$77,066.51	$85,040.79	$94,046.31	$104,223.28	$115,730.84	$128,749.57	$143,484.22	$160,166.88	$179,060.42	$200,462.50
4,000	$88,076.02	$97,189.48	$107,481.50	$119,112.31	$132,263.82	$147,142.36	$163,981.97	$183,047.86	$204,640.48	$229,100.00
4,500	$99,085.52	$109,338.16	$120,916.69	$134,001.35	$148,796.79	$165,535.16	$184,479.72	$205,928.84	$230,220.54	$257,737.50
5,000	$110,095.02	$121,486.85	$134,351.87	$148,890.39	$165,329.77	$183,927.96	$204,977.46	$228,809.82	$255,800.60	$286,375.00
5,500	$121,104.52	$133,635.53	$147,787.06	$163,779.43	$181,862.75	$202,320.75	$225,475.21	$251,690.80	$281,380.66	$315,012.50
6,000	$132,114.02	$145,784.22	$161,222.25	$178,668.47	$198,395.72	$220,713.55	$245,972.95	$274,571.79	$306,960.72	$343,650.00
6,500	$143,123.53	$157,932.90	$174,657.43	$193,557.51	$214,928.70	$239,106.34	$266,470.70	$297,452.77	$332,540.78	$372,287.50
7,000	$154,133.03	$170,081.59	$188,092.62	$208,446.55	$231,461.68	$257,499.14	$286,968.45	$320,333.75	$358,120.84	$400,925.00
7,500	$165,142.53	$182,230.27	$201,527.81	$223,335.59	$247,994.66	$275,891.93	$307,466.19	$343,214.73	$383,700.90	$429,562.50

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What is Tableau?
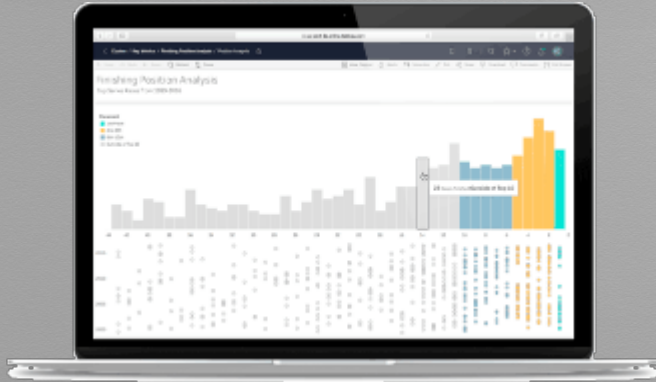
- Tableau is a ***visual analytics platform*** transforming the way we use data to solve problems—empowering people and organizations to make the most of their data.

- As the ***market-leading choice for modern business intelligence***, Tableau analytics platform makes it easier for people to explore and manage data, and faster to discover and share insights that can change businesses and the world.

- Tableau's mission is to ***help people see and understand data***, which is why their products are designed to put the user first—whether they're an analyst, data scientist, student, teacher, executive, or business user.

- From connection through collaboration, ***Tableau is a powerful, secure, and flexible end-to-end analytics platform.***

Visualizing Data & Analysis – On Demand

- Making your data and analysis results available *on demand* for your managers through Excel and Tableau dashboards
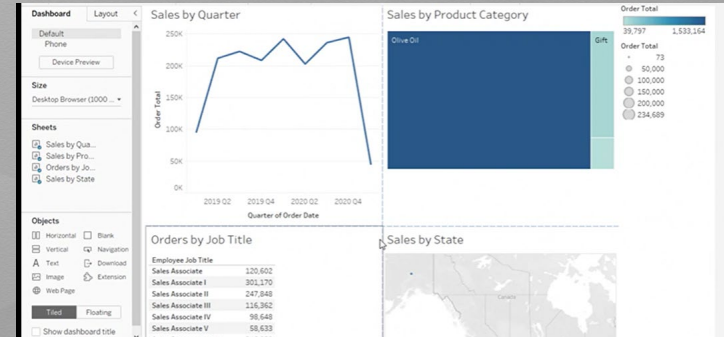
Researching and Presenting Data Ethically

- Learning to understand how to research data, conduct analysis, and present results ethically
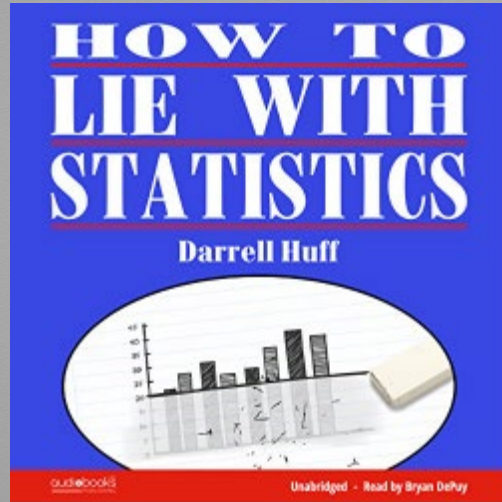
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Decision Models Micro Certificate

- Gain the skills you need to ask the right questions, pull together the right data, and use data-driven optimal decision processes to solve operations complex management problems.

- Program Goals
  - Allow students to quantitatively and critically evaluate operational decisions
  - Support data-driven decision making in operations management
  - Communicate optimal decisions, supported by data analysis and visualizations, to management and other stakeholders

- Courses
  - INEG/OMGT 5443 Decision Models (existing)
  - OMGT 5833 - Advanced Decision Support Tools with Visualization for Operations Managers (new)

- Decision Models Course
  - Focus on quantitative decision models for technical and managerial problems for private and public organizations.
  - Topics include stakeholder value, Value-Focused Thinking, decision making challenges, decision traps, cognitive biases, decision processes, decision framing, influence diagrams, value hierarchy structuring, designing creative alternatives, single objective models, multi-objective additive value model, sensitivity analysis, decision trees, Monte Carlo simulation, expected value, tornado diagrams, value of information, risk preference, utility models, and communicating analysis insights.

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Any Questions?

Q & A with Kirk Michealson

Type your questions in the chat section of this session.
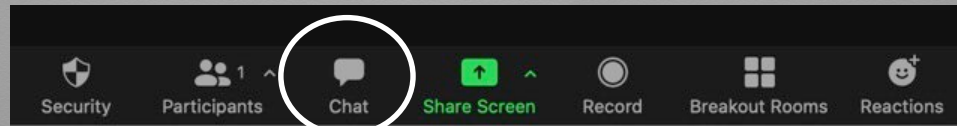
What is Operations Management?

✓ Leads and manages business and government operations to effectively create and deliver products and services.

- — Includes process design, location, layout, supply chain, inventory, scheduling, production, quality, job design, maintenance, distribution and transportation.

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What is Engineering Management?

✓ Leads technical workforce to develop new products and services to achieve strategic objectives

✓ Provides a bridge from engineering to managers
  – Communicatees technology opportunities and challenges to managers
  – Communicates strategy and strategic objectives to engineers

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Why MSOM or MSEM?

- ***Learn It Today, Use It Tomorrow!***

- 100% online

- No THESIS!

- Learn from professors with current and relevant expertise

- Flexible degree plan with only 10 graduate courses

- Earn a graduate certificate concurrently w/o taking any extra courses

- No Out-of-State Tuition = Total for a 3-hour class: from $1,061.64 to $1,151.64
  - $303.88/credit hour + $50 technology fee/credit hour (+$30 admin fee for engineering courses)

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Admission Requirements

MSOM

- Any bachelor's degree from an accredited institution

- NO GRE

- GPA 2.5 or above will be considered

MSEM

- BS in Engineering -accredited by the Engineering Commission of ABET accreditation, **AND**

- GPA ≥ 3.0 on all course work prior to the receipt of the engineering degree **OR**

- GPA ≥ 3.0 on the last 60 hours of coursework

- Conditional admission for GPA 2.90 – 2.5 possible; case-by-case basis

- No GRE

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BEST ONLINE PROGRAMS U.S.News GRAD ENGINEERING 2021

BEST ONLINE PROGRAMS U.S.News VETERANS GRAD ENGINEERING 2021

Graduate Certificates

Project Management – Learn skills to become a better project leader and manager and prepare for PMP Certification

Lean Six Sigma – Learn how to eliminate problems, remove waste and reduce variation to improve processes and create products and services

Homeland Security – Designed for industry and safety professionals to learn how to mitigate risk

Operations Management – Learn how to lead and manage business and government operations to effectively create and deliver products and services

Engineering Management – Learn how to lead a technical workforce to develop new products and services

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Graduate Certificates

1. Project Management

2. Lean Six Sigma

3. Homeland Security

4. Operations Management

5. Engineering Management

- Only 4 Classes!
- Obtain as part of your Master's Degree Classes will double count!
- Completed as stand-alone program
- 2.5 GPA
- No GRE/GMAT
- Transition to MSOM or MSEM

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NEXT WEBINAR 3/9/22:

Topic: Operations Management & Engineering Management

Presented by: Dr. Greg Parnell

THANKS FOR ATTENDING!

- For information about our flexible degree program options, email
  msom@uark.edu or msem@uark.edu

- **operations-management.uark.edu** or **engineering-management.uark.edu**

- _Registered_ participants will receive an email with the video link to this webinar.
  We hope to see you online next month!

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