



State of the Art Approaches to Market Data Analytics

Mark Avery



Introduction: Mark Avery

- 30+ years as a compensation professional
- Practitioner (comp analyst and manager) for 7 years
- Consultant for 11 years (small firm, then Mercer)
- Started creating point-factor job evaluation systems
- Founded MarketPay in the year 2000

Introduction: MarketPay

- Web-based market pricing system (15 years)
- Primarily serve compensation professionals
- House data from about 1000 different survey reports from all over the world
- Reporting and analytical applications
- Merged with PayScale in April 2016



Market Data Analytics Overview

- Analytics are emerging everywhere and forward-thinking HR groups are leading their companies into this new realm
- The C-Suite is demanding analytics to run the business
- Other areas of HR are benefiting from advanced analytics (staffing, performance management, workforce planning)
- Technology is bringing advanced tools for the analysis of market data to the desks of practitioners
- Surveys have been conducted in essentially the same way for decades, but change will come

Analytics in Sports

NFL teams amassing scientific data, but what does it mean?



Tom Pelissero, USA TODAY Sports 3:28 p.m. EST February 23, 2015



(Photo: Brian Spurlock, USA TODAY Sports)

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INDIANAPOLIS – NFL teams left the scouting combine Monday with more information than ever on each prospect as football's sports science revolution continues to accelerate.

Now comes the tricky part: figuring out what exactly all the numbers mean.

"That's the pain point right now in the industry," said Dr. Travis McDonough, founder and CEO of Kinduct Technologies, which works with the St. Louis Rams. "There's a tsunami of information, but it's turned out to be paralysis by analysis. People have no

RELATED VIDEO



Five NFL draft prospects to watch

Advanced Analytics in HR

- Forecasting workforce needs
- Sourcing the best candidates
- Finding the causes of attrition
- Identifying high potential employees at risk of leaving
- Determining factors that lead to greater employee engagement and productivity



A Model of Analytics



Descriptive Analytics

- The simplest form of statistics
- Describe “What happened?”
- Averages, medians, modes, quartiles, ranges, etc.
- Used commonly in organizations



Predictive and Prescriptive Analytics

- Analyze a sample, generalize to population
- Testing hypotheses, deriving estimates
- Seek to answer “why” things happen
- Help determine what to do next
- Who might succeed? ..fail? ..leave? ..stay?
- Impact of performance-based rewards on results



Advanced HR Analytics drives Success



Companies make
more money



HR departments
play more strategic role

Keys to successful Analytics

- Accurate, complete and reliable data
- Tools
- Working knowledge of statistics
- Asking the right questions
- Imagination and the ability to turn data into a “story”



HR Analytics – Hot Jobs?



- Natural progression out of HR's analytical/reporting functions
- Often duties added to existing HRIS positions
- Typical requirements
 - Master's in Business, Stats or Computer Science
 - 7-10 years experience in reporting/analysis
 - attention to detail, analytical acumen, intellectual curiosity, creativity
- Individual contributor positions with “Manager” titles
- Internal subject matter experts

Market Data Analytics – More and Better Data

Compensation
Surveys



HR Systems



Consultant,
Academic and
Scientific Studies



Internal
Surveys



Government Data



Market Data Analytics – Better Tools

- HR Systems have leaped into providing all sorts of Analytics features
- **Data Visualization** is one tool that provides innovative ways to explore the data available
- **Data Mining** capabilities let you explore large databases of survey information



» Professional judgement is still most critical - asking the right questions, forming hypotheses on cause and effect, and interpreting results

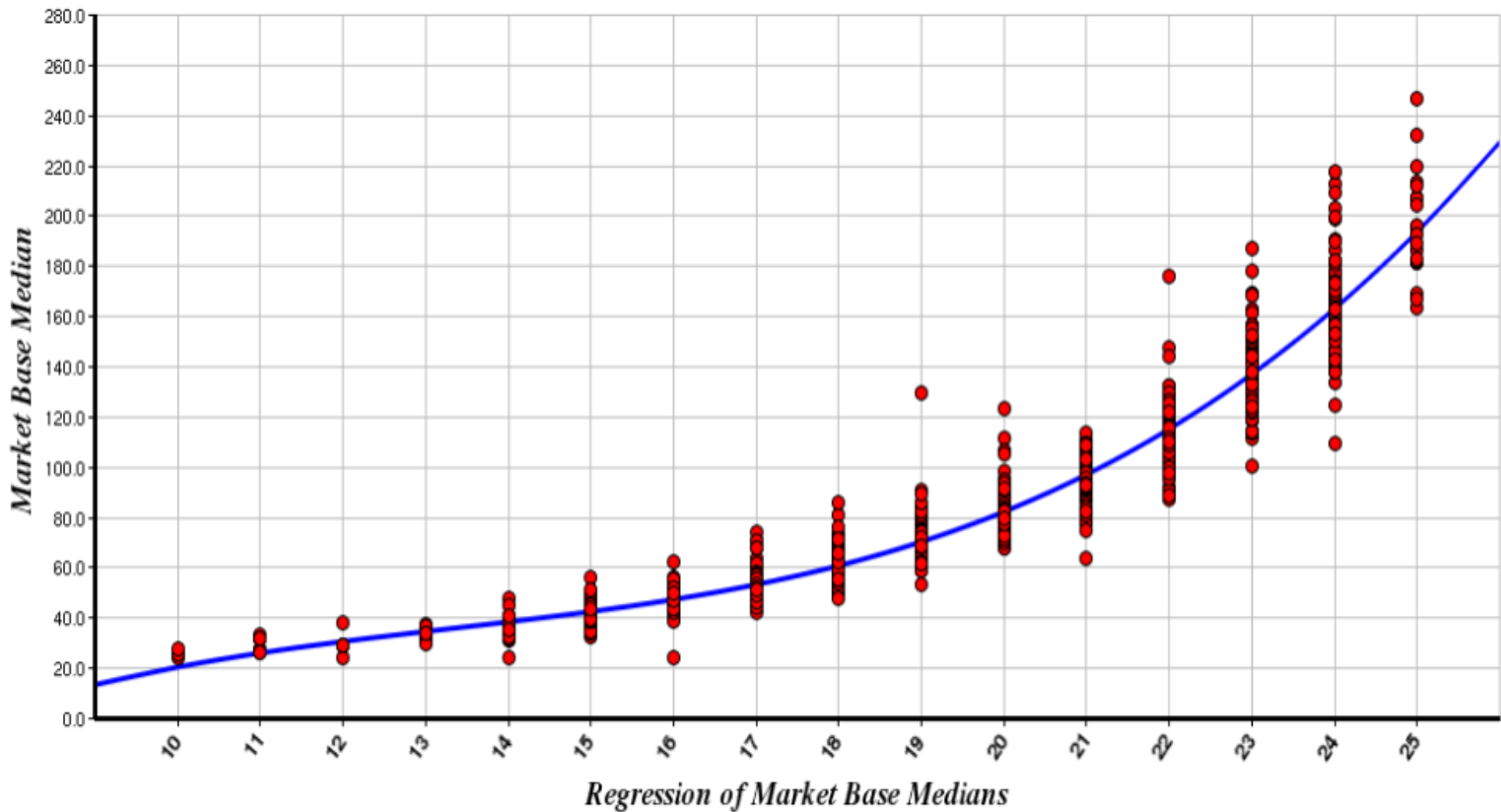
Traditional Market Data Analytics

- Benchmarks to determine grades and/or ranges
- Competitive assessments (individual or organizational)
- Often tabular reports

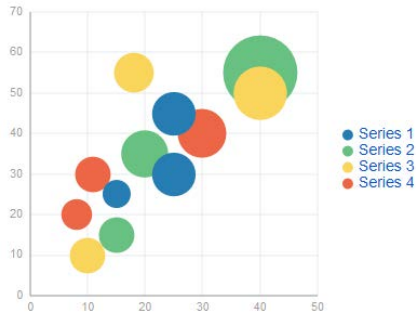
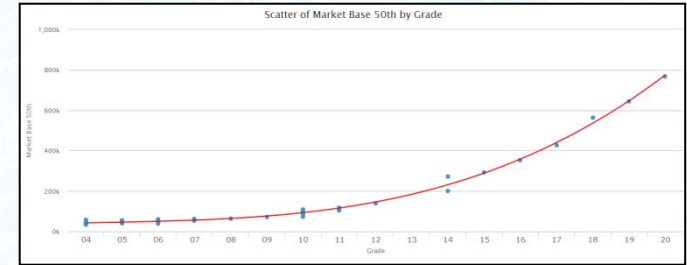
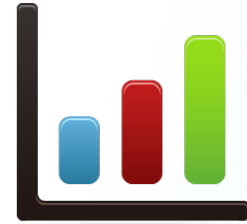
Department ▲		Number of Jobs	Number of Employees	Base Salary Amt Avg	Market Base Salary 50th (Median) Avg	Salary as % of Market Base 50th (Median) Avg	Market Base Salary 50th (Median)	Salary as % of Market Base 50th (Median)
contains ▼		equals ▼	equals ▼	equals ▼	equals ▼	equals ▼	equals ▼	equals ▼
Clerical	12	160	43,614	47,396	92.08			
Executive	17	88	209,424	216,706	98.73	66,169	82.86	
Finance	42	500	67,702	75,011	90.33	66,169	85.03	
Human Resources	27	348	74,928	82,355	91.39	78,312	76.09	
Peake, Christian		Supr Accounting		07	78,795	77,885	101.17	

Structure Modeling

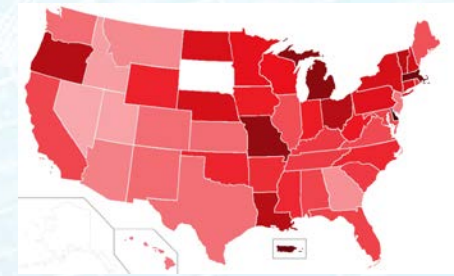
More advanced methods utilizing regression analysis



Data visualization and exploration



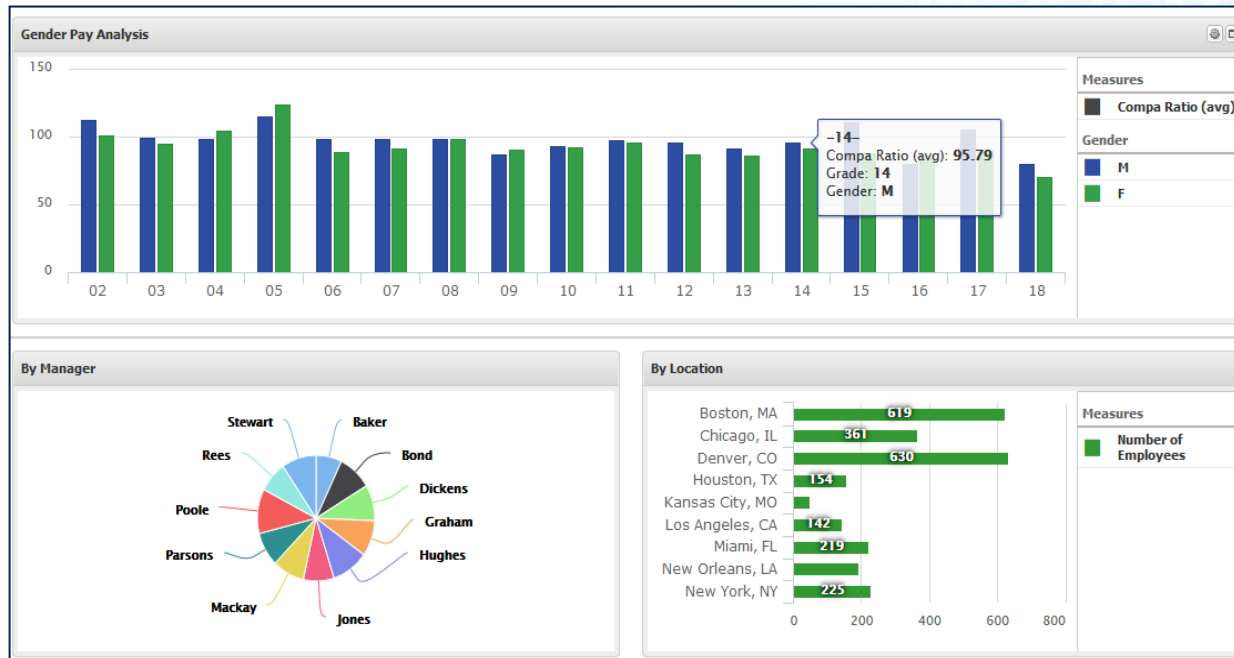
Creative use of graphics to illustrate data



Player	Running Speed	Zone Strength	Blocking for Coverage	Blocking for Power	Blocking
1. Daniels, Jonathan	2	3	3	3	3
2. Terrence, Calvin	3	3	3	3	3
3. Mullis, Drew	3	3	3	3	3
4. Emani, Ryan	3	3	3	3	3
5. Apkins, Ryan	3	3	3	3	3
6. Chisemoll, Lorenzo	3	3	3	3	3
7. Brantley, Michael	3	3	3	3	3
8. Parks, Matt	3	3	3	3	3
9. Terrence, Matt	3	3	3	3	3
10. Roberts, Ryan	3	3	3	3	3
11. Barnes, Tim	3	3	3	3	3
12. Hunt, Michael	3	3	3	3	3



Data visualization and exploration



Interactivity to explore hypotheses, dig deeper into issues, and “find the story”

Familiar graphics in two dimensions

Bars, Columns



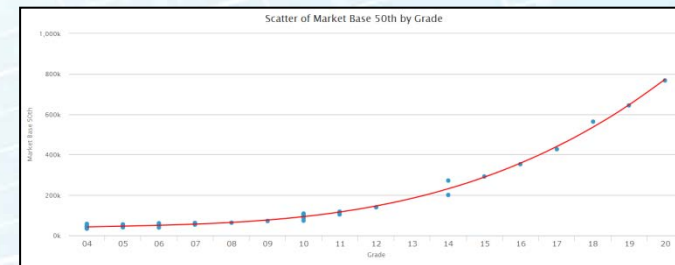
Pie



Line, Area

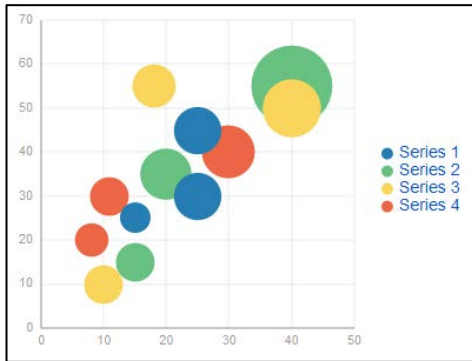


Scattergrams



New graphics adding additional dimensions

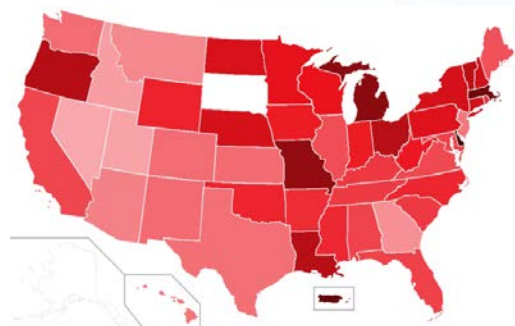
Bubble Charts



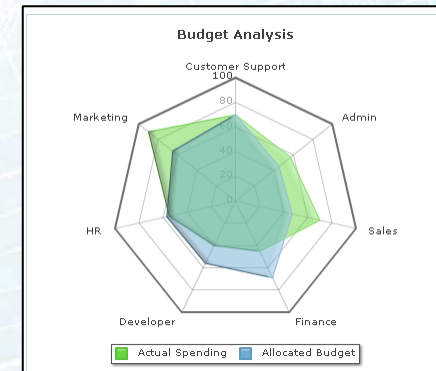
Heat Maps



Choropleth Maps



Radar Charts



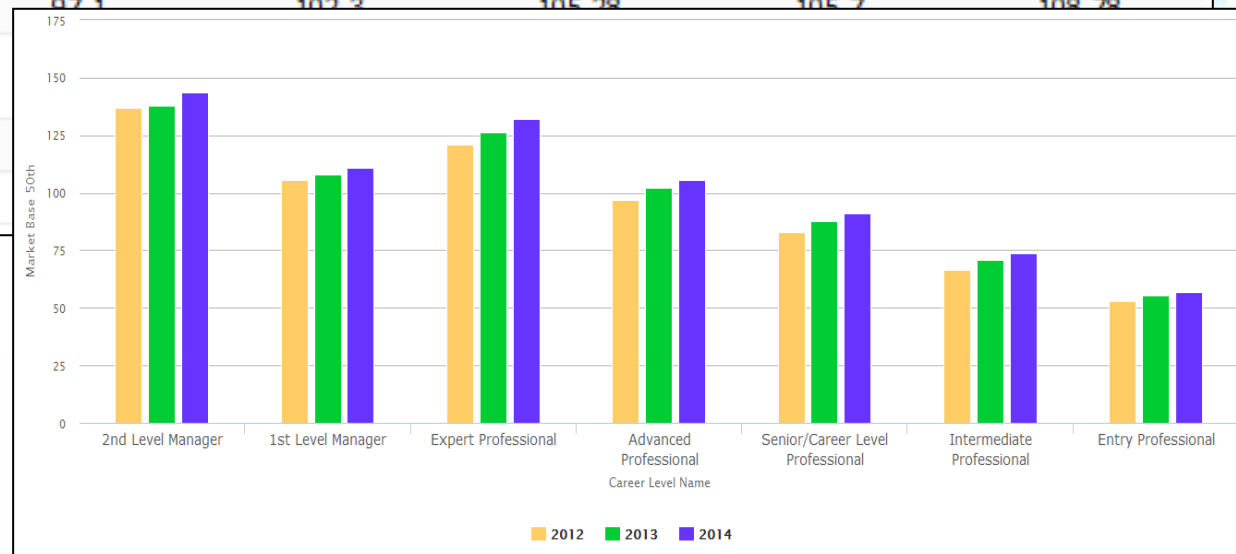
Data Mining

- Analysis and reporting of large survey data bases
- Clients typically use less than 1% of their libraries
 - A fraction of the positions
 - A small fraction of the data cuts
- There's a untapped wealth of information
- Classification/organization of survey jobs enables powerful reporting



Data Mining - Year over Year Pay Trends

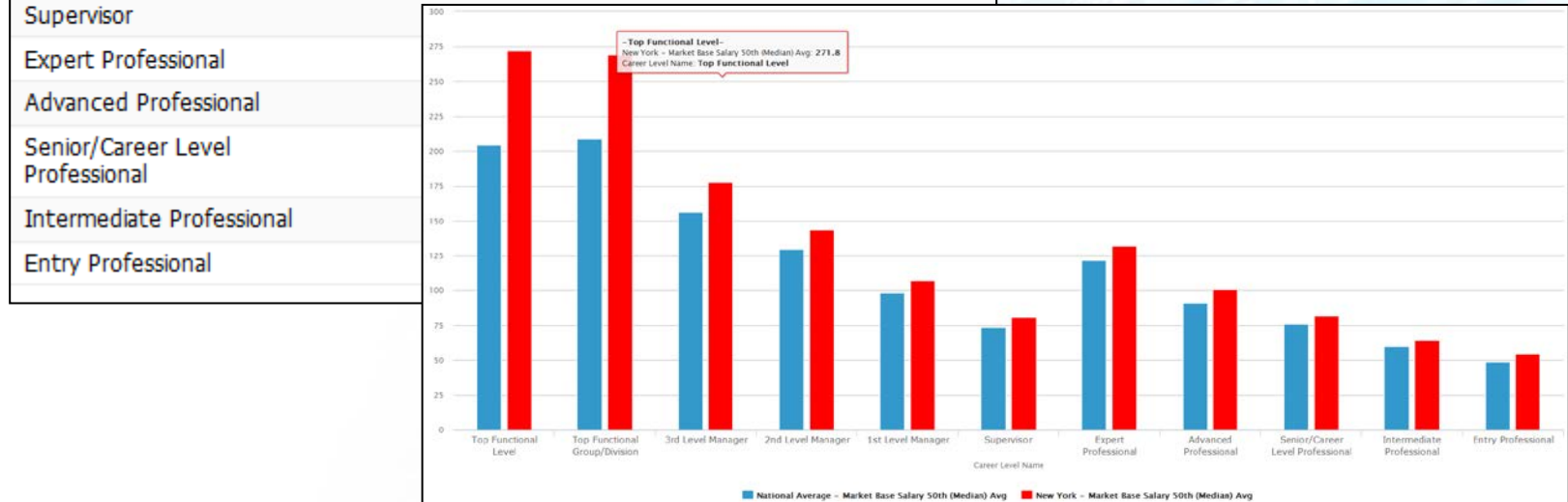
Career Level Name	All Jobs 2012	All Jobs 2013		All Jobs 2014	
	Market Base Salary 50th (Median) Avg	Market Base Salary 50th (Median) Avg	Market Base Salary 50th (Median) Avg % of baseline	Market Base Salary 50th (Median) Avg	Market Base Salary 50th (Median) Avg % of baseline
2nd Level Manager	136.7	138.1	101.08	143.7	105.17
1st Level Manager	105.8	108.2	102.28	110.9	104.80
Expert Professional	121.1	126.4	104.41	131.9	108.93
Advanced Professional	97.1	102.3	105.28	105.7	108.78
Senior /Career Level Professional					
Intermediate Professional					
Entry Professional					



Data Mining - Geographic Pay Differences

Career Level Name	National Average	New York	
	Market Base Salary 50th (Median) Avg	Market Base Salary 50th (Median) Avg	Market Base Salary 50th (Median) Avg % of baseline
Top Functional Level	204.5	271.8	132.87
Top Functional Group/Division	208.4	268.9	129.03
3rd Level Manager	156.3	177.6	113.62
2nd Level Manager	129.7	143.4	110.57
1st Level Manager	98.0	107.3	109.42

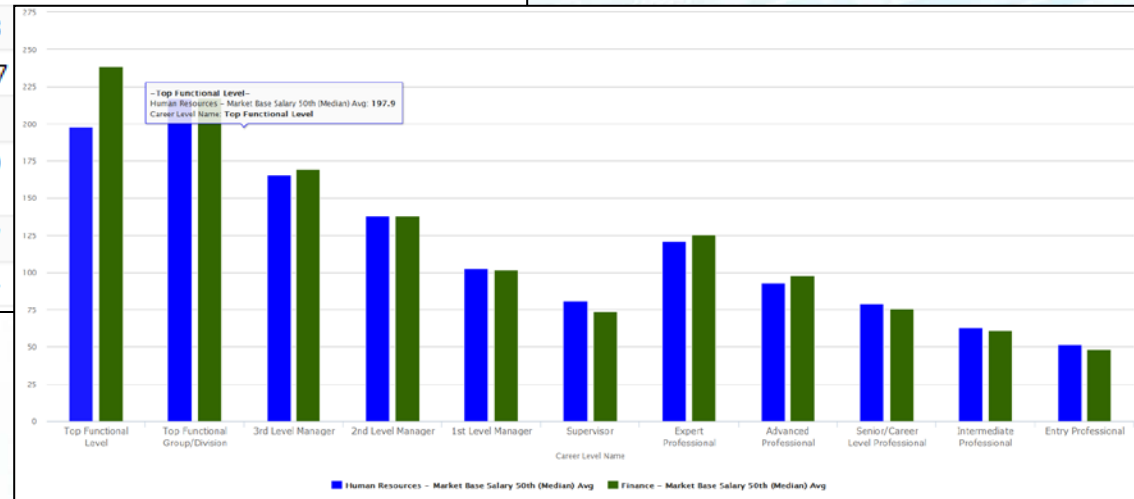
Pay rates are reported to be significantly higher in New York City.



Data Mining – Function vs. Function

Career Level Name	Human Resources	Finance	
	Market Base Salary 50th (Median) Avg	Market Base Salary 50th (Median) Avg	Market Base Salary 50th (Median) Avg % of baseline
Top Functional Level	197.9	238.2	120.40
Top Functional Group/Division	217.1	217.4	100.15
3rd Level Manager	165.6	169.5	102.35
2nd Level Manager	138.0	138.1	100.02
1st Level Manager	102.5	101.7	99.22
Supervisor	80.8		
Expert Professional	120.7		
Advanced Professional	93.1		
Senior/Career Level Professional	78.9		
Intermediate Professional	62.7		
Entry Professional	51.4		

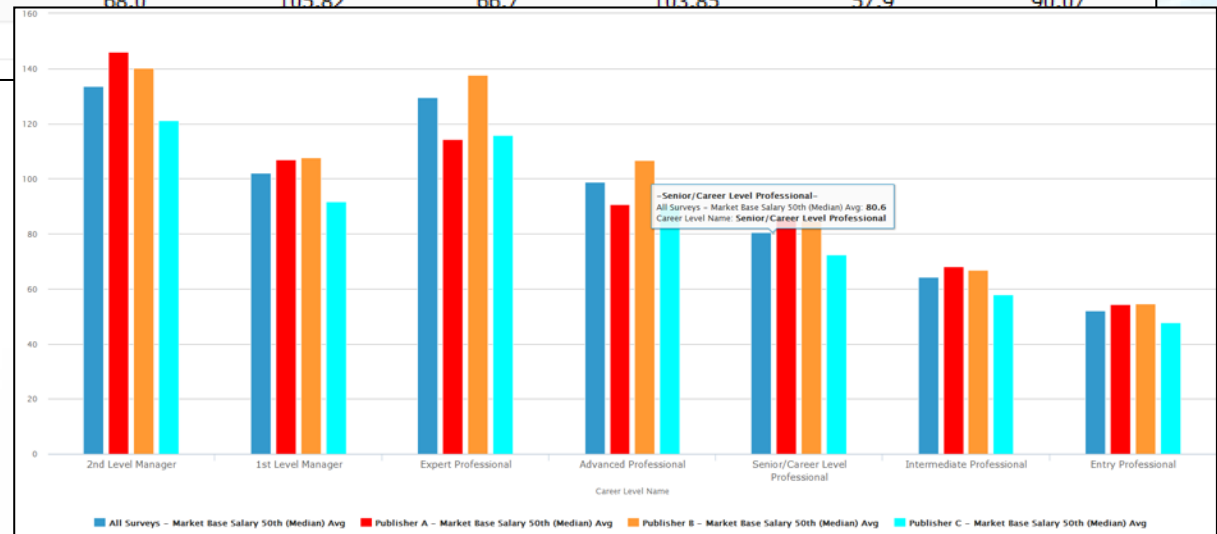
HR paid higher to start, then Finance paid more at higher grade levels.



Data Mining – Publisher vs. Publisher

Career Level Name	All Surveys	Publisher A		Publisher B		Publisher C	
	Market Base Salary 50th (Median) Avg	Market Base Salary 50th (Median) Avg	Market Base Salary 50th (Median) Avg % of baseline	Market Base Salary 50th (Median) Avg	Market Base Salary 50th (Median) Avg % of baseline	Market Base Salary 50th (Median) Avg	Market Base Salary 50th (Median) Avg % of baseline
2nd Level Manager	133.6	146.1	109.37	140.3	105.00	121.1	90.64
1st Level Manager	102.0	106.8	104.72	107.6	105.50	91.8	89.98
Expert Professional	129.5	114.3	88.28	137.7	106.40	115.7	89.33
Advanced Professional	98.9	90.7	91.69	106.7	107.94	90.3	91.27
Senior/Career Level Professional	80.6	85.3	105.80	84.5	104.84	72.3	89.67
Intermediate Professional	64.2	68.0	105.82	66.7	103.85	57.9	90.07
Entry Professional	52.1						

We always knew that Publisher C reported lower pay rates!



Market Data over the last 30 years

- Data collection methodology similar
- Electronic data submission and results
- Much better coverage of job levels, comp data elements
- Number of surveys greatly expanded in the 90s and 00s
- Globalization



Room for Improvement

- Matching is time-consuming and sometimes delegated downward
- Survey job descriptions are generalized
- Timeliness of data is an issue



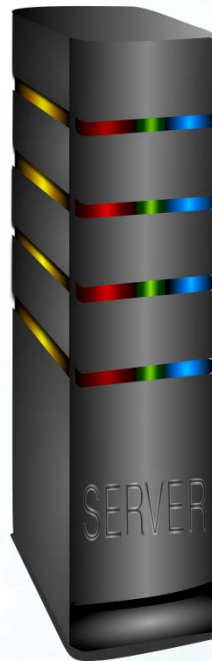
Technology's Help with Survey Matching

- Natural language processing
- Computational linguistics
- Machine learning



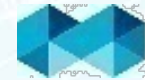
Automated Matching

Company Job Description



Match to positions in surveys

TOWERS WATSON



MERCER



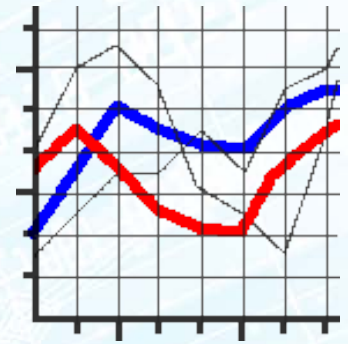
Radford

AON Hewitt

MarketPay

More Specific Survey Matching

- Determine compensable factors for each job
- Gather that data in the survey process
- Provide results that capture the impact of compensable factors



Description Details

PayScale Title: Registered Nurse (RN) [\(Change\)](#)

Administer nursing care to ill, injured, convalescent, or disabled patients. Advise patients on health maintenance and disease prevention or provide case management. Assess patient health problems and needs, develop and implement nursing care plans, and maintain medical records.

Typical years experience in field of 8-13. Typically holds Bachelor's Degree. Supervisory Role: No. Work Shift: Shift (2nd/Swing). Skills/Specialties include Emergency Room (ER).

\$64K

Estimated Base Pay at
the 50th Percentile

Typical Skills & Certifications

Skill/Specialty

Skip this question

Choose the most important skill/specialty for this job.

Skill/Specialty: 👉

Emergency Room (ER) ✕

These are estimates based on national data for popular answers. Actual effect on pay is based off your labor market and may be different.

Popular answers:

↑ **May increase pay:**

[Acute Care](#) | [Dialysis](#) | [Emergency Room \(ER\)](#)

➡ **May have little to no impact on pay:**

[Case Management](#) | [Critical Care](#) | [Intensive Care Unit \(ICU\)](#) | [Labor & Delivery, Birthing](#) | [Neonatal Intensive Care Unit \(NICU\)](#) | [Operating Room / OR](#) | [Recovery / Post-Anesthesia Care Unit \(PACU\)](#) | [Telemetry](#)

↓ **May lower pay:**

[Cardiology](#) | [Geriatrics](#) | [Home Health/Home Care](#) | [Hospice](#) | [Medicine / Surgery](#) | [Nursery](#) | [Oncology](#) | [Pediatrics](#) | [Psychiatric](#)

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Typical years experience in field of 8-13. Typically holds Bachelor's Degree. Supervisory Role: No. Work Shift: Shift (2nd/Swing). Skills/Specialties include Emergency Room (ER). Certifications include Certified Critical Care Registered Nurse (CCRN), Registered Nurse (RN), Trauma Nursing Course Certified (TNCC).

X

\$69K

Estimated Base Pay at
the 50th Percentile

Certification/License

Skip this question

Certification/License: \$

Choose the most important certification for this job.

Certified Critical Care Registered Nurse (CCRN) x

Registered Nurse (RN) x

Trauma Nursing Course Certified (TNCC) x

These are estimates based on national data for popular answers. Actual effect on pay is based off your labor market and may be different.

Popular answers:

↑ May increase pay:

Certified Critical Care Registered Nurse (CCRN) | Neonatal Resuscitation Program (NRP) | Neonatal Resuscitation Program (NRP) Provider | Oncology Certified Nurse (OCN) | Pediatric Advanced Life Support (PALS) | Registered Nurse (RN) | Trauma Nursing Course Certified (TNCC)

→ May have little to no impact on pay:

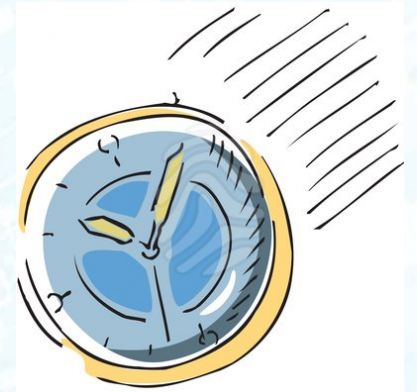
Basic Life Support (BLS) | Critical Care

↓ May lower pay:

Advanced Cardiac Life Support (ACLS) | Cardiopulmonary Resuscitation (CPR)

Survey Data Timeliness

- Up-front and evergreen matching of positions
- Continuous data feeds of pay and other data (HRIS integration)
- Closer to real-time data



What can we expect?

- More specific and timely market data
- Integration of market data with other databases and systems
- Tools for advanced data modeling, predictive and prescriptive analytics



Questions?

