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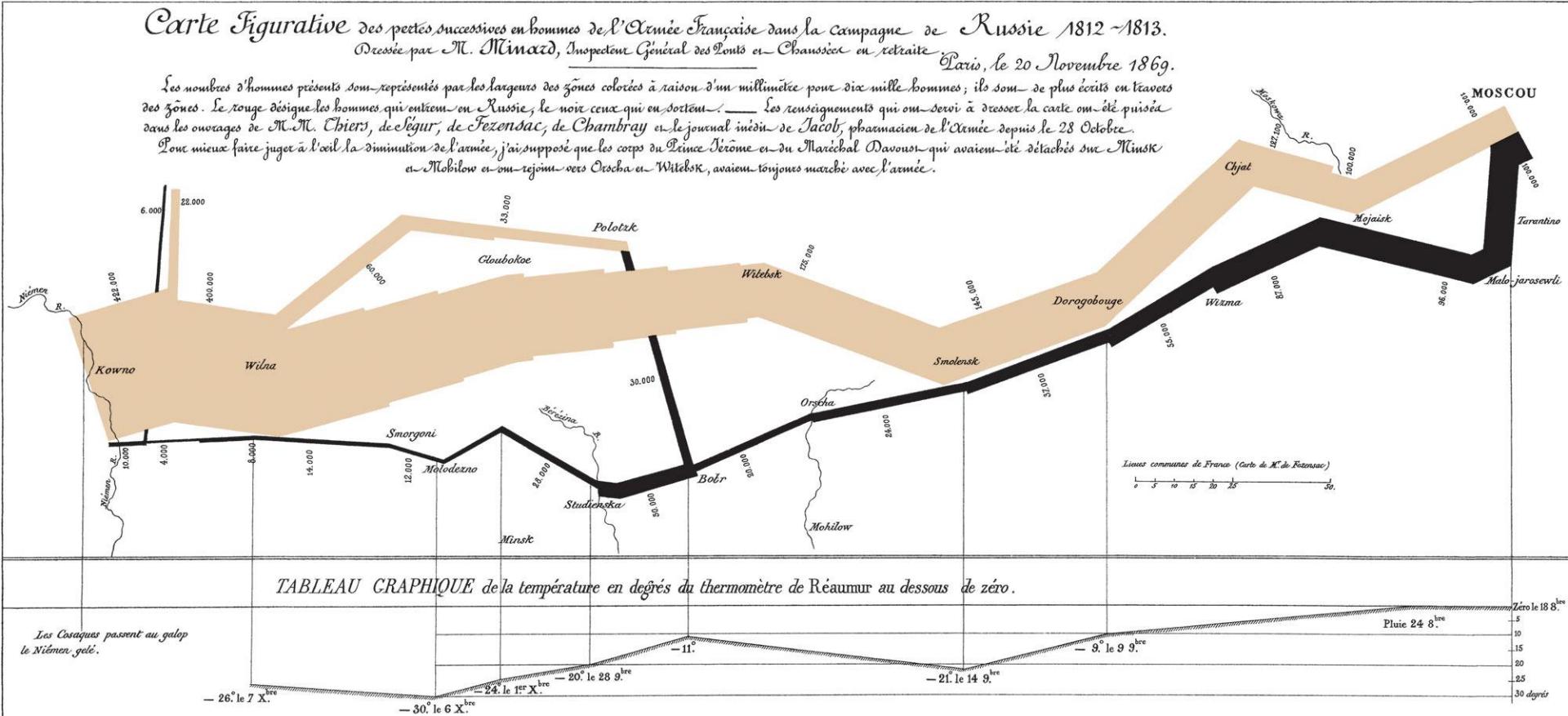
**Oleksandr Romanko, Ph.D.**

Associate Director, Financial Risk Quantitative Research, SS&C Algorithmics  
Adjunct Professor, University of Toronto

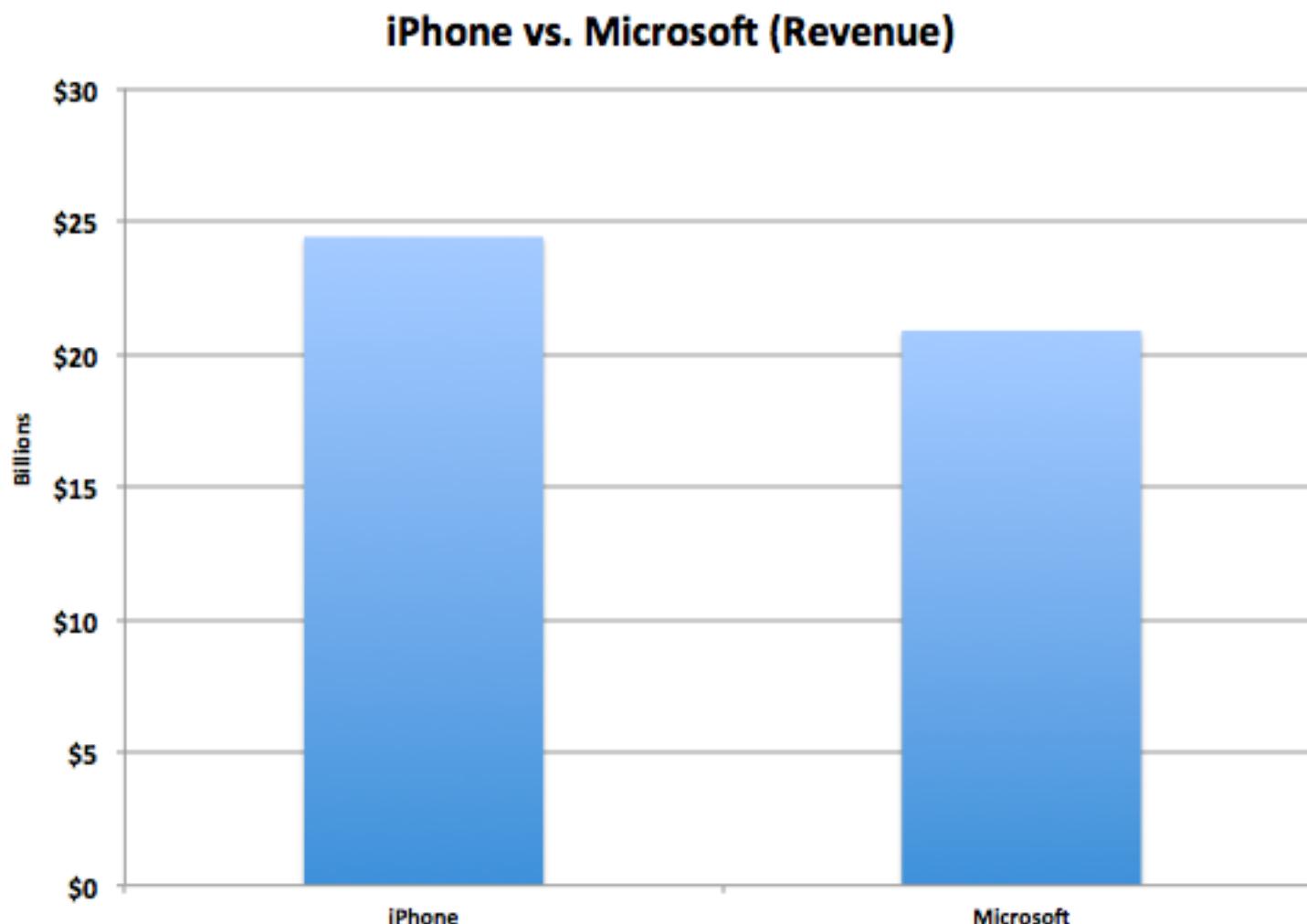
# **MIE1624H – Introduction to Data Science and Analytics Lecture 6 – Visual Analytics**

# Visual analytics

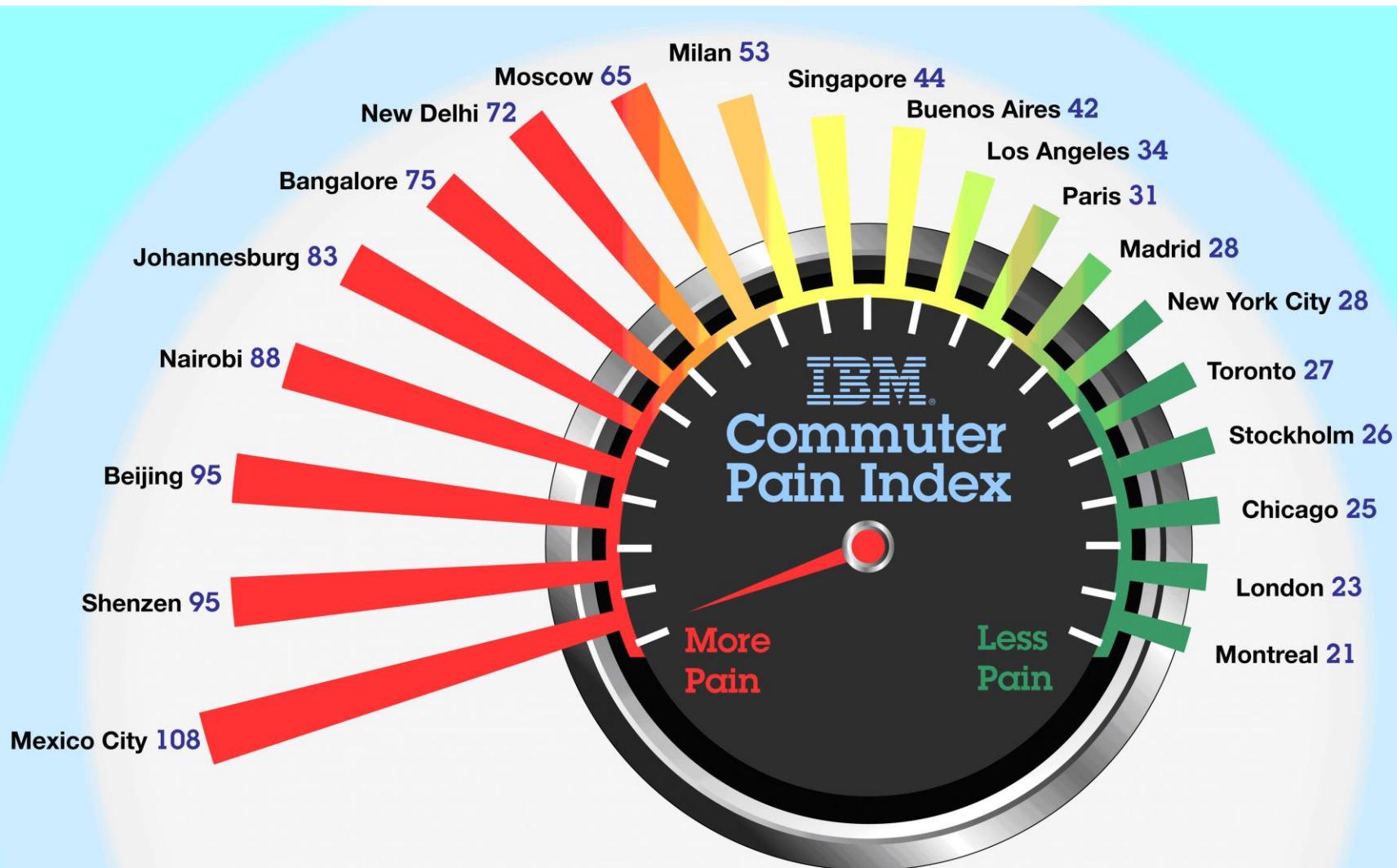
## Visual statistics of the Napoleon Campaign: the Minard Map



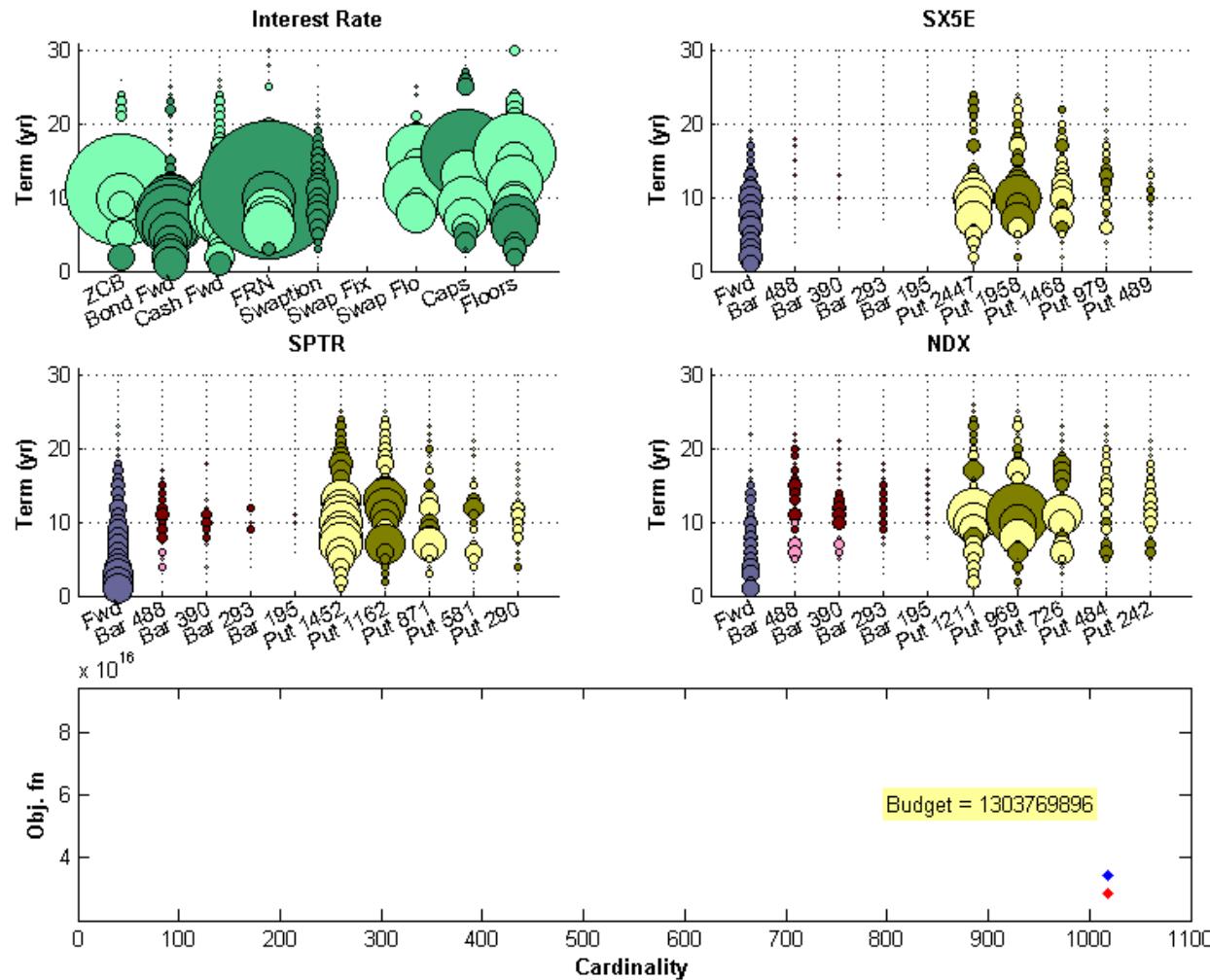
# Visual analytics



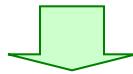
# Visual analytics



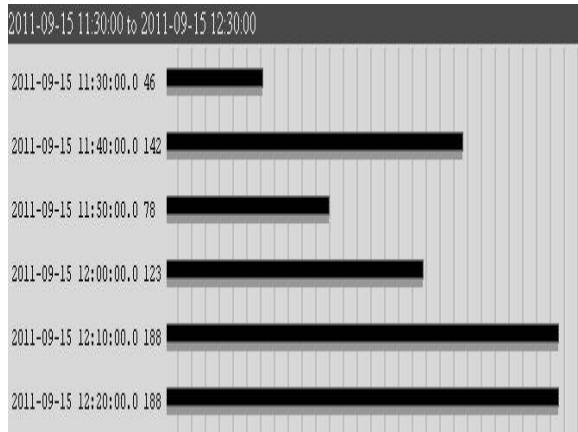
# Visual analytics – portfolio



# Historical visualization



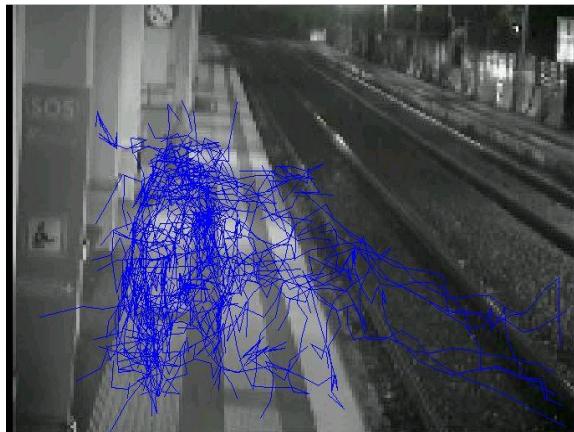
Activity Histogram



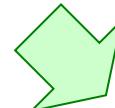
Distribution of events over time



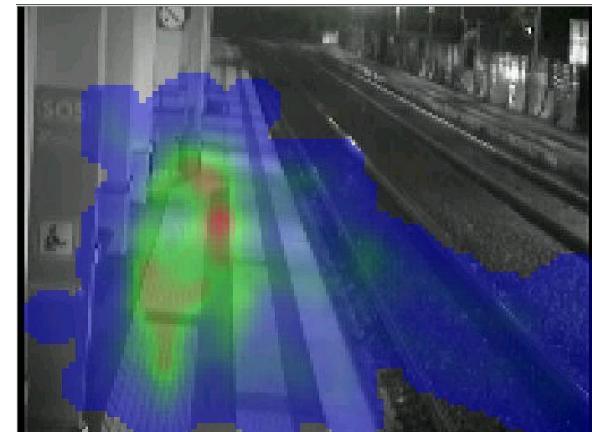
Track Summary



Show tracks of all objects returned from search

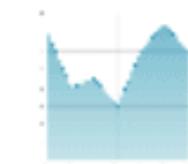


Heat Map



How long objects spent in different places

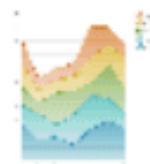
# Visualization types



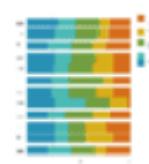
Area (Straight)



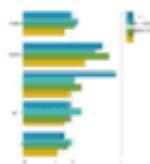
Area (smooth)



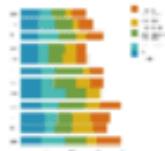
Area - Stacked (Strai...



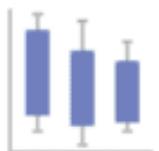
Bar - 100 Percent St...



Bar - Clustered



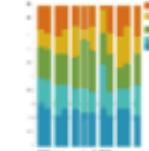
Bar - Stacked



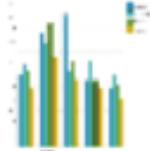
Box plot



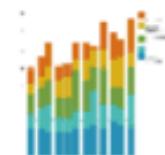
Bubble Chart



Column - 100 Percent...



Column - Clustered



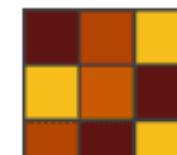
Column - Stacked



Donut



Gantt



Heatmap



Line (smooth)



Line (straight)



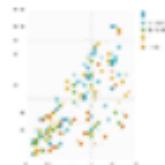
Network diagram



Network with Bubbles



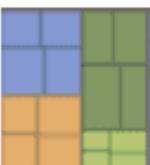
Pie



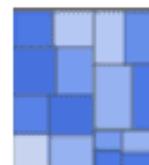
Scatter



Tag Cloud



Treemap by category



Treemap by value



Waterfall chart

# Visualization formatting

## Visual Encoding Properties and Best Uses

Visual Encoding		Properties		Best Uses			
Example	Encoding	Ordered	Useful values	Quantitative	Ordinal	Categorical	Relational
	position, placement	yes	infinite	Good	Good	Good	Good
1, 2, 3; A, B, C	text labels	optional (alphabetical or numbered)	infinite	Good	Good	Good	Good
	length	yes	many	Good	Good		
	size, area	yes	many	Good	Good		
	angle	yes	medium/few	Good	Good		
	pattern density	yes	few	Good	Good		
	weight, boldness	yes	few		Good		
	saturation, brightness	yes	few		Good		
	color	no	few (< 20)			Good	
	shape, icon	no	medium			Good	
	pattern texture	no	medium			Good	
	enclosure, connection	no	infinite			Good	Good
	line pattern	no	few				Good
	line endings	no	few				Good
	line weight	yes	few		Good		





# Visual Grids

# Layout grid

Welcome to TimesPeople  
What's this?

TimesPeople Lets You Share and Discover the Best of NY...

8:37 PM Get Started No, thanks

HOME PAGE TODAY'S PAPER VIDEO MOST POPULAR TIMES TOPICS

Get Home Delivery Log In Register Now

SEARCHING FOR THE LOWEST FARE? STOP.  
Continental Airlines

# The New York Times

Sunday, April 5, 2009 Last Update: 8:09 PM ET

CONTINENTAL.COM. LOWEST FARE GUARANTEED.  
Continental Airlines

Try the new Global Edition. International news from a global perspective. Switch to Global Edition >

Search Try Our EXTRA Home Page

Get Home Delivery Personalize Your Weather

Lowe's

Switch to Global Edition ,

JOBs  
REAL ESTATE  
AUTOS  
ALL CLASSIFIEDS

WORLD  
U.S.  
POLITICS  
N.Y./REGION  
BUSINESS  
TECHNOLOGY  
SPORTS  
SCIENCE  
HEALTH  
OPINION  
ARTS  
Books  
Movies  
Music  
Television  
Theater  
STYLE  
Dining & Wine  
Fashion & Style  
Home & Garden  
Weddings/  
Celebrations  
TRAVEL  
Blogs  
Cartoons /  
Humor  
Classifieds  
Corrections  
Crossword/

**Experts Call North Korean Missile Launch a Failure**  
By WILLIAM J. BROAD 17 minutes ago

Some experts said the test under the North Korean campaign to come across as a fearsome adversary able hurl deadly warheads halfway around the globe.

Read Comments (296)

**Obama Calls on U.N. to Punish North Korea Over Rocket**  
By HELENE COOPER and DAN BILEFSKY 6:46 PM ET

A meeting of the Security Council ended without any action in response to North Korea's missile launch, despite a call from President Obama for a quick response.



**Executive Pay in 2008**

**Highest Pay** PREV NEXT

	PER DAY	PER YEAR
Sanjay K. Jha Motorola	\$286,152	\$104.4 mil.
Lawrence J. Ellison Oracle	231,777	\$84.6 mil.
Robert A. Iger Walt Disney	139,925	\$51.1 mil.
Kenneth L. Chenault American Express	117,130	\$42.8 mil.

**K INTERACTIVE GRAPHIC**  
**The Pay at the Top**  
A compensation research firm compiled data reflecting pay for 200 chief executives at 198 public companies that had revenue of at least \$6.3 billion. Related Article

New G.M. Chief Doesn't Rule Out Bankruptcy  
By A.G. SULZBERGER 1:58 PM ET

Fritz Henderson said he felt confident in General Motors

THIS LAND  
A Shop of Motley Flavors Is Gone, but Not All Is Lost  
By DAN BARRY 5:02 PM ET

When a fire

OPINION »

Op-Eds: Obama's European Tour  
A. A. Gill: Class Lessons in England  
Christoph Peters: Back to Normal in Germany  
Amélie Nothomb: Envy in France

SPORTS »

WOMEN'S TOURNAMENT After Passing on UConn, Appel Stands in Its Path  
Stanford junior Jayne Appel stands directly in the path of a perfect season for the No. 1 seeded Huskies.

THE QUAD: Previewing the Women's Final Four

Big East Goes South Michigan State defeated Connecticut and North Carolina beat Villanova to reach the championship game in Detroit.

Brackets: Men | Women

the-watch-avenue.com

BUSINESS »

Executives Took, but the Directors Gave The corporate boards that approved steadily swelling paydays for C.E.O.'s are starting to come under scrutiny.

The New York Times Small Business GO ▶

# Layout grid

The image displays two versions of a website layout side-by-side, illustrating the underlying grid structure.

**The New York Times (Left):** This is a screenshot of the actual website. It features a complex grid of columns and rows. Key elements include:

- Header:** A top navigation bar with links for "MOVADO", "The New York Times", "Sports", "Opinion", "Style", and "Technology".
- Main Content Area:** Features a large central image of a ballerina, several text columns, and various sidebar modules.
- Footer:** A footer section at the bottom containing a QR code and links to "The New York Times Store".

**New York Times Wireframe (Right):** This is a wireframe version of the same website, showing the layout grid without the visual design. It highlights the structure of columns and rows used in the original layout.



# Dashboards

# Dashboards – sales analytics

## Sales Dashboard

**Company**

- JetCorp, Belgium
- JetCorp, North America
- JetCorp, UK

**Year**

- 2007
- 2008
- 2009
- 2010
- 2011
- 2000

**Country**

- Germany
- Great Britain
- Iceland
- Netherlands
- Slovenia
- Spain
- Sweden
- Switzerland
- USA

**Global Dimension 1**

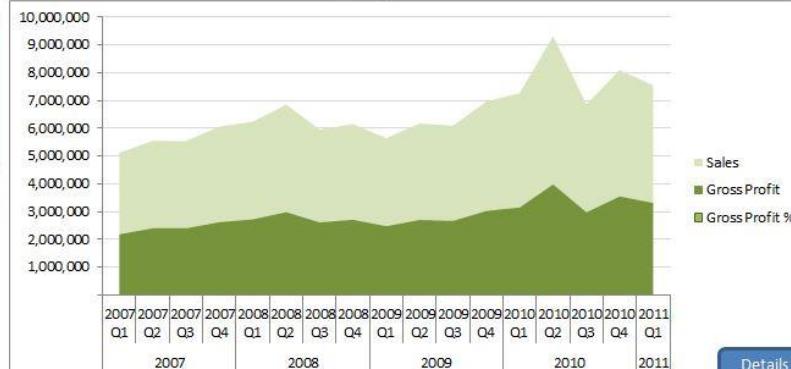
- CORPORATE - Corporate G...
- EVENTS - Events and Trad...
- SPORTS - Sports & Activities

**Global Dimension 2**

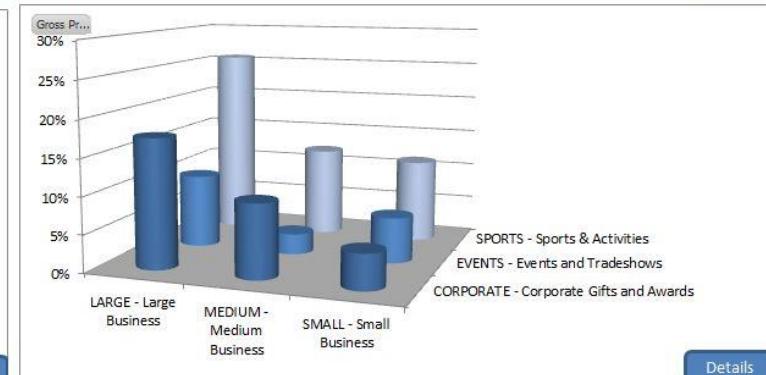
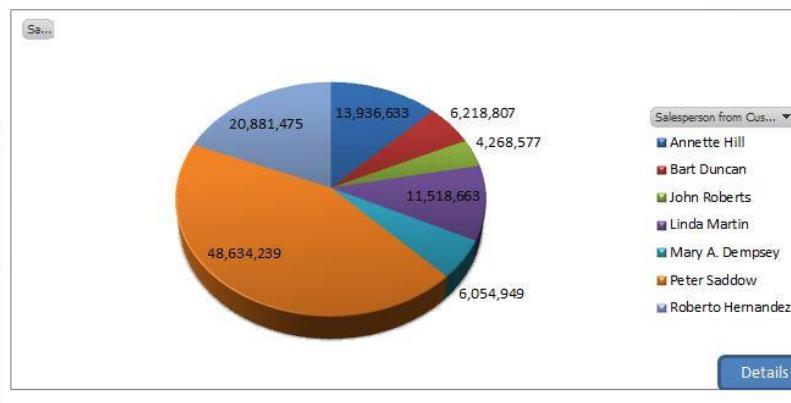
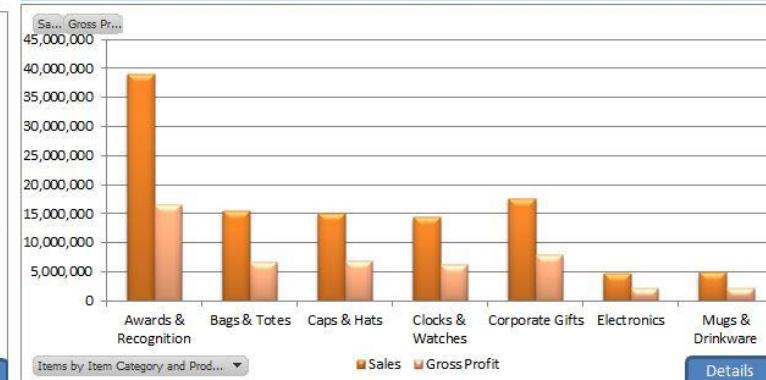
- LARGE - Large Business
- MEDIUM - Medium Business
- SMALL - Small Business

Salesperson from cust card	
Annette Hill	Bart Duncan
John Roberts	Linda Martin
Mary A. Dempsey	Peter Saddow
Roberto Hernandez	Unknown

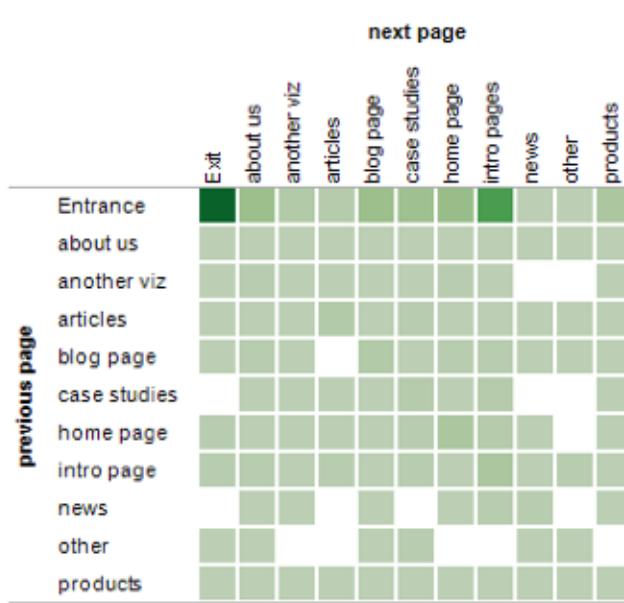
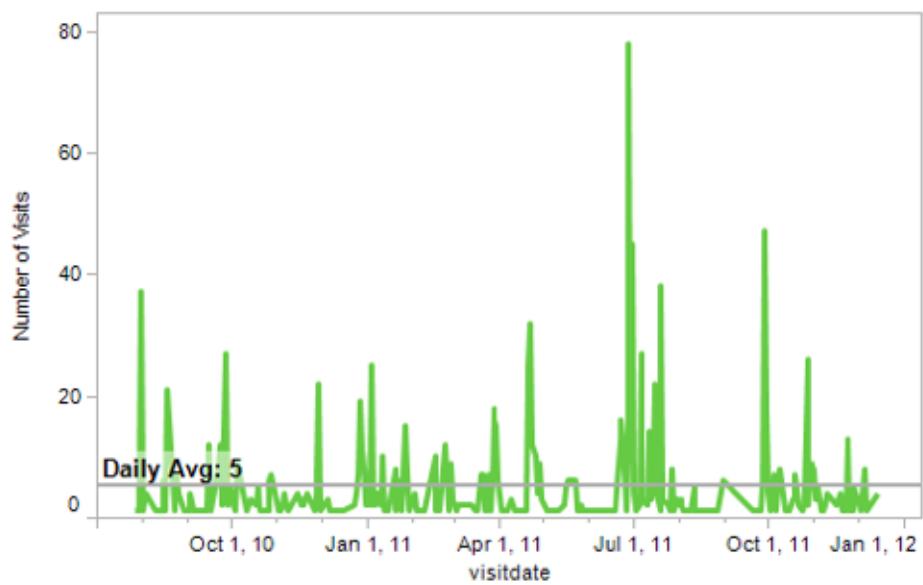
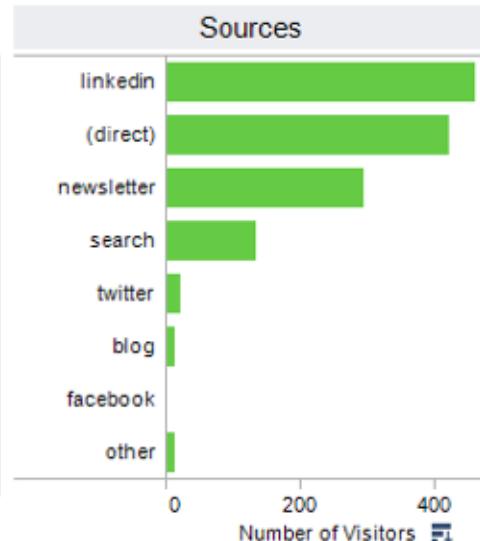
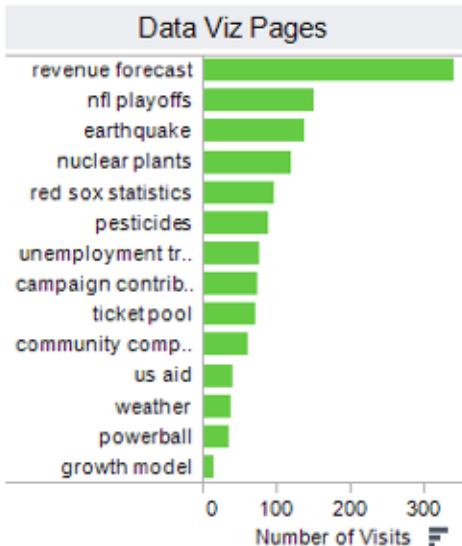
Item Category	
Awards & Recognition	Bags & Totes
Caps & Hats	Clocks & Watches
Corporate Gifts	Electronics
Mugs & Drinkware	Unknown



Product Group				
Emblems & Pins	Business Bags	Plastic	Sports Bags	Totes
Baseball Caps	Bucket Hat	Knit Hats	Visors	Clip-on
Desk Clocks	Stopwatches	Travel Clocks	Picture Frames	Headphones
MP3 Players	Speakers	Calculators	Computer Parts	Flashlights



# Dashboards – web-page analytics



# Dashboards – marketing analytics

IBM Digital Analytics Coremetrics Demo Site | Digital Analytics | My Profile | Admin | Help | Feedback | Support | Logout  
Welcome, aarikan@us.ibm.com

Find Report Actions

Dashboards Actions

- Standard Dashboards
  - Commerce Overview
  - Competitive Overview
  - Content Overview
  - Design Overview
  - Key Performance Indicators
  - Marketing Overview**
  - Real Time Overview

Workbook: Default Workbook \* Actions

Dashboard: Key Performance Indicators | Dashboard: Marketing Overview | Recently Used

Comments

### Marketing Overview

Marketing KPI Trends

Last 31 Days Ending 9/5/2013

	Yesterday	High / Avg. / Low
Sales	\$3,463,274.75	\$8,119,392.46 \$5,582,482.83 \$3,045,573.20
New Visitor %	87.72%	95.69% 86.23% 76.78%
Bounce Rate	44.80%	53.44% 48.66% 43.88%
Unique Visitors	18,500	20,313 16,912 13,511
Page Views / Session	9.53	12.10 10.68 9.27

Top Line Metrics

Sales Heatmap

4 Week Avg Ending 9/2/2013 - 9/8/2013

Conversion Trend

New Buyer % Trend

Top Marketing Programs

Yesterday | 9/5/2013

Program	Sales
google PPC	\$280K
Email_eMessage	\$180K
facebook	\$120K
X+1	\$80K
dotcom	\$40K

Marketing Programs | By Vendor

Top Natural Search Keywords

Yesterday | 9/5/2013

Keyword / Search Engine	Sales	Orders
term not provided	\$66,399.59	
desk lamp	\$29,632.04	
leather office chair	\$22,854.82	
executive chair	\$21,303.33	
lamp	\$17,387.22	
desks	\$16,871.40	
student desk	\$16,454.05	
office chairs	\$15,780.02	
wood furniture	\$15,705.31	
coffee tables	\$15,694.51	

Reports Actions

Workbooks Actions

Manage

Guide Me

Messages (0) | 90232642 | About | © Copyright IBM Corporation 2010



# **Spreadsheets vs. Visual Analytics**

**HumanResources.cdd - IBM Cognos Insight**

**Open positions count by month**

Month	Customer Service	Customer Service Representative	Planned position count	Open positions
January	Customer Service	Customer Service Representative	248	265
February	Customer Service	Customer Service Manager	42	42
March	Finance	Accounting Clerk	188	189
April	Finance	Accounting Manager	42	42
May	Finance	Controller	42	42
June	Financial Analyst	63	67	
July				4

**Days to fill open positions by recruiting type**

Recruiting Type	Professional Publication	National Newspaper	Local Newspaper	Internal	Employment agency	Website
Newspaper or Magazine	10	10	10	10	10	10
Local Newspaper	10	10	10	10	10	10
Internal	10	10	10	10	10	10
Employment agency	10	10	10	10	10	10
Website	10	10	10	10	10	10
All	10	10	10	10	10	10

**Samples | Employee expenses | Open positions**

**Employee expenses & performance**

**Employee Expenses:**

Organization	Total of Expense type	Benefits	Bonus	Pay	Training
Customer Service	393,254.99	123,119.53	292,19.39	24,988.27	
Finance	137,403.79	247,935.97	12025.20	10,674.62	
Human Resources	86,051.71	67,865.87	1451.13	16,694.71	
Information Services and Technology	75,247.02	136,091.14	8567.80	53,110.08	
Marketing	19,026.24	38,932.26	11,186.28	15,136.70	
Production and Distribution	74,847.23	134,977.05	59,787.99	53,371.16	
Sales	120,000	100,000	80,000	60,000	40,000

**Employee Performance:**

Employee name	1-Poor	2-Satisfactory	3-Good	4-Very good
James Kent	10	10	10	10
Jonathan Taver	10	10	10	10
Maurice Hoffman	10	10	10	10
Michaela Ogilvie	10	10	10	10
Paisa Kene	10	10	10	10
Alice Martin	10	10	10	10
Andrew Roberts	10	10	10	10
Dana Miles	10	10	10	10
Helen Jones	10	10	10	10
Bernard Lassus	10	10	10	10
Tammy Shewshed	10	10	10	10
Vittorio Rizza	10	10	10	10
Wu Gao	10	10	10	10
Jules Dauphin	10	10	10	10
Chiyo Yosoda	10	10	10	10
Isamu Ashi	10	10	10	10
Cyril Sodding	10	10	10	10
Scott Brown	10	10	10	10

**Samples | Employee expenses | Employee training | Open positions**

**Open positions**

Month	Customer Service	Customer Service Representative	Planned position count	Open positions
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Local Newspaper	10	10	10	10	10	10
Internal	10	10	10	10	10	10
Employment agency	10	10	10	10	10	10
Website	10	10	10	10	10	10
All	10	10	10	10	10	10

**Sales performance with theme.cdd - IBM Cognos Insight**

**Sales Performance**

Quarter	North America	Europe	Asia Pacific	South America
Q1/2012	181,055.19	161,327.45	213,442	20,366
Q2/2012	178,773.19	169,327.45	252,811.22	37,339.89
Q3/2012	154,087,550	29,817,500	24,380,500	20,347,500
Q4/2012	178,773.19	169,327.45	252,811.22	37,339.89

**Competitor Analysis Plan.cdd - IBM Cognos Insight**

**Competitive Data Analysis**

**Future Chips Product Data**

Month	2011-Jan	2011-Feb	2011-Mar	2011-Apr	2011-May	2011-Jun
Asia Pacific	5,216,895	122,820	144,583	166,798	189,033	209,200

**Competitor Product Data**

Month	2011-Jan	2011-Feb	2011-Mar	2011-Apr	2011-May	2011-Jun
Asia Pacific	4,681,350	169,800	189,850	213,900	235,950	258,000

**Explore Point Example - Customer Return Default - IBM Cognos Insight**

**Locations of Returns**

Year	Quarter	Month	City
2011	Q1/2011	Jan-11	Las Vegas
2011	Q2/2011	Feb-11	Montreal
2011	Q3/2011	Mar-11	Tokyo
2011	Q4/2011	Apr-11	Warsaw
2011	Q1/2012	May-11	Montreal
2011	Q2/2012	Jun-11	Ottawa
2011	Q3/2012	Jul-11	China
2011	Q4/2012	Aug-11	France
2011	Q1/2013	Sep-11	Hong Kong
2011	Q2/2013	Oct-11	Japan
2011	Q3/2013	Nov-11	Germany
2011	Q4/2013	Dec-11	Malaysia

**Return Period**

**Customer and Product Details**

**Telecommunications in Industrialized Nations**

**Fixed telephone lines**

**Estimated Internet Users**

---

## Unique Capabilities

### 1 **Read and Write**

Change or add new data, simple import, no scripting

### 2 **Customize**

You are empowered to create, not just consume

### 3 **What-if Scenario Model**

Model new scenarios, test assumptions, optimize

### 4 **Plan**

Modify plans, budgets, forecasts accordingly

### 5 **Extend**

Predictive analytics, managed reporting, performance management

**Don't just discover...  
Do something with it.**

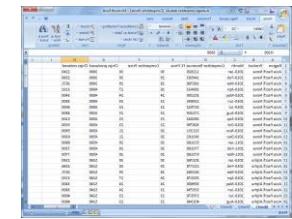
# How will it help you?

- A business analyst has to manage data from multiple sources.
- Data warehouses, spreadsheets, ERP systems
- The analyst can communicate high level findings but wishes to make the details more accessible and useful to business users

## Using Cognos Insight

- The Analyst can import files from local sources or corporate servers into Cognos Insight and create dashboards or plans that reflect the needs of individual or workgroup scenarios
- Allows business users further analyze the findings for themselves, using calculations, what-if, traffic lights
- Fast visualization selection for better understanding
- Focus on their particular areas of responsibility
- Share finding amongst colleagues
- No IT assistance

Microsoft Excel



Cognos Insight





# HR Analytics

# Visual resume



Pranav Mistry | [LinkedIn](#).

Research Assistant and PhD ca...

Research Assistant and PhD candidate at Media Lab, MIT

PREVIOUSLY

[Share](#) [+1](#) [Tweet](#) [Recommend](#)

## Experience

Visiting Researcher

0.2 Year(s) [JST ERATO Igaras...](#)

Research Intern

0.2 Year(s) [Microsoft Research](#)

Research Intern

0.1 Year(s) [Global Connecti...](#)

Research Assistant and PhD candidate

6 Year(s) [MIT Media Lab](#)

UX Researcher

1.2 Year(s) [Microsoft](#)

Intern in Incubation Team

0.2 Year(s) [Microsoft](#)

## Education

Massachusetts Institute of Technology

3 Year(s) [Massachusetts In...](#)

Massachusetts Institute of Technology

2 Year(s) [Massachusetts In...](#)

Indian Institute of Technology, Bombay

2 Year(s) [Indian Institute o...](#)

Gujarat University

4 Year(s) [Gujarat University](#)

## Skills

User Experience

System Design

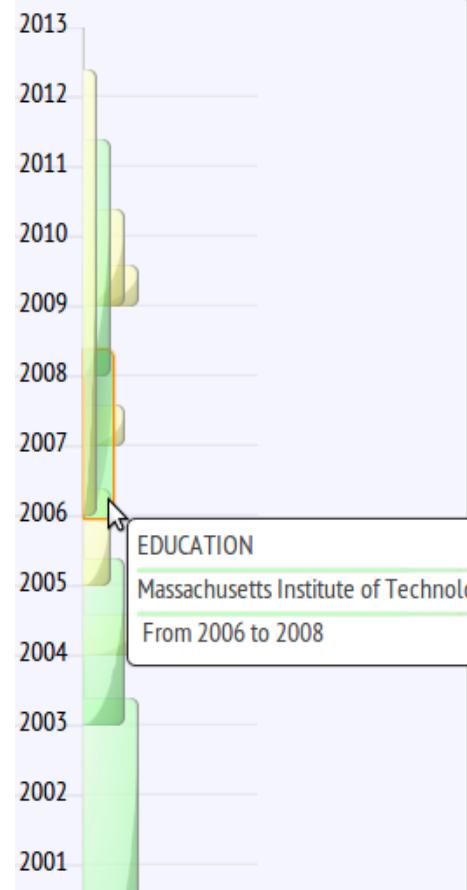
Architecture

Human-computer Interaction

Prototyping

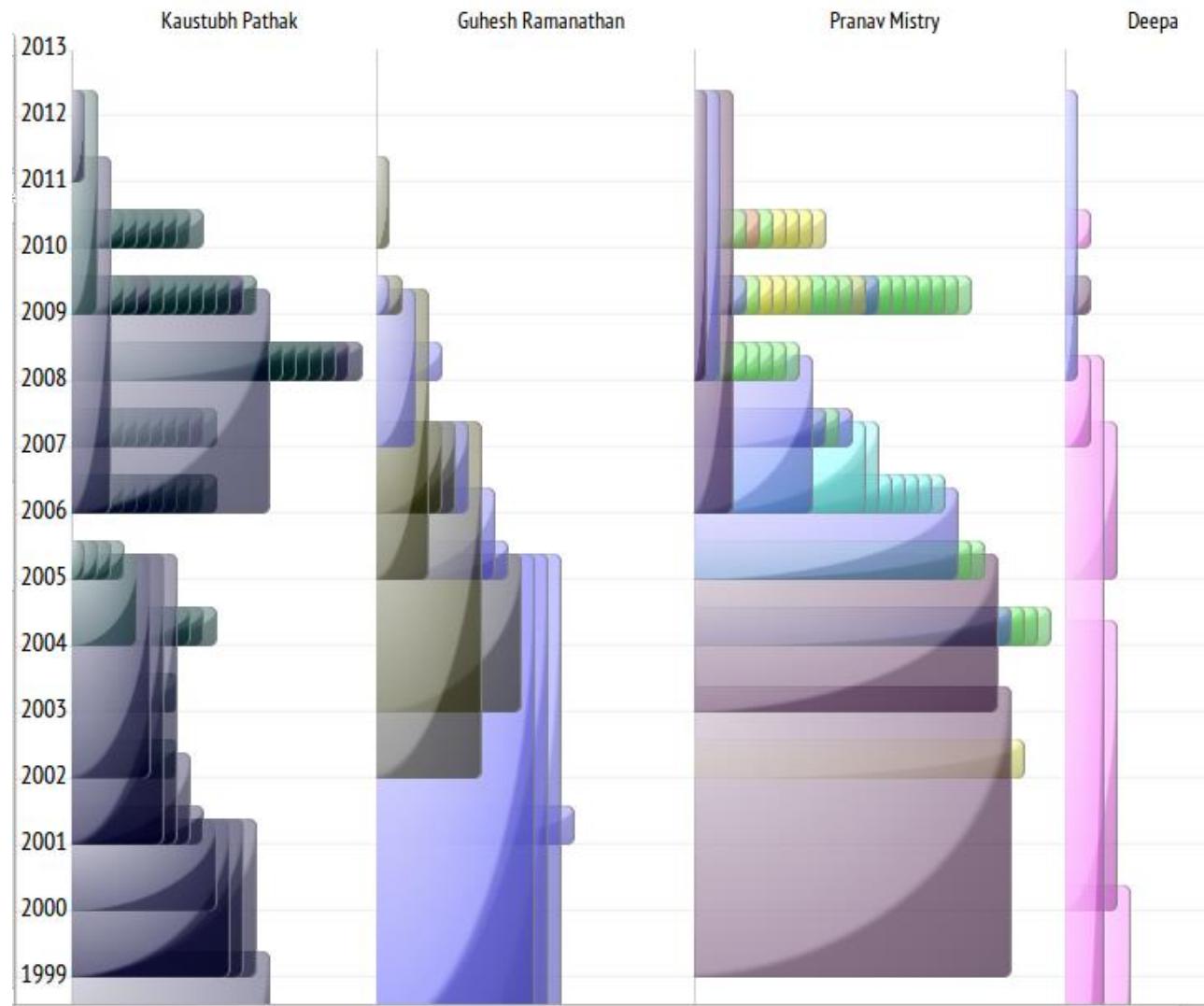
### EDUCATION

Massachusetts Institute of Technology  
From 2006 to 2008

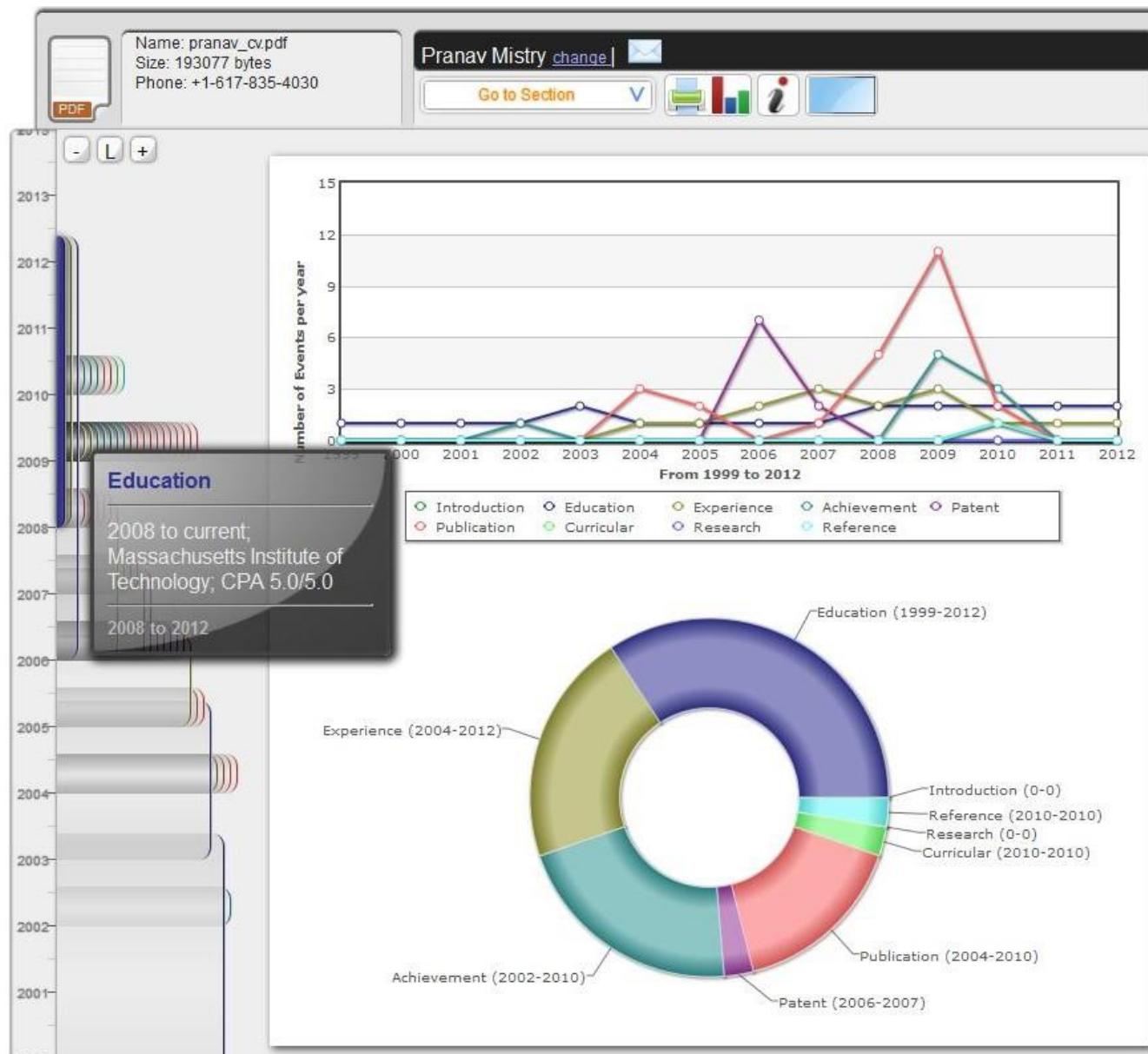


# Visual resume

Event-line with different sections, like Education, Experience, Projects, Achievements etc. (shown with different colors) and blocks representing an event for the corresponding section



# Visual resume





# Infographics

---

# Advantages of Infographics

## 1 More user engagement

Less text-based content typically means better user engagement

## 2 Potential to go viral

Shareable nature of an infographic leads to the possibility of going viral through social sharing

## 3 Subject authority

Can show the company values data and is an authority figure in its niche

## 4 Better brand value

Publishing unique and original infographics can boost brand value and company's reputation

## 5 Increased SEO

Can infuse your infographic with keywords and high-quality links to amplify SEO effort

---

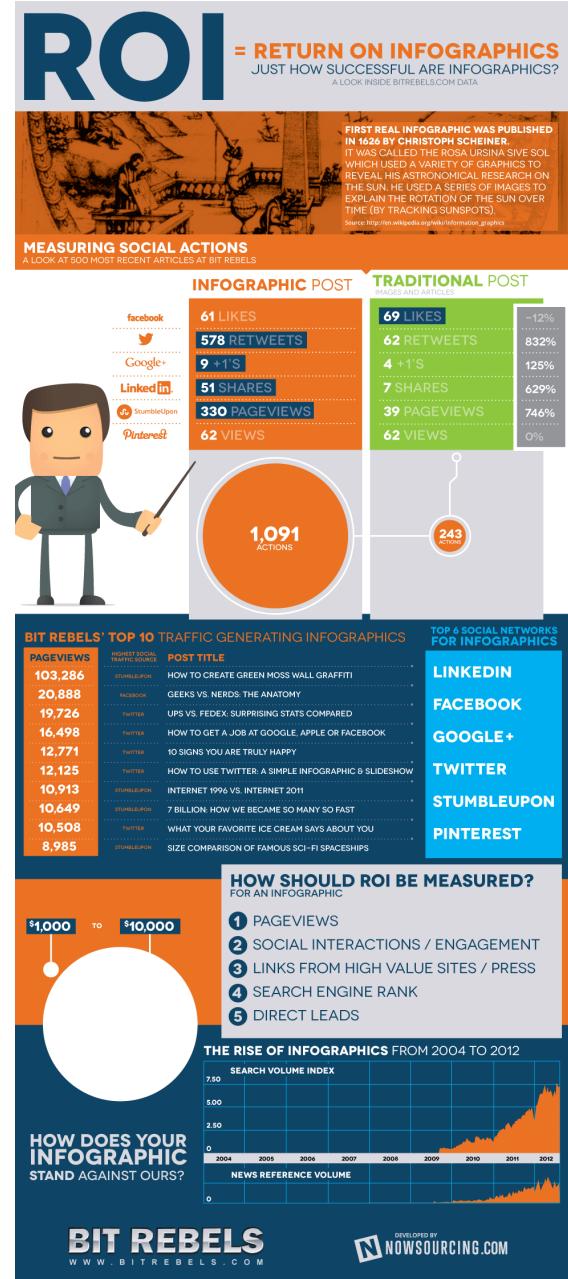
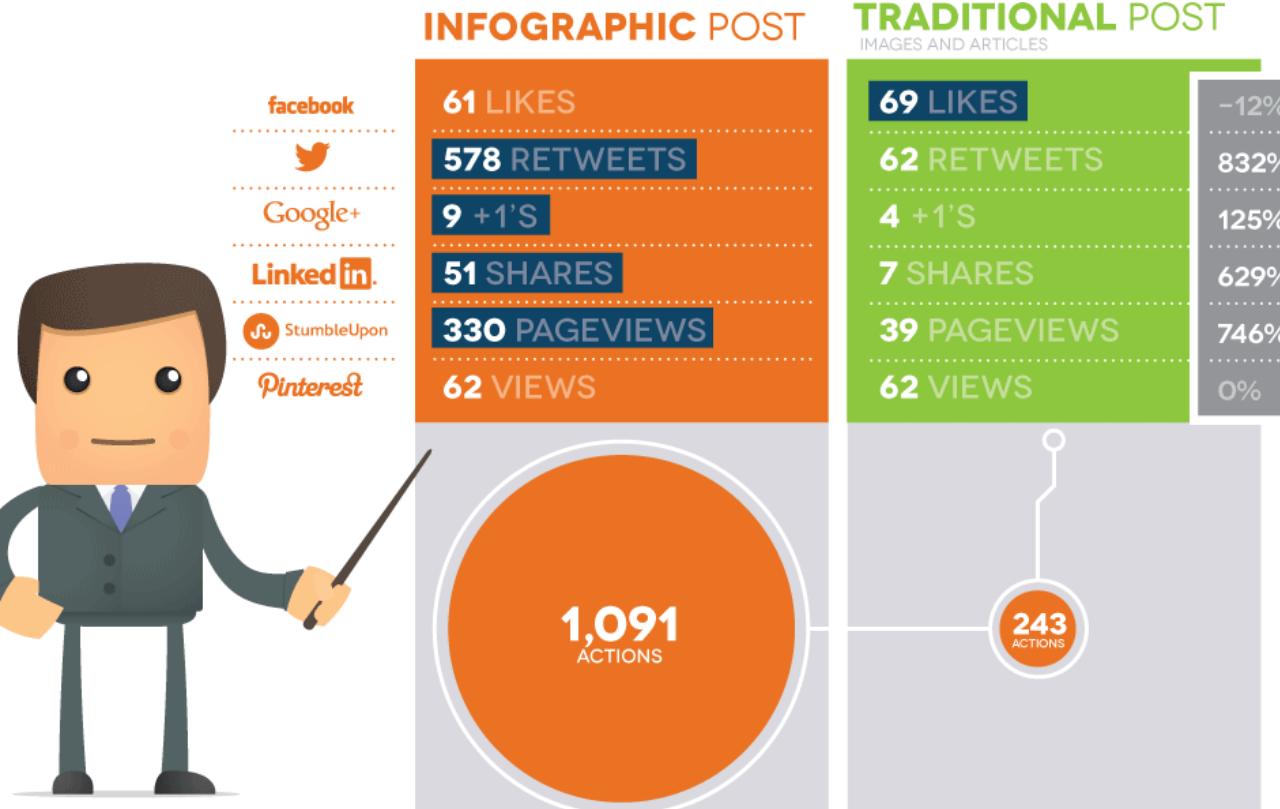
## IGW Report on Infographics

- 84% of companies that use infographics say they are effective
- 76% of marketers believe infographics are essential business tools of the future
- Visuals can improve retention rates by 400%
- Infographics are 61% effective at teaching readers and helping them retain information (more effective than commercials, articles with images, and blog posts)
- 57% of people asked say infographics made them think deeply about a subject
- 46% said infographics influenced their decision to purchase a product or service
- 50% of consumers have a favorable view of infographics

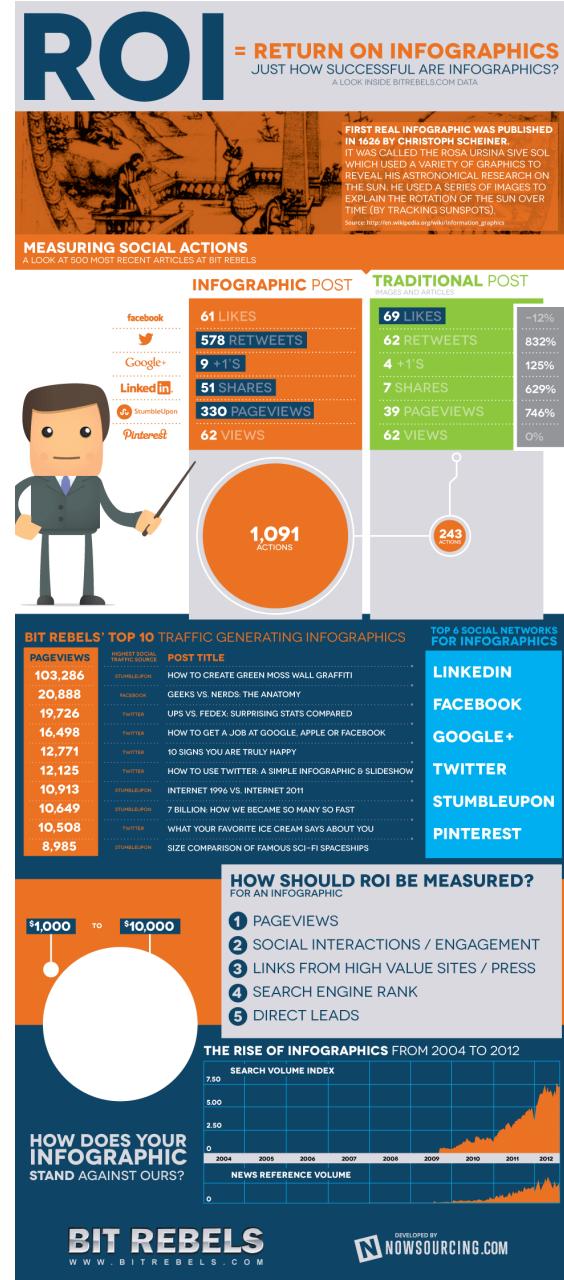
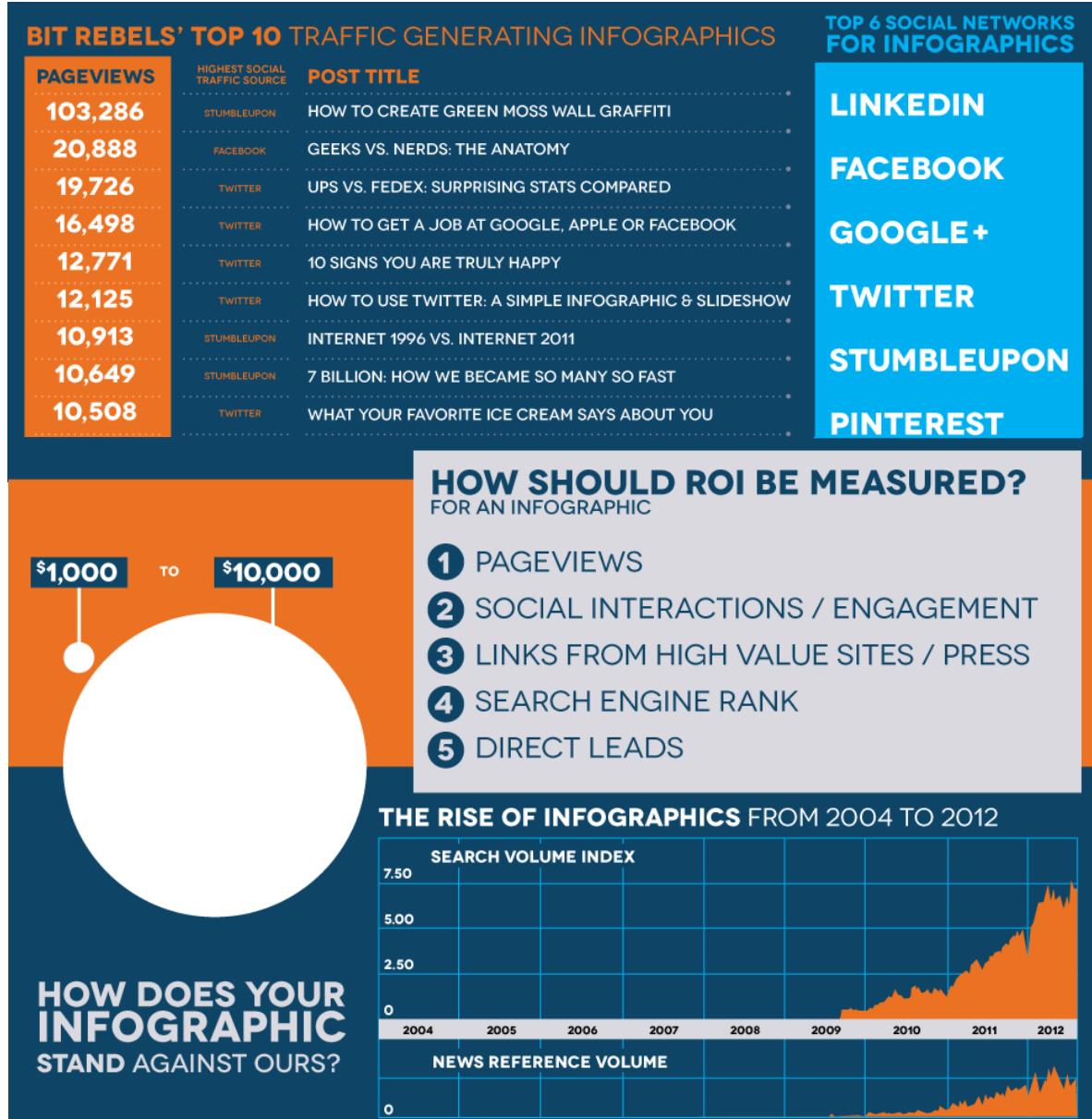
<https://infographicworld.com/project/the-state-of-infographics-2017/>

<https://www.spinxdigital.com/blog/how-infographics-can-help-you/>

# Infographics



# Infographics



# Infographics

## MUSGO GRAFFITI



## ROI = RETURN ON INFOGRAPHICS

JUST HOW SUCCESSFUL ARE INFOGRAPHICS?

A LOOK INSIDE BITREBELS.COM DATA



### MEASURING SOCIAL ACTIONS

A LOOK AT 500 MOST RECENT ARTICLES AT BIT REBELS

#### INFOGRAPHIC POST



61 LIKES
578 RETWEETS
9 +1'S
51 SHARES
330 PAGEVIEWS
62 VIEWS



#### TRADITIONAL POST

69 LIKES	-12%
62 RETWEETS	832%
4 +1'S	125%
7 SHARES	629%
39 PAGEVIEWS	746%
62 VIEWS	0%

### BIT REBELS' TOP 10 TRAFFIC GENERATING INFOGRAPHICS

#### PAGEVIEWS

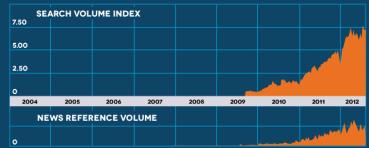
103,286	POST TITLE
20,888	HOW TO CREATE GREEN MOSS WALL GRAFFITI
19,726	NERDS VS. NERDS: THE ANATOMY
16,498	UPS VS. FEDEX: SURPRISING STATS COMPARED
12,771	HOW TO GET A JOB AT GOOGLE, APPLE OR FACEBOOK
12,125	10 SIGNS YOU ARE TRULY HAPPY
10,913	INTERNET 1990 VS. INTERNET 2011
10,649	7 BILLION: HOW WE BECAME SO MANY SO FAST
10,508	WHAT YOUR FAVORITE ICE CREAM SAYS ABOUT YOU
8,985	SIZE COMPARISON OF FAMOUS SCI-FI SPACESHIPS

POST SOURCE	TOP 6 SOCIAL NETWORKS FOR INFOGRAPHICS
STUMBLEUPON	LINKEDIN
FACEBOOK	FACEBOOK
GOOGLE+	GOOGLE+
TWITTER	TWITTER
STUMBLEUPON	STUMBLEUPON
PINTEREST	PINTEREST

### HOW SHOULD ROI BE MEASURED? FOR AN INFOGRAPHIC

- 1 PAGEVIEWS
- 2 SOCIAL INTERACTIONS / ENGAGEMENT
- 3 LINKS FROM HIGH VALUE SITES / PRESS
- 4 SEARCH ENGINE RANK
- 5 DIRECT LEADS

### THE RISE OF INFOGRAPHICS FROM 2004 TO 2012



### HOW DOES YOUR INFOGRAPHIC STAND AGAINST OURS?

# Infographics

IDA THA

## MACHINE LEARNING IN EMOJI 😎

Supervised  
Unsupervised  
Reinforcement

**Supervised:** Humans build models based on input/output.

**Unsupervised:** Human input, machine output, human utilizes if satisfactory.

**Reinforcement:** Human input, machine output, human reward/punish, cycle continues.

### BASIC REGRESSION

**Linear** linear\_model.LinearRegression()  
Lots of numerical data

**Logistic** linear\_model.LogisticRegression()  
Target variable is categorical

### CLASSIFICATION

**Neural net** neural\_network.MLPClassifier()  
Complex relationships, prone to overfitting. Basically magic.

**K-NN** neighbors.KNeighborsClassifier()  
Group membership based on proximity

**Decision tree** tree.DecisionTreeClassifier()  
if/then/else Non-contiguous data  
Can also be regression

**Random forest** ensemble.RandomForestClassifier()  
Find best split randomly, can also be regression

**SVM** svm.SVC() sv.LinearSVC()  
Maximum margin classifier. Fundamental Data Science algorithm

**Naive Bayes**   
Updating knowledge step by step with new info  
GaussianNB() MultinomialNB() BernoulliNB()

### CLUSTER ANALYSIS

**K-MEANS** cluster.KMeans()  
Similar datum into groups based on centroids

**Anomaly detection** covariance.EllipticalEnvelope()  
Finding outliers through grouping

### FEATURE REDUCTION

**T-Distrib. stochastic** manifold.TSNE()  
Visualize high dimensional data.  
Convert similarity to joint probabilities

**Principle component analysis** decomposition.PCA()  
Distill feature space into components that describe greatest variance

**Canonical correlation analysis** decomposition.CCA()  
Making sense of cross-correlation matrices

**Linear discriminant analysis** lda.LDA()  
Linear combination of features that separate classes

### OTHER IMPORTANT CONCEPTS

**BIAS VARIANCE TRADEOFF**

**UNDERFITTING / OVERFITTING**

**INERTIA**

**ACCURACY FUNCTION**  $(TP + TN) / (P+N)$

**PRECISION FUNCTION**  $TP / (TP + FP)$

**SPECIFICITY FUNCTION**  $TN / (FP + TN)$

**SENSITIVITY FUNCTION**  $TP / (TP + FN)$

---

# Steps to Create Infographics

## Craft your concept

What will your infographic say?

## Identify the Target Audience for the infographics

Where is your target audience located? What level of knowledge do they have?

What are the basic demographics of your audience?

## Gather data (information/content)

Invest in original data science research to use in infographic

## Select a template

Plenty online tools with templates

## Follow Minimal Design Practices

Infographic should transmit the intended information without overwhelming them

## Optimize the Infographics

Optimize for SEO and social media

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## Types of Infographics

- Statistical Infographic
- Informational Infographic
- Geographic Infographic
- Timeline Infographic
- Editorial Infographic
- Flowchart infographic
- Resume Infographic

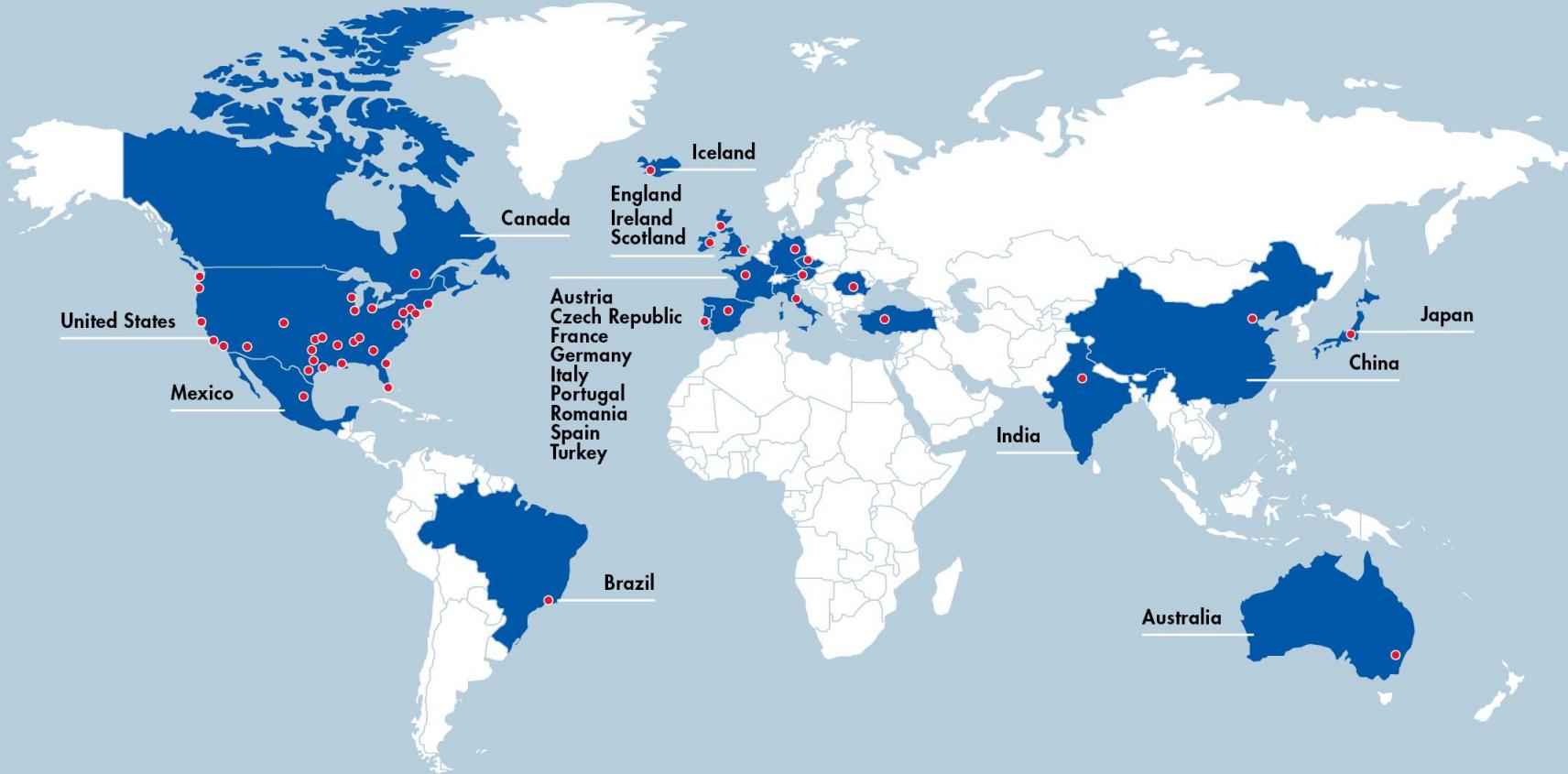


# Other Visualizations

# Do you know what are your alumni doing?

## The Cox Alumni Network — Global Reach with a Local Touch

The strength and magnitude of our alumni network is a key attribute from which you'll reap a lifetime of benefits. With more than 40,000 alumni around the world, it's no surprise that *The Economist* ranks our alumni network 25th in the world for global breadth and effectiveness.



\$2.50

\$2.00

↑  
Price of  
a gallon  
of gasoline

Annual average for  
regular grade,  
adjusted for inflation

Cheap gas,  
longer commutes

The Arab  
oil embargo

Miles driven per capita each year →

5,000 mi.

6,000 mi.

7,000 mi.

1956-72

Cheap gas, longer commutes

1973-74

The Arab oil embargo

1978-81

Energy crisis

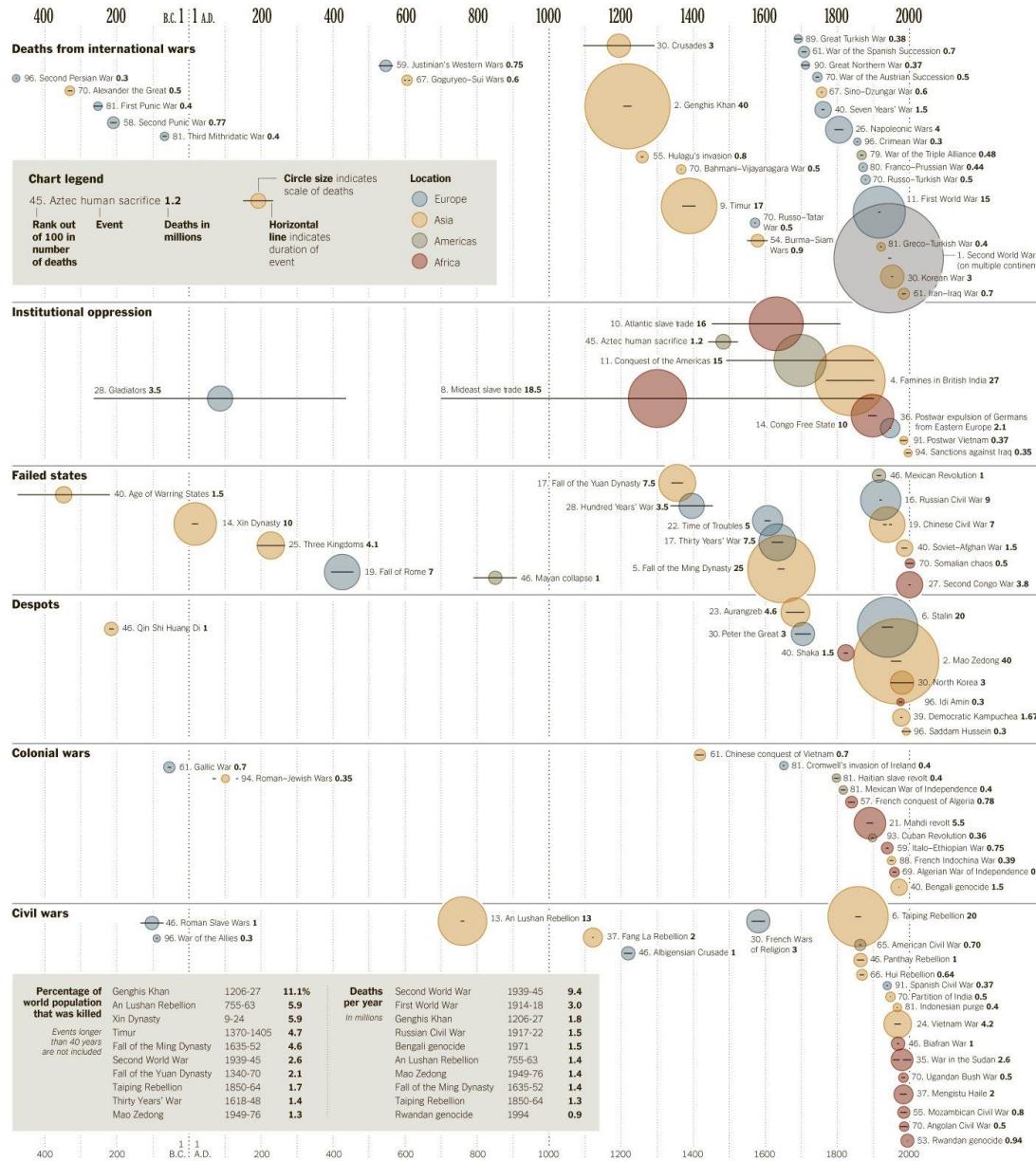
# Population Control, Marauder Style

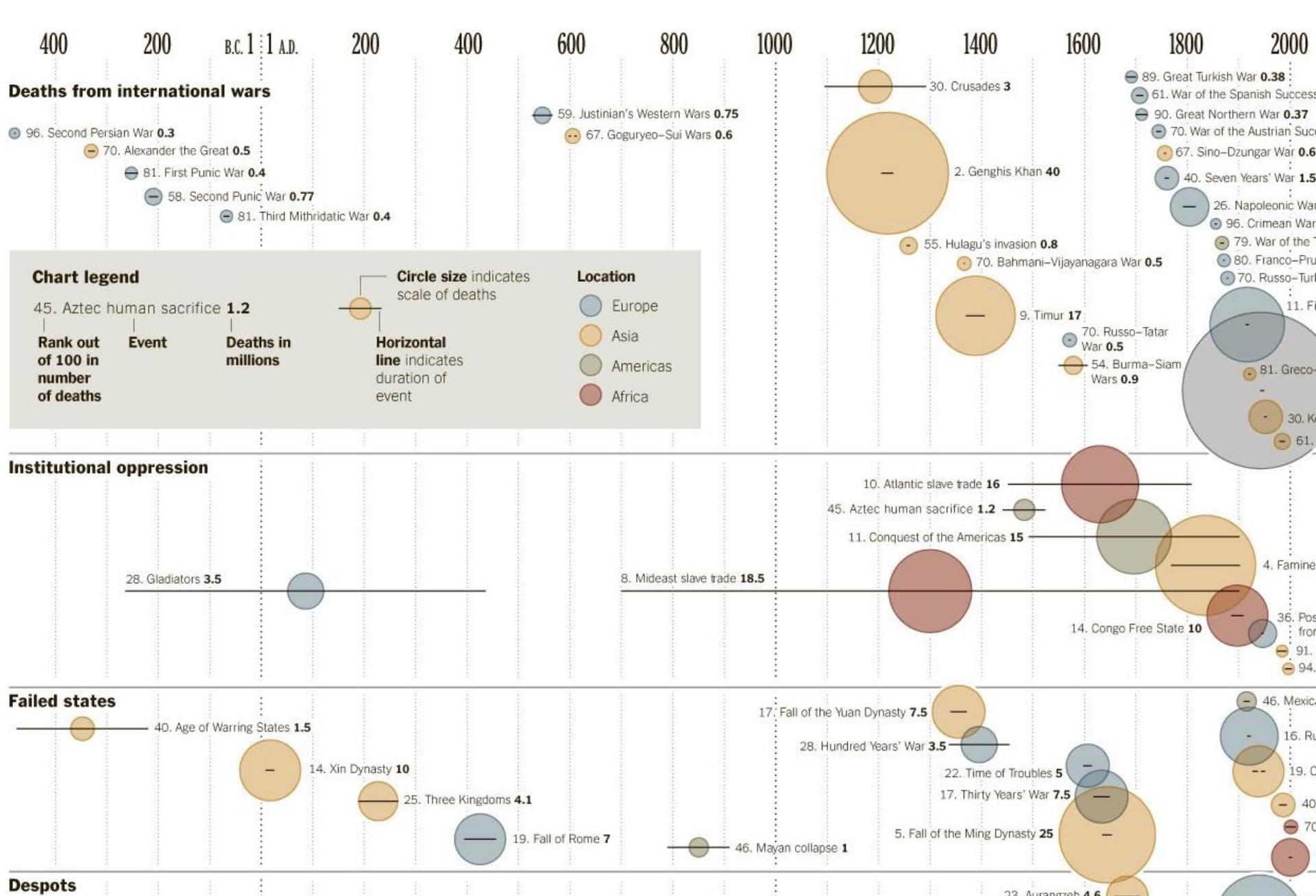
## Visual analytics

Last week, the United Nations announced that the world's population had reached seven billion, which have been times we headed in the opposite direction, and when plagues were common. Of the most notorious, Genghis Khan may have cut the global population by about 11 percent; two bloody upheavals in China — the An Lushan Rebellion and the collapse of the Xin Dynasty — each may have killed about 6 percent of humanity. Those are but 3 of the 100 worst atrocities in history, as cataloged by Matthew White in "The Great Big Book

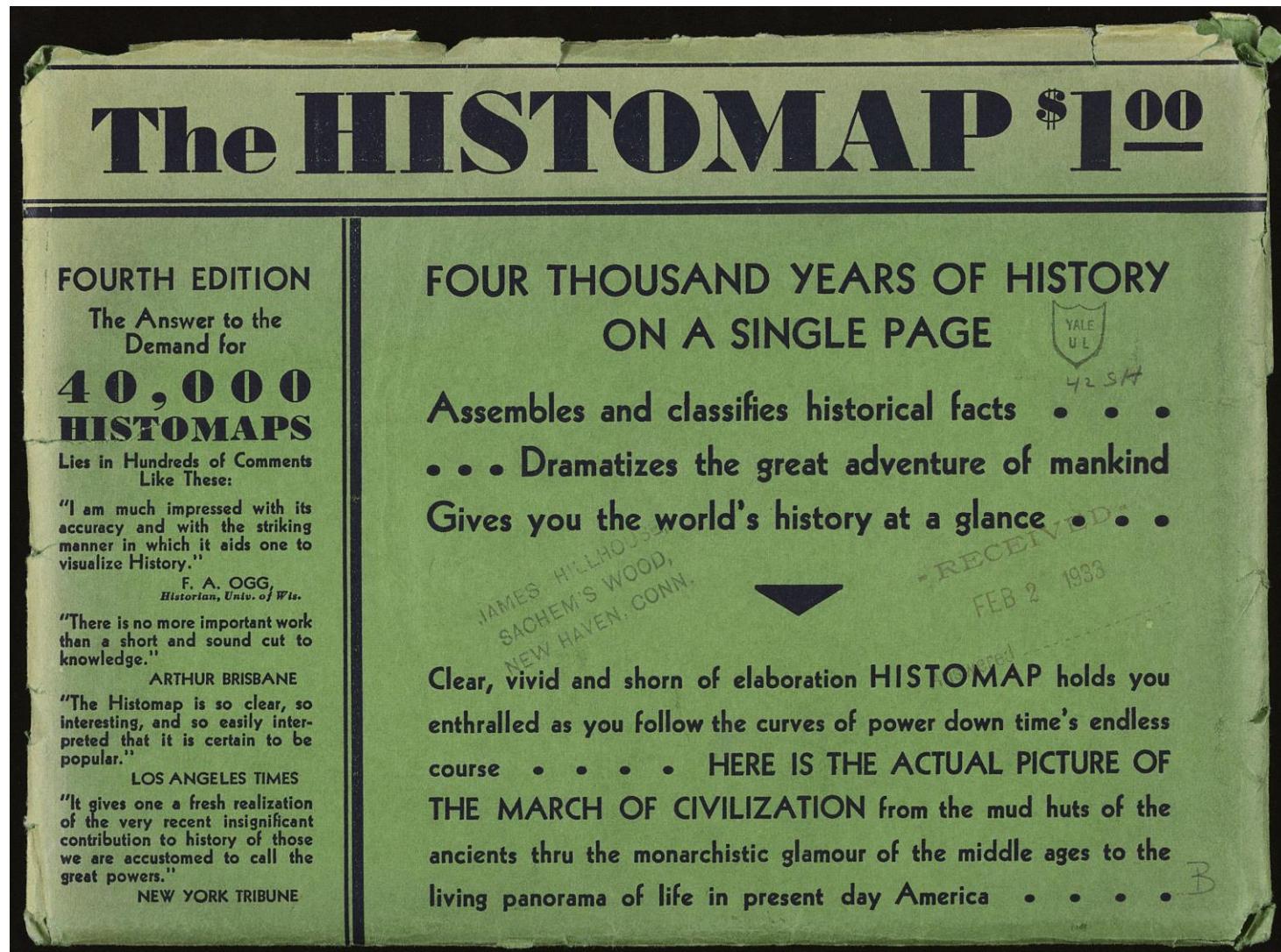
of Horrible Things," an amusing (really) account of the murderous ways of despots, slave traders, blundering royals, gladiators and assorted hordes. Estimating the tolls can sometimes be a challenge, since, given the nature and the properties of antiquity. The deadliest "multitudes" are more plentiful in recent centuries, given that there were more people to kill and better ways to kill them on a grand scale. Even so, killings as a percentage of all humanity are probably declining. Below, the sweep of human brutality in a timeline.

BILL MARSH

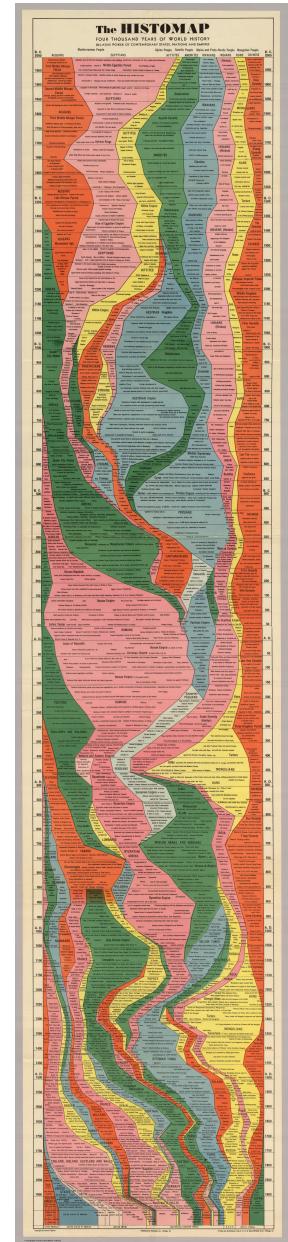
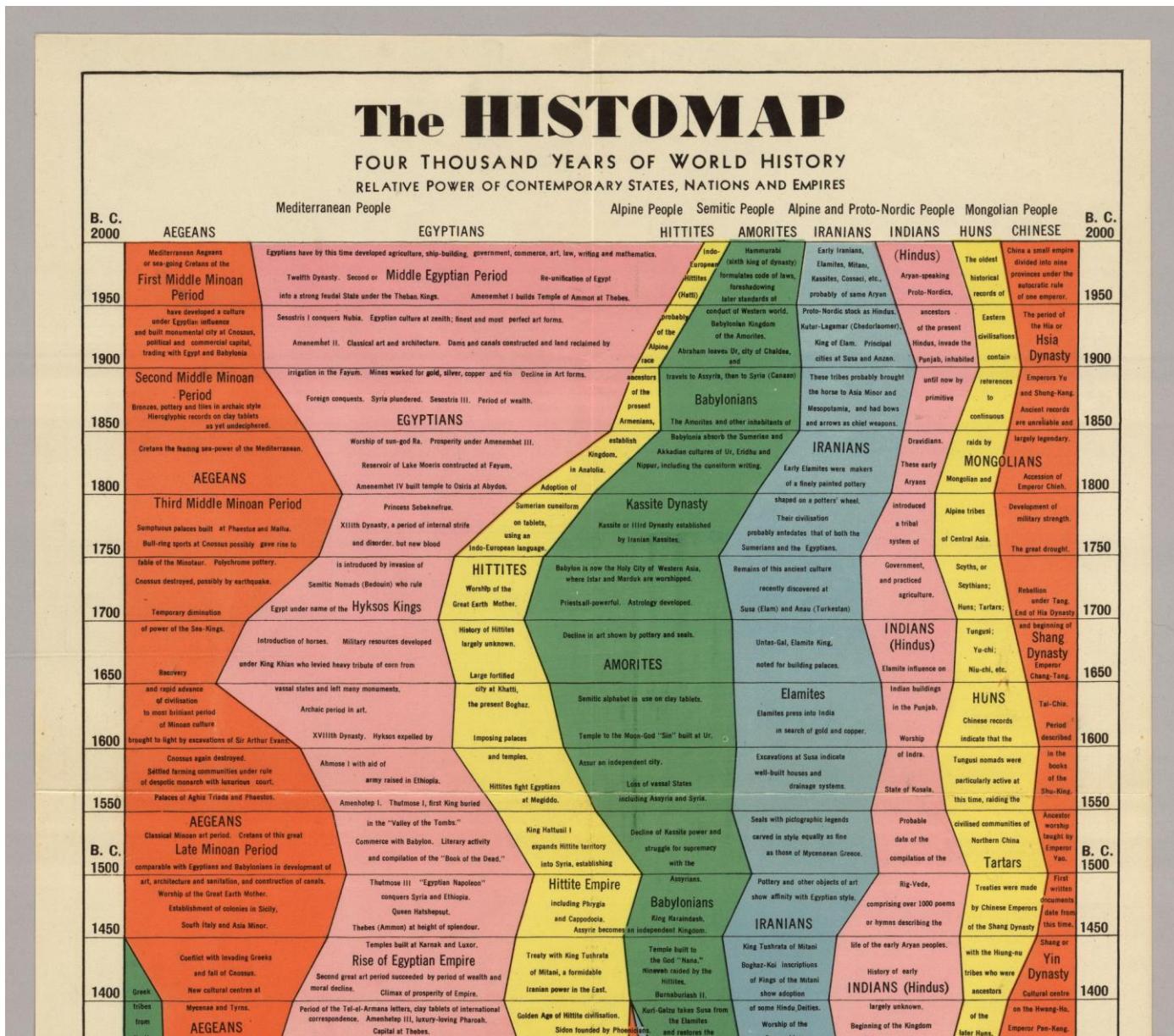




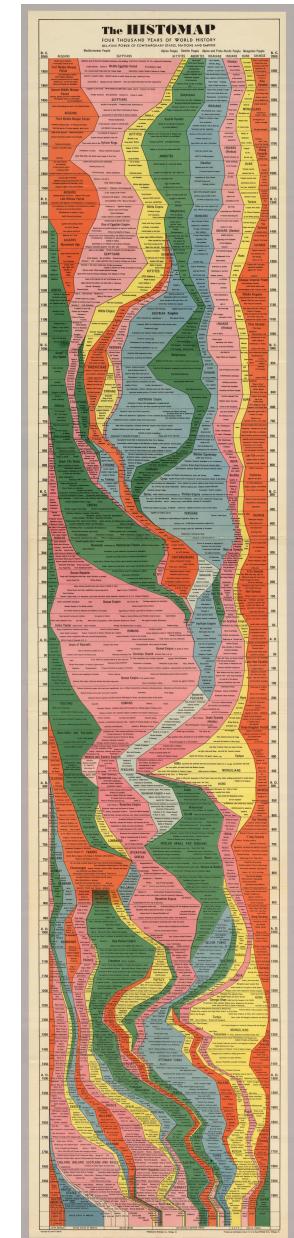
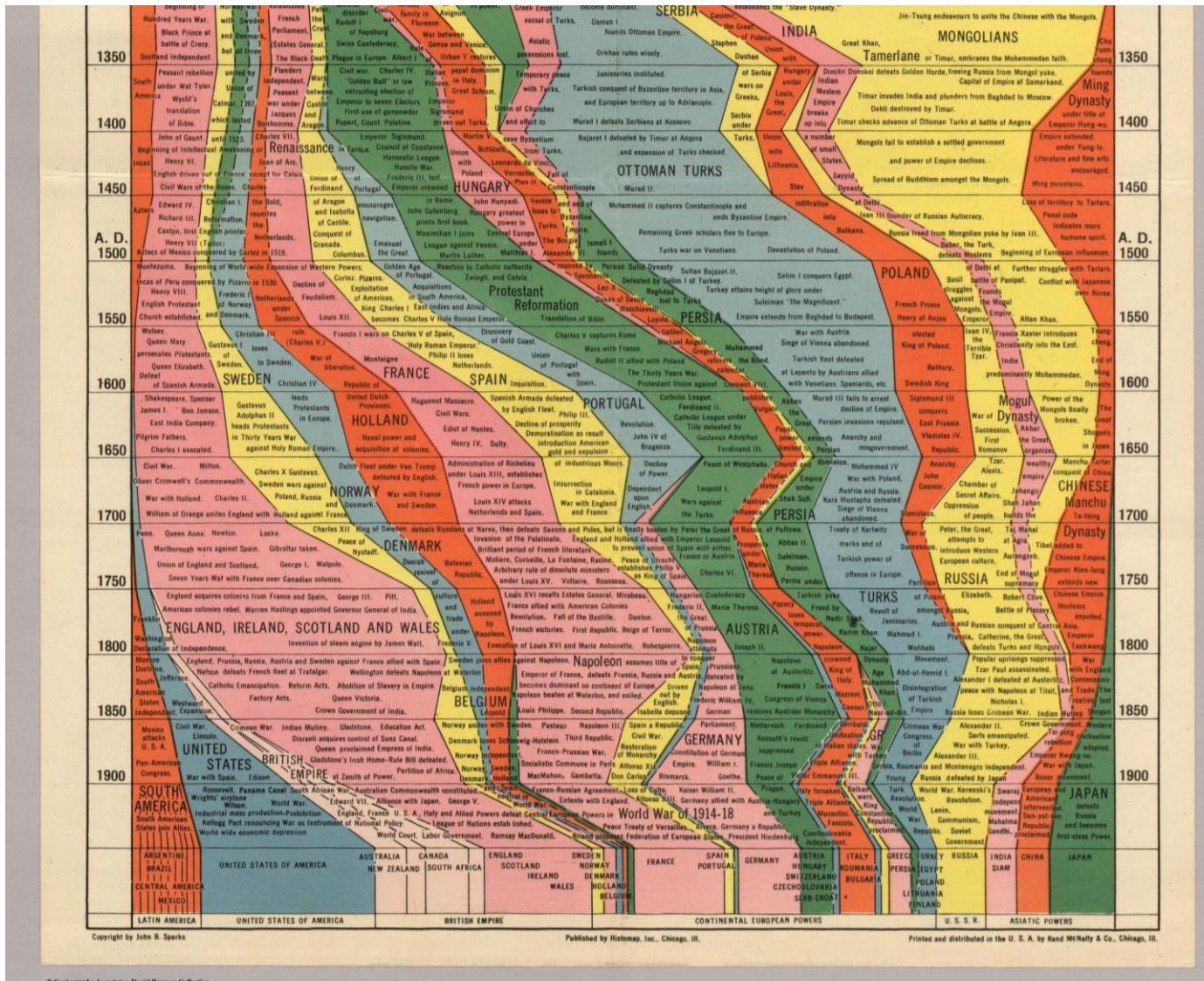
# Visual analytics – histomap (1931)



# Visual analytics – histomap (1931)



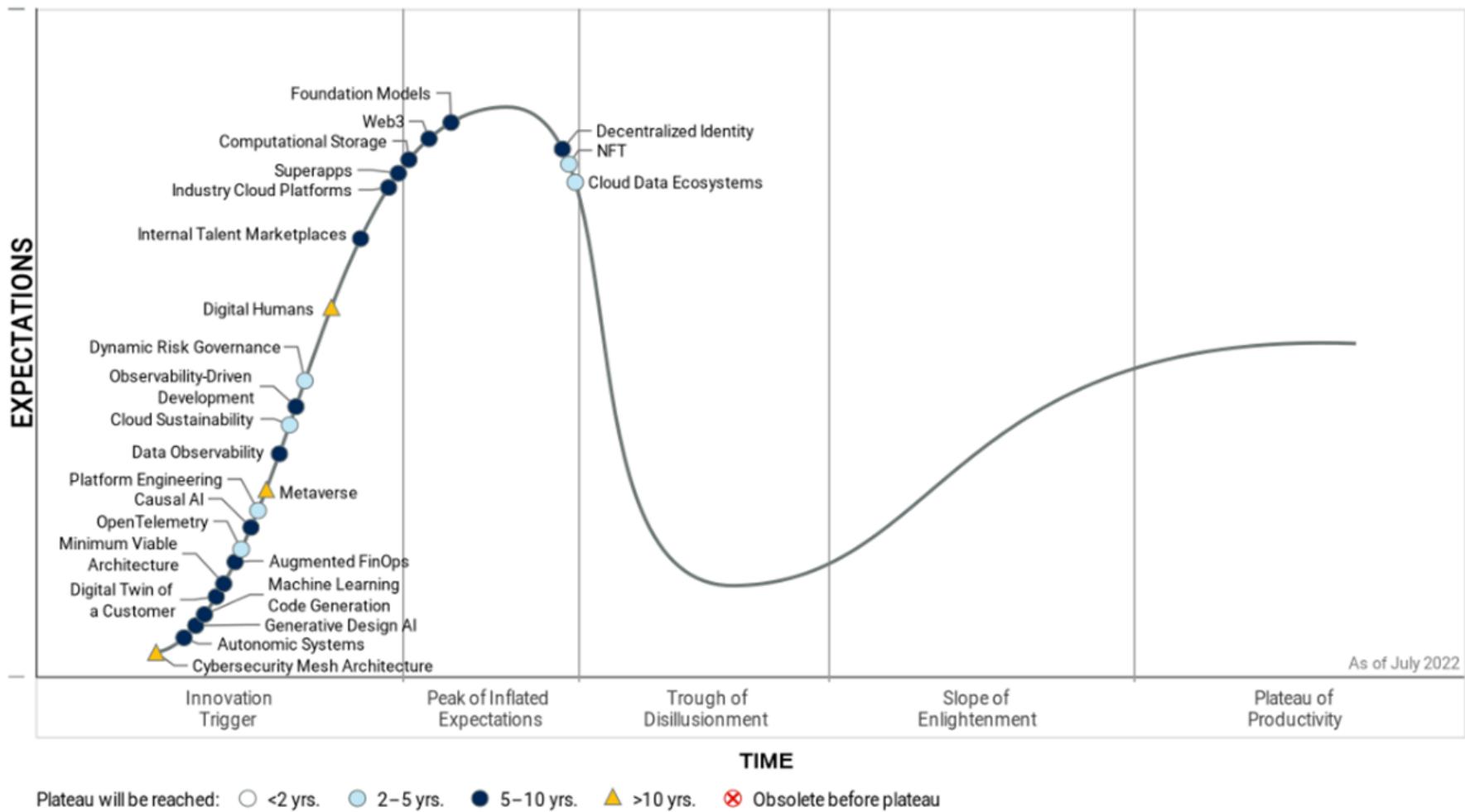
# Visual analytics – histomap (1931)





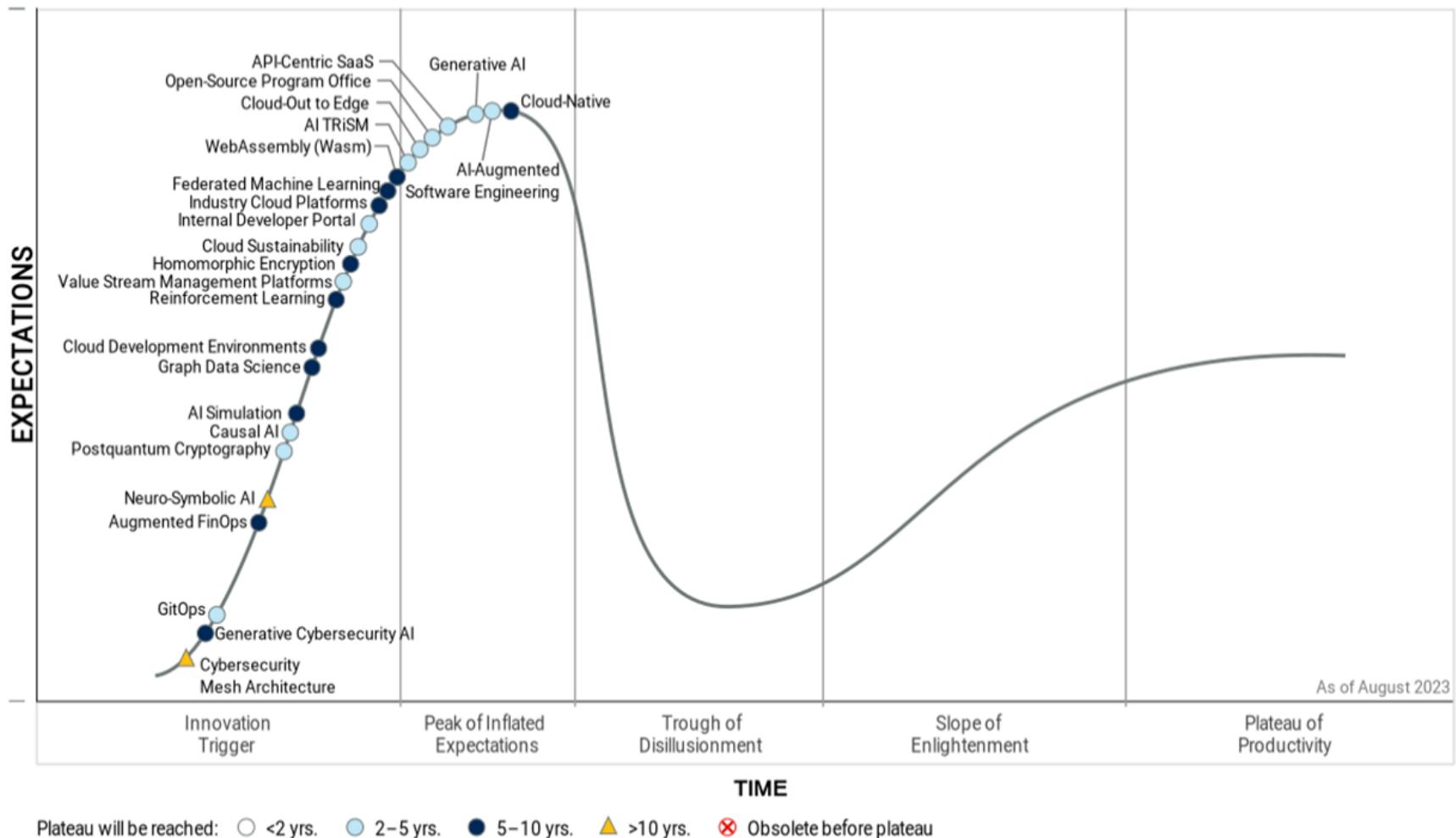
# AI Adoption in Industry Visualizations

# Hype cycle for emerging technologies (2022)



<https://www.gartner.com/en/newsroom/press-releases/2022-08-10-gartner-identifies-key-emerging-technologies-expanding-immersive-experiences-accelerating-ai-automation-and-optimizing-technologist-delivery>

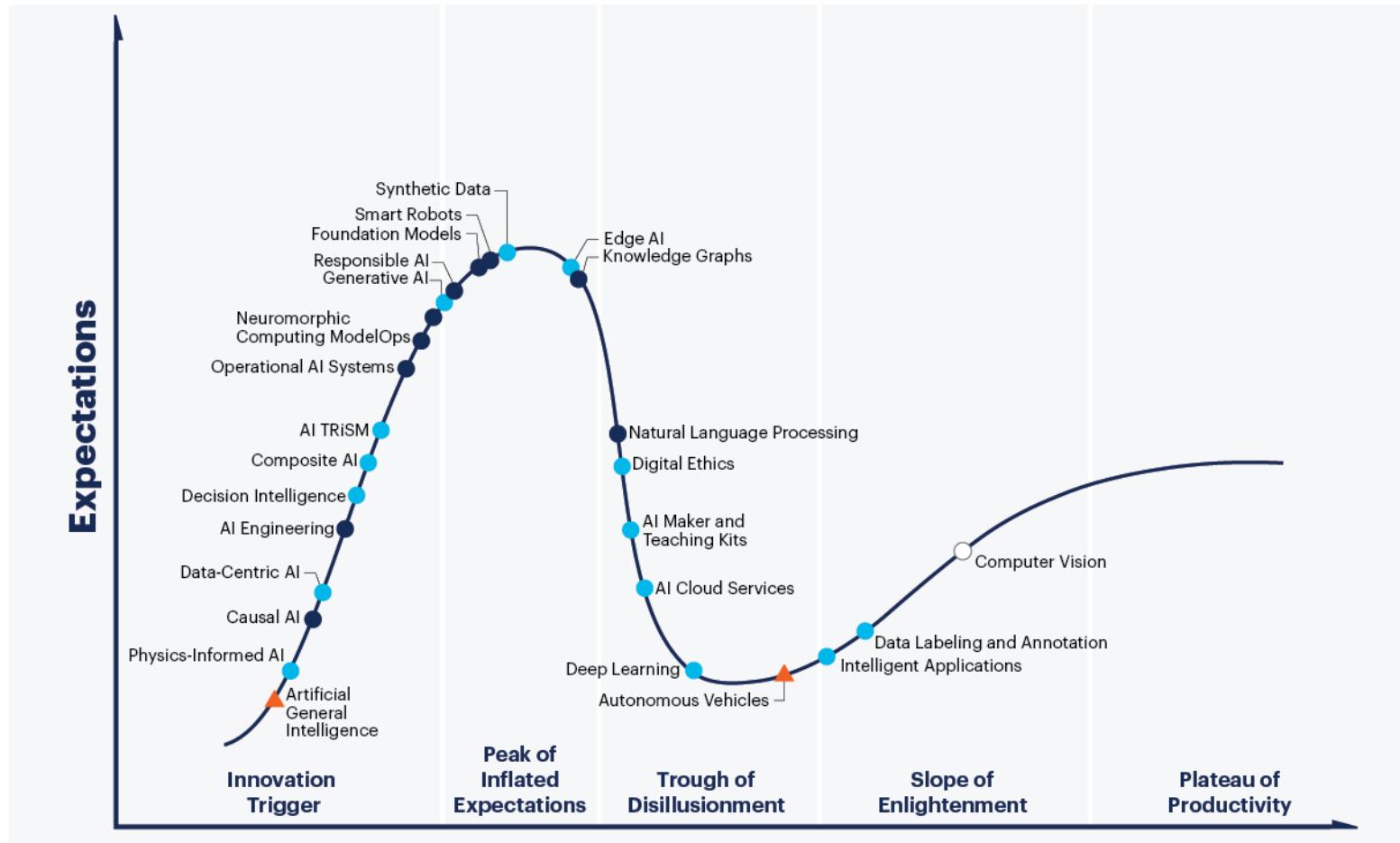
# Hype cycle for emerging technologies (2023)



Gartner

<https://www.gartner.com/en/articles/what-s-new-in-the-2023-gartner-hype-cycle-for-emerging-technologies>

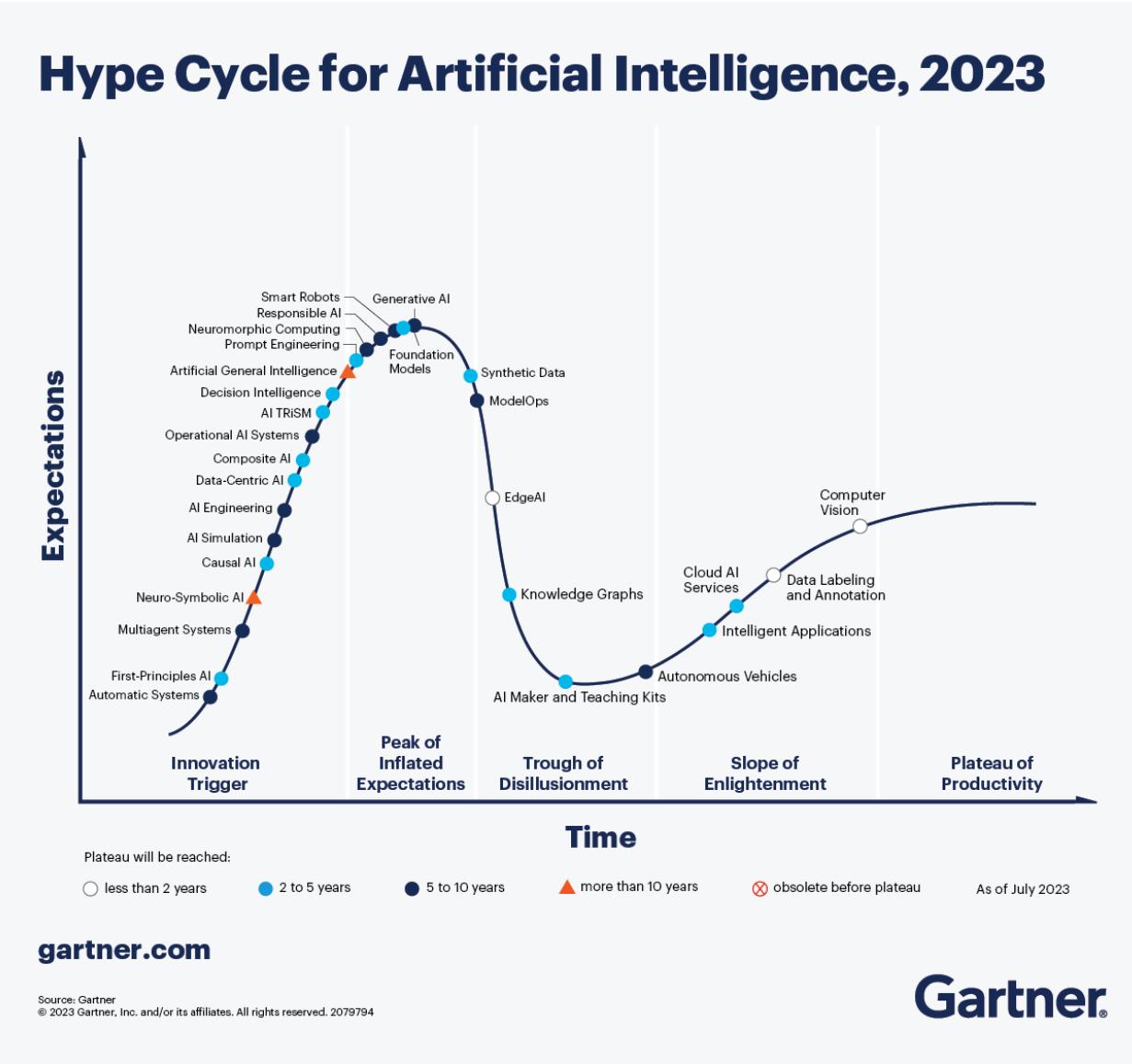
# Hype cycle for AI technologies (2022)



**gartner.com**

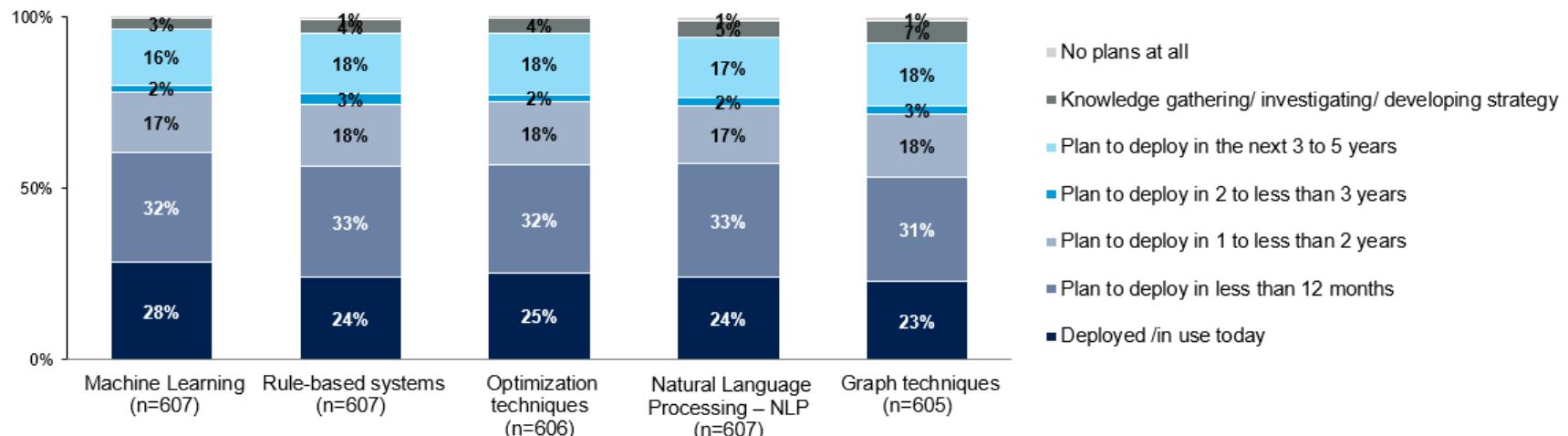
<https://www.gartner.com/en/articles/what-s-new-in-artificial-intelligence-from-the-2022-gartner-hype-cycle>

# Hype cycle for AI technologies (2023)



# Hype cycle for AI technologies (2020)

## AI Adoption by type of Techniques



Bases vary, based on All Respondents, Excluding Don't Know  
S09. What is the adoption status of the following AI solutions in your organization?  
Source: Gartner 2019, AI in Organisations

# AI Adoption in the Enterprise (2022)

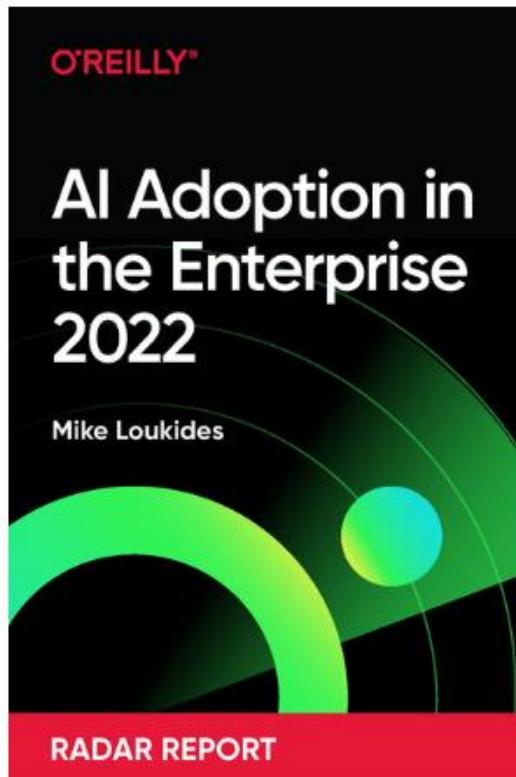
[“AI Adoption in the Enterprise” report from O’Rielly](#)



## AI Adoption in the Enterprise 2022

Write the [first review](#)

By [Mike Loukides](#)



TIME TO COMPLETE:

33m

TOPICS:

[Artificial Intelligence](#)

PUBLISHED BY:

[O'Reilly Media, Inc.](#)

PUBLICATION DATE:

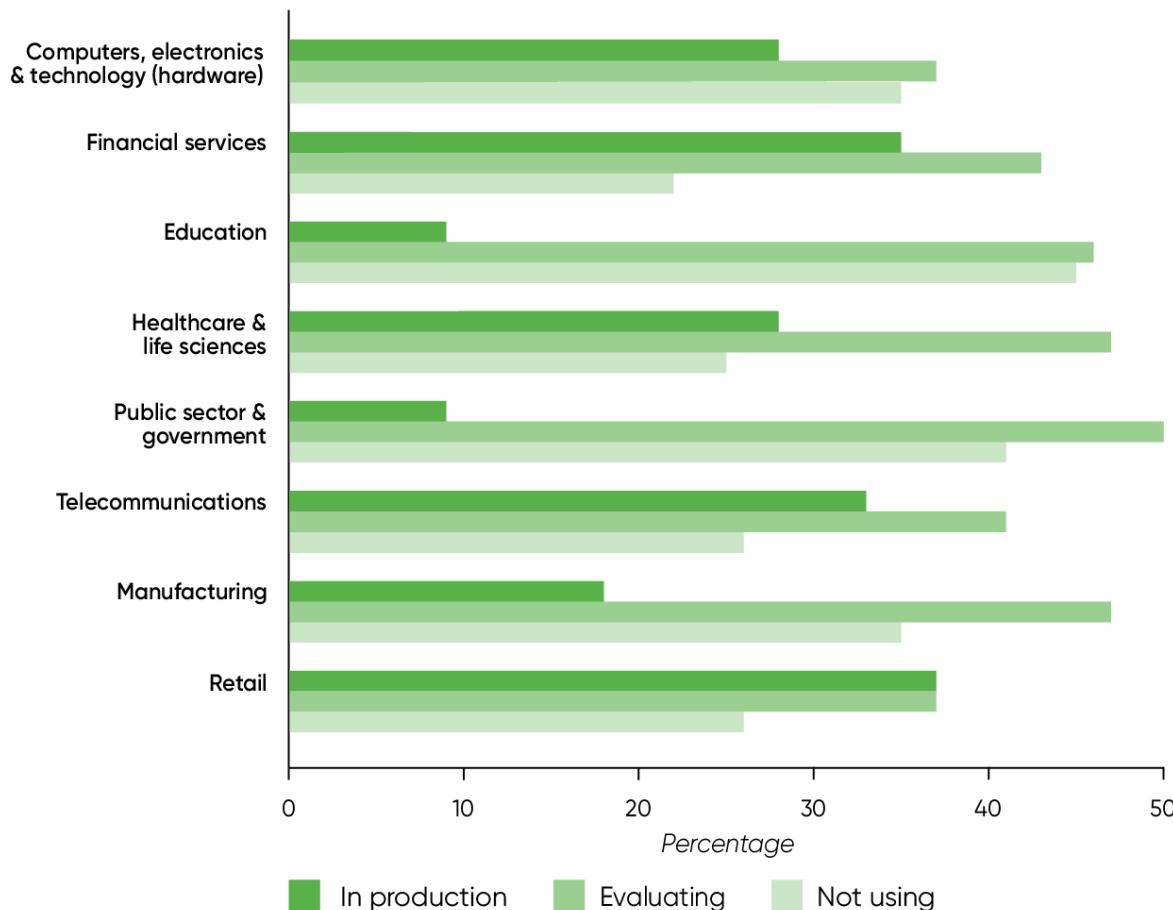
March 2022

PRINT LENGTH:

26 pages

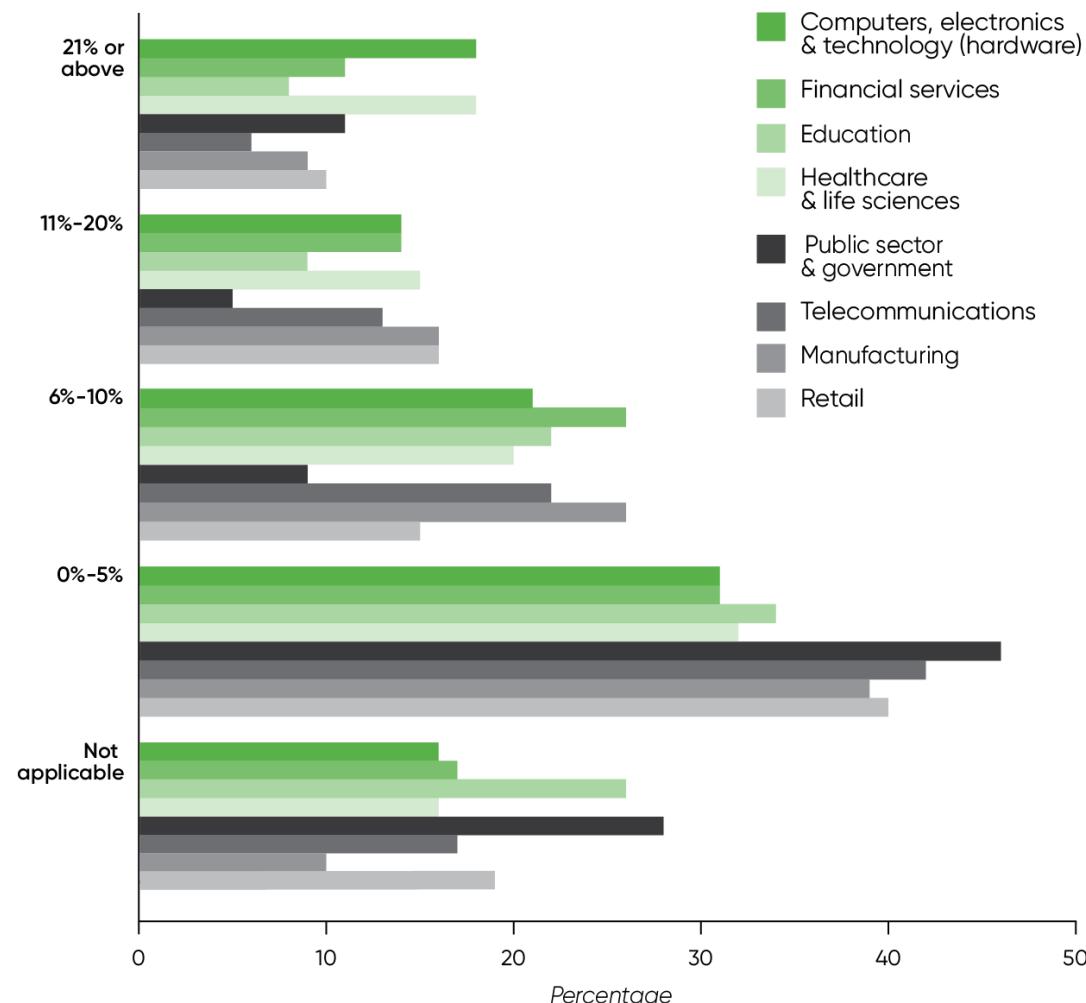
# AI Adoption in the Enterprise (2022)

[“AI Adoption in the Enterprise” report from O’Rielly](#) – **AI adoption by industry**



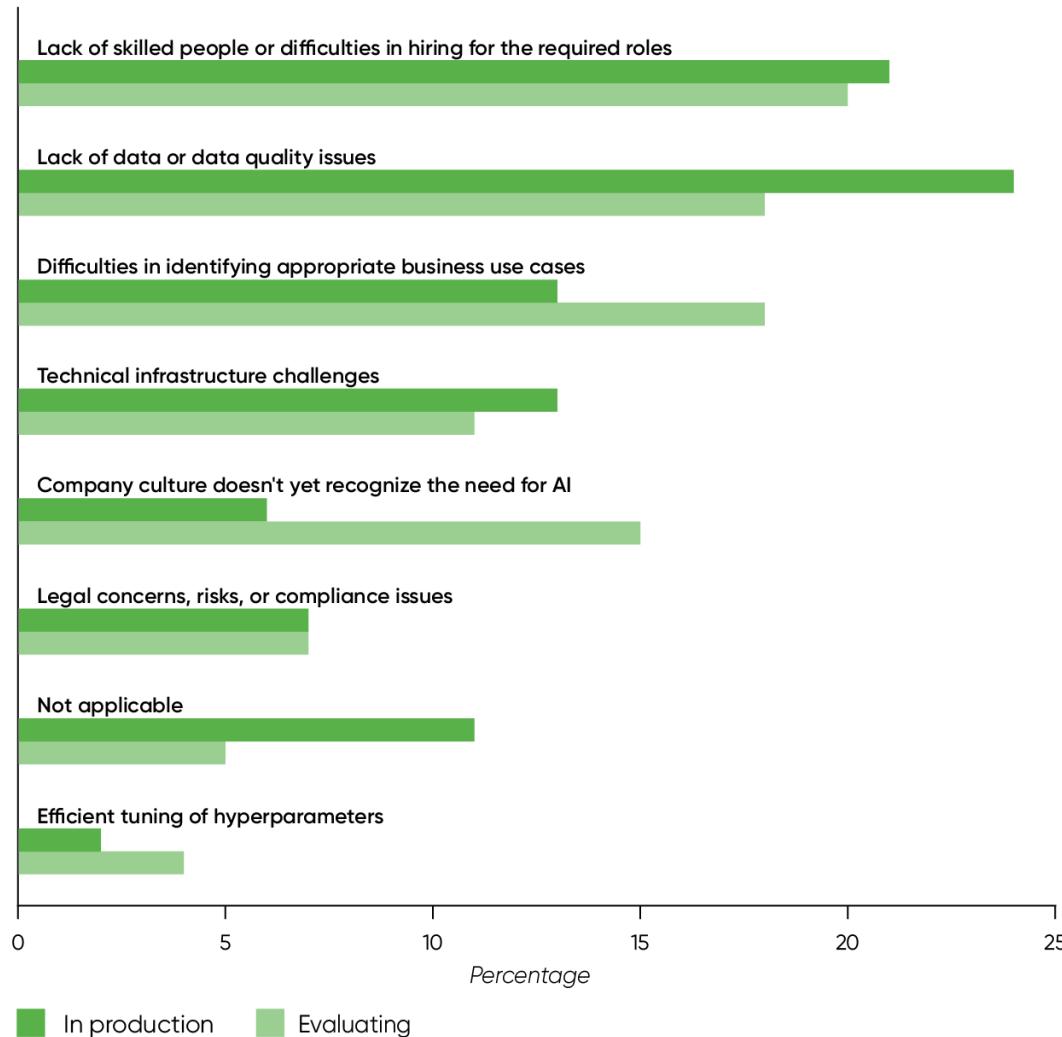
# AI Adoption in the Enterprise (2022)

“[AI Adoption in the Enterprise](#)” report from O’Rielly – **share of IT budget allocated to AI, by industry**



# AI Adoption in the Enterprise (2022)

“[AI Adoption in the Enterprise](#)” report from O’Rielly – **bottlenecks to AI adoption**





# IBM Watson Analytics

# IBM Watson Analytics

Quick start intuitive interface

The screenshot shows the IBM Watson Analytics interface. At the top, there's a navigation bar with 'WELCOME' and a user profile for 'Georgia Henriot'. Below it, a 'Getting Started' tab is selected, along with 'Add Data', 'Recent Workbooks', and 'Open Workbook'. A blue callout bubble points to the 'Georgia Henriot' profile with the text 'Natural language dialogue'.

The main content area has three main sections:

- Start from Data:** Includes 'EXPLORE YOUR DATA' (with a network icon) and 'PREDICT AND EXPLAIN' (with a circular icon). A blue callout bubble points to the 'EXPLORE YOUR DATA' section with the text 'Data discovery'.
- Start from a Story:** Features a grid of nine story starters categorized by role: Marketing, Sales, Finance, Operations, HR, IT, and Executive. Each story includes a thumbnail, title, and brief description. A blue callout bubble points to the 'Executive' section with the text 'Mobile-ready'.
- Search Bar:** A search bar at the top right contains the placeholder 'Enter a keyword to filter the list below, or to ask Watson a question about your data!' with a magnifying glass icon.

Cloud-based agility

# IBM Watson Analytics

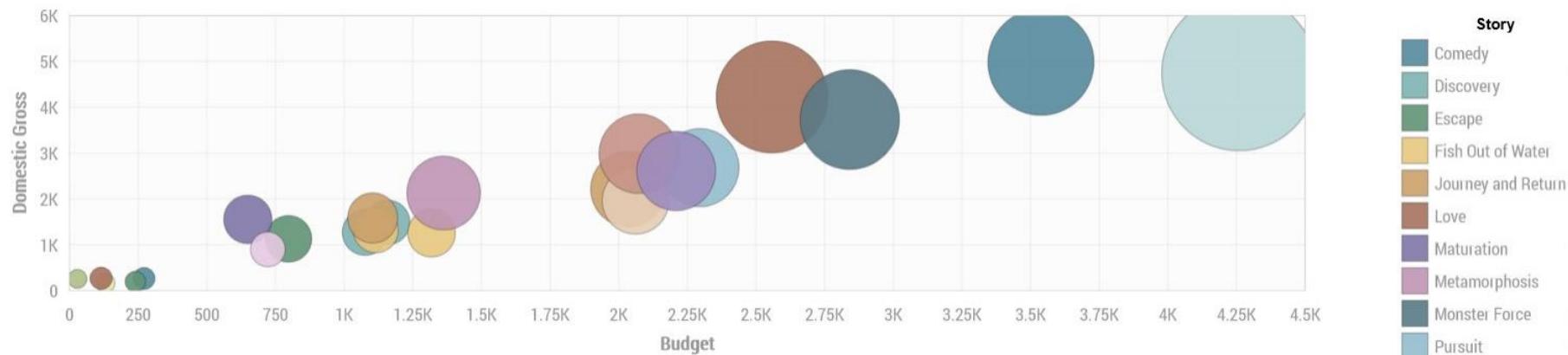
The screenshot displays the IBM Watson Analytics platform with several key features highlighted:

- Data access and refinement**: A blue callout points to the "Analysis Detail" section, which shows metrics like "146 Input Fields were evaluated" and "60 Input Fields were potentially useful".
- Integrated social business**: A blue callout points to the top right corner of the interface.
- Intelligent automation**: A blue callout points to the "Predictive Model" section, which illustrates how multiple drivers (labeled 1-8) influence the "Sales" outcome.
- Guided analytic discovery**: A blue callout points to the bottom left, indicating the platform's ease of use ("Easier to Understand") and predictive power ("More Predictive").
- Report and dashboard creation**: A blue callout points to the right side of the interface, showing a grid of cards with insights and a placeholder for "Drop content here!".
- Visual storytelling**: A blue callout points to the bottom right, highlighting the "What else is interesting about this field?" section, which provides additional context and correlations.
- Unified analytics experience**: A large blue callout at the bottom center summarizes the overall user experience.

# IBM Watson Analytics



What is the relationship between **Budget** and **Domestic Gross** by **Story** ?

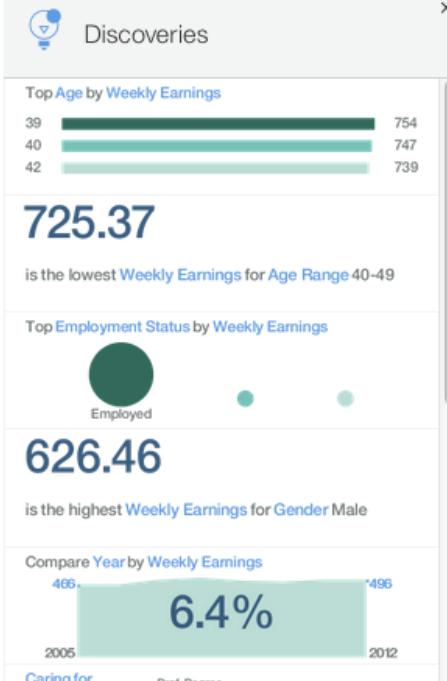


# IBM Watson Analytics

Discovery 1



What is the breakdown of **Weekly Earnings** by **Education Level** ?



Education Level

Weekly Earnings



Heat by

Rows



	Age Range	Education Level	Employment S...	Year	Gender	Age	Television	Housework	Socializing & R...	Weekly Earnings	Caring for Ch...
--	-----------	-----------------	-----------------	------	--------	-----	------------	-----------	--------------------	-----------------	------------------



# Tableau

**(covered in Tutorial)**



# Power BI

**(covered in Tutorial)**