Semantic Search at Bloomberg

Search Solutions 2017

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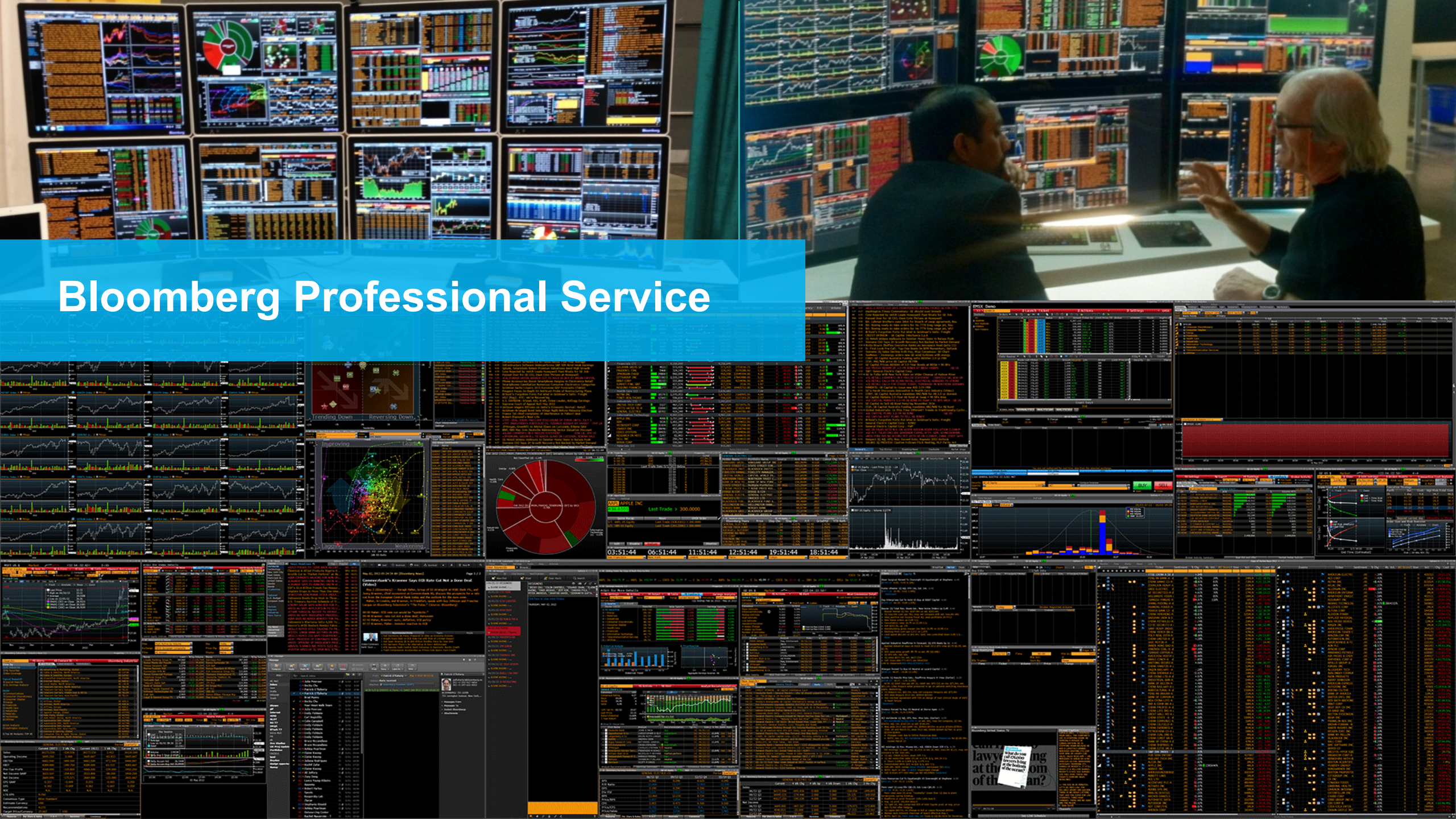

Bloomberg Professional Service

Bloomberg at a glance

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Bloomberg by the numbers

- Founded in **1981**
- **325,000** subscribers in **170 countries**
- Over **19,000 employees** in 192 locations
- **More News reporters** than The New York Times + Washington Post + Chicago Tribune
- **Over 4,800 Engineers**

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All Stories | Pages | Custom Searches | Top News

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Top Stories Selected By Bloomberg | More »

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3) Fillon Slips Further Back in France as Canard Reports Putin Ties BN 07:21
4) Fed Looks Past Trump Stocks Rally, Sees Same Old Tired Expansion BN 04:00

Featured Stories 1 of 3 More »

5) Li Ka-Shing Speaks After Main Companies Raise Dividends: TOPLive BN 08:40
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8) UBS Introduces Charges on Euro Accounts Exceeding 1 Million BN 08:45 B
9) Hermes 2016 Profit Climbs on Handbag Sales, Europe Growth BN 08:19
10) Trump Looms Over $35 Million College Border Security Grant BN 08:00
11) Stock Traders Gain New Bellwether for Analyzing Brexit Talks BN 06:30
12) Nordea Mergers Prompt Finland to Seek Tougher EU Mega-Bank Rules BN 07:42 B
13) ✓Ghana's Growing Government Erodes Pledge to Protect Public Purse BN 00:00 B
14) Why Libya Oil Revival Hinges on Fate of Two Ports: QuickTake Q&A BN 08:16
15) Scotland Demands Independence Vote in Shadow of a Weaker Economy BN 05:00 B

Commentary & Analysis 1 of 3 More »

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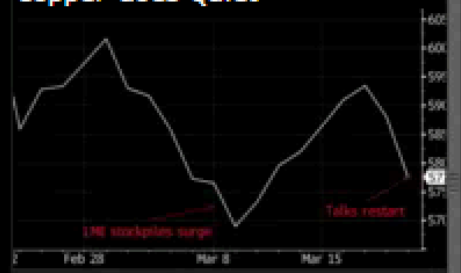
17) Modi May Be Getting Too Powerful for His Own Good: Mihir Sharma BV 03/21 V
18) U.K. Consumer Could Be Saving a Surprise for BOE: Intelligence BI 06:05
19) Around We Go, Where It Stops You Need to Know: Trader's Notes BFW 07:41
20) Check for Shifting Foundations in China Housing Profits: Gadfly BG 02:50
21) Italian Cement Companies Get Emotional About M&A: Intelligence BI 06:06

Chart of the Hour | More »

Copper Goes Quiet



First Word | More »

CK Hutchison Final Dividend/Share HK$1.945; Est. HK$1.95 [08:38]

EUROPEAN WRAP-Stoxx 600 Slides as Trump Trade Pullback Continues [08:34]

PALM OIL: Futures Extend Advance as Production Outlook Assessed [08:29]

Akzo Nobel/PPG Talks Likely to Be Over for Now: Louis Capital [08:29]

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4) Previous 3) Next 66) Send 98) Actions Top News: News Story

03/22/2017 00:00:00 [BN] B Translate to...

Ghana's Growing Government Erodes Pledge to Protect Public Purse

- Team of ministers and deputies to increase to 110 people
- Unplanned spending announced in January startled markets

By Ekow Dontoh

(Bloomberg) -- Ghanaian President Nana Akufo-Addo's plan to enlarge the government may undermine his administration's efforts to convince investors it'll keep the purse strings tight.

Akufo-Addo has announced nominations and appointments of ministers and deputies that could increase the size of the team to run his two-month old administration to 110 people, the largest in the West Africa nation's history and up from 84 under his predecessor John Dramani Mahama. The group of officials is 50 percent bigger than that of South Africa, the continent's most industrialized economy, and three times the size of the ministerial team in Nigeria, where the population is seven times bigger.

Ghana's finance ministry this month announced plans to cut the fiscal deficit as it sought to fulfill campaign promises and raise investor confidence eroded by the announcement in January of a 7 billion-cedi ($1.5 billion) hole in the budget. While Finance Minister Ken Ofori-Atta, who will now have three

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Your research just got a NOTE-able upgrade.

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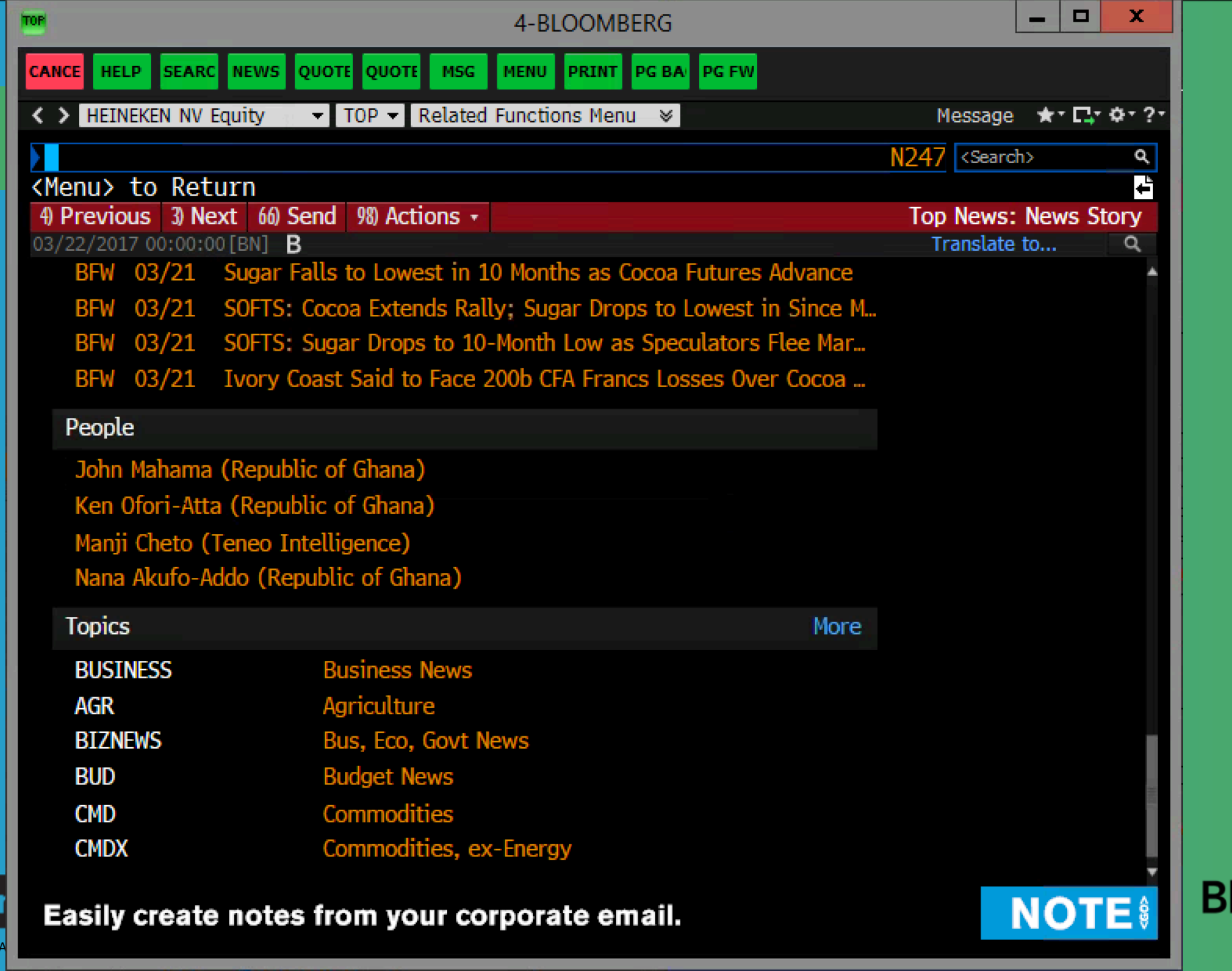

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News stories

Jun 24, 2014 17:16:51 [BN]

Fed Extends Capital-Plan Deadline for Four Banks to January (1)

(Updates with Citigroup's results starting in the fourth paragraph.)

By Dakin Campbell and Jeff Kearns

June 24 (Bloomberg) -- The Federal Reserve extended deadlines until next year for new capital plans from Citigroup Inc. and the U.S. units of HSBC Holdings Plc, Royal Bank of Scotland Group Plc and Banco Santander SA after objecting to earlier versions.

Financial Analysis

The four banks' June 26 deadline was pushed to Jan. 5, the due date for the next round of annual plans, the Fed said today in a statement in Washington. Regulators objected to the companies' submissions during the central bank's 2014 Comprehensive Capital Analysis and Review, a

C US Equity

HSBA LN Equity

Banking (BNK)

Federal Reserve (FED)

United States (US)

Mark Costiglio

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News queries

- Arbitrarily complex Boolean queries
  - For both search and alerting
  - AND, OR, NOT, NEAR, wildcards and phrase queries…
  - Users create queries as large as 20K characters (or more!)
- Searches using keywords and metadata
  - Topics, companies (and lists, e.g., with 1000s of companies), people, sources, …
- Stories from 125K+ sources
  - Users privileged for a subset of these sources
  - Can be turned on/off per user
  - ACLs can have a few, many or all of the users
- Searches and stories in 40 languages
  - Any user can have a subset of these selected

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Solr // Learning to Rank

- The News Search Cloud
  - Open source: Solr
  - Hundreds of shards, and thousands of Solr cores
  - Multiple tiers: ‘recent’ collection to optimize chronological results
  - Ability to fix bugs and contribute to core engine
  - Solr committers in-house
- Machine Learning
  - Allows continuous relevance tuning
  - SOLR LTR plugin

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Multi-linguality

- Traditional search engines struggle when dealing with queries in different languages
- Typically specialized by “market” (e.g., en-US, en-GB, …)
- All components are specialized “vertically” for a market
  - Online spell correction
  - Terms/query expansion
  - Click counts on URLs vary from market to market
- Why is this different for us?

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Multi-linguality

- Suppose you are an natural energy trader (oil, gas,…)
  - access news in multiple languages is an advantage
  - news will appear first in the language of the country where it happens
  - e.g., if you trade in oil and your target markets are in South America, knowing Spanish is a **big** advantage, but knowing both Spanish and Portuguese is a **huge** advantage

- More than 1/3 of the queries are executed in 2 languages or more

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Multi-linguality

- Everything starts with the documents: news stories are annotated with entities and topics
  - There are 1000s of possible topics in our system
  - Plus entities like people, companies, …

- Queries are also translated into entities and topics and then matched against the index

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Multi-linguality

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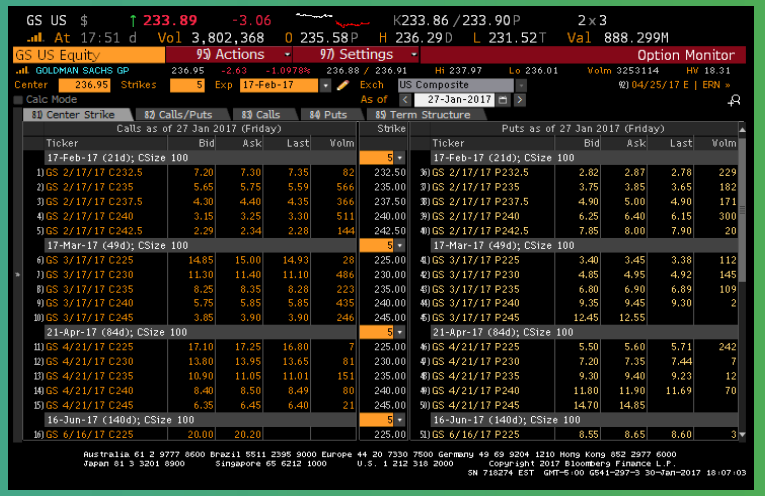
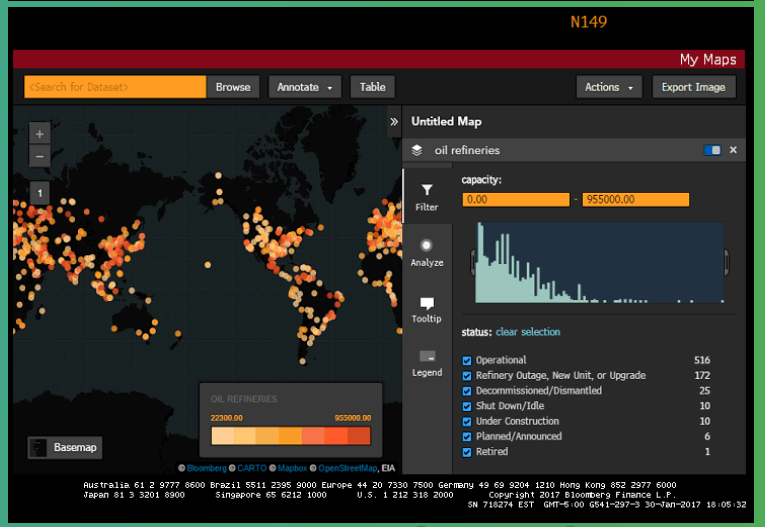
Search at Bloomberg

Search for Bloomberg is unique

- Neither web search nor enterprise search
- Search means different things for different areas
  - Federated search
  - Screening (multi parameter filtering)
  - Geospatial search
  - News search
- Data is heterogeneous, but connected
- Precision is very important





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GS US $ ↑ 233.89 -3.06 K233.86 / 233.90 P 2 x 3

At 17:51 d Vol 3,802,368 O 235.58 P H 236.29 D L 231.52 T Val 888.299M

GS US Equity | 95) Actions | 97) Settings | Option Monit

GOLDMAN SACHS GP 236.95 -2.63 -1.0978% 236.88 / 236.91 Hi 237.97 Lo 236.01 Volm 3253114 HV 18.3

Center 236.95 Strikes 5 Exp 17-Feb-17 Exch US Composite 92) 04/25/17 E | ERN

Calc Mode As of 27-Jan-2017

81) Center Strike | 82) Calls/Puts | 83) Calls | 84) Puts | 85) Term Structure

Calls as of 27 Jan 2017 (Friday)					Strike	Puts as of 27 Jan 2017 (Friday)				
Ticker	Bid	Ask	Last	Volm		Ticker	Bid	Ask	Last	Vo
17-Feb-17 (21d); CSize 100					5	17-Feb-17 (21d); CSize 100				
1) GS 2/17/17 C232.5	7.20	7.30	7.35	82	232.50	36) GS 2/17/17 P232.5	2.82	2.87	2.78	
2) GS 2/17/17 C235	5.65	5.75	5.59	566	235.00	37) GS 2/17/17 P235	3.75	3.85	3.65	
3) GS 2/17/17 C237.5	4.30	4.40	4.35	366	237.50	38) GS 2/17/17 P237.5	4.90	5.00	4.90	
4) GS 2/17/17 C240	3.15	3.25	3.30	511	240.00	39) GS 2/17/17 P240	6.25	6.40	6.15	
5) GS 2/17/17 C242.5	2.29	2.34	2.28	144	242.50	40) GS 2/17/17 P242.5	7.85	8.00	7.90	
17-Mar-17 (49d); CSize 100					5	17-Mar-17 (49d); CSize 100				
6) GS 3/17/17 C225	14.85	15.00	14.93	28	225.00	41) GS 3/17/17 P225	3.40	3.45	3.38	
7) GS 3/17/17 C230	11.30	11.40	11.10	486	230.00	42) GS 3/17/17 P230	4.85	4.95	4.92	
8) GS 3/17/17 C235	8.25	8.35	8.28	223	235.00	43) GS 3/17/17 P235	6.80	6.90	6.89	
9) GS 3/17/17 C240	5.75	5.85	5.85	435	240.00	44) GS 3/17/17 P240	9.35	9.45	9.30	
10) GS 3/17/17 C245	3.85	3.90	3.90	246	245.00	45) GS 3/17/17 P245	12.45	12.55		
21-Apr-17 (84d); CSize 100					5	21-Apr-17 (84d); CSize 100				
11) GS 4/21/17 C225	17.10	17.25	16.80	7	225.00	46) GS 4/21/17 P225	5.50	5.60	5.71	
12) GS 4/21/17 C230	13.80	13.95	13.65	81	230.00	47) GS 4/21/17 P230	7.20	7.35	7.44	
13) GS 4/21/17 C235	10.90	11.05	11.01	151	235.00	48) GS 4/21/17 P235	9.30	9.40	9.23	
14) GS 4/21/17 C240	8.40	8.50	8.49	80	240.00	49) GS 4/21/17 P240	11.80	11.90	11.69	
15) GS 4/21/17 C245	6.35	6.45	6.40	21	245.00	50) GS 4/21/17 P245	14.70	14.85		

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Actions
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oil refineries
Filter
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Tooltip
Legend
capacity:
0.00
955000.00
status: clear selection
Operational 516
Refinery Outage, New Unit, or Upgrade 172
Decommissioned/Dismantled 25
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Under Construction 10
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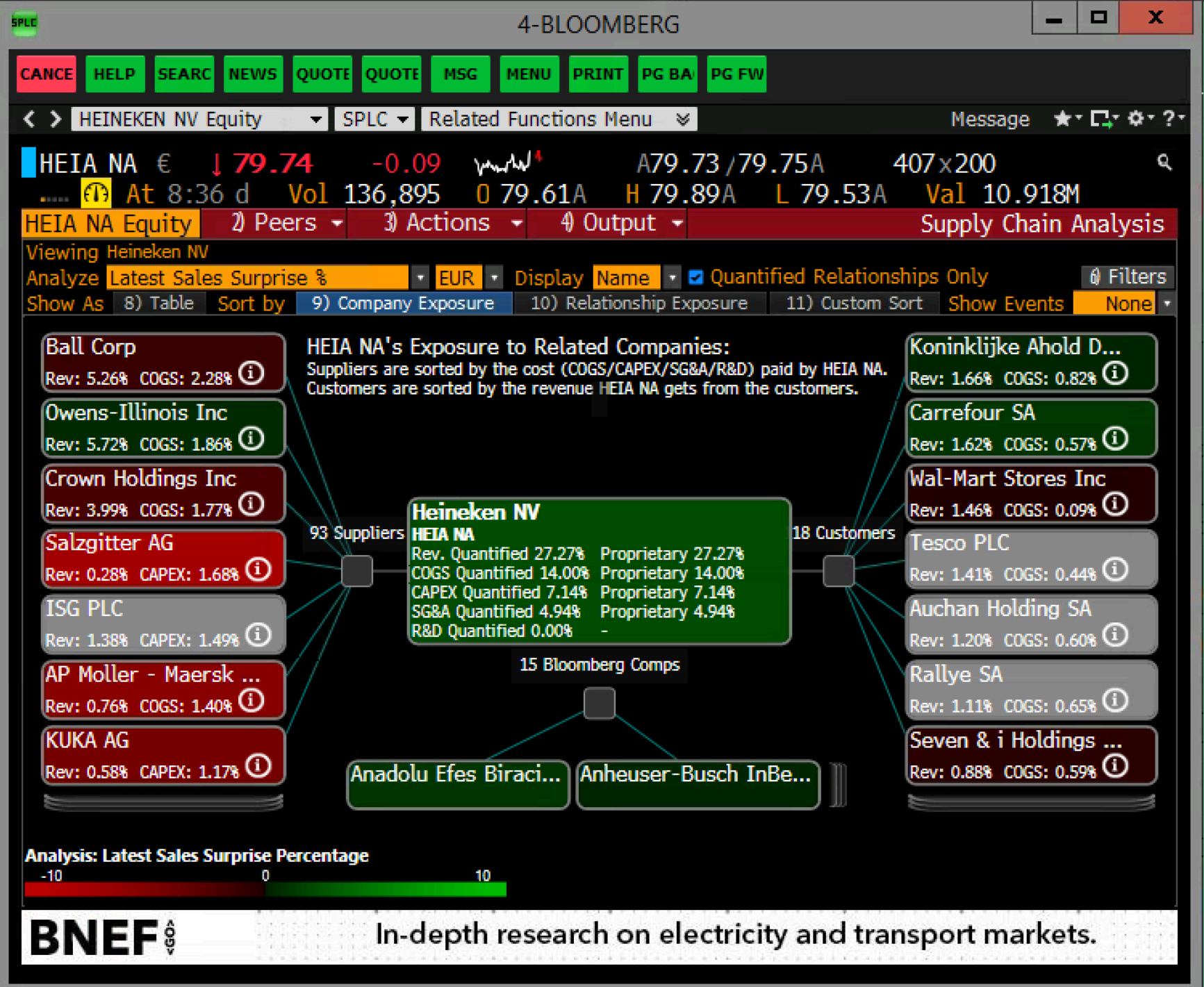

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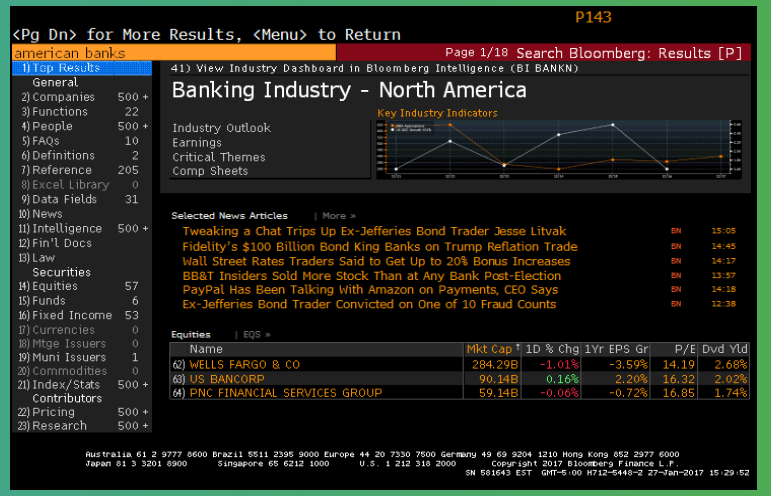
Federated Search

Unified Search for the Bloomberg Terminal

- Searches through around 60 data sources
  - Structured, semi-structured and pure text sources
- Our goal is to ease information discovery
  - Focus on what you are looking for, not where it might be
  - One interface to find all the data, analytics, news, …
- Results are presented in one relevance-ranked list



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american banks

1) Top Results
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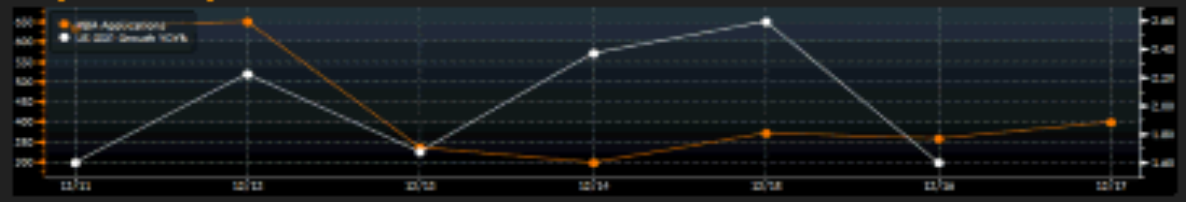
5) FAQs 10
6) Definitions 2
7) Reference 205
8) Excel Library 0
9) Data Fields 31
10) News
11) Intelligence 500 +
12) Fin'l Docs
13) Law
Securities
14) Equities 57
15) Funds 6
16) Fixed Income 53
17) Currencies 0
18) Mtge Issuers 0
19) Muni Issuers 1
20) Commodities 0
21) Index/Stats 500 +
Contributors
22) Pricing 500 +
23) Research 500 +

41) View Industry Dashboard in Bloomberg Intelligence (BI BANKN)

Banking Industry - North America

Industry Outlook
Earnings
Critical Themes
Comp Sheets

Key Industry Indicators



Selected News Articles | More »

Tweaking a Chat Trips Up Ex-Jefferies Bond Trader Jesse Litvak	BN	15:05
Fidelity's $100 Billion Bond King Banks on Trump Reflation Trade	BN	14:45
Wall Street Rates Traders Said to Get Up to 20% Bonus Increases	BN	14:17
BB&T Insiders Sold More Stock Than at Any Bank Post-Election	BN	13:57
PayPal Has Been Talking With Amazon on Payments, CEO Says	BN	14:18
Ex-Jefferies Bond Trader Convicted on One of 10 Fraud Counts	BN	12:38

Equities | EQS »

	Name	Mkt Cap ↑	1D % Chg	1Yr EPS Gr	P/E	Dvd Yld
62)	WELLS FARGO & CO	284.29B	-1.01%	-3.59%	14.19	2.68%
63)	US BANCORP	90.14B	0.16%	2.20%	16.32	2.02%
64)	PNC FINANCIAL SERVICES GROUP	59.14B	-0.06%	-0.72%	16.85	1.74%

Australia 61 2 9777 8600 Brazil 5511 2395 9000 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000
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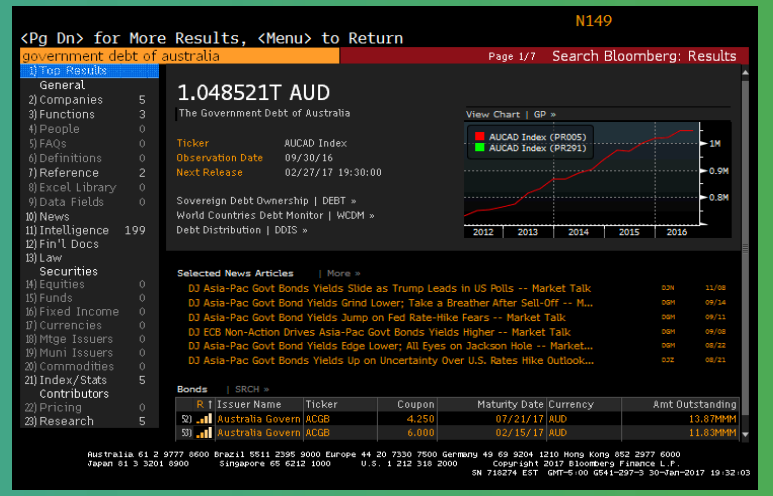
Federated Search

Unified Search for the Bloomberg Terminal

- Users can query using Natural Language
- Searches dynamic content
- Has unique challenges
  - Data is varied in structure and popularity
  - Usage patterns vary vastly
  - Feedback is sparse
  - Precision is key



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12) Fin'l Docs
13) Law
Securities
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15) Funds 0
16) Fixed Income 0
17) Currencies 0
18) Mtge Issuers 0
19) Muni Issuers 0
20) Commodities 0
21) Index/Stats 0
Contributors
22) Pricing 0
23) Research 0

Selected News Articles | More »

Jack Ma Takes Aim at Trump's Wall With MoneyGram Deal: Gadfly	BG	01/26
Jack Ma's Ant Financial Buys MoneyGram for $880 Million	BN	01/26
Wanda's Driving Too Fast Down Boulevard of Broken Dreams: Gadfly	BG	01/22
Toshiba Selling Chip Unit Stake May Be Least Bad Option: Gadfly	BG	01/23
Japan's Raw Deal Shows India Needs to Cure Delhi Belly: Gadfly	BG	01/23
Goldman Sachs Said to Work on Sale of Toshiba's Chip Business	BN	01/24

Mergers and Acquisitions | MA »

	Ann Date↑	Target Name	Acquirer Name	Value	Status
51)	01/26/17	Premier Eda Solutions Ltd	Altium Ltd		Completed
52)	01/26/17	Cloud Socius Ltd	Nippon Telegraph & Telephon		Completed
53)	01/24/17	E2 Inc	Takara Printing Co Ltd		Pending
54)	01/24/17	NE Mobile Services India Pvt	Unnamed Buyer		Pending
55)	01/24/17	Design Camp LLC	Kabuni Ltd		Pending

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Increasingly entity-oriented search

- companies
  - stocks, bonds, location, …
- people
  - government officials, board members, C-suite, …
  - …
- products/commodities
  - prices, …
- countries, regions, …
- economic indicators (GDP, operating surplus, …)
- sentiment, polarity, popularity, …
- …

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Lots of potential for applications

- Smarter search, smarter alerts
  - news, stock prices, commodities, interest rates, …
- Query/document tagging, search, and recommendations
  - sentiment, polarity, saliency/aboutness, …
- Information landscapes
  - …
- …

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Conclusions

- Search at Bloomberg is unique in many ways
- Federated Solr/ML-based search architecture for search (open source!)
- Multi-lingual, complex searches involving companies, people, and more
- The world (and also Bloomberg!) increasingly moving towards entity-oriented search

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Data Science Research Grant Program

Bloomberg invites faculty worldwide to apply for unrestricted gifts that support research in broadly-construed data science, including natural language processing, machine learning, and data mining. We also invite proposals for creation of, or contributions to, open source software used for data science.

Applications

Faculty members, research scientists, and post-doctoral fellows at universities worldwide are eligible to serve as Principal Investigators (PIs). A PI can lead one proposal per cycle, but can serve as co-PI on other proposals.

Applications should be submitted here in PDF format. We prefer a single file containing all materials, named after the first PI's last name and first name. Please note that Bloomberg cannot accept any proposal containing confidential or proprietary information.

The application deadline for Round 5 will be announced before the end of 2017.

https://www.techatbloomberg.com/data-science-research-grant-program/

Q&A

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PS. We're hiring :-)

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