



6th Malaysia Statistics Conference

19 November 2018

Sasana Kijang, Bank Negara Malaysia

2018

Embracing Data Science and Analytics to Strengthen
Evidence-Based Decision Making

Session 1(b): Adoption of Data Science and Analytics by the Public Sector

Adoption of Data Science and Analytics in Regulation : Capital Market Supervision & Surveillance

Lim Kok Eng

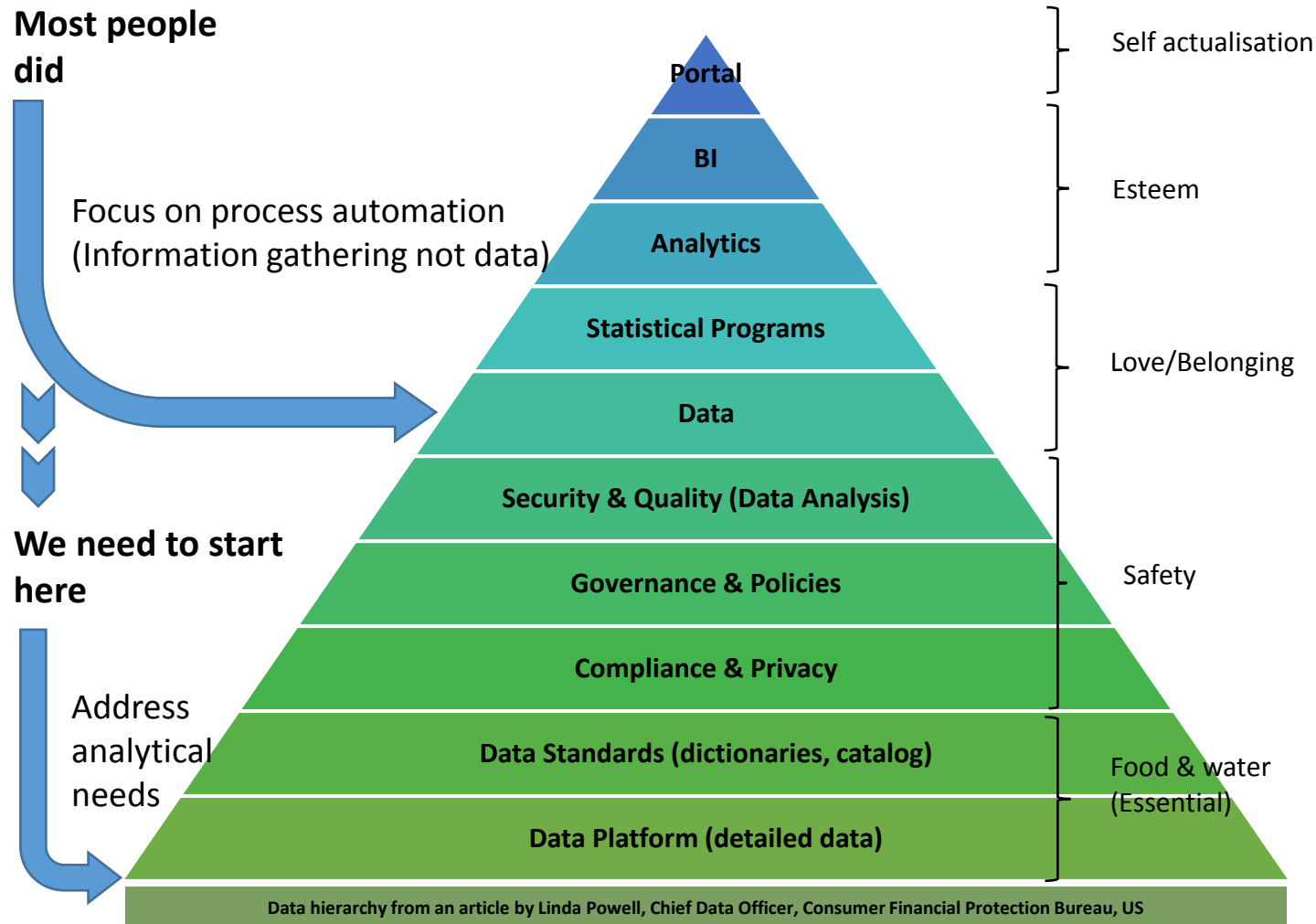
Analytics Department, Securities Commission Malaysia



6th Malaysia Statistics Conference

Data Hierarchy of Needs

- Infrastructure needed to do data driven analysis



- Analysis needs **specific data set**, else will be difficult, inaccurate, or impossible.
- Comprehensive analysis needs data inter-connectivity where data **standardisation and consistency** is importance.
- Advanced analysis begins with **detailed data** to provide data agility and multi-dimensional permutation.

The SC's Enterprise Analytics Platforms



To empower frontline business with superior insights through advanced predictive analytics and be the single point for data warehousing across functions

Data Efficiency

- ▶ **Straight-through processing** - End-to-end processing with accurate data captured at source
- A unified and standard digitalised information disclosure system for all Capital Market participants



Common Reporting Platform (ComRep)

- An automated data sourcing robots to collect relevant data and generate insights from internet



Web Crawling Robots

Enterprise Approach

- ▶ **Enterprise approach** – An automate integrator to collect standardized data from multiple internal and external systems for data inter-connectivity and modeling

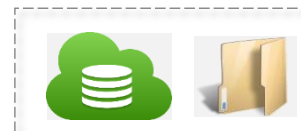


Enterprise Integrator System (EIS)

- ▶ **Data Governance** - Establish organizational policies, procedures and standards to manage data and empower users through a consolidated single source of the truth



Enterprise Data Warehouse (EDW)



Enterprise Information Repository

Advanced Analytics

- ▶ **Empowering users** - Enterprise Analytics Platform to access, visualize and gain insights from data
- An enterprise solution to empower users with the capability to obtain data and generate analysis to support business decisions



Enterprise Analytics Platform

- An advanced analytics platform with artificial intelligence engine to enhance capital market surveillance capability



Regulator Analytics & Intelligence Platform (RegAI)

Superior Data



Enterprise Intelligence



Insights

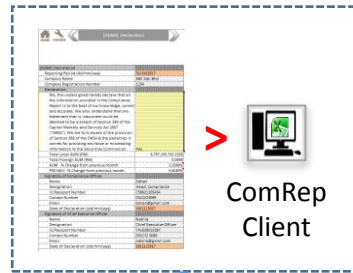


Common Reporting Platform (ComRep)

- A robust and sustainable single submission platform

Filers

Option 1 : Offline Preparation



Generate
XBRL Instance
Document



Secured
Transmission



Option 2 : Automate Report Generation

ComRep System & EDW

Objectives :

- To collect timely & quality data
- To lighten regulatory burden
- Better reporting change management

Upload XBRL Filing

XBRL Instance * No file chosen
Only xml files allowed

Supporting Documents No file chosen
Only .zip / pdf files allowed (maximum file size limited to 4 MB)

Comments for Filing

ComRep Portal



Enterprise
Data
Warehouse



XBRL Validation



Enterprise Analytics Platform

- Industry AUM Dashboard



- Source of Fund Dashboard



- Fund Overview



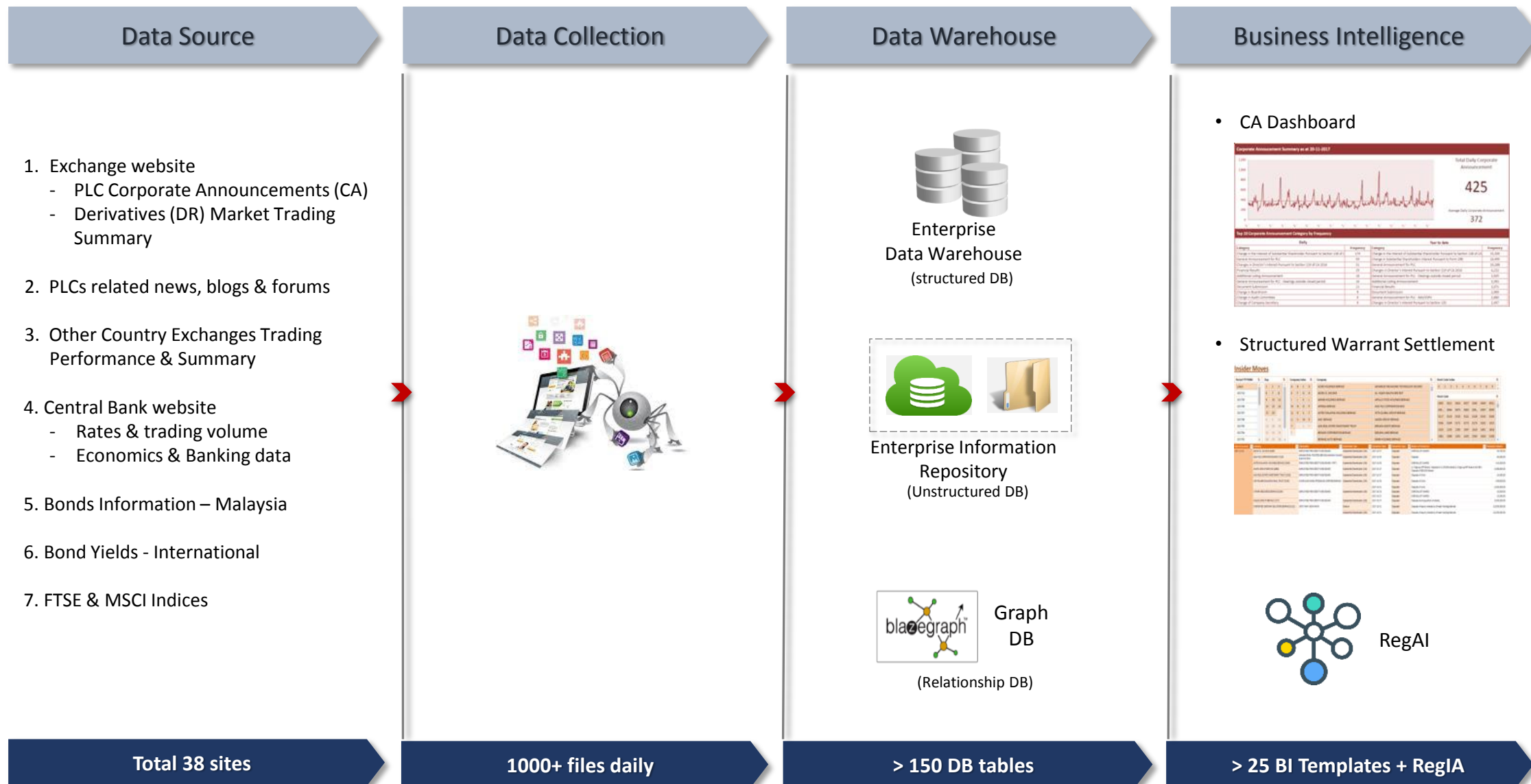
- Unit Trust Fund Dashboard





Web Crawling Robots

- Internet data for more effective supervision & surveillance





Web Crawling Robots

- Transforming semi-structured data into structured data for analysis

Bursa Corporate Announcement Web Site

Company Announcements

Category:

Sub Category:

Company:

Alphabetical: Market:

Date Range: Sector:

No	Announcement Date	Company	Title
1	18 Apr 2018	AIRASIA GROUP BERHAD	Notice of Interest Sub. S-hldr (Section 137 of CA 2016) - EMPLOYEES PROVIDENT FUND BOARD
2	18 Apr 2018	AIRASIA GROUP BERHAD	Notice of Interest Sub. S-hldr (Section 137 of CA 2016) - TUNE AIR SDN. BHD.
3	18 Apr 2018	AIRASIA GROUP BERHAD	Notice of Interest Sub. S-hldr (Section 137 of CA 2016) - TAN SRI (DR.) ANTHONY FRANCIS FERNANDES
4	18 Apr 2018	AIRASIA GROUP BERHAD	Notice of Interest Sub. S-hldr (Section 137 of CA 2016) - TUNE LIVE SDN. BHD.
5	18 Apr 2018	AIRASIA GROUP BERHAD	Notice of Interest Sub. S-hldr (Section 137 of CA 2016) - DATUK KAMARUDIN BIN MERANUN

Notice of Interest Sub. S-hldr (Section 137 of CA 2016)

AIRASIA GROUP BERHAD

Particulars of Substantial Securities Holder

Name: **EMPLOYEES PROVIDENT FUND BOARD**
Address: **Level 19, Bangunan KWSP, Jalan Raja Laut, Kuala Lumpur, 50350 Wilayah Persekutuan Malaysia**

Company No.: **EPF ACT 1991**
Nationality/Country of incorporation: **Malaysia**

Descriptions (Class): **Ordinary Shares**
Name & address of registered holder: **Level 42, Menara Citibank, 105 Jalan Ampang, 50450 Kuala Lumpur, Wilayah Persekutuan Malaysia**

Date interest acquired & no of securities acquired

Date interest acquired: **16 Apr 2018**
No of securities: **169,669,049**
Circumstances by reason of which Securities Holder has interest: **Exchange of all Ordinary Shares in AirAsia Berhad ("AAB") ("AAB Shares") with New Ordinary Shares in AirAsia Group Berhad ("AAGB") ("AAGB Shares"), on the basis of 1 New AAGB Share for every 1 Existing AAB Share Held**

Name of interest: **Direct Interest**
Total no of securities after change: **169,669,049**

Direct (units): **169,669,049**
Direct (%): **5.977**
Indirect/deemed interest (units): **0**
Indirect/deemed interest (%): **0**
Date of notice: **17 Apr 2018**
Date notice received by Listed Issuer: **18 Apr 2018**

Corporate Announcement Master

Date Announced	Stock Code	Stock Name	Stock Long Name	Announcement Header	HTM Filename
2018-04-18	5099	AIRASIA	AIRASIA GROUP BERHAD	Acquired 516,485,082 shares by TUNE AIR SDN. BHD. and is now new substantial shareholder	\\hq01cmd03\Production\90DMDPublic\CA\201804\2848655.htm
2018-04-18	5099	AIRASIA	AIRASIA GROUP BERHAD	Acquired 1,077,485,082 shares by DATUK KAMARUDIN BIN MERANUN and is now new substantial shareholder	\\hq01cmd03\Production\90DMDPublic\CA\201804\2848649.htm
2018-04-18	5099	AIRASIA	AIRASIA GROUP BERHAD	Acquired 169,669,049 shares by EMPLOYEES PROVIDENT FUND BOARD and is now new substantial shareholder	\\hq01cmd03\Production\90DMDPublic\CA\201804\2848657.htm
2018-04-18	5099	AIRASIA	AIRASIA GROUP BERHAD	Acquired 1,077,085,082 shares by TAN SRI (DR.) ANTHONY FRANCIS FERNANDES and is now new substantial shareholder	\\hq01cmd03\Production\90DMDPublic\CA\201804\2848652.htm
2018-04-18	5099	AIRASIA	AIRASIA GROUP BERHAD	Acquired 559,000,000 shares by TUNE LIVE SDN. BHD. and is now new substantial shareholder	\\hq01cmd03\Production\90DMDPublic\CA\201804\2848648.htm

Generate meaningful header for better surveillance

Retrieval of Original announcement

Change In Substantial Shareholders

Date Announced	Stock Code	Stock Long Name	Name of Shareholder	Shareholder Identity Number	Shareholder Nationality	Type of Share	Transaction Type	Transaction Date	Transaction Volume
2018-04-18	5099	AIRASIA GROUP BERHAD	TUNE LIVE SDN. BHD.	948620-U	Malaysia	Ordinary Shares	Acquired	2018-04-12	559000000.0000
2018-04-18	5099	AIRASIA GROUP BERHAD	DATUK KAMARUDIN BIN MERANUN		Malaysia	Ordinary Shares	Acquired	2018-04-12	1077485082.0000
2018-04-18	5099	AIRASIA GROUP BERHAD	TAN SRI (DR.) ANTHONY FRANCIS FERNANDES		Malaysia	Ordinary Shares	Acquired	2018-04-12	1077085082.0000
2018-04-18	5099	AIRASIA GROUP BERHAD	EMPLOYEES PROVIDENT FUND BOARD	EPF ACT 1991	Malaysia	Ordinary Shares	Acquired	2018-04-16	169669049.0000
2018-04-18	5099	AIRASIA GROUP BERHAD	TUNE AIR SDN. BHD.	548526-V	Malaysia	Ordinary Shares	Acquired	2018-04-12	516485082.0000

Table with multiple columns including Stock Code, Stock Name, Stock Long Name, Shareholder Identity Number, Shareholder Nationality, Type of Share, Transaction Type, Transaction Date, Transaction Volume, and various financial metrics.

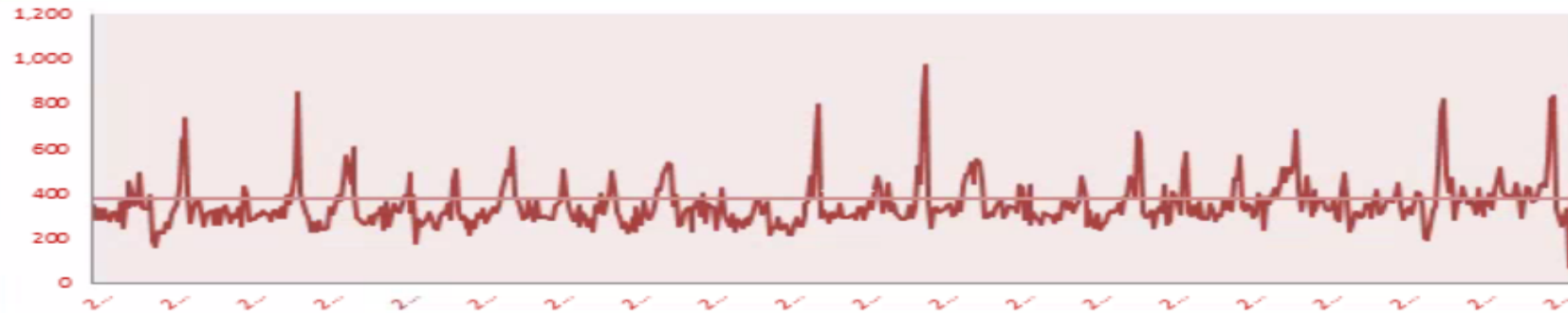
Insider Moves BI



Web Crawling Robots

- Monitoring of the PLCs heartbeats

Corporate Announcement Summary as at 21-05-2018



Total Daily Corporate Announcement

457

Average Daily Corporate Announcement

383

Top 10 Corporate Announcement Category by Frequency

Daily		Year to date	
Category	Frequency	Category	Frequency
Change in the Interest of Substantial Shareholder Pursuant to Section 13	142	Change in the Interest of Substantial Shareholder Pursuant to Section 13	11,957
General Announcement for PLC	65	Change in Substantial Shareholders Interest Pursuant to Form 29B	10,495
Financial Results	37	General Announcement for PLC	5,157
Changes in Director's Interest Pursuant to Section 219 of CA 2016	33	Changes in Director's Interest Pursuant to Section 219 of CA 2016	3,098
Document Submission	28	Changes in Director's Interest Pursuant to Section 135	2,497
Listing Information and Profile	24	General Announcement for PLC - Dealings outside closed period	1,900
General Announcement for PLC - Dealings outside closed period	21	Document Submission	1,636
General Meeting	16	Additional Listing Announcement	1,283
Immediate Announcement on Shares Buy Back	15	General Announcement for PLC - NAV/IOPV	1,254
Entitlement(Notice of Book Closure)	11	Immediate Announcement on Shares Buy Back	1,223

Top 10 Companies by Frequency

Company	Total Frequency	Category With Highest Frequency for the Company	Frequency
GSB GROUP BERHAD	12	Notice of Person Ceasing To Be Substantial Shareholder Pursuant to Section 13	4
IOI CORPORATION BERHAD	11	Change in the Interest of Substantial Shareholder Pursuant to Section 13	7
IOI PROPERTIES GROUP BERHAD	10	Change in the Interest of Substantial Shareholder Pursuant to Section 13	6
TIGER SYNERGY BERHAD	9	Change in the Interest of Substantial Shareholder Pursuant to Section 13	3
CIMB GROUP HOLDINGS BERHAD	8	Change in the Interest of Substantial Shareholder Pursuant to Section 13	8
SERBA DINAMIK HOLDINGS BERHAD	7	Change in the Interest of Substantial Shareholder Pursuant to Section 13	5
RUBBEREX CORPORATION (M) BERHAD	7	Change in Audit Committee	1
MALAYSIAN RESOURCES CORPORATION BERHAD	6	Change in the Interest of Substantial Shareholder Pursuant to Section 13	2
CUSCAPI BERHAD	6	Change of Company Secretary	3
AEON CO. (M) BHD	6	Change in the Interest of Substantial Shareholder Pursuant to Section 13	6



Web Crawling Robots

- Better monitoring of the Structured Products (SP) issuance & performance

1. Summary of SP

Structured Warrant Term Sheet Registered Summary

Year		Instrument Category		Month	
2016	2017	2018	Securities of PLC	Structured Warrants	
Year	Month	CALL WARRANTS	PUT WARRANTS		
2018	1	105	4		
	2	72	7		
	3	81	4		
	4	49	3		

2. Issuers of SP

Instrument Category	Issuer Name
Securities of PLC	CIMB BANK BERHAD
Structured Warrants	KENANGA INVESTMENT BANK BERHAD
	MACQUARIE CAPITAL SECURITIES (MALAYSIA) SDN BHD
	MAYBANK INVESTMENT BANK BERHAD
	RHB INVESTMENT BANK BERHAD

Issuer Name	Number of Stocks	Total Issuance Size
MACQUARIE CAPITAL SECURITIES (MALAYSIA) SDN BHD	112	4,890,000,000
KENANGA INVESTMENT BANK BERHAD	75	3,750,000,000
RHB INVESTMENT BANK BERHAD	66	2,640,000,000
CIMB BANK BERHAD	48	3,200,000,000
MAYBANK INVESTMENT BANK BERHAD	23	2,300,000,000

3. Underlying stocks used & frequency

Underlying Stock - Name	Number of Stocks
HANG SENG INDEX	18
HENGYUAN REFINING COMPANY BERHAD	11
DRB-HICOM BERHAD	9
SAPURA ENERGY BERHAD	9
SUPERMAX CORPORATION BERHAD	8
FELDA GLOBAL VENTURES HOLDINGS BERHAD	8
FTSE BURSA MALAYSIA KLCI INDEX	8
HIBISCUS PETROLEUM BERHAD	7
TOP GLOVE CORPORATION BHD	6
POS MALAYSIA BERHAD	6
UEM SUNRISE BERHAD	6
MY E.G. SERVICES BERHAD	6
ANN JOO RESOURCES BERHAD	5
UMW OIL & GAS CORPORATION BERHAD	5
AIRASIA X BERHAD	5
MALAYAN BANKING BERHAD	5
CIMB GROUP HOLDINGS BERHAD	5
INARI AMERTRON BERHAD	5

4. Performance of SP

Stock Code	Stock Name	Stock Long Name	Issue Date	Maturity Date	Revised Maturity Date	ITM OTM	Settlement Amount
0097CD	VITROX-CD	VITROX-CD: CW VITROX CORPORATION BHD (RHB)	2017-08-30	2018-04-19		ITM	0.117
0097CE	VITROX-CE	VITROX-CE: CW VITROX CORPORATION BHD (KIBB)	2017-09-27	2018-04-09		ITM	0.023
129518	PBBANK-C18	PBBANK-C18: CW PUBLIC BANK BHD (KIBB)	2017-09-27	2018-04-09		ITM	0.272
161944	DRBHCOC44	DRBHCOC44: CW DRB-HICOM BHD (KIBB)	2017-09-27	2018-04-09		ITM	0.114
3042CF	PETRONM-CF	PETRONM-CF: CW PETRON MALAYSIA REFINING & MARKETING BHD	2017-09-27	2018-04-09		OTM	-0.250
467713	YTL-C13	YTL-C13: CW YTL CORPORATION BERHAD (KIBB)	2017-09-27	2018-04-09		OTM	-0.053
5161C3	JCY-C3	JCY-C3: CW JCY INTNL BHD (RHB)	2017-08-30	2018-04-19		OTM	-0.216
5216C1	DSOINIC-C1	DSOINIC-C1: CW DATASONIC GROUP BERHAD (RHB)	2017-08-30	2018-04-19		OTM	-0.088



Enterprise Approach - Entity Identifier

- SC Identity (SC Id) - unique internal identifier for each entity & product

- Challenging process to manage entity name from multiple sources, e.g.
 - No identity number or multiple identity numbers
 - Same name but different person / entity
 - Wrong spelling

 All PLCs and Fund Products

 PLCs Directors

 PLCs Top 30 Shareholders

 Directors & Shareholders from company search

 Auditors

 Licensee

 Marketing Representatives

- For Example : Employees Provident Fund Board (EPF)
 - EPF has 1,918 different names in 14,285 records, due to
 - Name with trustee
 - English or Malay Name (EPF / KWSP)
 - Short form or Full Name
 - Wrong spelling
 - Employees
 - Employee
 - Emplo yee
 - Employees
 - Employeed
 - Employment, Etc.
 - Provident
 - Provient
 - Providend
 - Provideent, Etc.



Automated cleansing,
Named Entity Recognition
(NER), Fussy lookup



Manual
Screening &
Confirmation

 Entity Master

 Entity Id

 Entity Address

 Entity Salutation

 Entity Contact

 Entity Website

 Entity Name Reference

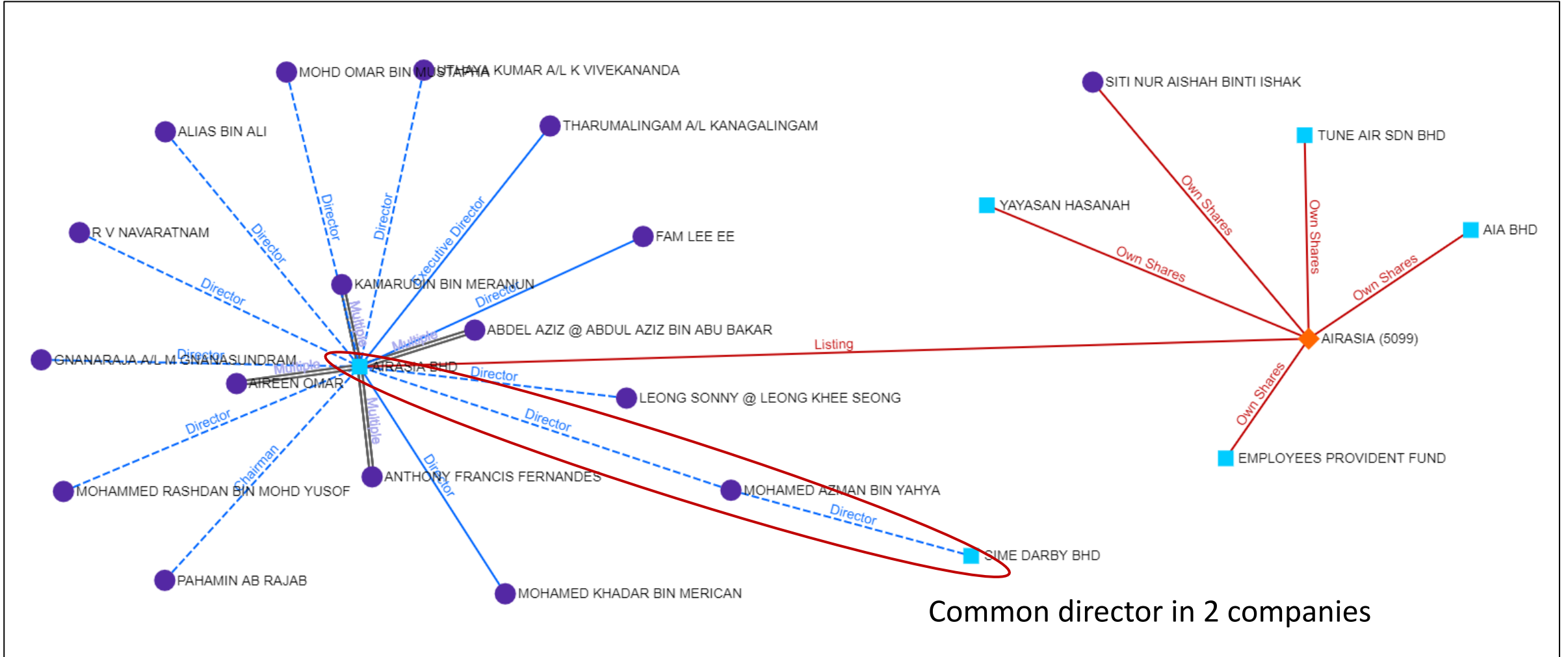
 Entity Name History





Entity Connectivity Analysis

- Visualisation of entities inter-connectivity



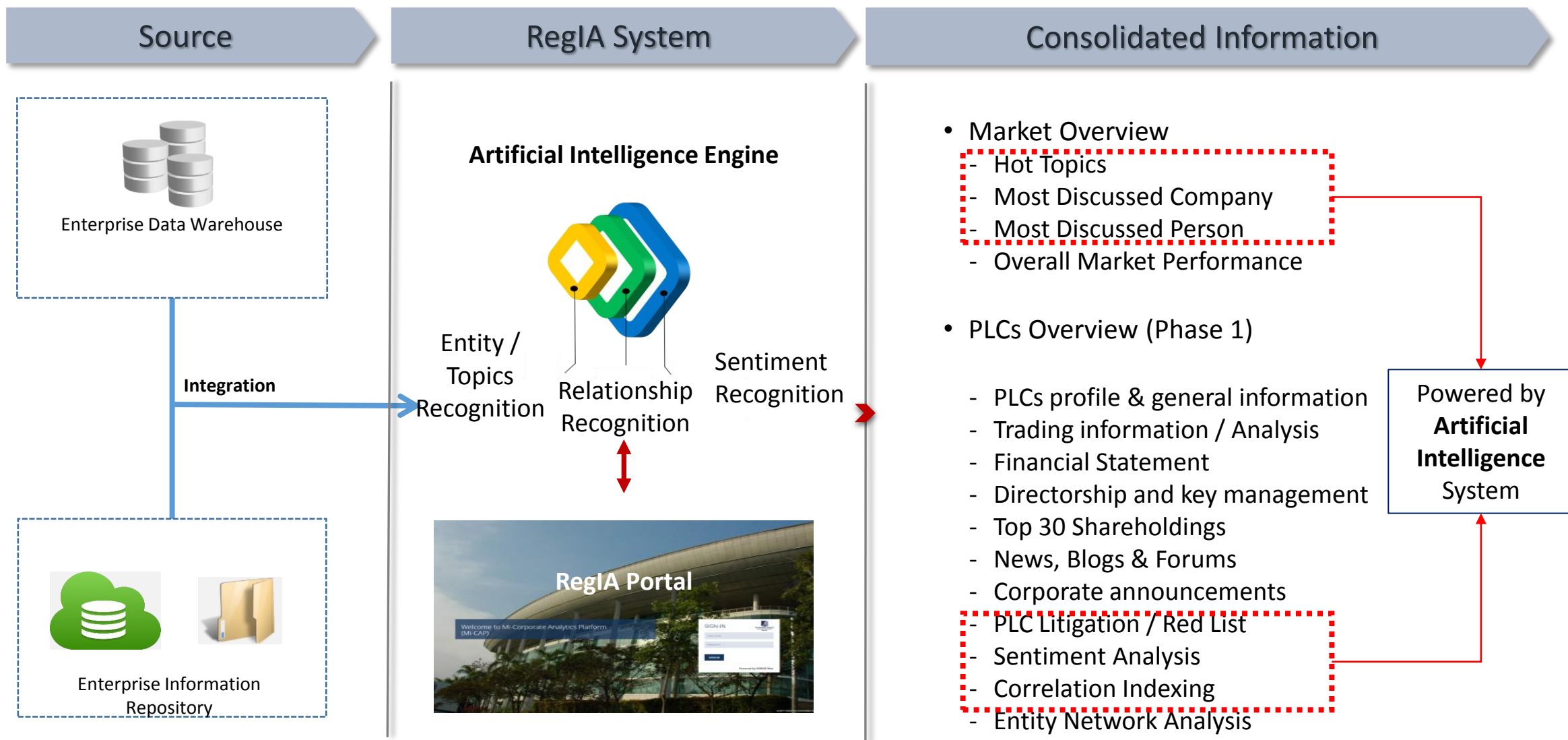
Radial Search

Interconnection Search



Regulator Intelligence & Analytics (RegIA) Platform

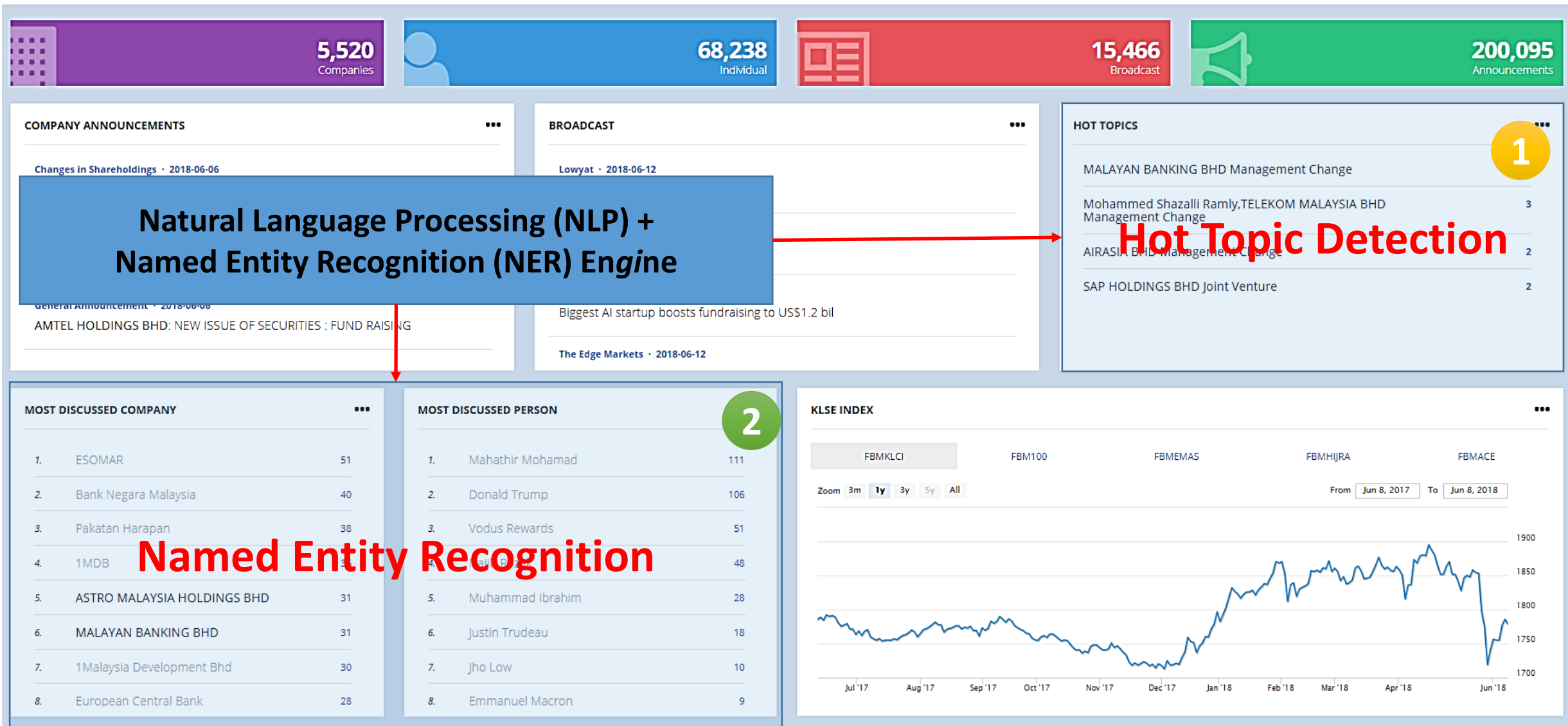
- The Malaysian Capital Market intelligence platform





Regulator Analytics & Intelligence (RegAI) Platform

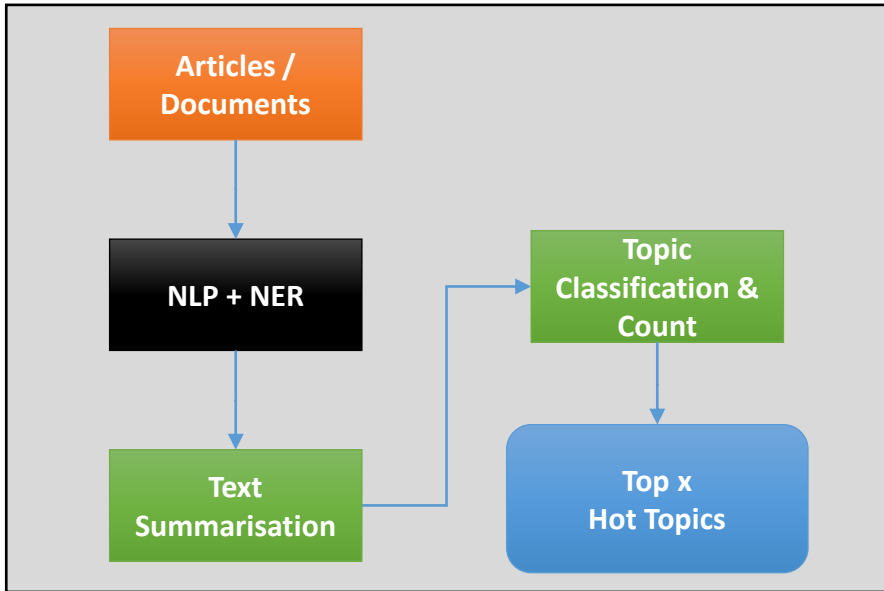
- Market Overview





NLP + NER

- The hot topics being discussed / circulated



HOT TOPICS

NWP HOLDINGS BHD, LBS BINA GROUP BHD Joint Venture 3

UEM SUNRISE BHD Shrinking 3

BERJAYA CORPORATION BHD Lawsuit 2

M Downsizing 2



NEWS / KEY DEVELOPMENTS

All (3)

News (3)

Blog (0)

Forum (0)

UEM Sunrise to reconsider plans for Gerbang Nusajaya

The Edge Markets · 2018-06-01

KUALA LUMPUR: UEM Sunrise Bhd, which had in January engaged London-based Atkins as the master planner for Gerbang Nusajaya's transit-oriented development (TOD) plot, will reconsider its plan following the government's decision to scrap the Kuala Lumpur-Singapore high-speed rail (HSR) project. Sprawl...

3 x Tun Mahathir Mohamad · 12 x Londonbased Atkins

UEM Sunrise to reconsider plans for Gerbang Nusajaya's transit-oriented development plot

The Edge Markets · 2018-06-01

KUALA LUMPUR (May 31): UEM Sunrise Bhd, which had in January awarded London-based Atkins as the master planner for Gerbang Nusajaya's transit-oriented development (TOD) plot, will reconsider its plan following the government's decision to scrap the Kuala Lumpur-Singapore high-speed rail (HSR) project. Sprawl...

2 x Tun Mahathir Mohamad

UEM Sunrise looking for catalysts to replace the 300-acre loophole in its Gerbang Nusajaya project

New Straits Times · 2018-05-24

SUBANG JAYA: UEM Sunrise Bhd will be looking at other "catalysts" to replace the 300-acre loophole in its Gerbang Nusajaya project, following the axing of Kuala Lumpur-Singapore high speed rail (HSR). UEM Sunrise, whose Gerbang Nusajaya project will house Iskandar Puteri HSR station, is among the b...

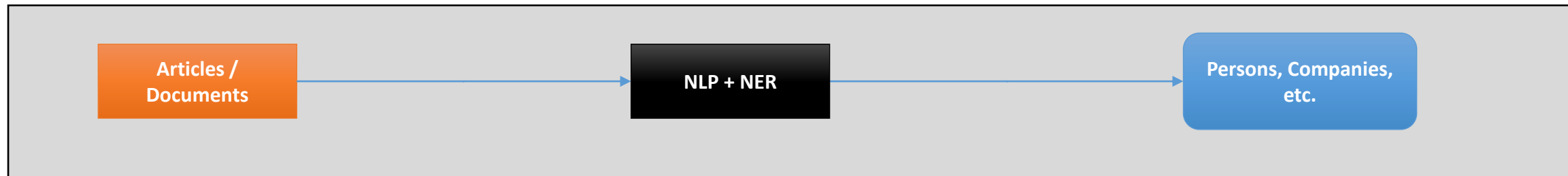
1 x Anwar Syahrin Abdul Ajib · 4 x Anwar

Number of people / company mentioned in the article



NLP & NER

- The companies or people being discussed



MOST DISCUSSED COMPANY From 2018-05-07 to 2018-05-17

2018-05-07 - 2018-05-17

1.	Pakatan Harapan	77
2.	BANK NEGARA MALAYSIA	67
3.	GST	40
4.	MALAYAN BANKING BERHAD	33
5.	PUBLIC BANK BERHAD	33
6.	Barisan Nasional	29
7.	MIDF AMANAH INVESTMENT BANK BHD	29
8.	CIMB BERHAD	27
9.	PH	26
10.	PETROLIAM NASIONAL BERHAD	25



Meanwhile, '09/18 and '10/18 Public Bank Bhd  bonds recorded a trading volume of RM60mil with yields mixed between 4.28% and 8.64%.

Among heavyweights, Maybank fell six sen to RM10.42, Public Bank was flat at RM23.94 and Tenaga eased two sen to RM15.80.

Effective April 1, VPB will become a 100% wholly-owned subsidiary of PBB. Under the terms of the foreign-owned bank licence, PBVN has been granted a term of operations of 99 years.

"In addition, Public Bank Vietnam will provide a convenient platform for the Malaysian business community to conduct business operations in Vietnam," Teh said.



- Overview with sentiment analysis & correlation indexing

AXIATA GROUP BHD

4.64

As of 2018-06-08

4.64

Open

4.66

Day's High

4.62

Day's Low

4.64

Previous Close

5.99

52 Week High

4.19

52 Week Low

The principal activities of the Group are the provision of mobile communication services and network transmission related services. The principal activities of the Company are investment holding and provision of technical and management services on an international scale, where it has investments in subsidiaries, joint ventures and associates.

Level 5, Corporate Headquarters, Axiata Tower, 9 Jalan Stesen Sentral 5, Kuala Lumpur Sentral 50470 KUALA LUMPUR WILAYAH PERSEKUTUAN KUALA LUMPUR MY

+60322638911

+60322638911

HTTP://www.axiata.com

Sentiment

Positive (more details)

SHARE PRICE CHART

Zoom

3m

1y

3y

5y

All

From

2018-02-11

To

2018-06-11

Date	Share Price (MYR)	Volume
14 Mar	5.4	100,000
20 Mar	5.4	150,000
24 Mar	5.4	100,000
28 Mar	5.4	100,000
3 Apr	5.4	100,000
7 Apr	5.4	100,000
11 Apr	5.4	100,000
17 Apr	5.4	100,000
21 Apr	5.4	100,000
25 Apr	5.4	100,000
29 Apr	5.4	100,000
3 May	5.4	100,000
9 May	5.4	100,000
16 May	5.4	100,000
20 May	5.4	100,000
24 May	4.3	100,000
30 May	4.3	100,000
5 Jun	4.6	100,000
9 Jun	4.6	100,000



Sentiment Analysis

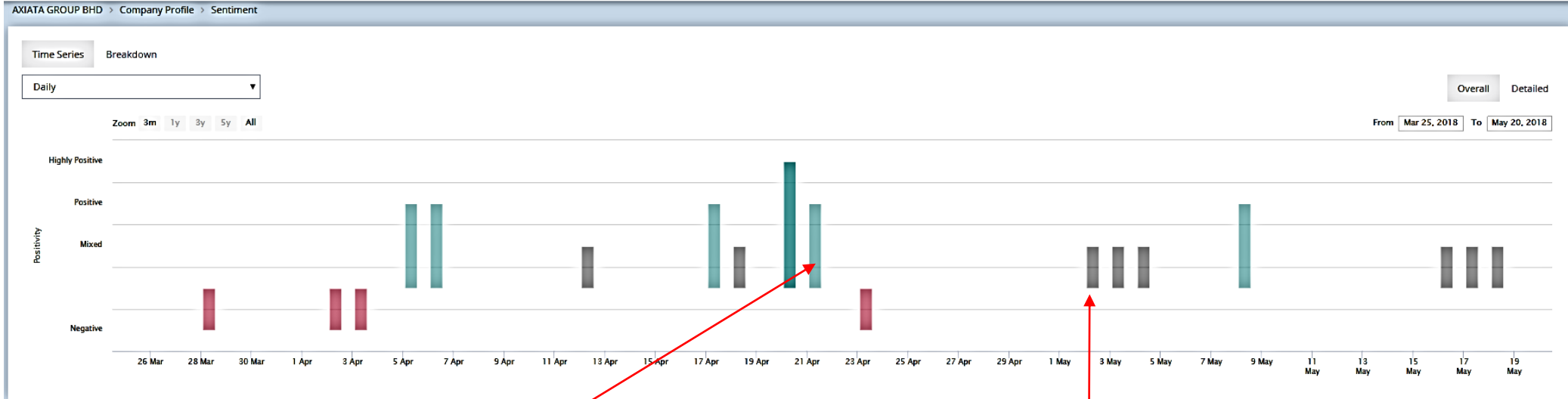
- Provides quick reference on what is happening to a company

Articles / Documents

NLP + NER

Sentiment Analysis

Market Sentiment



BROADCAST

Three-pronged approach for Axiata

The Star News · 2018-04-21 05:17:16

😊 Positive

JUST like how the cellular telecommunications industry is changing, Axiata Group Bhd, the regional telecoms company, is looking at a three-pronged approach towards driving its business. The stagnating cellular business has much to do with the new areas Axiata is veering in order to bring back growth...

BROADCAST

KLCI closes down 18pts as Maxis, CIMB and Maybank weigh

The Star News · 2018-05-02 11:15:48

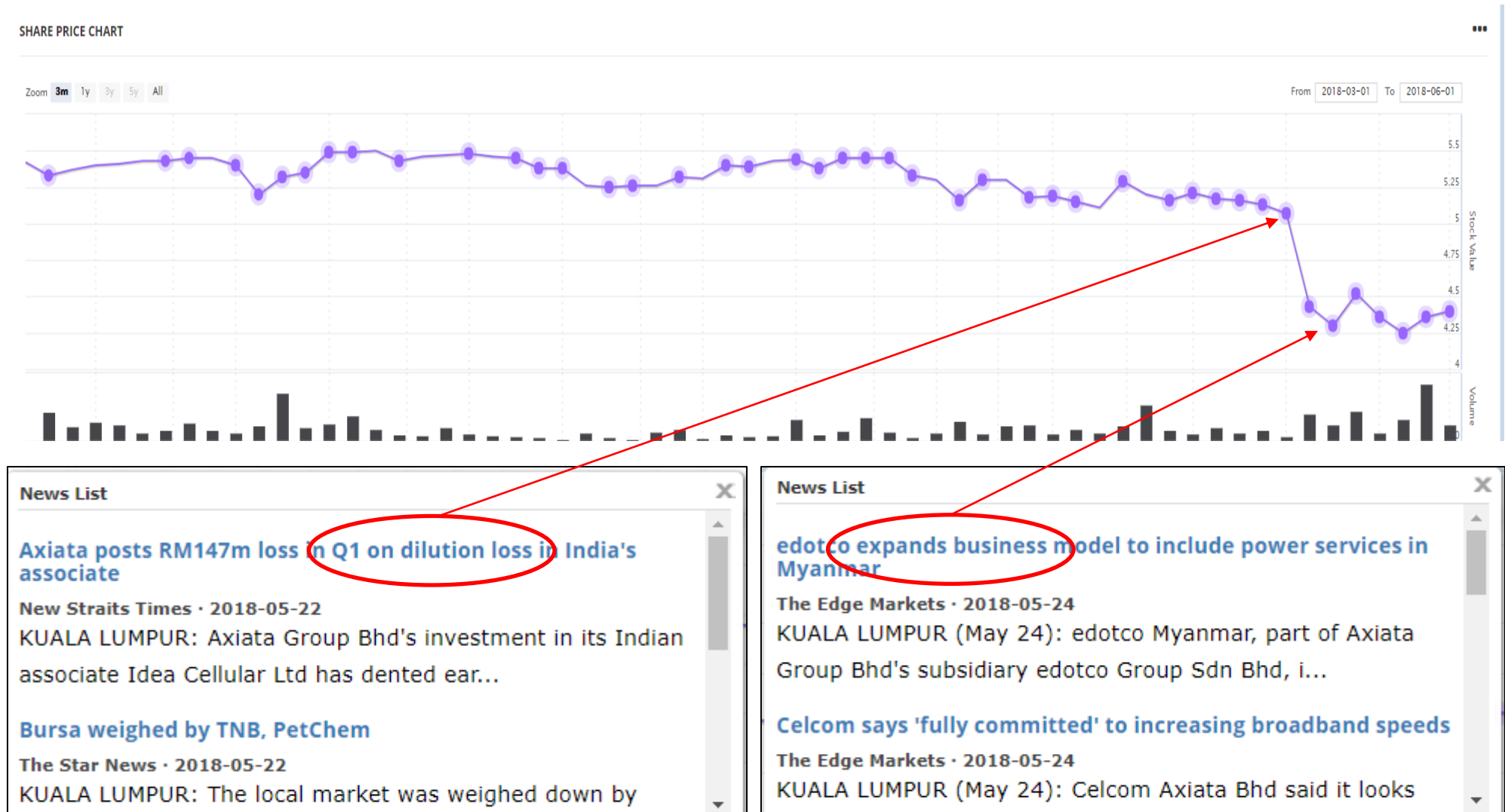
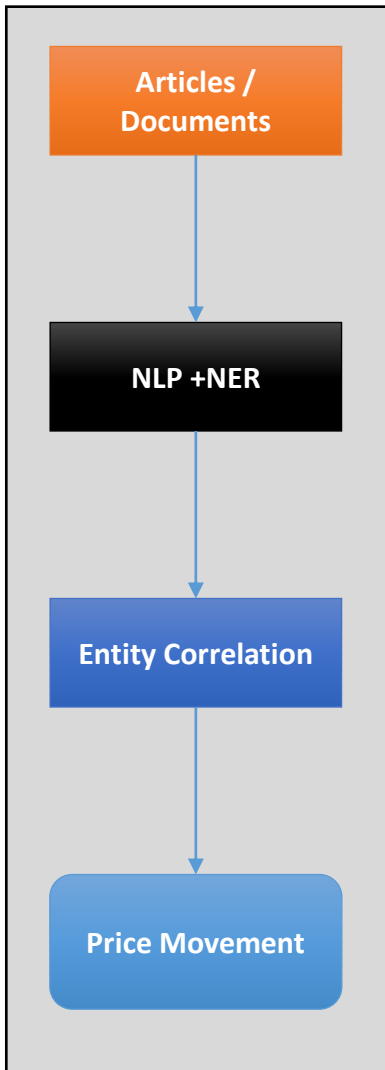
😐 Mixed

KUALA LUMPUR: Blue chips closed on a weak note on Wednesday ahead of the 14th General Election on May 9 as investors decided to stay on the sidelines. At 5pm, the FBM KLCI was down 18.34 points or 0.98% to 1,852.03. Turnover was 2.10 billion shares valued at RM2.43bil. There were 311 gainers, 551 lo...



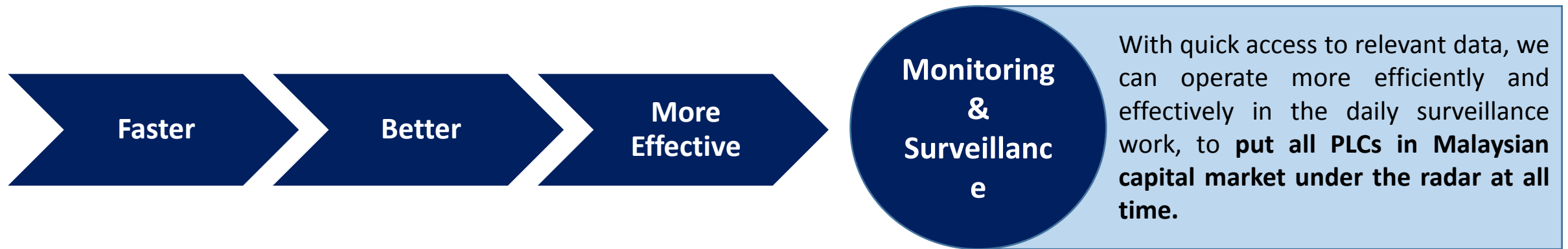
Correlation Indexing

- Provides news relating to stock price movements



Technology ...

- Enables Efficient and Effective Surveillance of the Capital Market



Thank you