The Most Valuable Resource – Data is the new oil.

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Abstract:
Over the last 60+ years, oil has been the black gold. One of the most valuable ~~assets~~ resource that can be used by millions of people to drive their cars, businesses to run their factories, and airlines to fly people around the world. However, over the last few years, Data has become the new oil. In 2017, the total value of information related companies far exceeded those focused on oil and its byproducts. Data is now being used by billions of people using smartphones or other mobile devices to communicate and make daily life decisions. Companies are using data to enhance revenue, customer and employee satisfaction, etc. Data is the fuel that powers the information and consumer economy just as oil/fuel powered the industrial economy.

According to Ajay Banga[1], CEO MasterCard, the prosperity that oil brought in the last 50 years, data will bring in the next 50, 100 years if you use it the right way, just like we had several wars for oil, the next major war will be digital and for data/information.

Refineries are used all over the world to process crude oil into petrol, diesel, kerosene, etc. so that cars and factories can use it. Similarly, companies have started using advanced analytics, AI and Machine Learning (ML) to process quintillion bytes of data to speed up the development of new drugs, rollout out new products, provide enhanced services, including efficient patient care.

It has not been difficult to protect oil, but data brings a different set of challenges. It can be stolen, sold, or used to bypass research. We lost a total of 1.6 billion records just in the first six months of 2017. We must think of better ways to protect one of our most critical asset *data*.

Just as countries and corporations rose to power with the control and distribution of oil, the same is for data. Just as oil allowed countries to win wars and develop advanced machines and weapons, data is now being used to make these technologies more efficient, using already collected data to maximize each dollar invested.

Introduction
In its purest form, oil is a black liquid comprised of several organic compounds. Hundreds of corporations and countries invested millions and billions to mine this so-called 'black gold.' In 2013 the oil industry had total world industry revenue above $1.23 trillion[2]. Its almost free money, all you had to do was just ~~put~~ drill it out of the ground. The "power of the oil" and the

[1] https://www.cnbc.com/2017/10/24/mastercard-boss-just-said-data-is-the-new-oil.html
[2] "World gas and oil industry revenue 2013 | Statistic." *Statista*, www.statista.com/statistics/215892/revenues-of-the-world-gas-and-oil-industry/.

growth into today's trillion dollar oil economy started in 1938, when few Americans discovered oil in commercial quantity in Saudi Arabia. Oil was being used before 1938 but was not the primary source of earnings and GDP growth for countries like Russia, Saudi Arabia, Iraq, Venezuela, Nigeria, etc. Things have definitely changed in the last 90+ years. 99% of all transportation in the world is run using refined crude oil. Oil powers everything; controlling oil translates to power and wealth.

Countries and their rulers have fought wars, spent billions, and invaded other countries to get access to additional land and sea that holds the 'black gold'. The gulf war was started when Iraq overthrew the Kuwait government to capture its oil fields. According to Wikipedia, the two gulf wars cost, according to estimates published by the Brown University, just over $1.1 trillion. The Department of Defense's direct spending on gulf war was at least $757.8 billion; Brown University's 1.1 trillion numbers include the cost such as interest paid on the funds borrowed to finance the 757.8 billion.

Countries in the Gulf spend billions of dollars every year buying arms from US and Russia to protect their oil; that just needs to be pulled out of the ground. The US has a fleet designated to protect certain middle-eastern countries that export oil to the US.

Data is the New Oil.

Times are changing; we now live in a digital economy where data and information drives people's lives. Data is now more valuable than ever before. Oil is a finite resource, data/information is not. Data is not controlled by 20+ countries.

Ajay Banga[3], CEO of MasterCard, while speaking at the Future Investment Initiative in Riyadh in October 2017, stated, "I believe that data is the new oil. The prosperity that oil brought in the

[3] https://www.cnbc.com/2017/10/24/mastercard-boss-just-said-data-is-the-new-oil.html

last 50 years, data will bring in the next 50, 100 years if you use it the right way," just like we had several wars for oil, the next major war will be digital and for data/information.

Oil is one-dimensional commodity, it has one-life. Once it gets used or burnt its life ends. Data can be used again and again to make better decisions, models and predictions.

The Economist published an article on May 6th, 2017 titled “The world’s most valuable resources are no longer oil, but data.”

(Published in the Economist on May 6th, 2017)

The author in the Economist article[4] said the 5 largest “data companies” (Facebook, Amazon, Apple, Google, Microsoft) made over 25 billion in profit just in the first quarter of 2017.

Data is the fuel that powers the information and consumer economy just as oil/fuel powered the industrial economy. Although the information sector has not nearly approached the worth of the oil sector, the “data and information economy”, will very soon outgrow the oil economy.

Data can be used to create specified ads, create better research practices, and create better transportation operations and many more. Just like oil data also has its liabilities. All this data can be used to advance a war, create weapons, and even an election that is still under investigation with voter data tampering.

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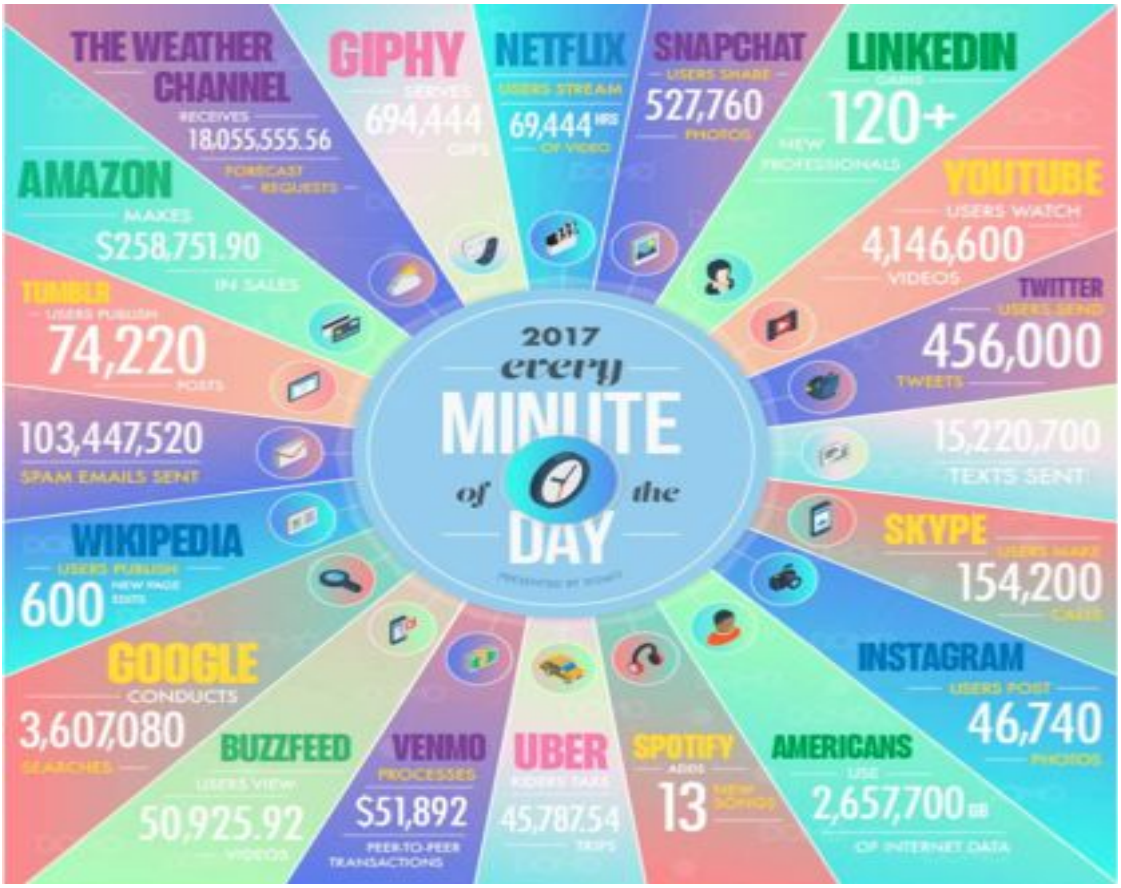
4 https://www.economist.com/news/leaders/21721656-data-economy-demands-new-approach-antitrust-rules-worlds-most-valuable-resource

Data is way more important and more promising because it holds a much larger force multiplier. Data allows the people to become more efficient and smarter, ultimately saving money and time.

How much data do we generate everyday?



(fig. source http://www.iflscience.com/technology/how-much-data-does-the-world-generate-every-minute/)

According to IFLScience[5] we generate roughly 2.5 quintillion bytes of data everyday. A number that is larger than one can even imagine. In simpler terms, over a 2-day period, we are

[5] http://www.iflscience.com/technology/how-much-data-does-the-world-generate-every-minute/

generating new data that will be equivalent to all the words ever spoken by mankind, that is, included those in the B.C period.

Simple operations like a Boeing 787 flight generates 40 TB of data per hour, and a Rio Tinto mining operation that can generate up to 2.4 TB of data a minute.

Few new sources of data in the next few years that we will be adding to the 2.5 quintillion bytes.

1. Approximately, 2 petabytes of data per autonomous car per year.
2. IoT devices in 2018 are expected to generate 400 ZB[6] of data.

Who uses these quintillion bytes of data?

- According[7] to Nick Johnson at Salesforce.com, companies will use AI to boost US productivity by 35% by 2035. AI will use some of this quintillion bytes of data we generate everyday to enable the productivity.
- Personalized medicine
- MasterCard uses credit card transactional data to provide its customers on how they can improve topline business[8].
- Companies like Netflix uses data to make recommendations to its customers
- Banks use transactional data to identify and stop billions of dollars in fraudulent transactions
- Manufacture skis or other products that are made to the specific requirements and needs of a customer, saving supplies and resources[9]
- Retailers are now using their in-store Wi-Fi to track customers, what aisles customers visit and for how long[10]

Comparing Oil and Data:

Properties	Oil	Data	
Resource	Finite	Infinite	
Asset Type	Liquid – Found underground- Primarily supplied from 20+ countries cross the world.	Many forms, supplied in different languages. Supplied from anywhere that carries information	

[6] https://www.v3.co.uk/v3-uk/news/2379626/internet-of-things-to-generate-400-zettabytes-of-data-by-2018
[7] https://www.salesforce.com/blog/2017/11/why-ai-will-boost-productivity-by-35-percent.html
[8] https://uk.finance.yahoo.com/news/mastercard-boss-just-told-saudi-105800298.html
[9] https://www.ibm.com/blogs/watson/2016/07/10-industries-using-big-data-win-big/
[10] Ibid.

Estimated 2017 Capital Value	9.6 million barrels a day at $55 a barrel – approximately – $195 billion.	The revenue of top 10 companies[11] that are primarily data and information focused – 200+ billion	
General Use Properties	To enable Automobiles, Transportations, Manufacturing, Industries, Power Generation, Heating Homes, etc.	To communicate, to enable research, make daily decisions, identify hack or fraud,	
Landscape	20+ countries in the world control majority of the oil assets.	Data is generated and processed by individual users and companies all over the world	
Security	Many of the oil fields in gulf are protected by countries military or police	Protected by individual information security teams or country or region specific laws	
Environment	Major impact to environment - source of carbon oxide and carbon dioxide	No major impact to the environment	
Long-term Opportunities	Major countries[12] and cities are trying to reduce their dependence and investment in oil.	Using data to decrease amount of human error. Efficient processes and higher quality of service.	
Potential Changes by 2020	Reduction in the use of oil. Renewable energy and efficient cars, planes and manufacturing.	Companies use data to continuously improve their processes, services, products, etc.	

[11] Companies like Google, Facebook, Bidu, Tencents, Twitter, Tesla, etc.
[12] WSJ Jan. 4, 2018 – Norway government is looking at winding down its in oil and gas sector by 1 trillion dollars.

Lifetime	According BP[13] we have 50.6 years of oil supply. Approximately 1707 Billion barrels	As long as information is being passed through the internet, there will always be data	
Asset Transport	Ships, Tankers, Pipes	Mostly local device and data center storage drives and the network.	

What will change over the next few years?
As countries move to other sources of energy, including renewable and nuclear, and develop a much more efficient mode of transportation, devices, etc. we will start seeing a slow down in oil consumption. Countries like Saudi Arabia, the biggest producer of oil, have started major efforts to reduce their dependence on oil. At some point, we will run out of oil. It is an asset with a limited lifetime.

The world of information has just started, still a young adult like many of us who are still in college. Digital transformation, AI, and Machine Learning is at best 20 years old. Data has a long way to go, probably 100s or 1,000s of years.

Data is not one dimensional, it gets used again and again to enhance digital transformation, improve process efficiency, discover the next drug to meet the unmet needs of the patients, improve product quality, enhance customer satisfaction, create new strategies; the fact is, Data allows corporations and individuals to be better at what they do everyday.

How best to manage, use, and protect our most valuable asset: Data.

1. **"Crown Jewels"**
2. **Big Data**
3. **AI, Machine Learning and Deep Machine Learning**
4. **Cybersecurity**

Crown Jewels:
Most companies deal with four different types of assets: People, Information, Technology, and Facilities. Information (Data) is one of the critical assets, and the most critical parts of the data assets like IP (intellectual Property), Customer and Employee Information, Financial data, etc. are companies Crown Jewels.

[13] https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy/oil/oil-reserves.html

In this global world where people's mobile devices can become local personalized data centers, companies having their own in-house data centers, and cloud-based data centers, like AWS, Azure, etc., we must identify What and Where are our Crown Jewels. One cannot manage and protect what one does not know. Loss of crown jewels to an unauthorized user will definitely impact the trust and confidence of our employees and customers. It will impact business reputation, and potentially organizational survival.

Big Data:

SAS, a software company, describes Big Data as "is a term that describes the large volume of data – both structured and unstructured – that inundates a business on a day-to-day basis." [14] Any browser you use, any digital market or website connected to the Internet is always collecting data. More specifically what you click on, what you're looking at, what you're buying is all collected and analyzed to help businesses plan and strategize. This data is not important on a quantitative basis, meaning it doesn't matter how much is collected, but really what is done with it. All of this data can be used in many ways for corporations including strategic planning, decision-making, and marketing.

Application of Big Data in the Real World

According to Bernard Marr, a well-known author and strategist, there are 10 ways Big Data is most commonly used. I will go over a few just to give an overview of the applications for Big Data. The most common and most talked about is the use of big data with understanding and targeting customers.[15] In one case the retailer Target could basically predict when their customers would be expecting a baby by matching what women would buy during their stages of their pregnancy. Target would then send coupons or notifications on sale or clearance items to women based on what 'stage' they were at.[16]

Another way Big Data is used to support business is to analyze data to better decisions and optimize efficiency. Strategies like traceability can better companies when it comes to supply chain optimization. With the use of barcodes and RFIDs companies and distributors can easily pinpoint where problems have occurred and tackle it with efficiency. Bank of America noticed that their best call center employees all took breaks together, they then implemented 'group-break' policy and performance improved by more than 23%.

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[14] "What is Big Data and why it matters." *What Is Big Data? | SAS US*, www.sas.com/en_us/insights/big-data/what-is-big-data.html#.

[15] "How is Big Data Used in Practice? 10 Use Cases Everyone Must Read." *Bernard Marr*, www.bernardmarr.com/default.asp?contentID=1076.

[16] Hill, Kashmir. "How Target Figured Out A Teen Girl Was Pregnant Before Her Father Did." *Forbes*, Forbes Magazine, 31 Mar. 2016, www.forbes.com/sites/kashmirhill/2012/02/16/how-target-figured-out-a-teen-girl-was-pregnant-before-her-father-did/#3c4452386668.

Big Data analytics doesn't necessarily only apply to the business world, but can also be applied in Sports. More specifically data can be used to track a players effort and performance, used for referees to make better judgments, and used to keep fans satisfied and entertained. ESPN did a bit on Jimbo Fisher's Seminoles' and their use of GPS technology during practice. Each GPS supplies 1000 points of information/sec. All of this data is used for coaches to dissect each player's performance; who is going hard, who is slacking, who needs extra attention[17]. Other teams are following suit, spending money on technology that allows teams to see more than meets the eye.

There are so many areas where Big Data can be used and analyzed to better a number of aspects of many different sectors.

[18]

AI, Machine Learning (ML), and Deep Machine Learning:

According to HBR[19] article on how companies are using machine learning to get faster and more efficient, of the 168 early adopters that HBR (Harvard Business Review) looked at; organizations were reporting business process improvements of up to 10 times. Of course, ML and AI are dependent on having the right data and algorithms. With the right data using ML, companies can uncover buried insights, use predictive modeling to make better decisions, provide better customer service, etc. Data is core to the success of any AI and ML effort.

Cybersecurity:

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[17] Hale, David M. "FSU rides GPS technology to title." *ESPN*, ESPN Internet Ventures, 23 June 2014, www.espn.com/college-football/story/_/id/11121315/florida-state-seminoles-coach-jimbo-fisher-use-gps-technology-win-national-championship.

[18] "Big Data." *Digital Frontiers - Dtiers*, www.dtiers.com/big-data-2/.

[19] https://hbr.org/2016/05/how-companies-are-using-machine-learning-to-get-faster-and-more-efficient

There is always a risk in anything we do or decisions we make. However, when looking at cybersecurity risk and controls, we need to ensure that we have identified the major risks and put together a functional risk mitigation plan that will protect our critical assets.

The primary goal of any Cybersecurity risk management implementation is to ensure Confidentiality, Integrity, and Availability (CIA) of data. Companies must have consistent process and solution to protect data, identify a breach, and quickly respond and recover from those breaches. In the first six months 2017 we lost[20] 1.9 billion records. We have to do better. We have to protect one of our most important assets.

[20] https://www.csoonline.com/article/3235684/data-breach/more-data-records-were-lost-or-stolen-in-the-first-half-of-2017-than-all-of-2016.html