



Digital Systems

6.1 Information Systems: Part III – Data Analytics

FOX
MIS

Who has created/contributed
some data already today?



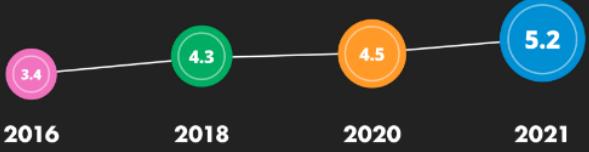
Data Never Sleeps 9.0

How much data is generated every minute?

The 2020 pandemic upended everything, from how we engage with each other to how we engage with brands and the digital world. At the same time, it transformed how we eat, how we work and how we entertain ourselves. Data never sleeps and it shows no signs of slowing down. In our 9th edition of the "Data Never Sleeps" infographic, we bring you a glimpse of how much data is created every digital minute in our increasingly data-driven world.

As of July 2021, the internet reaches 65% of the world's population and now represents 5.17 billion people—a 10% increase from January 2021. Of this total, 92.6 percent accessed the internet via mobile devices. According to Statista, the total amount of data consumed globally in 2021 was 79 zettabytes, an annual number projected to grow to over 180 zettabytes by 2025.

Global Internet Population Growth (IN BILLIONS)



As the world changes, businesses need to change too—and that requires data. Domo gives you the power to make data-driven decisions at any moment, on any device, so that you can make smart choices in a rapidly changing world. Every click, swipe, share, or like tells you something about your customers and what they want, and Domo is here to help you and your business make sense of all of it.

Learn more at [domo.com](https://www.domo.com)

SOURCES: LOCAL IQ, BUSINESS OF APPS, DUSTIN STOUT, HOOTSUITE, EXPANDED RAMBLINGS, INTERNET WORLD STATS, STATISTA, CNBC, BRANDWATCH, KILL THE CABLE BILL, YOUTUBE, KINSTA, THE VERGE, MANAGEMENT COMMUNICATION: A CASE ANALYSIS APPROACH, INTERNET LIVE STATS, SODA, STATISTA



Source: <https://www.domo.com/learn/guide/data-never-sleeps-9>



Units of data...



- 2,000,000,000,000,000 bytes of data are generated each day across all industries. Check out this chart to get a grip on just how big that really is...
- The global datasphere will grow to 175 zettabytes by 2025.
- By 2023, the big data industry will be worth an estimated \$77 billion, which is roughly 70% of Bill Gates' net worth.
- Big data is now utilized by every industry, but the media and entertainment sector takes the prize for predictive analytics. By analyzing their 100 million subscribers, Netflix was able to influence 80% of content viewed by subscribers due to accurate data insights.
- 81.7% of companies have a mix of legacy and modern cloud technologies — highlighting the rapid transition to the cloud continues year over year. 95 million photos and videos are shared every day on Instagram.
- Despite the importance of data, only 14% of companies are having it be widely accessible to employees.
- Most companies only analyze 12% of the data they have. You got it, that means 88% of data goes unanalyzed.
- 1 out of 4 companies claim they have no single source of truth when it comes to centralized data.

Unit	Value	Size
bit (b)	0 or 1	1/8 of a byte
byte (B)	8 bits	1 byte
kilobyte (KB)	1000 ¹ bytes	1,000 bytes
megabyte (MB)	1000 ² bytes	1,000,000 bytes
gigabyte (GB)	1000 ³ bytes	1,000,000,000 bytes
terabyte (TB)	1000 ⁴ bytes	1,000,000,000,000 bytes
petabyte (PB)	1000 ⁵ bytes	1,000,000,000,000,000 bytes
exabyte (EB)	1000 ⁶ bytes	1,000,000,000,000,000,000 bytes
zettabyte (ZB)	1000 ⁷ bytes	1,000,000,000,000,000,000,000 bytes
yottabyte (YB)	1000 ⁸ bytes	1,000,000,000,000,000,000,000,000 bytes

Source: <https://www.sigmacomputing.com/blog/top-20-big-data-statistics/> and quora.com

How does **data** influence ...

- ❖ Purchasing Habits
- ❖ Hiring
- ❖ Where you eat
- ❖ Politics
- ❖ Your decision making

How does **data** influence ...

- ❖ The importance of data in decision lies in consistency and continual growth. It enables companies to **create new business opportunities**, generate more revenue, predict future trends, optimize current operational efforts, and **produce actionable insights**.



Source: <https://medium.com/seamfix-engineering/data-analysis-and-its-importance-for-intelligent-data-driven-business-decisions-fccb9728278a>

Data is Nothing New to Business

- ❖ We've always had data; we've always used data...
- ❖ Now we have more! Yay! But wait...
- ❖ What has this changed?
 - Who?
 - What?
 - When?



Data as an Asset

- ❖ In a data-driven enterprise, data and analytics are no longer afterthoughts — they are fundamental to digital business transformation. Yet the ability to “think in data” is difficult for most enterprises.

What is Data Analytics?

Thoughts?

“The use of tools & people to uncover hidden patterns in the data that might not be readily available to the naked eye”

– Professor Lavin



Source: <https://i2.wp.com/johnbauerconsulting.com/wp-content/uploads/2017/06/Big-Data-Analysis-In-HR-Department.jpg>

What is Data Analytics?

❖ Three Types of Data Analytics:

- Descriptive
- Predictive
- Prescriptive



Source: <https://i2.wp.com/johnbauerconsulting.com/wp-content/uploads/2017/06/Big-Data-Analysis-In-HR-Department.jpg>

What is Data Analytics?

❖ Three Types of Data Analytics:

Descriptive
analytics

Summarizes
past data

Predictive
analytics

Forecast of what
may happen in
the future

Prescriptive
analytics

Helps facilitate
decision-making

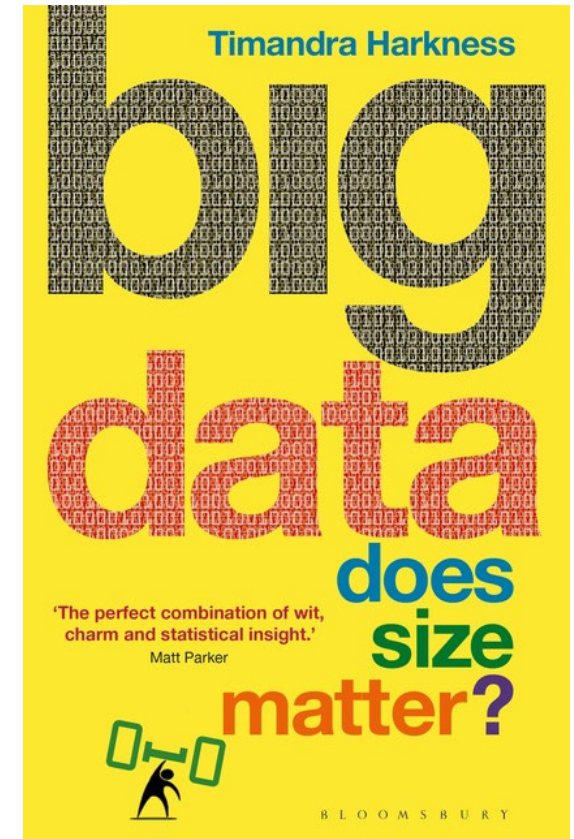
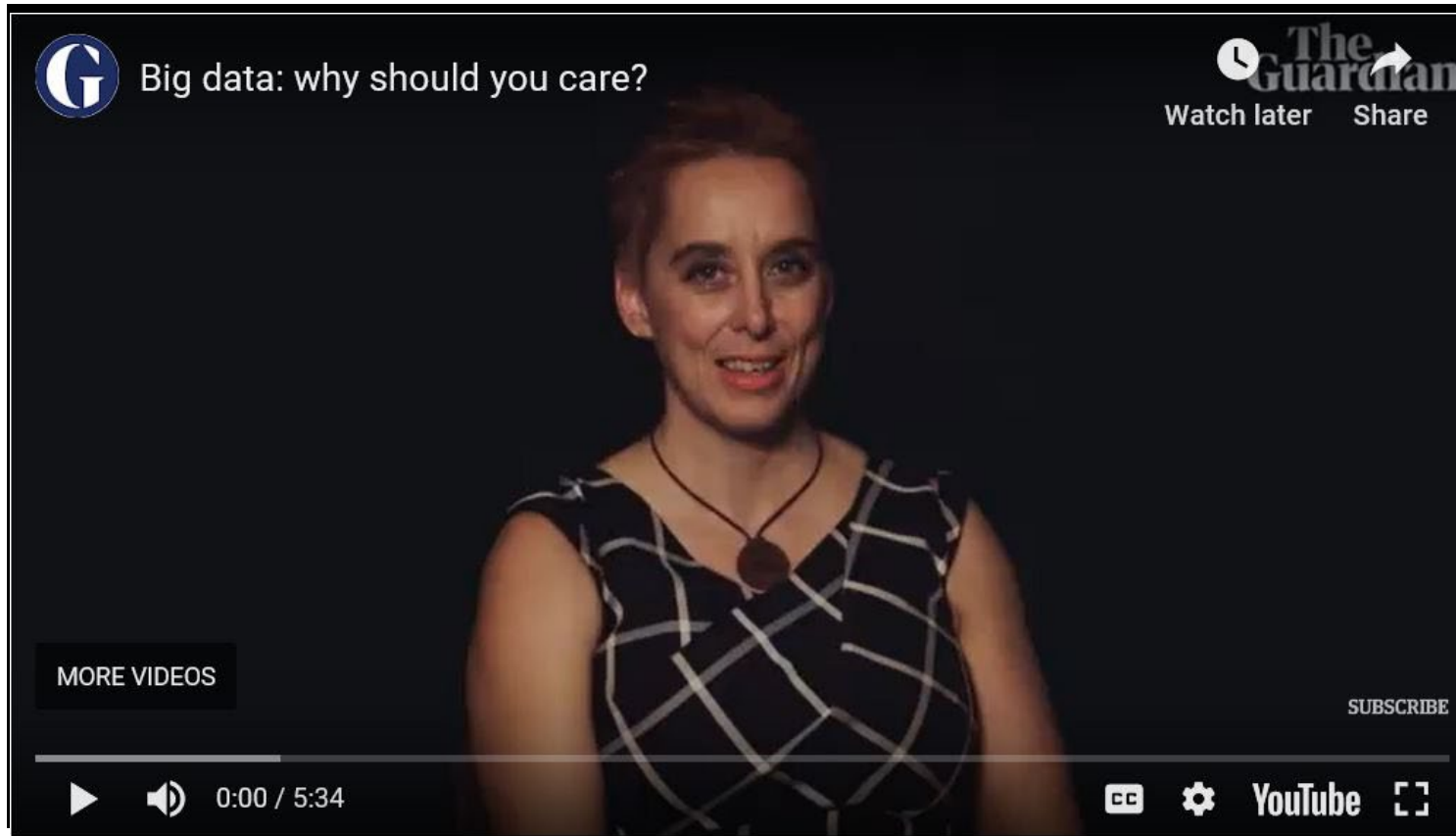


Source: <https://i2.wp.com/johnbauerconsulting.com/wp-content/uploads/2017/06/Big-Data-Analysis-In-HR-Department.jpg>

“Analytics is the process of making sense of large data sets and unlocking patterns, often using data visualization, to enable better decision making.”

- Professor Amy Lavin

What is Big Data...Why Care?



Source: <https://www.bloomsbury.com/uk/big-data-9781472920065/>

Data Investments...Why Care?

❖ What is the value of Big Data to organizations :

- Decrease Expenses
- Find New Innovations
- Launch New Products/Services
- Increase Efficiency
- Transform Business
- Establish Data-Driven Culture



Source: <https://hbr.org/video/3633937151001/the-explainer-big-data-and-analytics>

<https://hbr.org/2017/04/how-companies-say-theyre-using-big-data>

Big Data & Mickey D's

\$300 Million Acquisition

- Predictive Analytics
- Infrastructure Improvements
- Technology Transformation
- Digital Innovation
- Efficiency & Effectiveness
- Customer Experience



Source: KIYOSHI OTA/BLOOMBERG/GETTY IMAGES

What can data do for you?

Data Analysis & Data Visualization

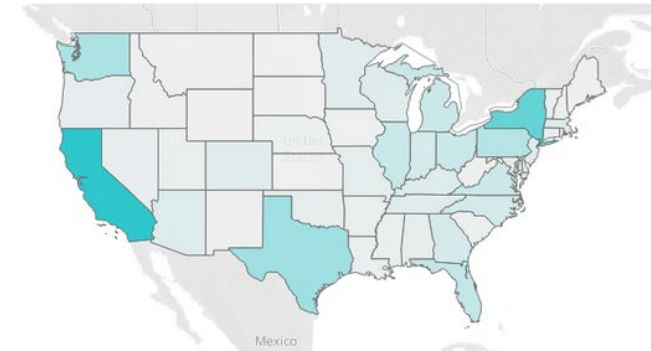
- What's the difference?
- What's the role of the dashboard?
 - Who are your stakeholders?
 - Which industries utilize dashboards?
 - When do you need them?

SALES & PROFITABILITY



SALES BY STATE

CLICK TO FILTER TO STATE



\$2,297,201 Sales
12% Profit Ratio
16% Discount

SALES BY SUBCATEGORY

DOT INDICATES NEGATIVE PROFIT



SALES & PROFIT BY CATEGORY



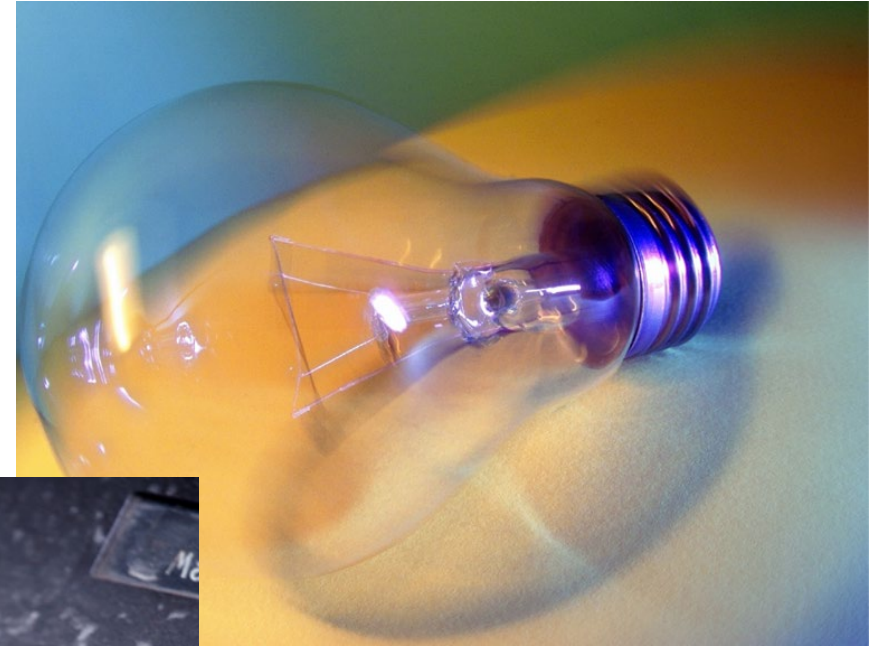
Source: <https://thumbor.forbes.com/thumbor/960x0/https%3A%2F%2Fblogs-images.forbes.com%2Fevamurray%2Ffiles%2F2019%2F03%2FExecutive-Sales-Profitability.jpg>

Data Translations

- Data – raw, unorganized facts
- Information – the transformation of those facts into meaning
- Knowledge – what to do with it

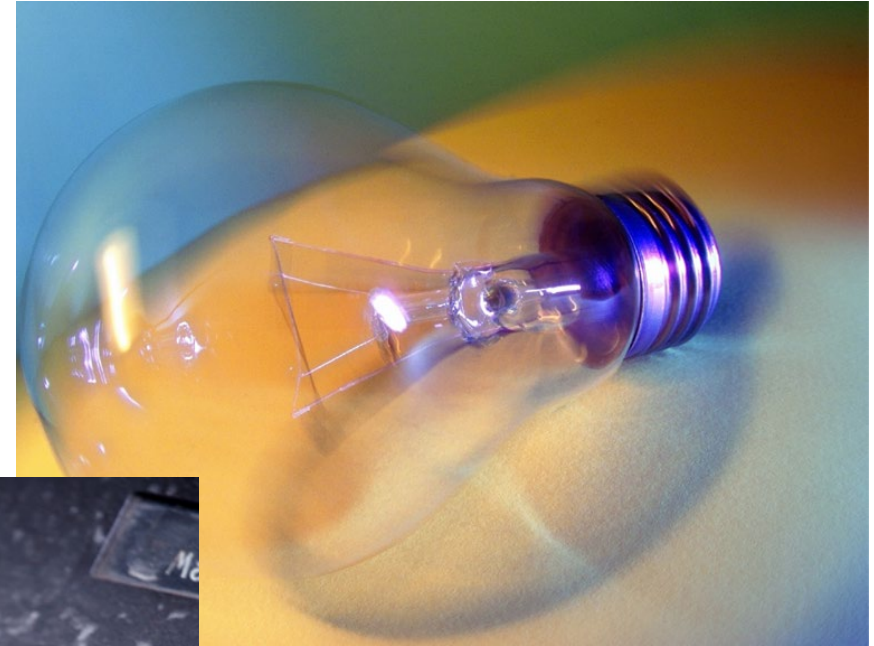
	D	E	F	G	H	I	J	K	L
7.30627	439.40863	452.27563	463.25256	472.35532	483.55487	498.43616	511.89728	522.68567	
8.74893	429.5562	440.6169	450.98254	463.73132	476.64896	489.53738	503.01788	515.56824	
3.69867	422.39417	432.74103	443.57468	457.87674	472.6895	487.22086	502.253	514.4262	
08.4358	417.0086	430.7998	444.53644	458.1768	474.9097	491.50635	506.66202	515.0542	
6.56052	418.2587	435.70285	453.29517	465.45325	481.9805	498.9079	514.99747	514.9726	
2.44327	425.18497	443.76752	462.9981	474.2444	490.07056	506.3385	518.18726	517.88367	
5.96793	430.79642	451.7624	470.77234	482.65155	501.33063	518.7925	531.4054	523.0779	
6.96973	434.88272	456.26443	477.3633	491.9948	514.6976	537.36053	543.21094	522.9911	
18.9646	437.5829	456.61786	478.36456	495.9365	523.38434	548.06934	543.6734	518.10016	
0.10873	435.25827	454.44482	474.35654	492.97693	524.4295	544.302	533.3901	512.3536	
2.80426	437.02127	452.10995	467.288	488.184	521.96674	533.5832	518.83307	502.24158	
0.57205	442.68533	452.3938	459.27618	481.93536	515.9054	517.6489	502.43298	488.51566	
8.23837	447.23532	451.39856	452.6053	474.3672	501.41595	496.01328	485.40866	476.62186	
0.21814	446.0736	451.40173	451.85736	466.03558	485.34033	481.50586	472.89734	467.4789	
2.03018	444.37802	447.08612	447.46216	453.00058	466.57437	471.43005	463.2974	460.3473	
7.74066	443.61066	438.7328	438.5736	437.9196	449.1804	460.14026	455.40833	454.92447	
8.65457	443.2132	434.78015	428.57983	425.8995	435.91467	444.348	446.107	449.56406	
0.21796	435.1094	425.97113	418.80966	417.62497	425.68845	432.75574	437.2845	442.65594	
5.09592	427.43103	415.30692	406.59424	408.7202	417.74484	424.83524	429.7122	437.02164	
35.2263	421.88992	405.92108	398.9858	401.74835	410.0914	417.58344	423.9037	433.2748	
4.53223	417.7317	400.43942	398.3374	398.9456	405.8497	412.81906	419.9064	431.33716	
28.8516	410.75275	394.89917	392.11737	395.98834	396.94592	402.19928	413.94147	427.43585	
0.90717	401.44162	388.3256	384.4872	386.23755	391.93127	402.8901	415.0039	426.04996	
11.4869	392.91333	377.57132	373.0225	380.62848	389.71567	398.97998	411.76627	422.9218	
02.3538	387.51132	374.71036	368.0822	379.55148	386.0626	393.55832	406.22296	420.58035	
5.64407	381.8333	367.25256	365.32492	373.8478	382.45105	388.175	400.0655	412.56848	
87.6797	374.0954	357.5706	363.0226	369.12192	376.61465	383.19778	396.23917	410.91977	
4.19742	363.54315	350.0338	357.855	365.8019	372.5703	381.52945	392.42862	403.3893	
0.25836	349.09064	343.26672	352.59387	361.4431	367.94772	377.83096	390.07294	401.56042	
8.76602	338.01614	339.70358	346.03943	355.99426	367.04657	377.33136	386.17636	397.014	

So how do you turn data into meaningful information?



So how do you turn data into meaningful information?

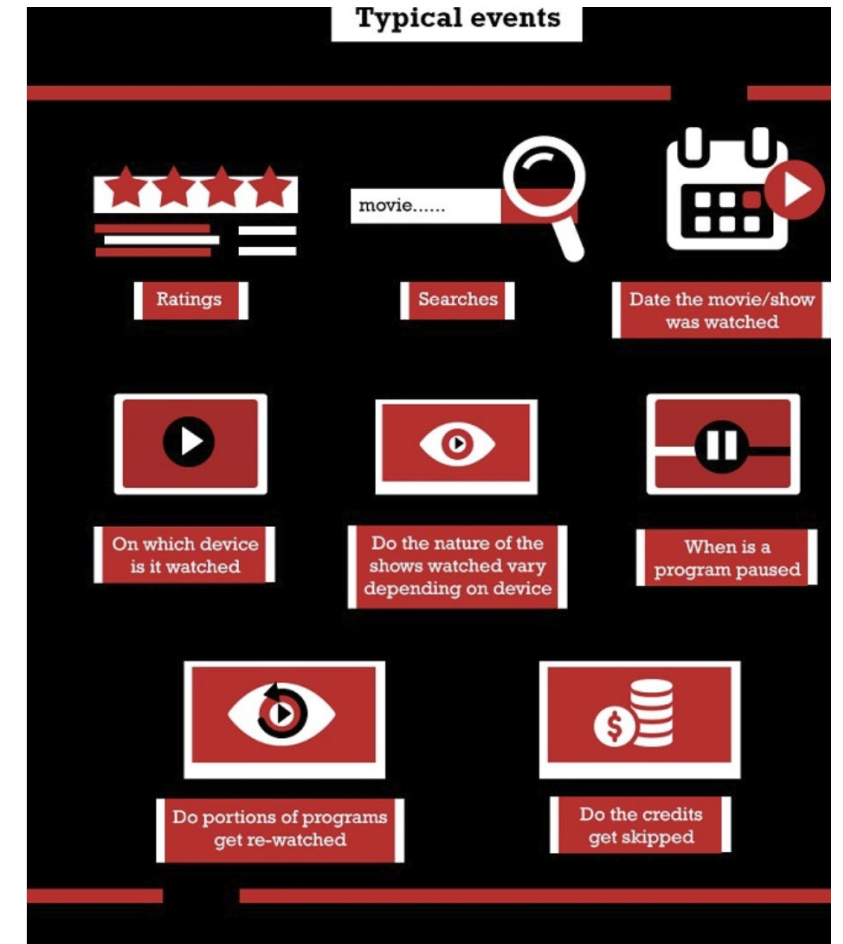
- ❖ ask the right question!
- ❖ collect the right data
- ❖ perform the correct analysis
- ❖ interpret the results correctly
- ❖ disseminate your results to the correct people/entities



Case Study: Netflix

- 80% of content influenced by recommendation engine
- \$1 billion a year saved in customer retention efforts – why?
- Would you consider Netflix a data company?

<https://seleritysas.com/blog/2019/04/05/how-netflix-used-big-data-and-analytics-to-generate-billions/>



Types of Data

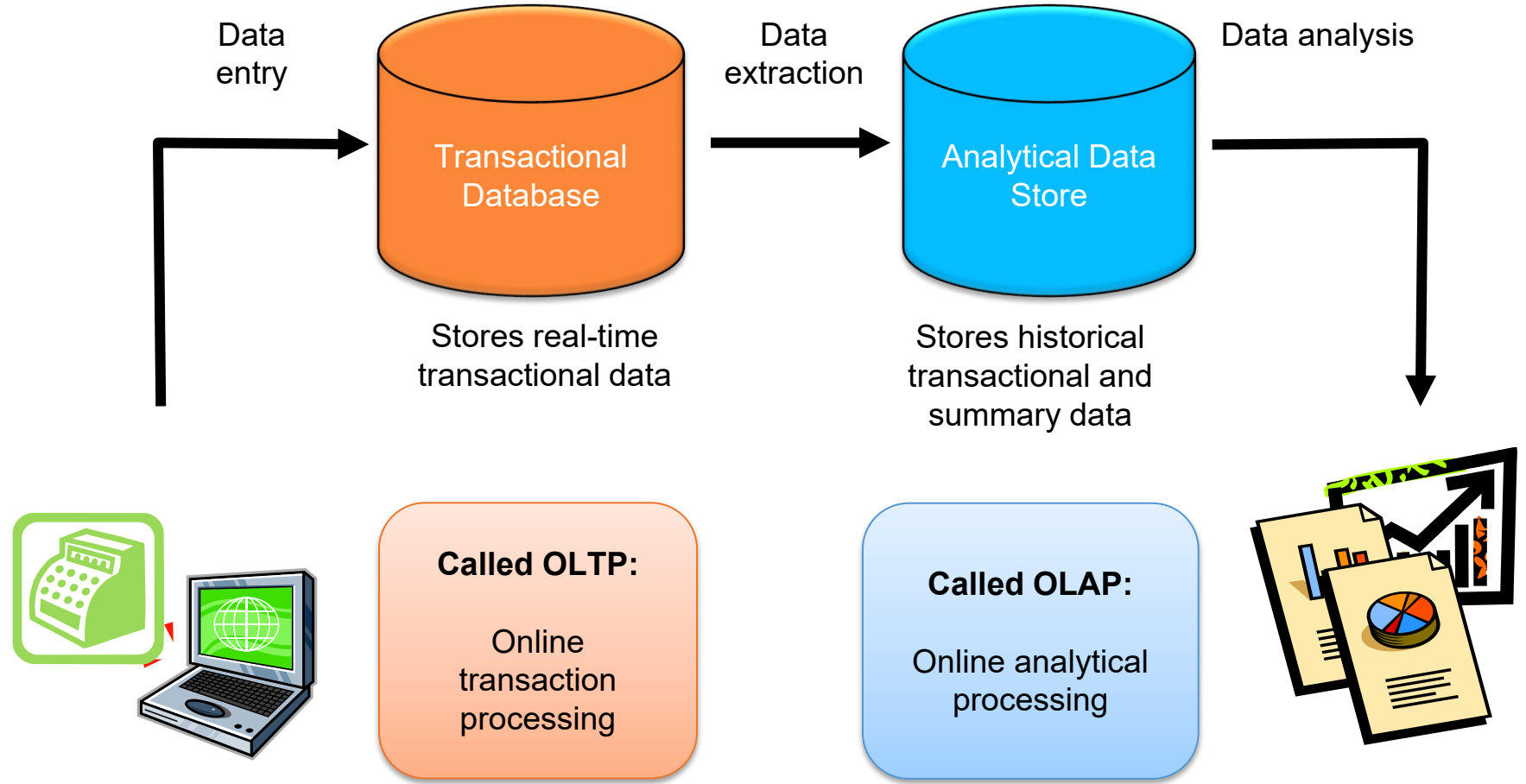
Transactional

- Captures data describing and event
- An exchange between actors
- Real-time

Analytical

- Captures data to support analysis and reporting
- An aggregated view of the business
- Historical

The Information Architecture of an Organization



Components of an information infrastructure

- **Transactional Database**

- Supports management of an organization's data
- For everyday transactions
- Known as “Database management”

- **Analytical Data**

- Supports managerial decision-making
- For periodic analysis
- The foundation for business intelligence

Leverage Data and Technology

- Google Analytics
- Excel
- Tableau



Data Breaches and Ethicality of Data Usage

- Role of Marketing?
- Consumer Rights?
- Organizational Needs?
- Legal Use?
- **PRIVACY!**



What is Business Intelligence (BI)?

BI Leverages Software & Services to Transform Data

- Mobile BI
- User friendly
- Agile & Intuitive Systems
- Leads to Strategic Business Decisions

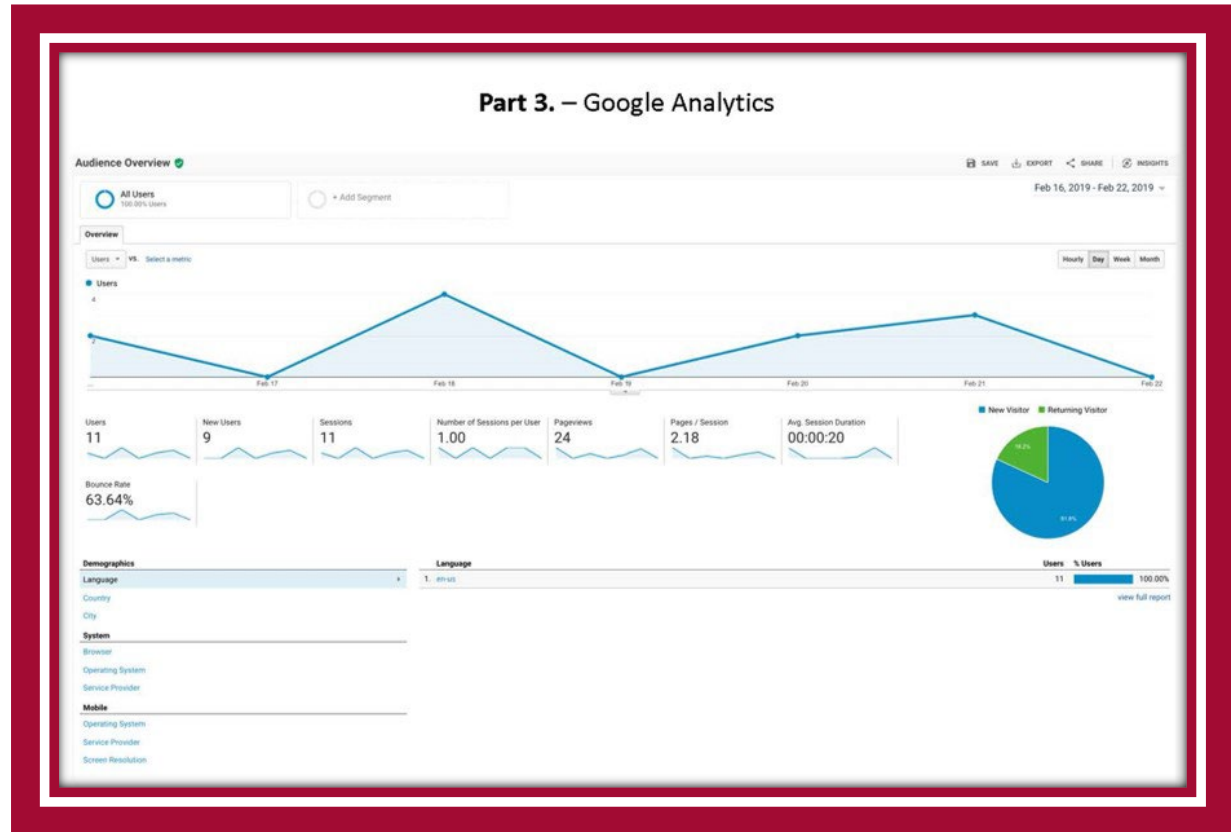


Source: <https://blog.radware.com/tag/internet-of-things/page/3/>

Google Analytics

What Can We Track?

- web site metadata & user engagement
- Number of Sessions
- Average Session Duration (minutes, hours, etc.,)
- Number of pages visited
 - Duration of Each Visit
- Bounce Rate
- Conversion Rate



Learn IT #2

Get Certified!

- Google Analytics for Beginners
 - Complete all four units
 - Score 80% or better on all assessments





Digital Systems

6.2 Information Systems: Part IV - SCM

FOX
MIS

What is Supply Chain Management (SCM)?

Thoughts?

“Supply Chain includes many components...from Procurement to Manufacturing to Distribution.”

“SCM is about getting the right product on the right shelf at the right time!”

– Professor Doyle



Source: <https://www.chainstorage.com/wp-content/uploads/2017/06/supplychain.jpg>

What is Supply Chain Management (SCM)?

Cross Functional Approach:

- ❖ Improves trust & collaboration
- ❖ Improves inventory visibility & velocity
- ❖ Reduces Cost
- ❖ Increases Revenue



Source: <https://www.chainstorage.com/wp-content/uploads/2017/06/supplychain.jpg>

Supply Chain Management

Pick a product

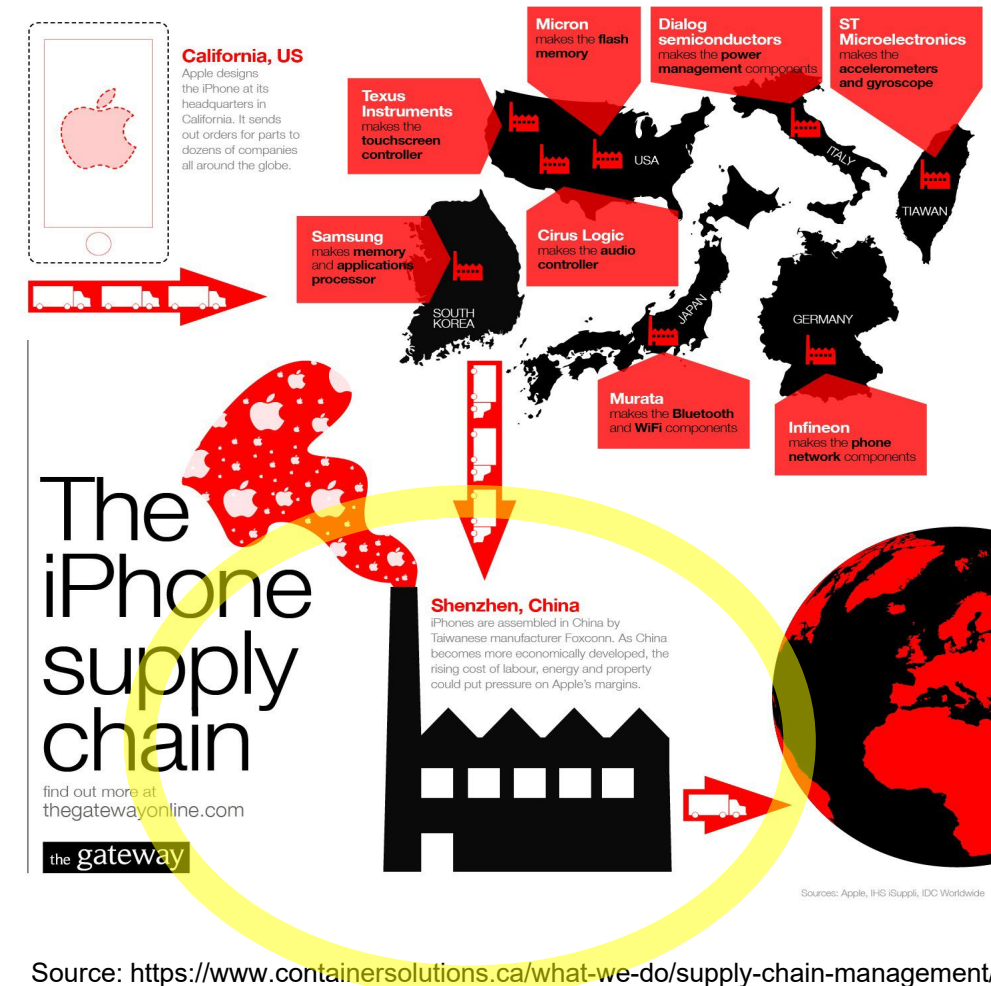
- ❖ Who are the key actors?
- ❖ What types of materials are involved?
- ❖ What about technology?
- ❖ What skills are required?
- ❖ What's missing?



Source: <https://www.containersolutions.ca/what-we-do/supply-chain-management/>

Case Study: iPhone Xs

- ❖ Where is your iPhone Made?
- ❖ What happens in Shenzhen, China if there are any delays?
- ❖ How do you plan for problems?
 - Weather
 - Material shortages
 - Strikes



Source: <https://www.containersolutions.ca/what-we-do/supply-chain-management/>

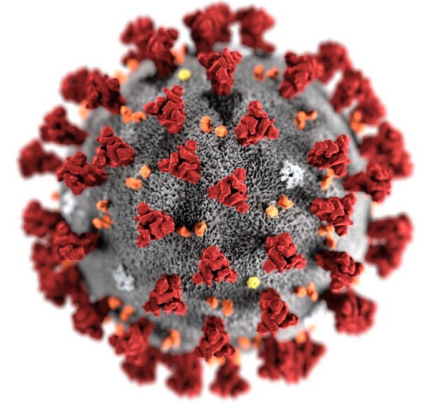
Supply Chains are Fragile

- ❖ Complex ecosystem of partners
- ❖ Cost distribution
 - ❖ How much value is *really* added by each supplier?
- ❖ Balancing inventory & efficiency
- ❖ Manual SCM causes issues



COVID Impacts on SCM

- ❖ Highlighted SC vulnerabilities
- ❖ Global shortages & delays
- ❖ Which products were impacted most?
- ❖ New SCM priorities going forward
 - Visibility, resiliency, automation



Case Study: Kimberly-Clark

- ❖ March 12, 2020: TP sales increased 734%
- ❖ Supply shortages, lack of supplier diversity
- ❖ Many companies forward-buying
- ❖ TP scarce for weeks after initial shortage



Case Study: Kellogg's

- ❖ Cereal, noodle & snack sales increased during pandemic
- ❖ Relied on several weeks of “safety stock”
- ❖ Quickly shifted packaging suppliers
 - Korean supplier → New Zealand supplier



SCM Discussion

- ❖ Who works for a company which manufactures a product?
- ❖ What kind of product is it?
- ❖ What stuff do you need to make your product?
- ❖ Where do you get this stuff?
- ❖ What happens if they run out of this stuff?



Source: <https://www.neurored.com/wp-content/uploads/2018/01/supply-chain-smartification-1030x824.png>

Safety Stock – That's the Answer!!!

- What people in fulfillment see...



- What people in Accounting see...



Supply Chain Optimization

Two approaches for Supply Chain Management:

1. Plan to Work Backwards

- DEMAND

2. Project Execution

- Efficient flow of products, information, & financing



Source: <https://liquidplanner-wpengine.netdna-ssl.com/wp-content/uploads/2019/04/Supply-Chain-graphic.jpg>

What is RFID

What is RFID?

- Radio Frequency Identification
- Wireless technology that lets you identify objects that have been fitted with special RF identification tags

What is RFID good for?

- Inventory control, access control...

How it works

- Antenna reads electromagnetic energy
- Can penetrate non-metallic solid objects

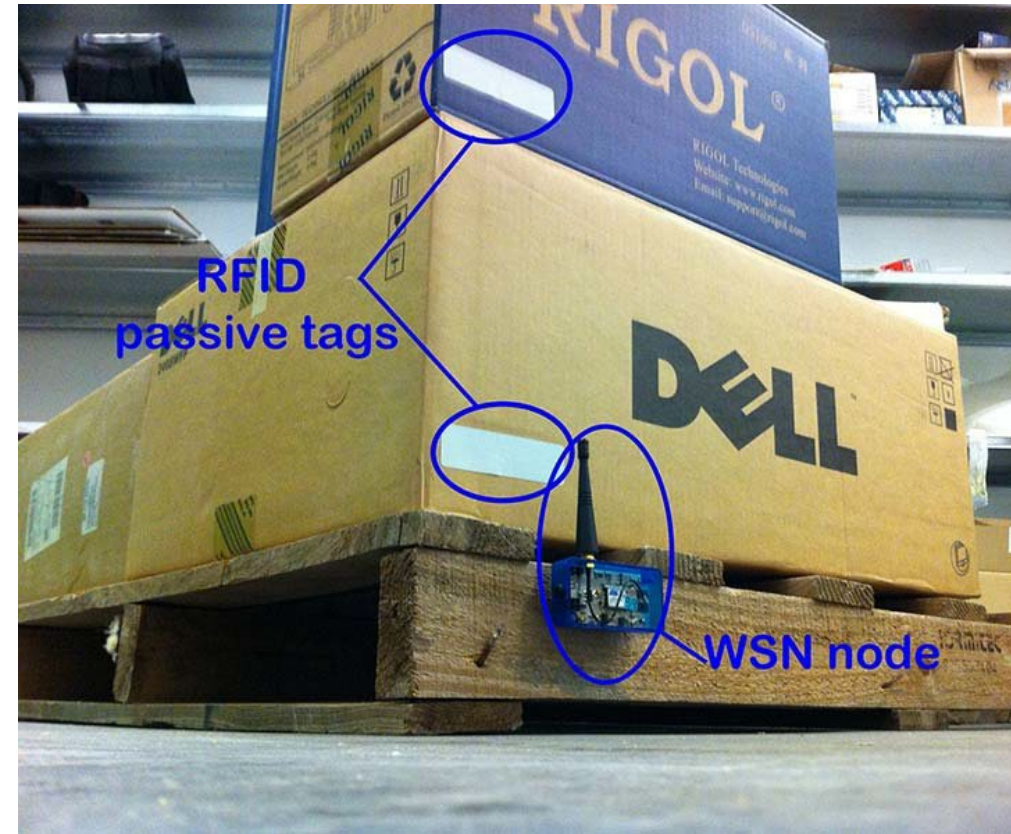


Source: <https://journals.ala.org/index.php/ltr/article/viewFile/4514/5301/6514>

RFID explained

The use of electromagnetic energy to transmit energy between a reader (transceiver) and the tag (antenna).

- ✓ RFID tags can contain more information than bar codes.
- ✓ Tags are programmable
 - Scanning can be done from greater distance.
 - Passive tags—inexpensive, range of few feet.
 - Active tags—more expensive, longer range



Source: https://www.researchgate.net/profile/Jose_San_Jose_Vieco/publication/261430560/figure/fig1/A/S:564991784742913@1511715946690/WSN-Node-and-RFID-tags-in-a-pallet.png

Case Study of RFID: Disney Magic Band

Why Did Disney Invest \$1 Billion?

- ❖ Marketing Opportunities
- ❖ UX & CX
- ❖ Patron Tracking
 - Multiple Parks
 - Hotels
- ❖ Endless Possibilities!



Source: https://media.wired.com/photos/593275a15c4fbd732b552d4a/master/w_1200,c_limit/disneymagicband2_f.jpg

Case Study of RFID: Disney Magic Band

Was the \$1 Billion investment wasted?

- Disney will no longer offer Magic Bands included with park pass
- Magic Band features transferred to cell phones
- What are the pros/cons of this decision?



Case Study: MagicBand+ Will Debut in 2022

Was the \$1 Billion investment wasted?

- Complimented by DisneyMagic Mobile
MagicBand+ enables new levels of engagement across the parks
- Features include color-changing lights, haptic vibrations and gesture recognition
- What changed?



Source: <https://disneyparks.disney.go.com/blog/2021/09/just-announced-magicband-will-debut-in-2022-at-walt-disney-world-resort-as-part-of-50th-anniversary-celebration/>

More to Come

Prepare with Readings & Videos before our next class!!!