Incident Databases: Improving Safety through Advanced Data Analytics

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Learning Objectives

- Understand the value of collecting Incident Data into a database platform
- Learn about the basic types of database platforms for collecting & storing data
- Understand the type of data you should be collecting
- Discover the ‘magic’ of how Data Analytics can transform your data into actionable steps for your program

Why Collect Data?

- **Compare**
  - Across your Organization
  - Across Time
  - To other similar organizations
- **Evaluate**
  - Impact of Program Changes
  - New Activities
- **Assess**
  - Critical Risk Areas
  - Are strategies working?

Data Analytics

- Incident Data has to be Digital

Incidents	3/1000 participant days
Close Calls	5/1000 participant days
Incident Rate	0.003%
Close Call Rate	0.005%

Total Events

3

5

Incidents Close Calls

The Problem

- **You Don’t Collect Data**
  - Too Hard
  - Don’t Know How
  - Don’t Know What you would do with it
- **You Do Collect Data**
  - A paper incident report is a ‘single incident’ rather than a ‘collection of data’
  - Sits in a File
  - No one looks at it
  - Not consistent/chaotic = no ability to compare
  - Access Control Issues – who gets to see it?
  - What would they do if they did look at it?

The Solution

- **System for inputting & storing data**
  - Some data-aware software
    - Paper forms or Word documents are insufficient
  - Unified System
  - Consistent data entry
  - User friendly
  - Secure
  - Access Control
  - Expandable
  - Analytics ready

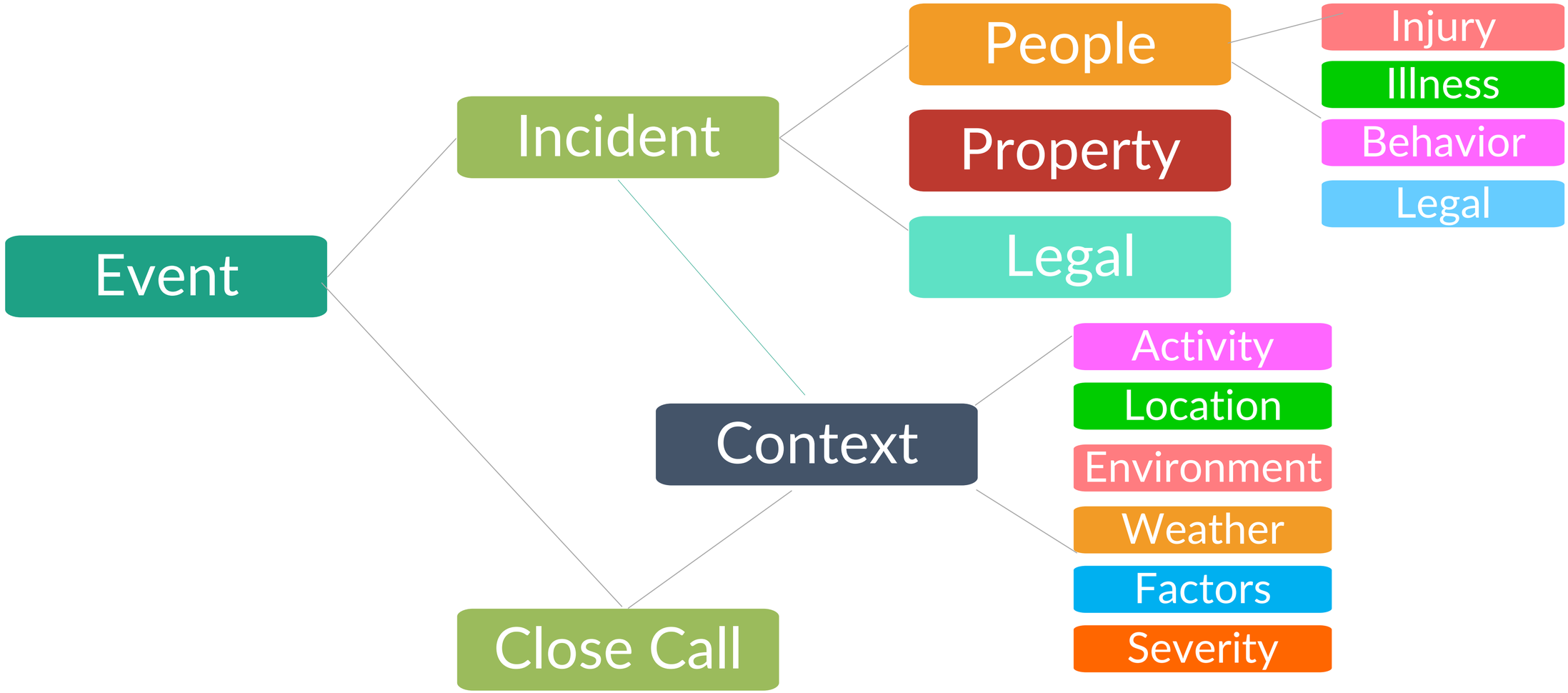
What Data to Track?

- **Start with an assessment of past incidents**
  - What are most common?
  - What are the most severe?
  - What incidents are commonly associated with that activity, population, etc. (even if it hasn't happened to you)
  - What has never happened but that you need to prepare for?

What Data to Track?

- **Identify the Data Categories you need to track**
  - What data will help?
    - Who? – participant, staff, other
    - When? – time of day
    - Where? – location, field site
    - What? – activity
    - Conditions? – weather, equipment
    - Why? – identifiable causal factors

What Data to Track?



What Data to Track?

- **What constitutes an Incident/Close Call?**
  - **Philosophical Question**
    - What is the threshold for something being reportable in your organization?
      - Share
  - **Are their reporting requirements/legislation?**
    - Colleges – Cleary Act & Title VIIII
    - Kitchen – State Health Department
    - Camp – State Camp Safety Acts
    - Minors – Youth & Family Services
      - Share
  - **Need to Train Staff about what is Reportable**

Designing a Database System

- **'Big Net' Principle**
  - **Design for the future**
    - Basic understanding of database theory is essential
  - **Design for ease of use**
    - If it's not user friendly it won't be used (accurately)

Collecting & Storing Data

- **Options for Data Storage**
  - Spreadsheet
  - Desktop Database
  - Database Server
  - Cloud Database

How to Structure Data?

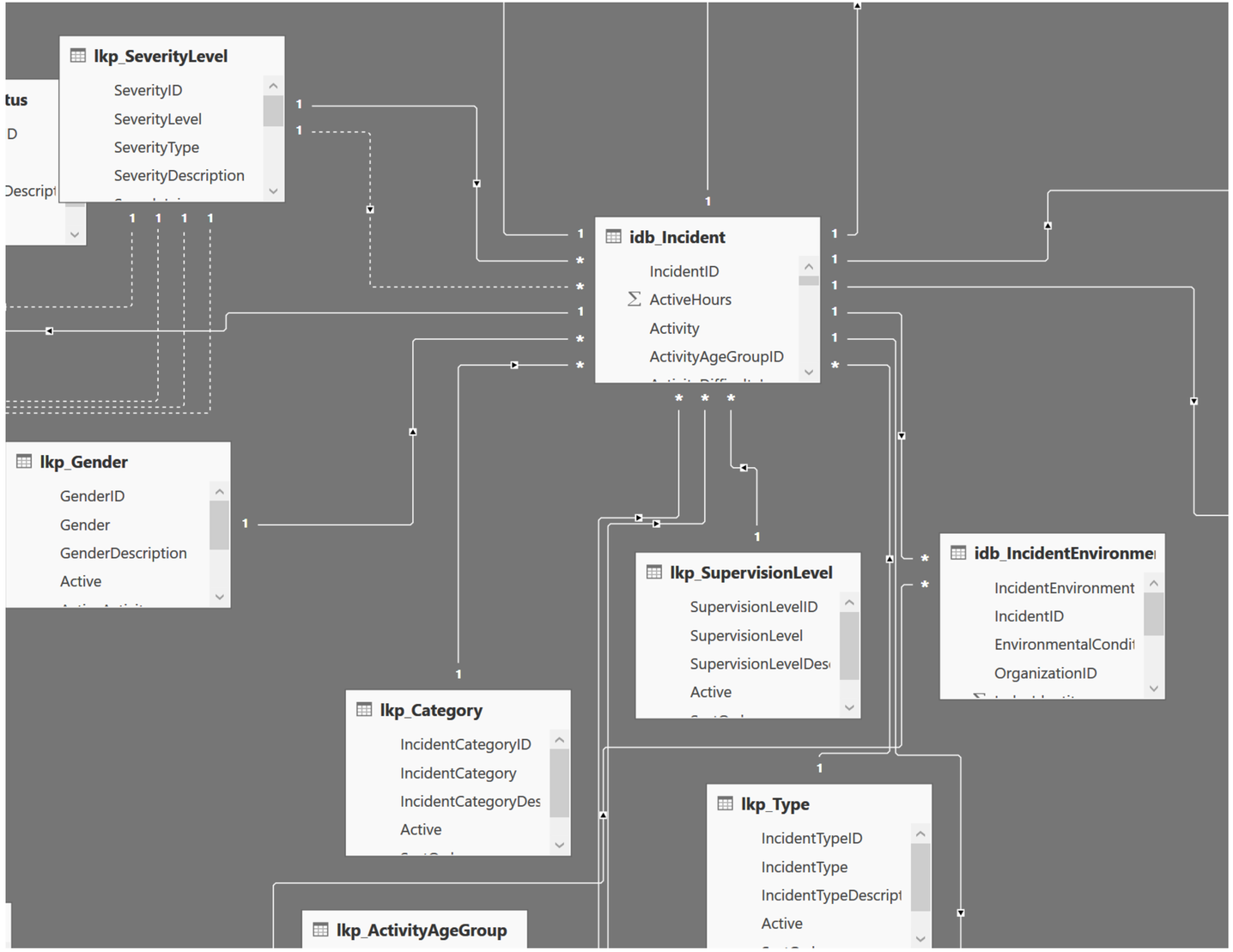
- **Structure**
  - Each Incident Event is a Record = Row
  - An Incident Data Category is a Field = Column

IncidentID	Event	IncidentType	IncidentCategory	Activity
1	Broken leg from canoe capsize	Incident	Injury	Canoeing
2	Sprained ankle	Incident	Injury	Hiking
3	Stove flare-up	Close Call		Camping
4	Fall on challenge course	Close Call		High Ropes Course
5	Diarrhea & vomiting	Incident	Illness	Camping
6	Gastrointestinal Distress	Incident	Illness	Bike Touring
7	Blisters on heal	Incident	Injury	Hiking
8	Migraine headache	Incident	Illness	Canoeing
9	Participant Exhaustion	Close Call		Hiking

How to Structure Data?

- **Software**
  - Flat File = Spreadsheet
  - Relational Database
    - Parent Tables & Child Tables allow you to create deep levels of data
    - Lookup Tables (data integrity & consistent data entry)

Relational Database



Data Storage Options

Spreadsheet	Relational Database
Simple	Complex to Very Complex
Requires little database experience	Requires database experience
Harder to control data input	Greater options for form-based input (
Not very extendable	Very Extendable
Large data sets are cumbersome	Large data sets are not a problem
Limited Filtering	Robust Filtering through Queries
Desktop Only	Can be on Web/Cloud
Secure Access limited	Securing Access can be finally controlled
Doesn’t require a server	May require a server and IT staff

Examples

- **Spreadsheet**
  - Excel
- **Desktop Database**
  - Access, Filemaker Pro
- **Server Database**
  - SQL Server, MySQL, Oracle
- **Cloud Database**
  - SQL Azure Database

Incident Database System

Quick Actions | Incident Database & Analytics System | Admin | Log Out | My Profile

Drag a column header and drop it here to group by that column

Incident Event	IncidentType	IncidentCategory	ActivityType	IncidentDate
	All	All	All	From: To:
Broken leg from canoe capsize	Injury	Incident	Canoeing	2014/01/09
Sprained ankle	Injury	Incident	Initiative game	2014/24/01
Rock fall	Injury	Incident	Not Specified	2014/02/02
Near Drowning	Illness	Incident	Canoeing	2014/01/03
Gastrointestinal Distress	Illness	Incident	Not Specified	2014/02/04
Student asked to leave trip	Motivational/Behavioral	Incident	Not Specified	2014/02/04
Significant blisters on feet	Injury	Incident	Not Specified	2014/24/01
Stove Burn	Injury	Incident	Cooking	2014/15/12
Flu-like symptoms	Injury	Incident	General Activity	2014/02/01
Diarrhea & vomiting	Illness	Incident	Snowshoeing	2014/01/01

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61 items in 7 pages

Analytics

- **Where?**
  - Desktop
  - On-premises Server
  - Cloud

Analytics

- **Software**
  - PowerPivot for Excel
    - Desktop
  - Power BI
    - Desktop
    - Cloud
  - Tableau, Qlik & Others
    - Desktop
    - Cloud
  - Build it Yourself
    - Desktop
    - Cloud

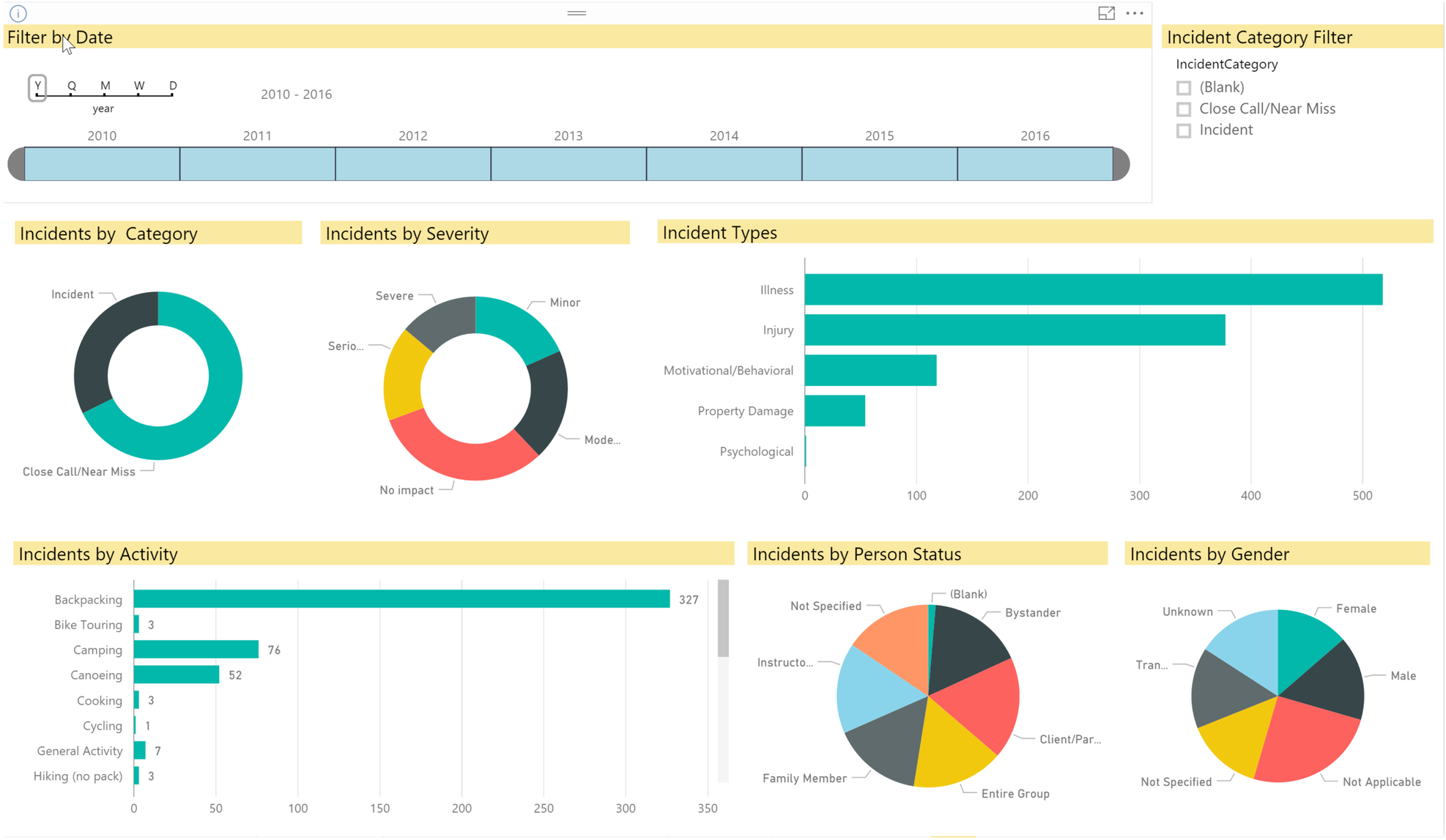
Gartner Magic Quadrant for BI

Power BI Analytics

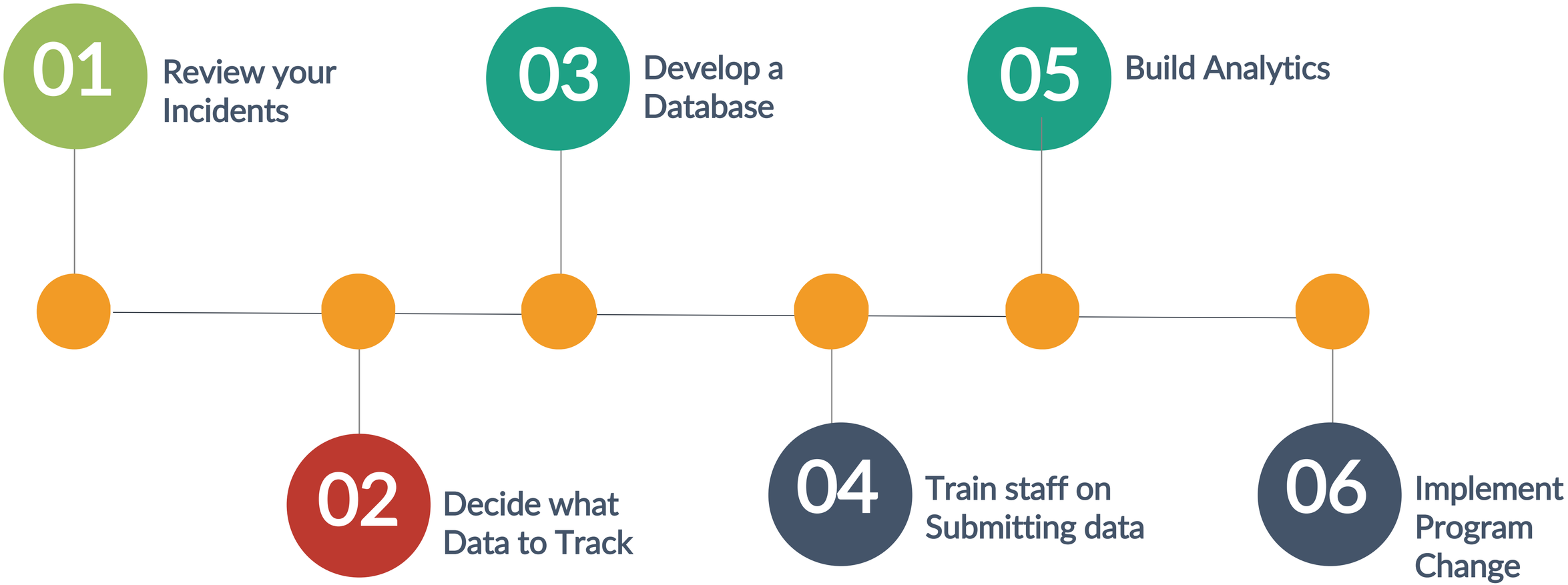
- **Excel PowerPivot**
  - Local Data Source
- **Power BI Desktop**
  - Local Data Source
  - Remote Data Source
- **Power BI Online**
  - Remote Data Source
- **Power BI Embedded**
  - Remote Data Source

Steps to Power BI Data Analytics

Power BI Walkthrough



Developing your Incident Data Management Plan



Take Aways

- **Develop your Incident Data Management Plan**
  1. Review your Incidents
  2. Decide What to Track
  3. Develop a Database
  4. Train your Staff in collecting/submitting data
  5. Build your Analytics
  6. **Implement Program Changes based on actionable data**
- **Analytics can be applied in many other areas of your organization**
  - Explore how Analytics can be used across other areas of your organization
    - Evaluating marketing
    - Assessing participant demographics
    - Exploring medical screening trends

Resources

- **Incident Data**
  - New Zealand There and Back Incident Report - https://issuu.com/nzmountainsafetycouncil/docs/msc.issuu.there.and.back.1.1.2016
  - National Estimates of Outdoor Recreational Injuries Treated in Emergency Departments, United States, 2004–2005 – Journal of Wilderness & Environmental Medicine - http://www.bioone.org/doi/pdf/10.1580/07-WEME-OR-152.1
  - Adventure Program Risk Management Report: Incident Data from 1998 – 2007 – WRMC & AEE - http://www.aee.org/assets/docs/wrmc_incident_poster_text_2008.pdf
  - College Sports–Related Injuries — United States, 2009–10 Through 2013–14 Academic Years – Centers for Disease Control - https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6448a2.htm
  - Outdoor Recreation and Participant Accidents in New Zealand – Mountain Safety Council - http://www.mountainsafety.org.nz/files/Participation-and-Incident-GC-Fixed.pdf

Resources

- **Database Design**
  - Database Fundamentals – Microsoft Virtual Academy - https://www.youtube.com/watch?v=GdeaqBCR5PQ&list=PLIoX3-mcY80hub9r9D9_ItMFW6mdRLLTw
  - Fundamentals of Relational Database Design – Lynda.com - https://www.lynda.com/Access-tutorials/Relational-Database-Fundamentals/145932-2.html

Resources

- **Power BI**
  - Analyze & Visualize with Power BI - https://www.youtube.com/watch?v=tHqdUdzpBng&list=PL1N57mwBHtN0JFoKSR0n-tBkUJHeMP2cP
  - Getting Started with Power BI - https://www.youtube.com/watch?v=Qgam9M8I0xA
  - Create a Report in Power BI Desktop - https://www.youtube.com/watch?v=IMAsitQ2cAc
  - User the Power BI Query Editor – https://www.youtube.com/watch?v=ByIUx-HmQbw
  - Create Relationships between Tables in Power BI - https://www.youtube.com/watch?v=fVW4MCr0APA
  - Publish from the Power BI Desktop to the Power BI service - https://www.youtube.com/watch?v=ObwsFdC9e94
  - Add a Calculated Column in Power BI - https://www.youtube.com/watch?v=62mLfiNcqVM

For more information

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