INTRODUCTION TO DASHBOARDING

LEARNING OBJECTIVE

Become familiar with some of the issues and concepts relating to dashboards and their design.

AN INTRODUCTION TO DASHBOARDS

"If a tree falls in the forest and nobody is there to hear it, does it make a sound?"

(old riddle)

REPORTING AND DEPLOYMENT

An analysis can only be as good as how it is **communicated** and/or **deployed**.

Crucial Questions:

- Who is in receipt of the report(s)?
- How are the workflows deployed into production?
- Can data insights be turned into useful policies?

Automatic reporting should be audited and validated **regularly**.

REPORTING AND DEPLOYMENT

Communication should occur at various stages of the project, not solely upon completion:

- keep sponsors / clients aware of broad lines
- technical details may be avoided, but documented nonetheless

Ideal scenario: analysis software is also reporting software

- minimizes human error related to cut-and-paste
- removes the need for keeping analysis and reporting separate
- makes sharing the work with other project member easier

Simplify the process further by deploying directly to the Web.

DISCUSSION

What are your favourite reporting tools?

How much should you test a product before deployment?

What's the cost of deploying a faulty product?

[Wexler, Shaffer, Cotgreave, *The Big Book of Dashboards*]

DASHBOARDS

A **dashboard** is any visual display of data used to monitor conditions and/or facilitate understanding.

Examples:

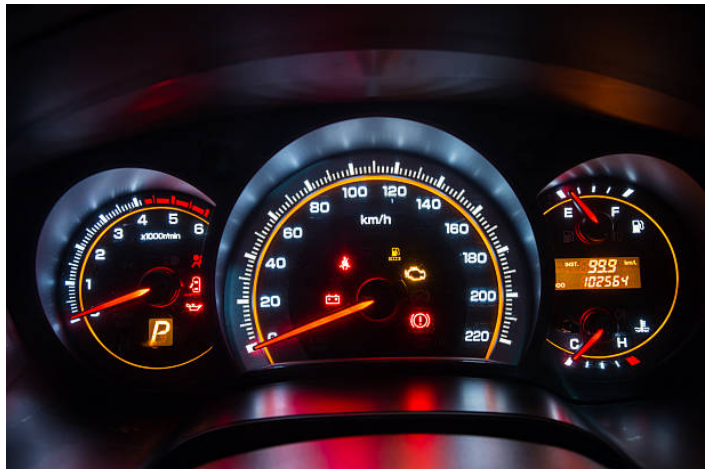
- interactive display that allows people to explore motor insurance claims by city, province, driver age, etc.
- PDF showing key audit metrics that gets e-mailed to a Department's DG on a weekly basis.
- wall-mounted screen that shows call centre statistics in real-time.
- mobile app that allow hospital administrators to review wait times on an hourly- and daily-basis for the current year and the previous year.

SOME QUESTIONS TO CONSIDER

In a car's dashboard, a small number of **key indicators** (speed, gasoline level, lights, etc.) need to be understood **at a glance**. A dashboard design that does not take these two characteristics under consideration can have catastrophic consequences.

The following questions need to be answered prior to the dashboard being designed:

- Who is the dashboard's **consumer**?
- What **story** does the dashboard tell?
- What data (categories) will be used?
- What will **appear** on the dashboard?
- How can the dashboard **help** the consumer?



[https://www.geckoboard.com/blog/building-great-dashboards-6-golden-rules-to-successful-dashboard-design]

DASHBOARD DESIGN GUIDELINES

Nick Smith suggests the following 6 Golden Rules:

- **Consider the audience** (who are you trying to inform? does the DG really need to know that the servers are operating at 88% capacity?)
- **Select the right type of dashboard** (operational, strategic/executive, analytical)
- **Group data logically, use space wisely** (split functional areas: product, sales/marketing, finance, people, etc.)
- **Make the data relevant to the audience** (scope and reach of data, different dashboards for different departments, etc.)
- **Avoid cluttering the dashboard** (present the most important metrics only)
- **Refresh your data at the right frequency** (real-time, daily, weekly, monthly, etc.)

[https://dashboard.edmonton.ca]

TRANSPORTATION | LIVABILITY | ENVIRONMENT | URBAN FORM | ECONOMY | FINANCE

Meets or Exceeds Target | Near Target | Needs Improvement | Measuring | Collecting Data

IDLEWYLD Sysabee DAVHILL uOttawa

data-action-lab.com

[https://medium.com/gooddata-developers/ux-anatomy-of-dashboards-73dbf6515199]

DASHBOARD DESIGN ELEMENTS

GoodData takes an interesting approach to designing dashboards.

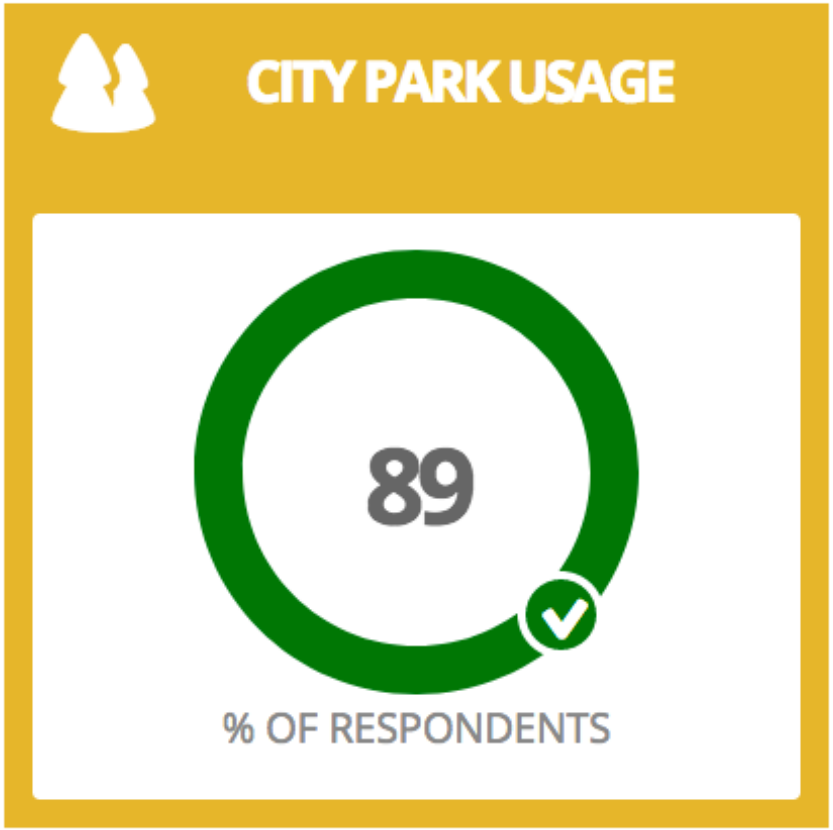
They suggest dashboards are composed of:

- Atoms
- Molecules
- Organisms

HOW WILL YOU VISUALIZE THE DATA?

To help generate visualization ideas:

- https://datavizcatalogue.com
- https://datavizproject.com
- https://rawgraphs.io

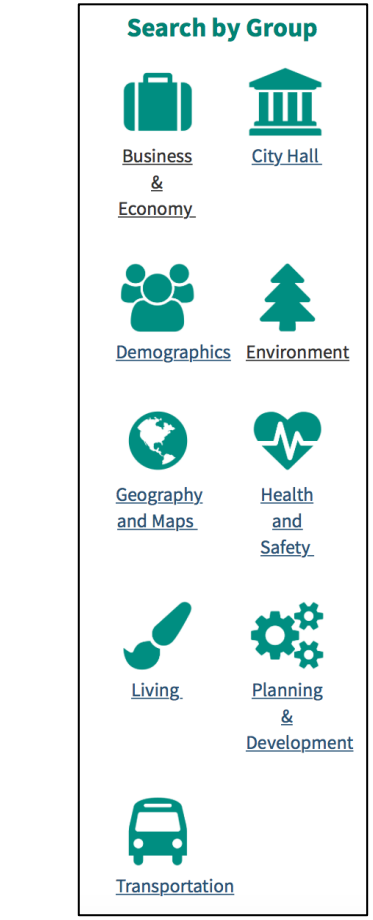


TYPE OF DATA YOU WILL FEATURE?

What type of data do you want to feature?

What type of data do you need to tell your story?

What datasets do you need to have available to do this?



ANALYSIS ELEMENTS (I)

Will you be considering:

- What has already happened – **hindsight**?
- What is going on currently – **situational awareness**?
- What will likely happen – **prediction**?

ANALYSIS ELEMENTS (II)

Will you show your audience ‘raw’ numbers (number of cars on the road)?

Will you need to come up with some aggregate measures (traffic level)?

[Wexler, Shaffer, Cotgreave, *The Big Book of Dashboards*]

COURSE METRICS DASHBOARD – SCENARIO

You are the head of an academic department. You want to know:

- how a given professor's course is rated compared to other courses in the department and at the university in general
- the overall course load, the number of students, and the overall growth or decline in the enrollment for a particular course
- how many courses an instructor has been teaching over time
- the detailed ratings of the most recent course and instructor feedback

What type of data do you need? How would you arrange/design a dashboard to help answer these questions?

COURSE METRICS DASHBOARD – DATA

Year	Semester	Students	Average
'12	S	42	52
	F	16	52
'13	S	71	52
	US	14	52
	F	27	52
'14	S	69	52
	S	55	52
	US	28	52
	F	27	52
	F	61	52
'15	S	46	52
	S	80	52
	US	43	52
	F	61	52
	F	69	52
'16	S	62	52
	S	80	52
	US	50	52
	F	62	52
	F	65	52
	F	69	52
		1097	

year	enrollments
'12	58
'13	112
'14	240
'15	299
'16	388
	687

Year	# classes
'12	2
'13	3
'14	5
'15	5
'16	6
	21

Year	Semester	Rating
'12	S	6.6
	F	6.5
'13	S	6.7
	US	7.7
	F	6.9
'14	S	6.4
	S	6.7
	US	7.5
	F	7.3
	F	7
'15	S	6.4
	S	7
	US	6.8
	F	7.3
	F	7.7
		7.7

[Wexler, Shaffer, Cotgreave, *The Big Book of Dashboards*]

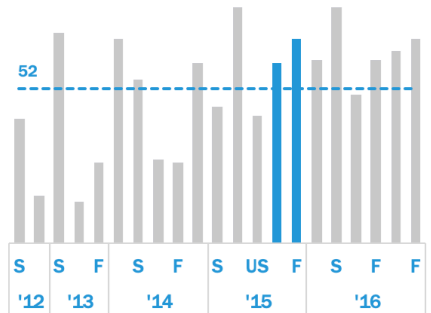
COURSE METRICS DASHBOARD – DATA

Semesters	Questions	Mean Rating	Entity	Shaffer	BANA	College
2015 Fall Semester 002	The instructor was well organized	7.5	Shaffer	7.5	6.8	7
2015 Fall Semester 002	The instructor communicated clearly	7.6	Shaffer	7.6	6.5	6.9
2015 Fall Semester 002	The instructor interacted well with students	7.7	Shaffer	7.7	6.6	7
2015 Fall Semester 002	The Instructor graded fairly	7.6	Shaffer	7.6	6.8	7.1
2015 Fall Semester 002	I developed specific skills and competencies	7.2	Shaffer	7.2	6.3	6.5
2015 Fall Semester 002	Overall, this instructor was excellent	7.7	Shaffer	7.7	6.4	6.8
2015 Fall Semester 002	Overall, this was an excellent course	7.4	Shaffer	7.4	5.9	6.4
2015 Fall Semester 001	The instructor was well organized	7.3	Shaffer	7.3	7	6.9
2015 Fall Semester 001	The instructor communicated clearly	7.4	Shaffer	7.4	6.7	6.7
2015 Fall Semester 001	The instructor interacted well with students	7.3	Shaffer	7.3	6.8	6.8
2015 Fall Semester 001	The Instructor graded fairly	7.5	Shaffer	7.5	7.1	7
2015 Fall Semester 001	I developed specific skills and competencies	6.9	Shaffer	6.9	6.8	6.7
2015 Fall Semester 001	Overall, this instructor was excellent	7.3	Shaffer	7.3	6.7	6.7
2015 Fall Semester 001	Overall, this was an excellent course	7.1	Shaffer	7.1	6.6	6.5

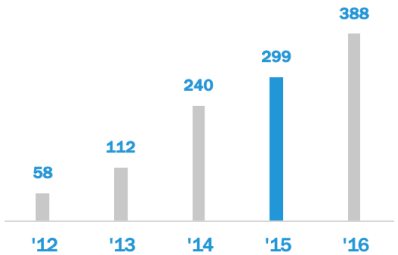
Course Metrics

[https://bigbookofdashboards.com/dashboards.html]

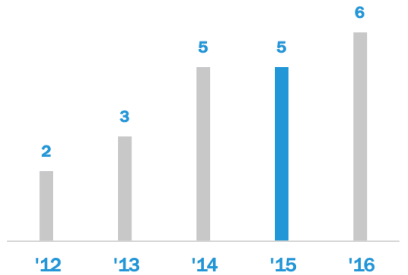
Students



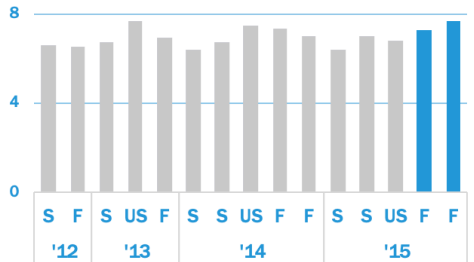
Enrollments



Classes



Ratings



1097

Total Students in five years

687

Total Students in 2015-2016

21

Total Classes in five years

7.7 of **8**

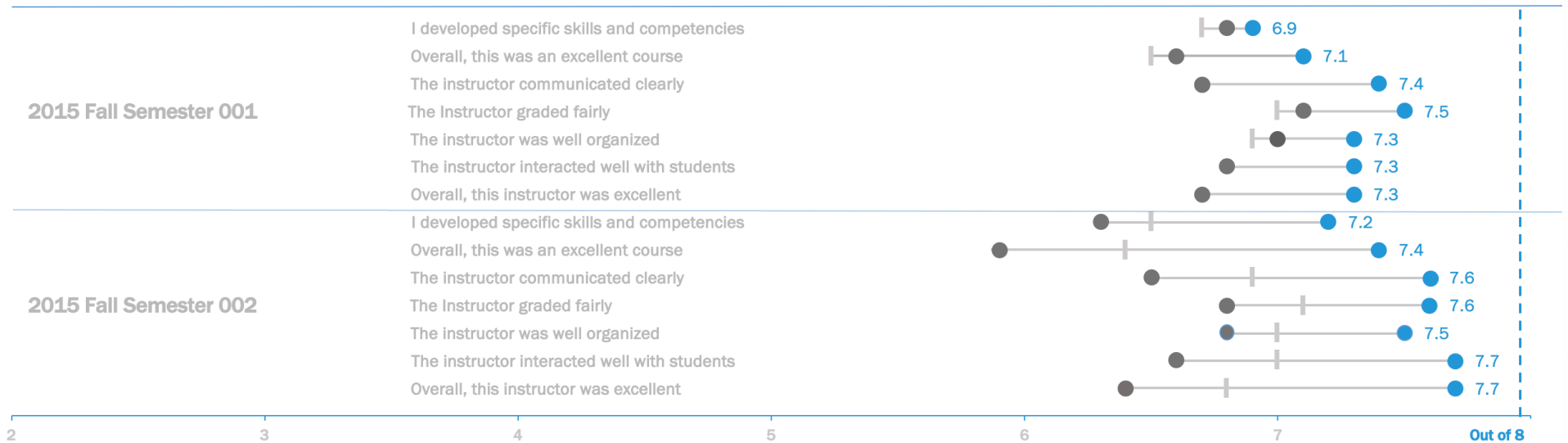
Most recent instructor rating (out of 8.0)

Semesters

Questions

BANA College Shaffer

Ratings



Course Metrics Dashboard created by Jeffrey A. Shaffer. Data from University of Cincinnati Course Evaluations. Blue indicates the 2 most recent rating periods.

COURSE METRICS DASHBOARD – STRENGTHS

Easy-to-see key metrics

Simple color scheme

Potential to be static or interactive

Both overview and details are clear

DISCUSSION

There are no perfect dashboards – no collection of charts will ever suit everyone who encounters it.

All dashboards should be **truthful** and **functional**, but dashboards that are also **elegant** (delightful, enjoyable) will take you further.

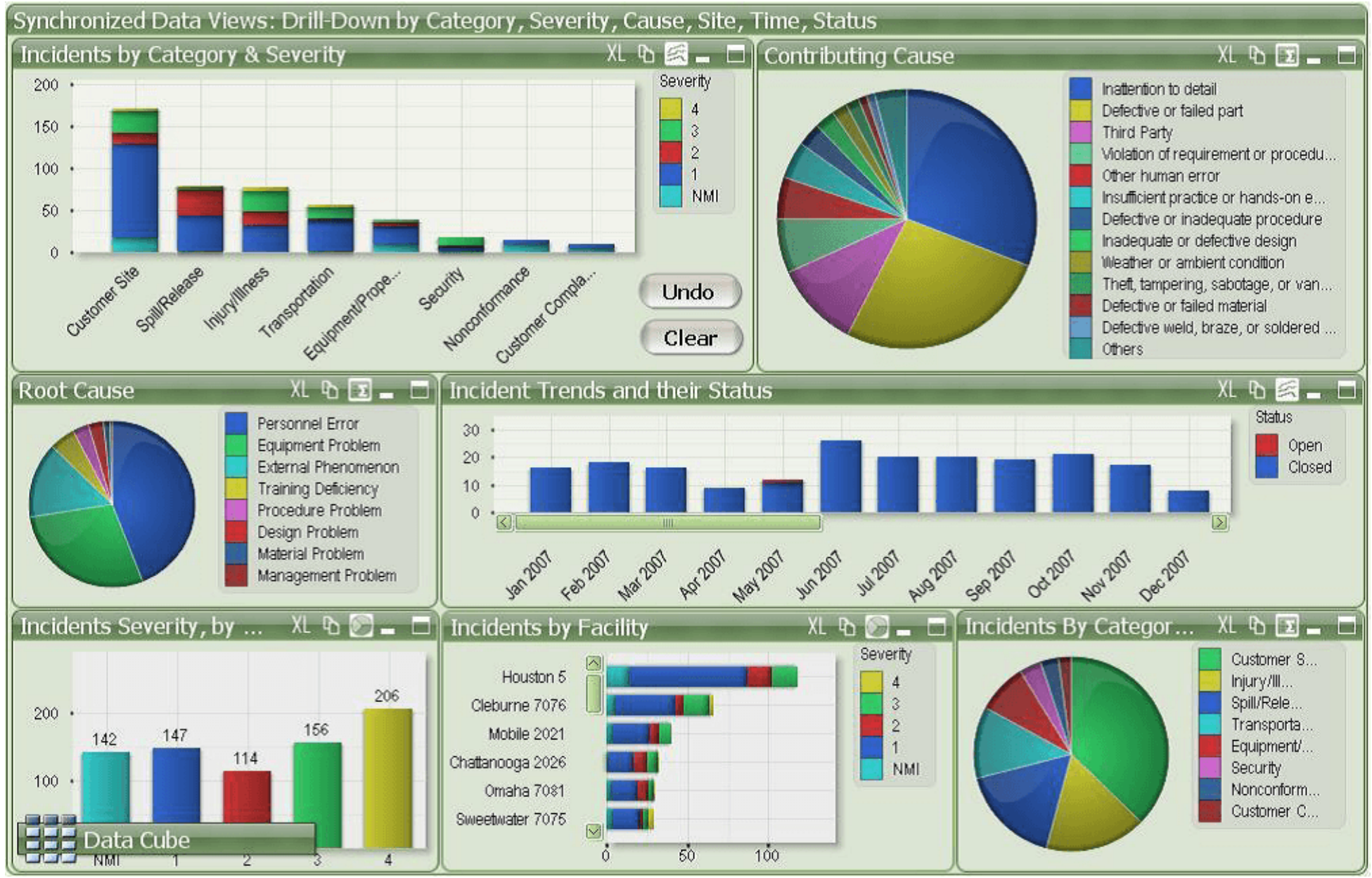
All dashboards are **incomplete**. Good dashboards will still lead to dead ends, but they should allow users to ask: “Why? What is the root cause of a problem?”

Tools: Excel, Power BI, Tableau, R + Shiny, Geckoboard, Matillion, etc.

EXERCISE

Consider the following dashboards. Can you figure out, at a glance, who their audience is? What are their strengths? What are their limitations? How could you improve them?

[https://www.matillion.com/wp-content/uploads/2014/11/qlikview-poor-use-of-dashboard-software.png]



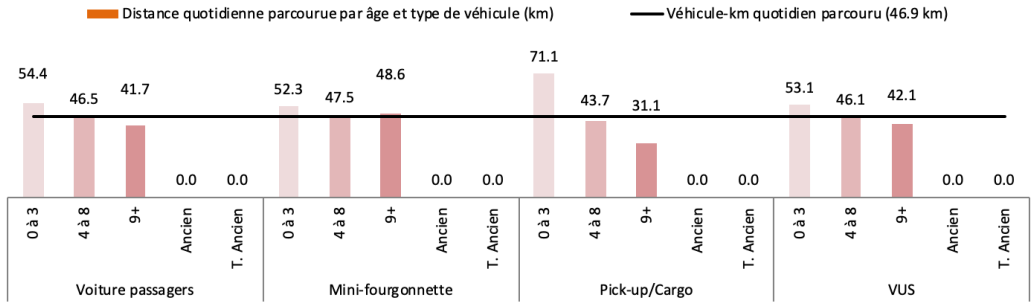
[https://www.geckoboard.com/assets/2-terrible-dashboard-example-min.png]

[Personal file]

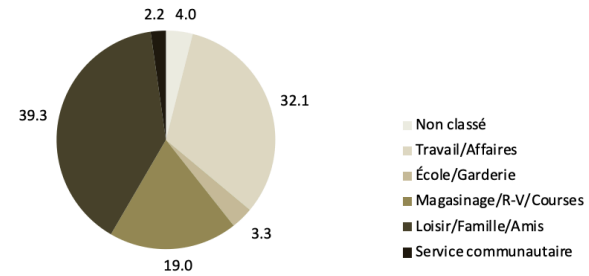
Ontario – 1er trimestre 2012

Caractéristiques des déplacements

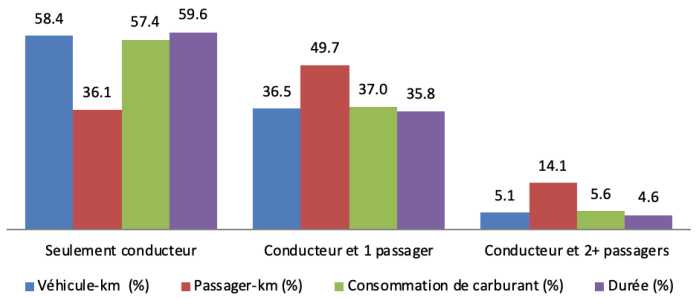
Véhicule-km quotidien parcouru par âge et type de véhicule



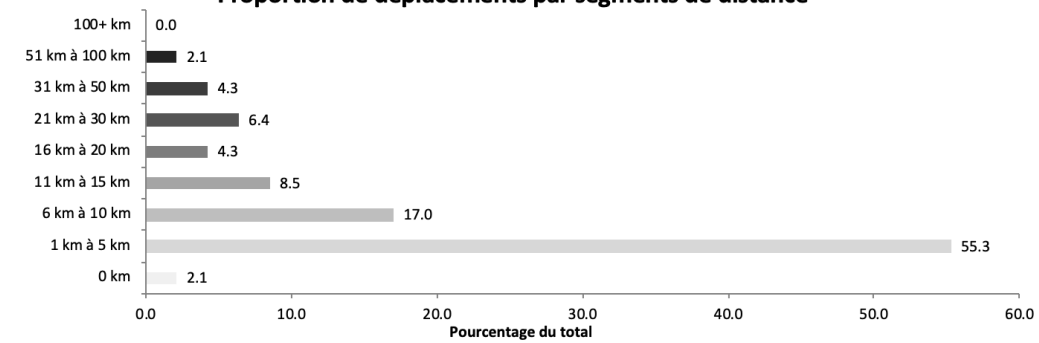
Passager-km quotidien parcouru par but des déplacements (%)



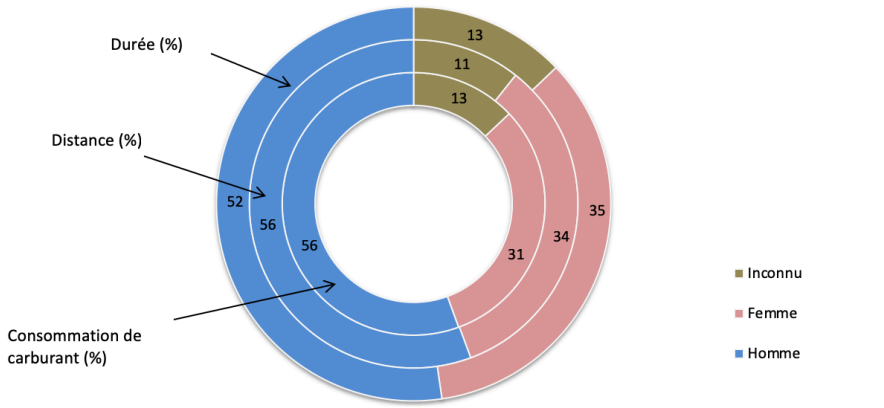
Distance, passager-km parcouru, durée et consommation de carburant par occupation



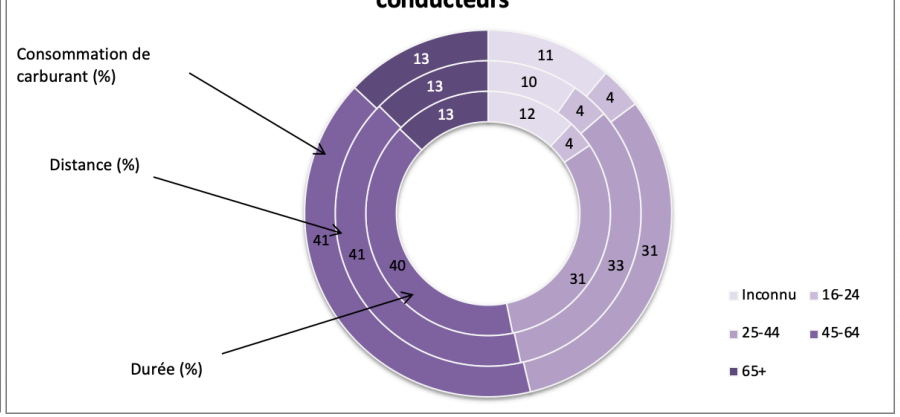
Proportion de déplacements par segments de distance



Durée, distance et consommation de carburant par sexe

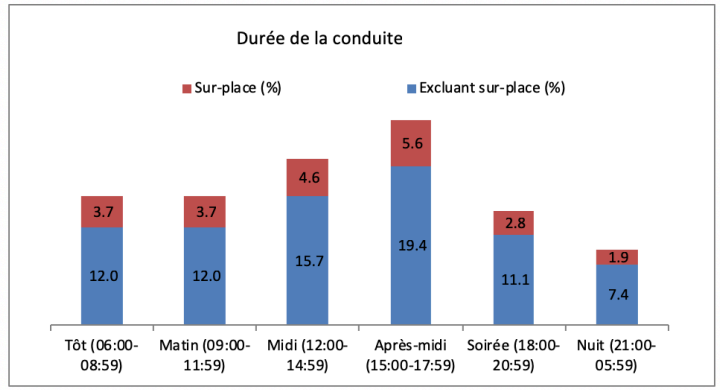


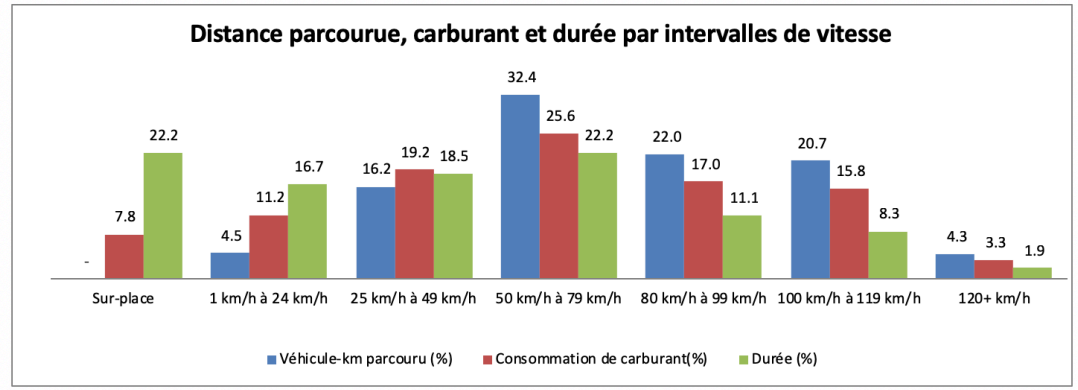
Consommation de carburant, distance et durée par âge des conducteurs

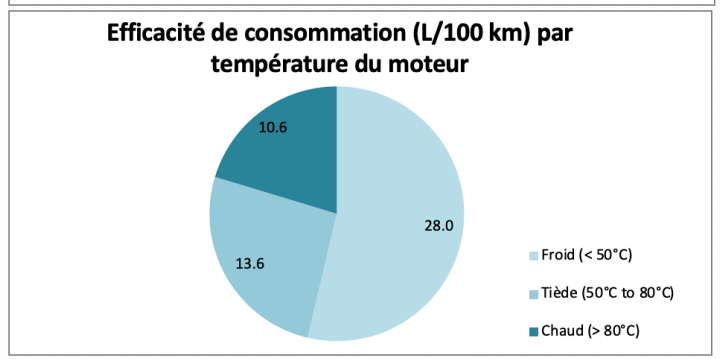


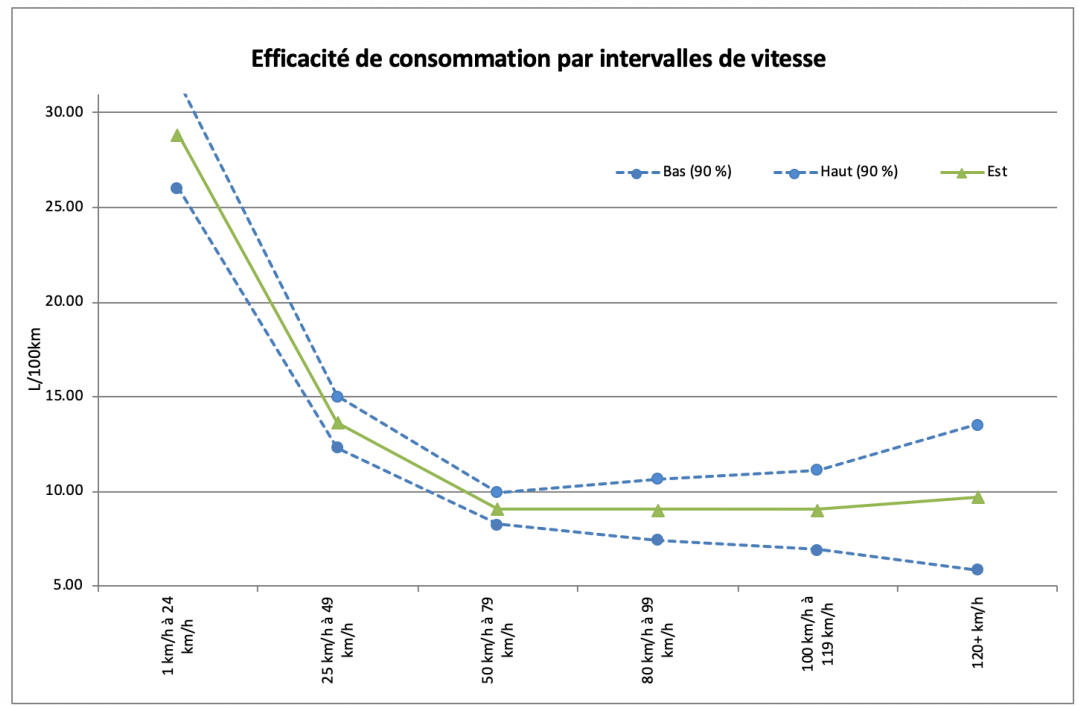
Ontario – 1er trimestre 2012

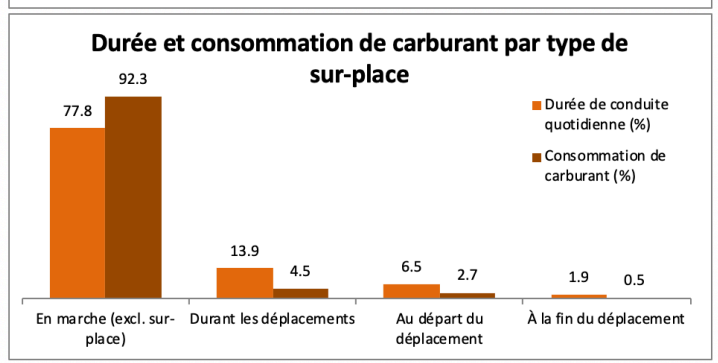
Sous-caractéristiques des déplacements











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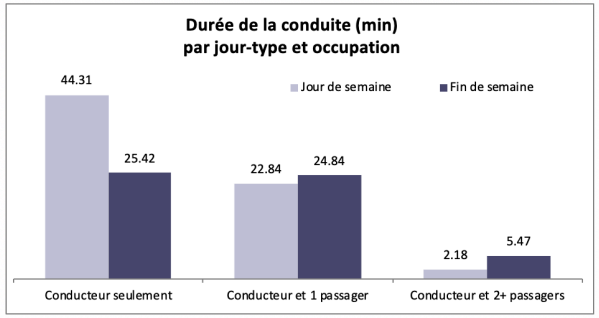
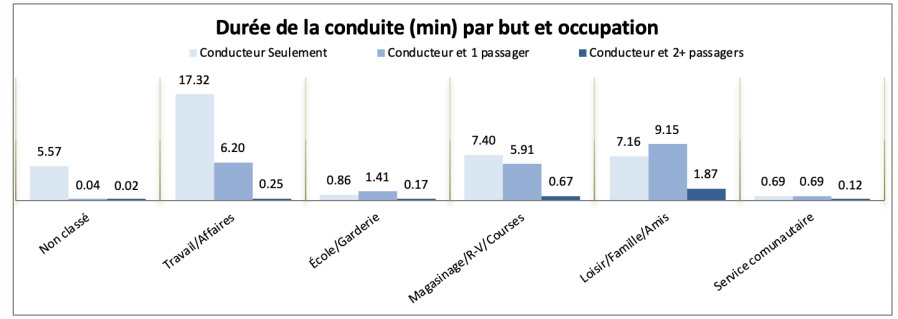
Ontario – 1er trimestre 2012

Caractéristiques mixtes sur les déplacements

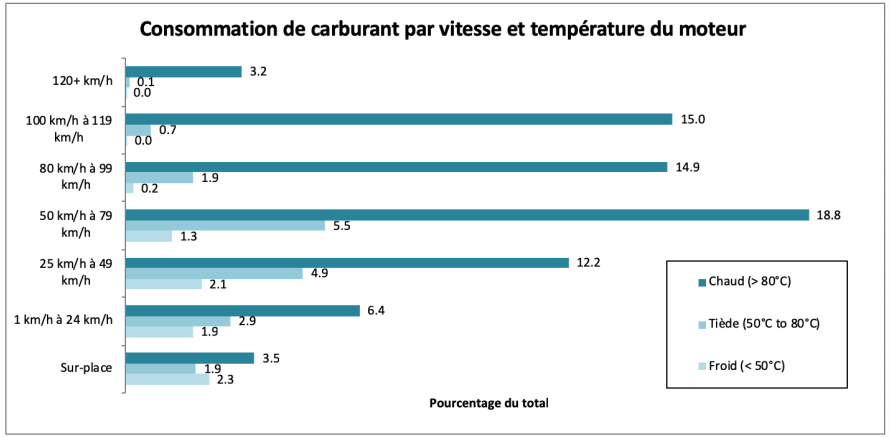
Durée de la conduite (min) par jour-type et occupation



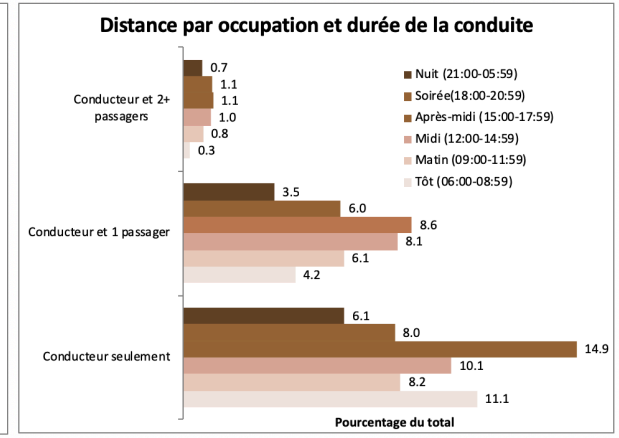
Durée de la conduite (min) par but et occupation



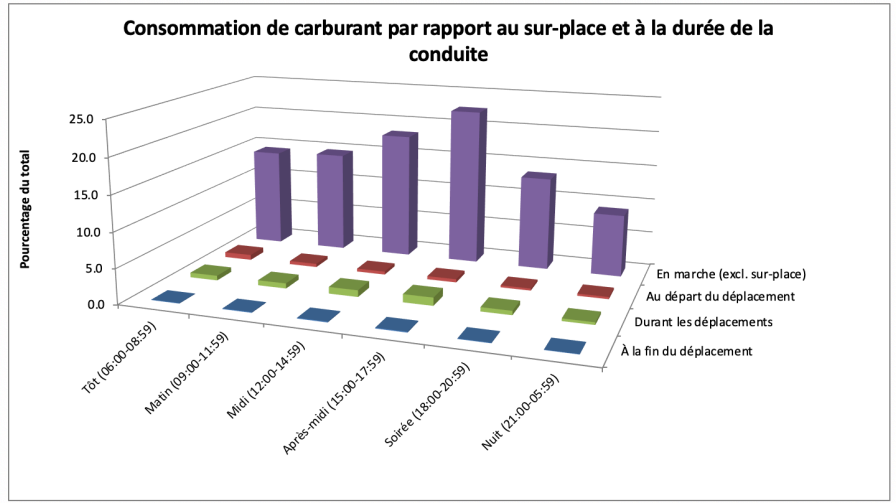
Consommation de carburant par vitesse et température du moteur



Distance par occupation et durée de la conduite



Consommation de carburant par rapport au sur-place et à la durée de la conduite



What-If Analysis: Impact of Minimum Wage

[https://bigbookofdashboards.com/dashboards.html]

Proposed Minimum Wage

$16.00

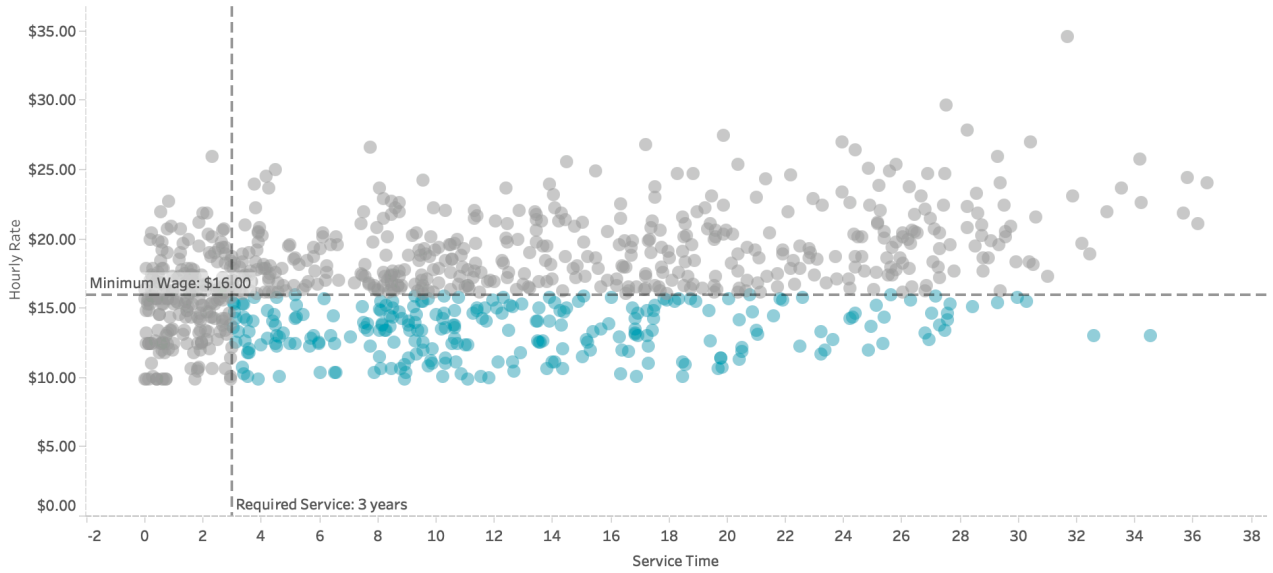
Required Service

3

Developed by Matt Chambers
http://sirvizalot.blogspot.com/

Below
256 (27.9%)

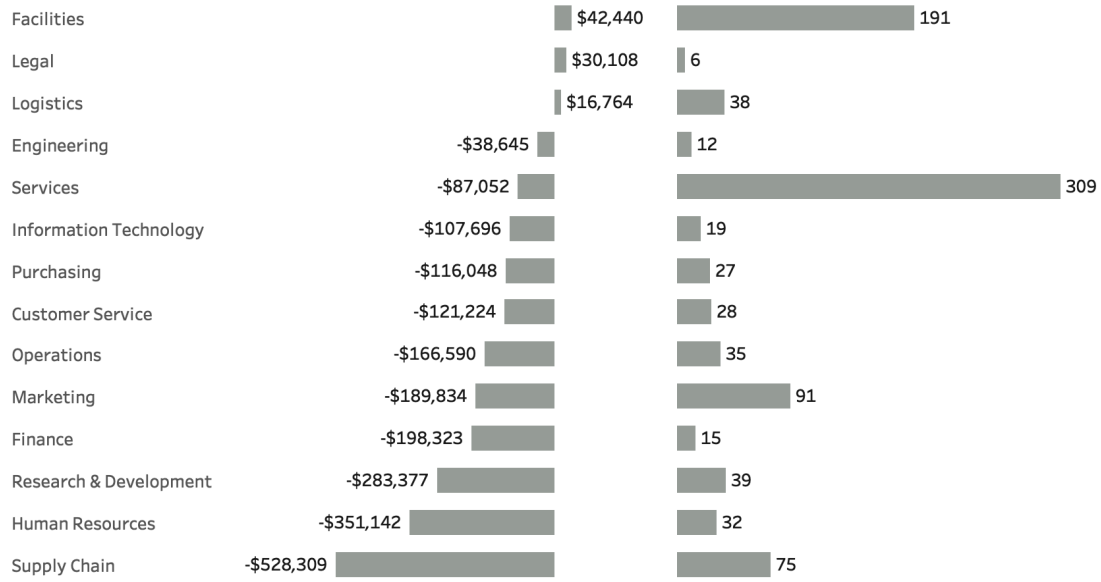
Above
661 (72.1%)



Dollar Impact of Minimum Wage: **$1,792,206**

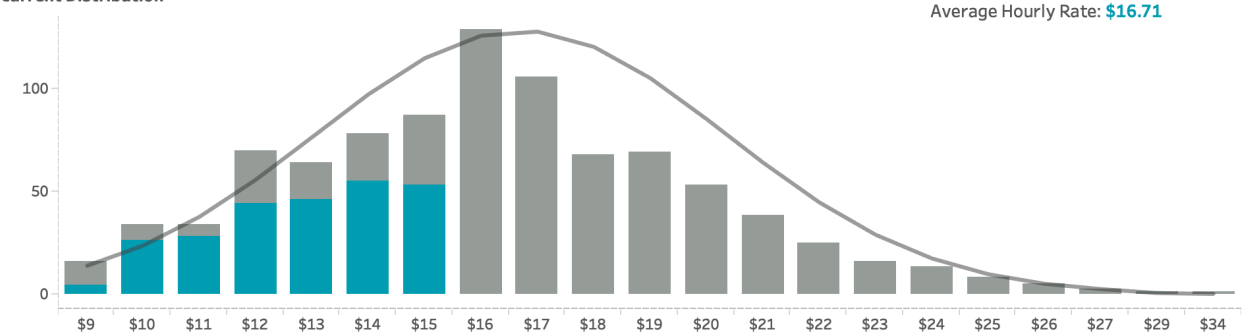
Employees Below Minimum Wage: **661**

Employees Below Minimum Wage: **256**



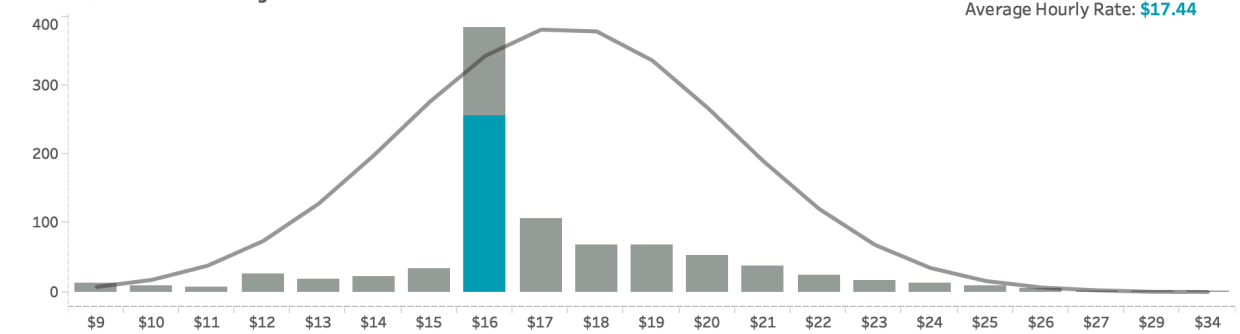
Current Distribution

Average Hourly Rate: **$16.71**



Distribution with Minimum Wage

Average Hourly Rate: **$17.44**



WHAT'S WRONG?

Dashboard #1: not glanceable, overuse of colour, pie charts??

Dashboard #2: 3D visualizations, distracting borders and background, lack of filtered data, insufficient labels and context

Dashboards #3 – 4: …

EXERCISE

In teams or individually, identify a scenario for which a dashboard could prove useful.

Determine specific questions that the dashboard could help answer or insights that it could provide.

Identify data sources and data elements that could be fed into your dashboard.

Design a display (with pen and paper) with mock charts.

What are the strengths and limitations of your dashboard? Is it functional? Elegant?

SOME WRAP-UP QUESTIONS

What did you learn through the dashboard exercise?

Was there anything that surprised you?

Would a dashboard be beneficial to your organization?

What team or skills sets would you need to do this in real life?

REFERENCES

REFERENCES

Interactive Data Visualization on Wikipedia

Is animation an effective tool for data visualization?, NASA

Wexler, S., Shaffer, J., Cotgreave, A. [2017], *The Big Book of Dashboards*, Wiley.

Beeley, C., Sukhdeve, S.R. [2018], *Web Application Development with R Using Shiny*, Packt.