

This lesson has been prepared to introduce students to the main ways of **using infographics** and data visualizations in **different contexts**, suggesting some tools that better support the creation of the different **applications** of information visualization.

In this lesson, we will learn:

The different **practical applications** of information visualization and some suitable **online tools** to create them, focusing on how they can be **applied to natural and cultural heritage**.





Photo credits by Andrea Piacquadio, Pexels

Some practical
applications of
infographics
and data
visualization

To learn how to properly use the fundamental elements of information visualization, i.e. data and information, you need to be aware of their **different applications**, in order to spot the **different styles and interaction modalities** that characterize each one.

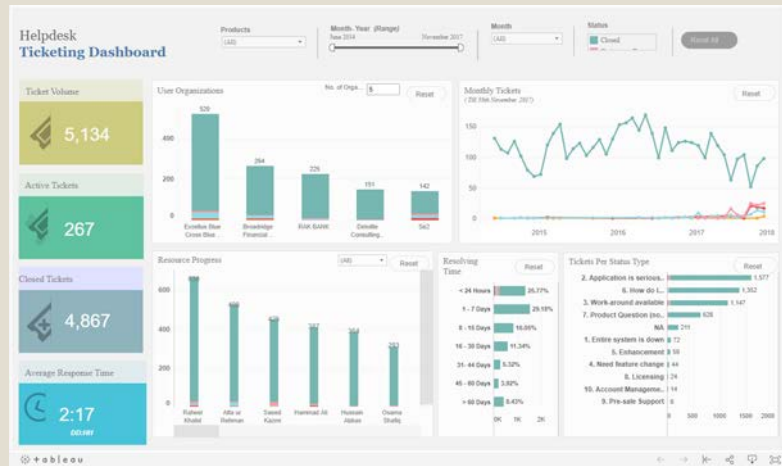
Following, different types of information visualization are presented, in order to help you in finding **which one best suits what you want** to represent in your infographic.

This is a brief introduction to a **very vast field**, so take this as a starting point.



Photo credits by Burst, Unsplash

Data and information can be visualized through specific User Interfaces, called **dashboards**. This is the **most suitable tool** for representing in a quick way large amounts of continuously updated data.



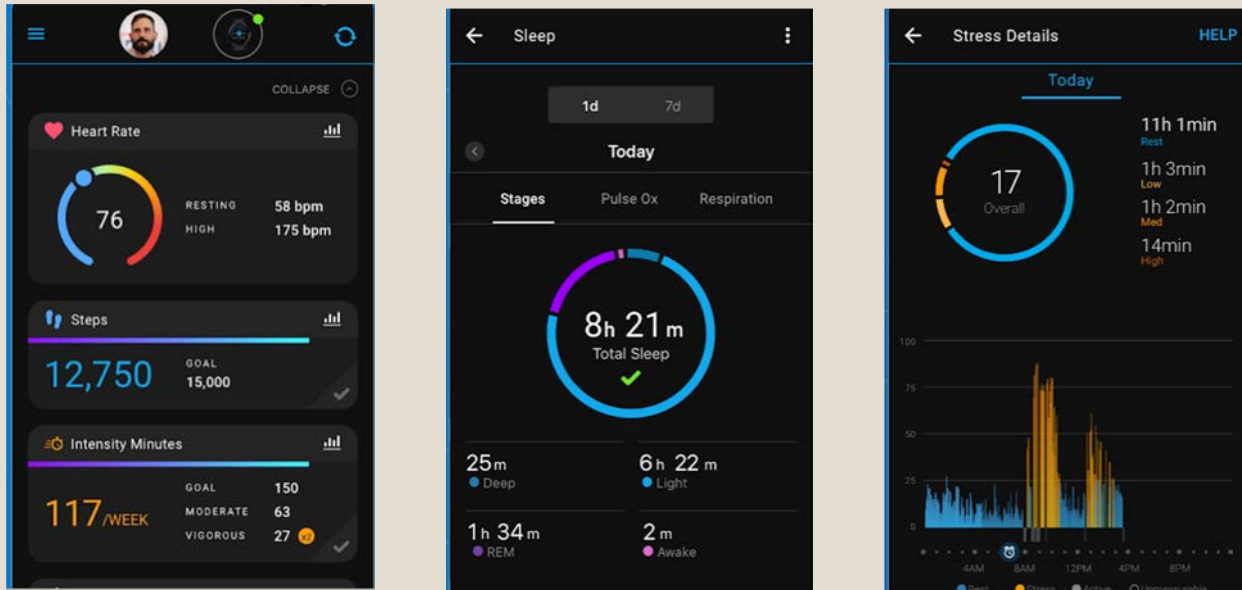
Source: <https://public.tableau.com/en-gb/gallery/helpdesk-ticketing-dashboard>



Source: <https://maryland.maps.arcgis.com/apps/opsdashboard/index.html#/0f3ffd3350b24b17bd3b8e1705af3df5>

Generally, dashboards display in a **single view** different kinds of **graphs, charts,** and other **graphical representations of data** supporting the search and elaboration of **insights** and the **decision-making** process based on data.

A similar visualization, even if less overloaded, can be found in some apps displaying data **from sensors** for monitoring different parameters or indicators. Think, for example, of running apps.



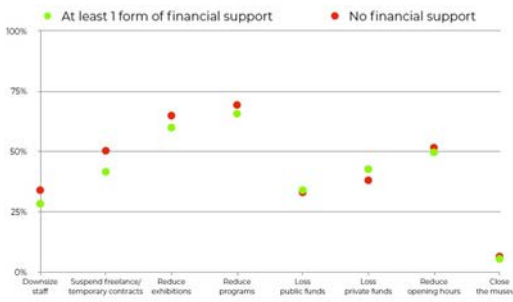
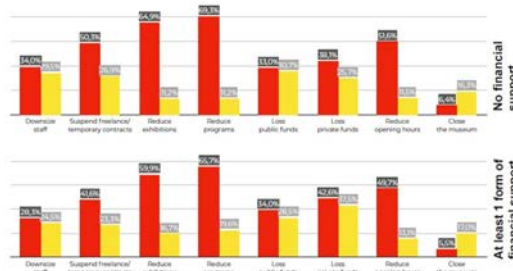
Source: <https://play.google.com/store/apps/details?id=com.garmin.android.apps.connectmobile>

Museums, museum professionals
and COVID-19: follow-up survey

ICOM

Financial support (or lack thereof) comparison

As a final analysis, we compared the expected economic impact for museums that stated that they had not received any financial support and for those that stated that they had received at least one. In this case data shows that, for all categories with the exception of future access to public or private funds, the expected negative impact percentages are generally lower. This further highlights how necessary it is for museums to be able to access financial support to ensure their stability.



ICOM - International Council of Museums

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Generally, **reports** deal more with providing compiled data and information, while **analytics** focus on delivering data analysis and interpretation to provide insights. However, both make a **critical use of graphs and charts** for communicating facts about a specific issue or system, especially organizations.

They present the **statistical or numerical picture** (as-is or to-be) of a given subject at a given time. Therefore, they use data visualization and infographics to show the results of a research or some forecasts derived from studies.

Source: <https://icom.museum/en/news/follow-up-report-museums-covid-19/>



Low culturally engaged audiences are far more local than cultural tourists, who tend to be high cultural engagers. What are the implications of this for pricing strategies?

Where do they come from?

Young Creatives

At 40% travelling less than 15 minutes to get to a museum, millennials are and Generation Z are the most hyperlocally-minded audiences.

Families

Family visitors are largely local. 65% of families visit within 30 minutes of their homes.

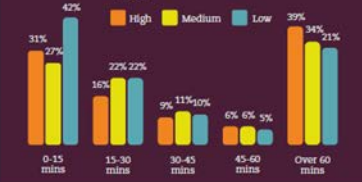
Older Learners

40% of 55+ audiences travel long distances to visit museums, suggesting that these visits form part of a day outing or longer trip.

Cultural Tourists

Whilst most artforms attract just 7% of their audiences from overseas, museums audiences are 12% non-UK residents.

Drive time x engagement level



Families and single adults are more likely to visit museums and attractions closer to home, whilst groups of adults will travel further afield.

Across all engagement levels, museums audiences are more likely to attend either very locally – within 30 minutes of their homes – or as part of a substantial trip – an hour or more away from home.

Within this pattern though, there are some stark differences between engagement levels, revealing almost as many 'cultural tourists' in high engaged groups as 'home bodies' in low engaged groups:

42% of low culturally engaged visitors live within 15 minutes of the museum they are visiting.

39% of highly culturally engaged visitors travelled over 60 minutes, compared to 21% of lower engaged audiences.

Regional Representation

Audience Spectrum profiles differ from region to region and museums generally attract a highly representative local demographic.

North Eastern museum audiences reflect the region's significant population of low cultural engagers. 39% of museums audiences in this region are usually low engaged.

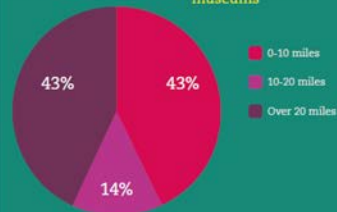
London museums rely on cultural frequent flyers. **Metroculturals** alone make up a third of London's museum goers.

In **London**, 37% of visitors are from overseas **37%**

19% of overseas audiences visit from USA **19%**

40% of overseas audiences visit from Europe **40%**

Home and Away



Travel distance to museums

% of attenders who live within a 30 minute drive of the museum they visit



Audience Finder data shows that museums in the **South East** and **West Midlands** attract more tourists whereas the **North East** audiences are highly local.



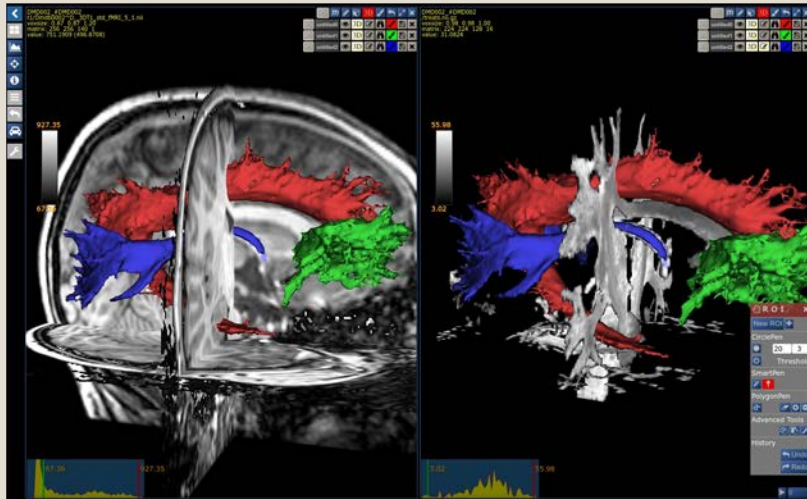
52% of all visitors live within a 30 minute drivetime of the museum they visit

They are particularly useful for marketing and business purposes.

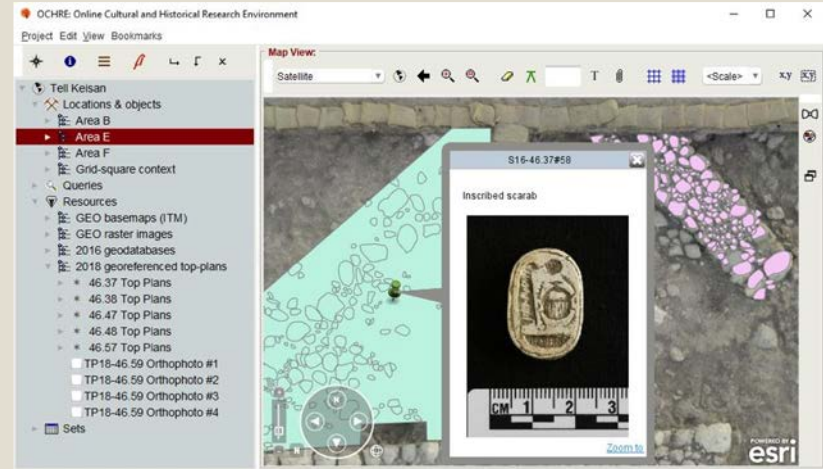
Source:

<https://www.theaudienceagency.org/resources/museums-audience-report>

An even more specialized and expert use of data visualization is made by the **softwares** and relative user interfaces employed by **scientists and physicians**.



Source: <https://www.nora-imaging.com/>



Source: <https://developers.arcgis.com/success-stories/ochre/>

In this case, a more accurate and rigorous **graphical representation** of scientific data is needed, in order to understand, analyse, explain and collect patterns and insights from data.

In recent years, because of the new trends in the digital era and the **easy access to tools** for analysing and representing data, infographics and data visualization have been used for **journalistic purposes**, as they are a **powerful form of communication**. In this case, they are both used to **inform and entertain**.

Photo credits by Edward Howell, Unsplash



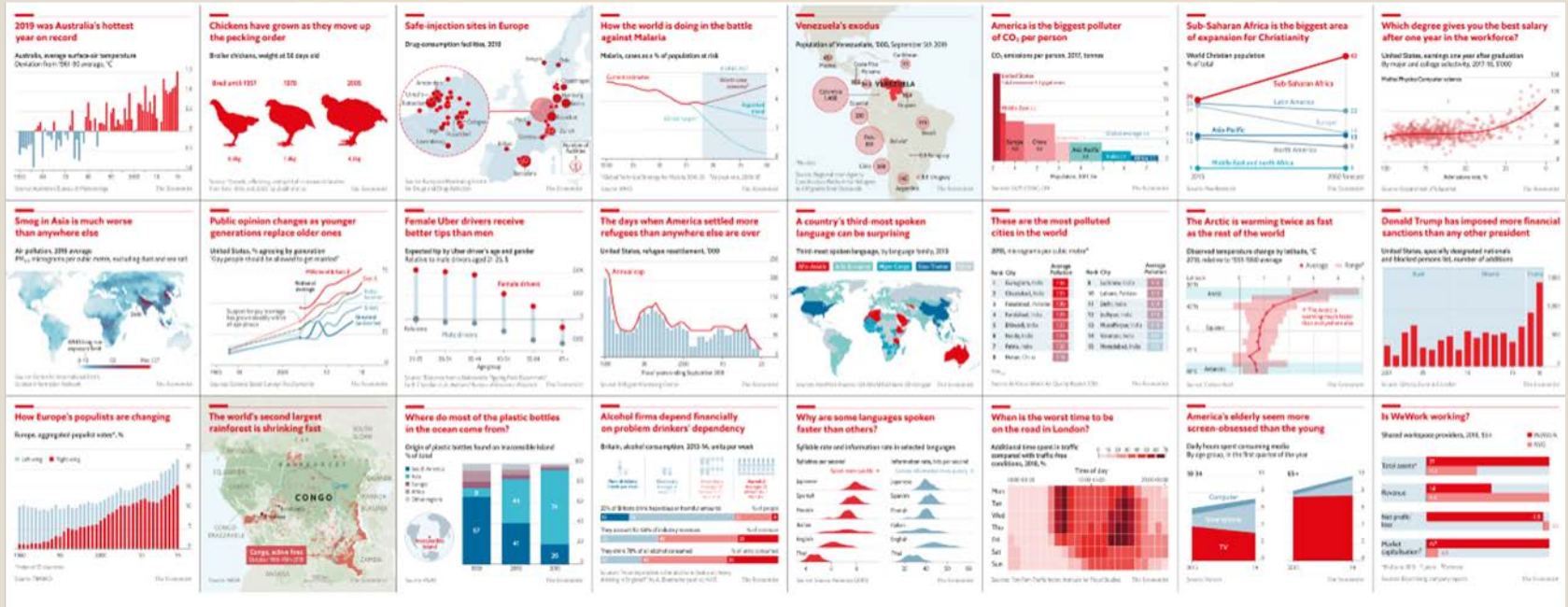
Indeed, they are especially effective when presenting a focus on a specific topic of interest or when they are used to clearly explain complex mechanisms and matters, since they **allow to have a deeper insight** on a news story or to **highlight relevant data**.

They can be **static or interactive** information visualizations.



Photo credits by Michal Czyz, Unsplash

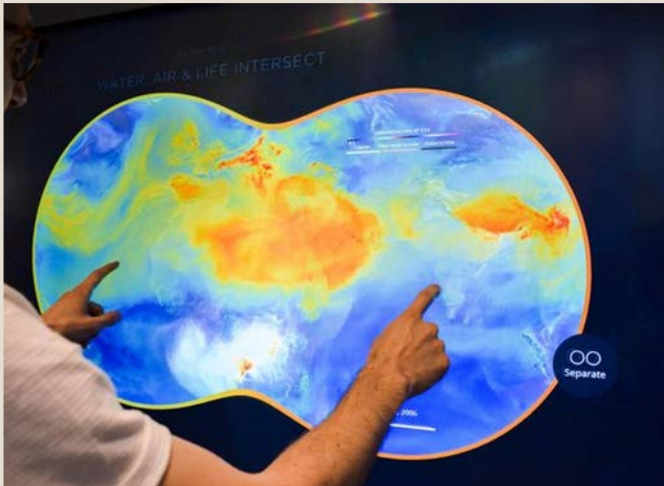
This is, instead, an example of several visualizations of data and information made by Helen Atkinson for the **Instagram channel of The Economist**.



Source: <https://medium.economist.com/charting-new-territory-7f5afb293270>

Data visualization also became a form of **digital art**. It can be used in exhibitions to **create engagement** through interactive installations that allow people to **explore or manipulate** data in a **dynamic or even creative way**.

Interacting with data became a cultural experience that may involve people in an active way (for example through crowdsourcing), or not, as part of the **visitor experience**.



Source:

<https://mw18.mwconf.org/glami/nasa-data-lens>

Installations having data as subjects or raw materials can employ very high level technology, such as artificial intelligence, to **meld art and information**.

On the contrary, data visualization can be used to **simply display relevant data and information** about an exhibit or a part of it.



Source: <https://pl.pinterest.com/evolvemedia1/created/>; <http://evolve-media.ro/en/index.php>

Although the different applications of information visualization mentioned above invest into areas concerning **natural and cultural heritage** to varying degrees, **infographics and data visualization** can be applied to this sector with high **benefits for promotional, educational, and experiential purposes**, in order to **enhance the relationship with the public** and improve the fruition of natural and cultural heritage.

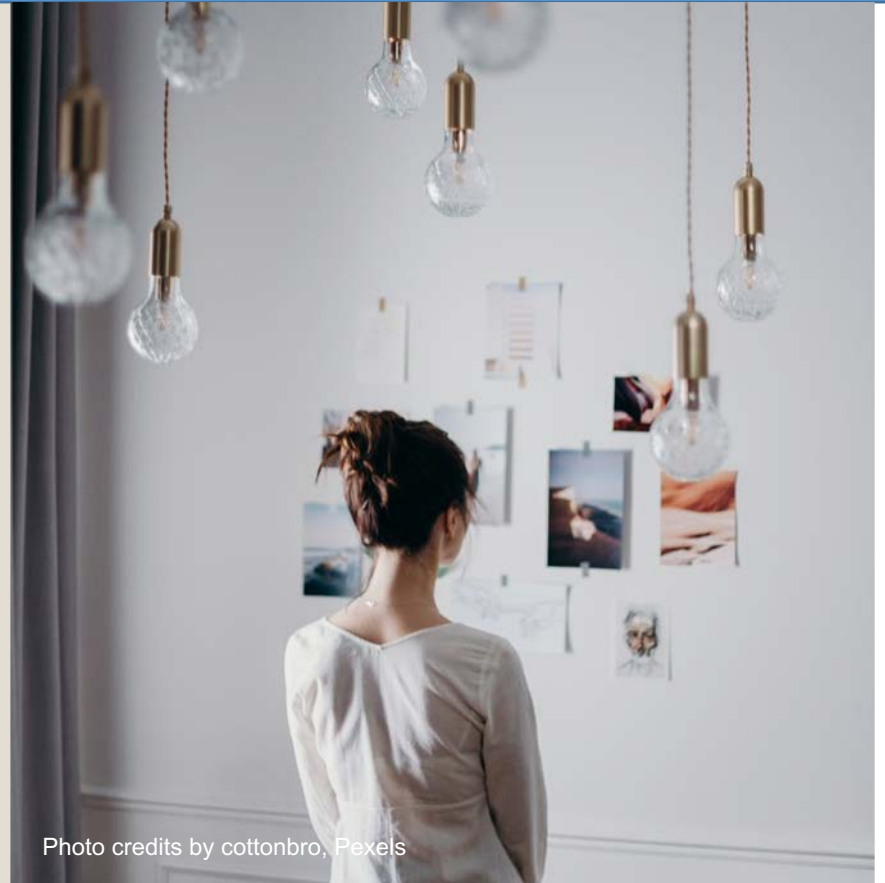
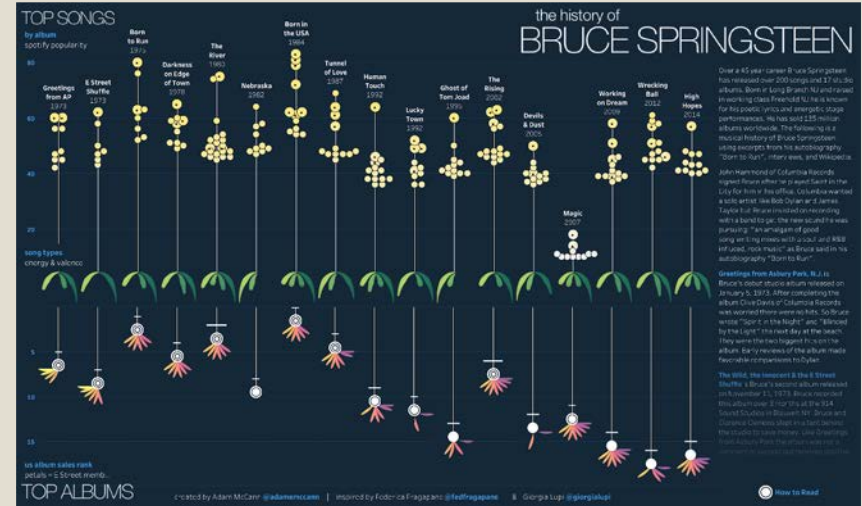
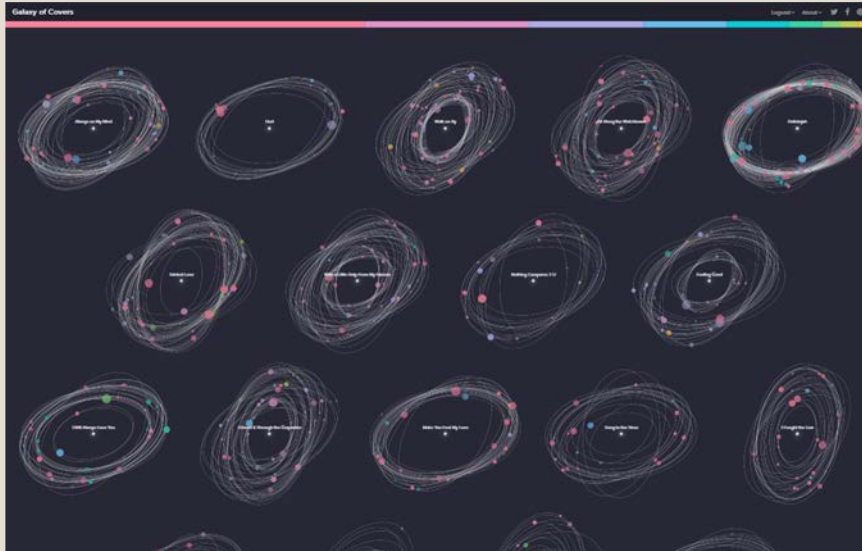


Photo credits by cottonbro, Pexels

Indeed, as already mentioned, they are **powerful tools for telling stories**, both for delving more deeply and for making more understandable a specific topic.

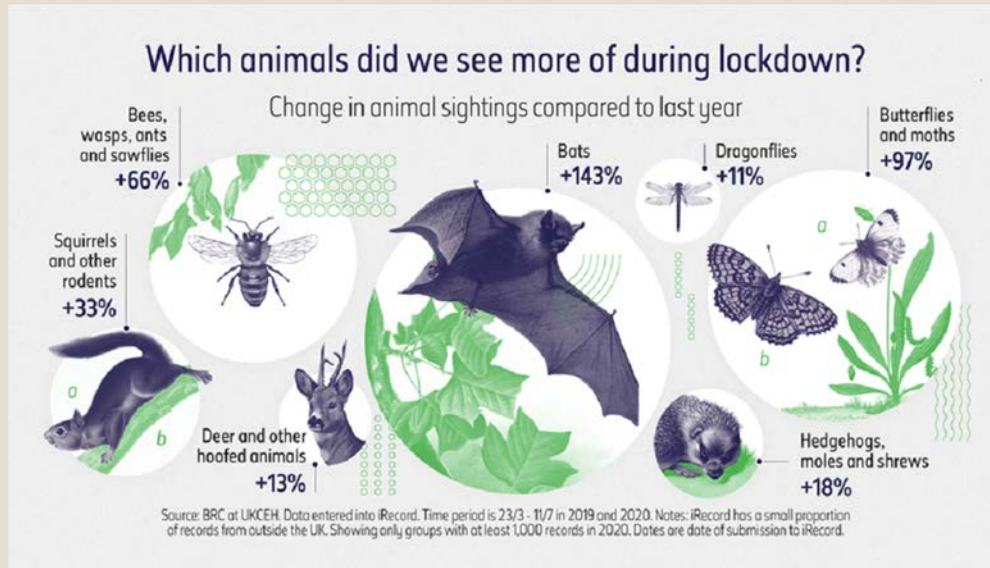


They can adopt different styles, being static and simpler or **interactive** and more elaborated visualizations.

Source: <https://public.tableau.com/en-gb/gallery/history-bruce-springsteen>

Source: <https://galaxy-of-covers.interactivethings.io/>

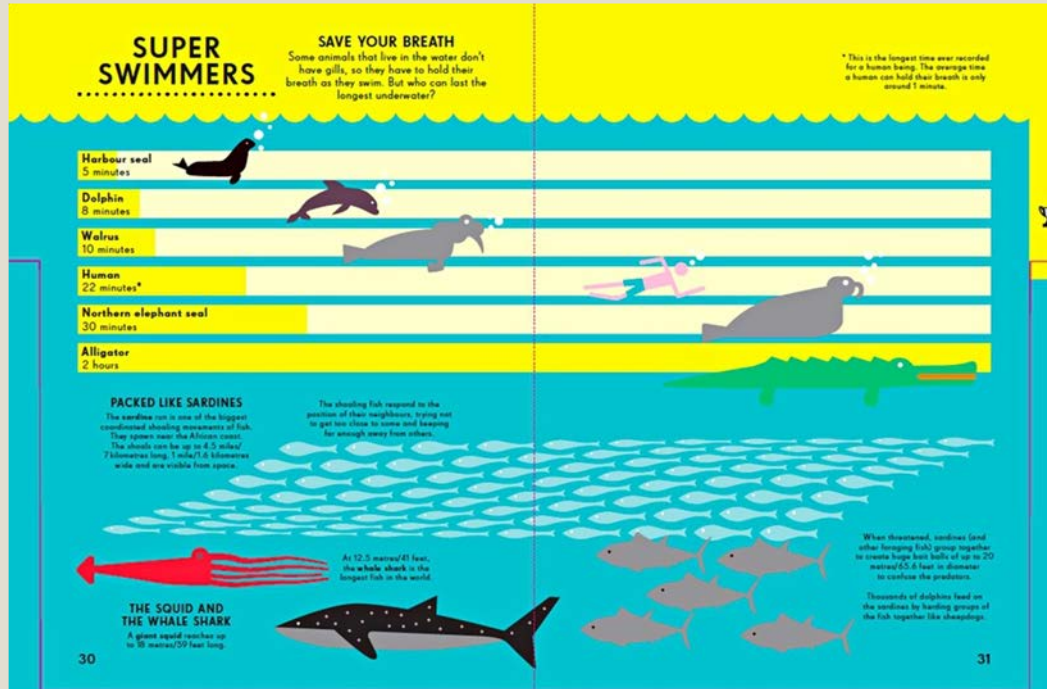
Infographics can be used for **disseminating scientific data** in a **more accessible way**, like The Natural History Museum did, as you can see in this figure.



It employs data visualization and infographics for **educating and engaging people**, in the view of establishing a new kind of relationship with the audience.

Source: <https://advisor.museumsandheritage.com/news/environmental-impacts-of-lockdown-charted-in-new-natural-history-museum-infographics/>

In museums, but also in other contexts, infographics and data visualization can be used to **disseminate** knowledge and **educate, especially kids**.



Source: "Information Graphics: Animal Kingdom" by Simon Rogers and Nicholas Blechman, <https://www.theguardian.com/news/datablog/2014/mar/07/infographics-for-children-can-learn-from-data-visualisations>

Another important and considerable application of infographics and data visualizations is made in physical and digital environments for **giving information and guiding visitors** in a journey through the available resources of the natural or cultural heritage. It is the case of description and information panels, maps, etc.

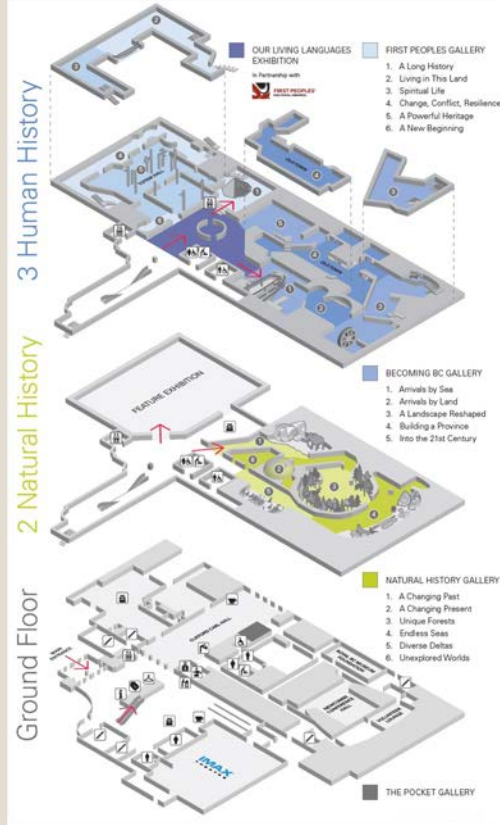


Source: <https://www.behance.net/gallery/26367445/The-Collection-as-a-Character>



This is an example of infographic for the signage of a naturalistic trail.

Source: <http://admarblecommunications.com/friends-of-the-wissahickon-trail-and-wayfinding-signage/>



Here an example of visual design used in a **guide map** to facilitate the explanation of the floor plan.

Source: <https://royalbcmuseum.bc.ca/>

Infographics can even be used **to decorate** the physical environment as a means for **busting motivation and creative inspiration.**



Source: <http://2ammedia.co.uk/blackpool-aspire-academy/>



Source: <https://ashton-design.com/work/mica-founders-green/>



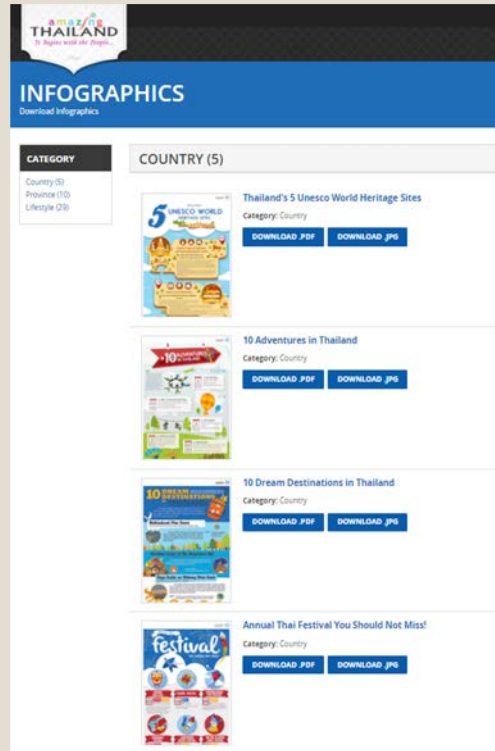
Here, an example of
The New York City
Marathon timeline.

Source:

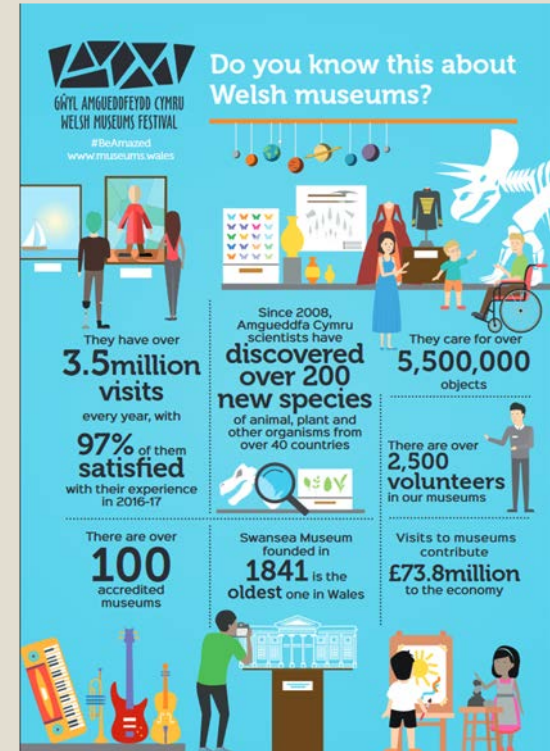
<https://www.archdaily.com/471468/pharmacy-museum-site-specific-arquitectura/52e72098e8e44e081d000267-pharmacy-museum-site-specific-arquitectura-photo>

Infographics and data visualizations can also be very **captivating tools** for **promotion** and rise of **awareness**.

For example, see how the tourism office of Thailand uses them for **marketing purposes** in one case, or the initiative of the Welsh Museums in the other case.



Source: <http://travelthailand.tourismthailand.org/infographic/>



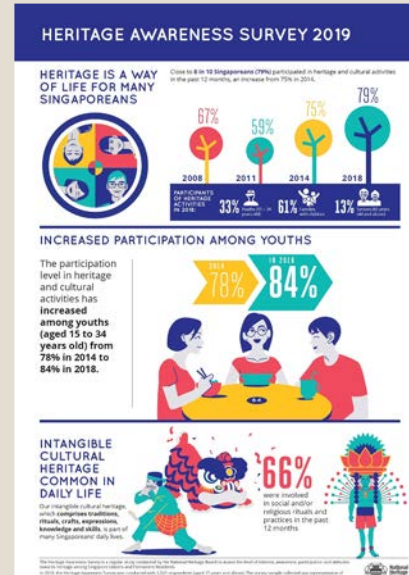
Source: <https://museum.wales/>

Even simplified and length-reduced **reports** illustrating cultural policies and plans, statistical surveys, or visitors feedback can be used to inform and engage people. In this case, the **style** for data visualizations and infographics will be different from that used for business purposes, aiming at having a **less serious and more joyful look**.



Source:

<https://www.oursqheritage.gov.sg/>
<https://www.oursqheritage.gov.sg/wp-content/uploads/2018/04/English.pdf>



Source:

<https://www.nhb.gov.sg/what-we-do/our-work/sector-development/heritage-awareness-survey-2019>

Lastly, notice that many apps, websites, and other online platforms, make large use of visual elements typically applied in infographics and data visualizations, such as **maps, icons and photos, illustrations**, especially in the field of natural and cultural heritage, as the **visual language** is very effective in conveying meanings and creating engagement. Therefore, it is a **valuable resource** for promotion and dissemination.



Photo credits by Christian Wiediger, Unsplash



Photo credits by Julie Molliver, Unsplash

Some tools for
the creation of
infographics
and data
visualizations

As already said, the realization of infographics and data visualizations may require **some specific technical skills** referring to graphic, data analysis, and programming.



Photo credits by Matthew Waring, Unsplash

However, there are a lot of **specialized tools supporting non-experts** in creating their projects and offering to expert people a lot of functionalities to make amazing information visualizations.

Let's have a quick look at some of the **most suitable online tools** to create them.

In detail, the different tools suit **different design needs** according to the type of application the infographic or data visualization is made for. Some are more recommended for creating **charts and visualizing data**, others for creating more **pictorial and illustrative visualization** of information, in a static or interactive form.

You can use them or find others more suitable to you for your future projects.

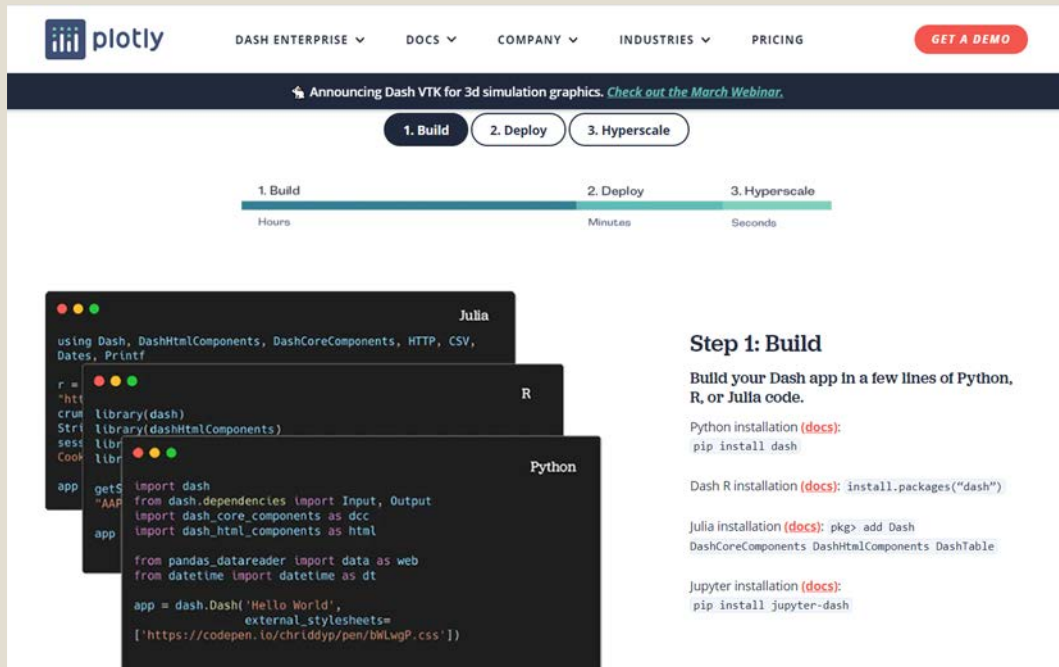


Photo credits by NeONBRAND, Unsplash

1. Plotly (<https://plotly.com/>)

Plotly is an online data analysis and visualization tool **perfect for creating dashboards.**

It allows to create different types of **interactive web apps, graphs, and visualizations** in any programming language.



The screenshot shows the Plotly website header with navigation links: DASH ENTERPRISE, DOCS, COMPANY, INDUSTRIES, and PRICING. A red button labeled "GET A DEMO" is visible. Below the header is a dark blue banner with the text "Announcing Dash VTK for 3d simulation graphics. Check out the March Webinar." and three buttons: "1. Build", "2. Deploy", and "3. Hyperscale". A progress bar below the buttons shows "1. Build" completed in "Hours", "2. Deploy" in "Minutes", and "3. Hyperscale" in "Seconds".

Below the progress bar are three code snippets for different programming languages:

```
Julia
using Dash, DashHtmlComponents, DashCoreComponents, HTTP, CSV,
Dates, Printf

r = "htt
crum library(dash)
Str library(dashHtmlComponents)
sess libr
Cook libr

app getS
"AAP
app

Python
import dash
from dash.dependencies import Input, Output
import dash_core_components as dcc
import dash_html_components as html

from pandas_datareader import data as web
from datetime import datetime as dt

app = dash.Dash('Hello World',
                external_stylesheets=
                ['https://codepen.io/chriddyp/pen/bWLwgP.css'])
```

Step 1: Build

Build your Dash app in a few lines of Python, R, or Julia code.

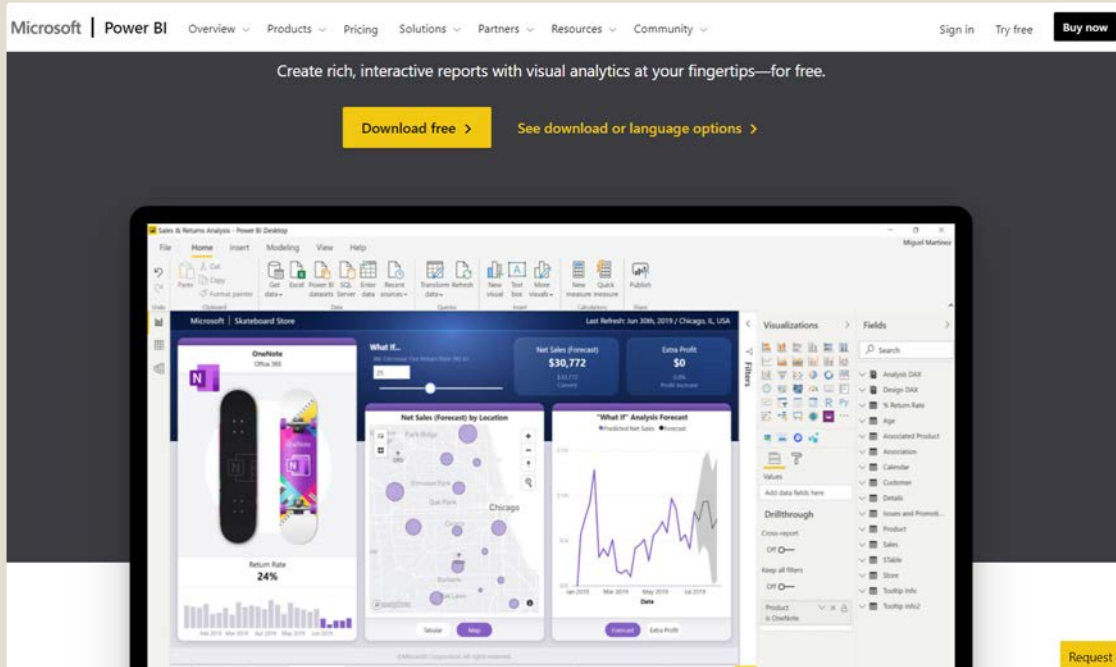
Python installation ([docs](#)):
`pip install dash`

Dash R installation ([docs](#)): `install.packages("dash")`

Julia installation ([docs](#)): `pkg> add Dash`
`DashCoreComponents DashHtmlComponents DashTable`

Jupyter installation ([docs](#)):
`pip install jupyter-dash`

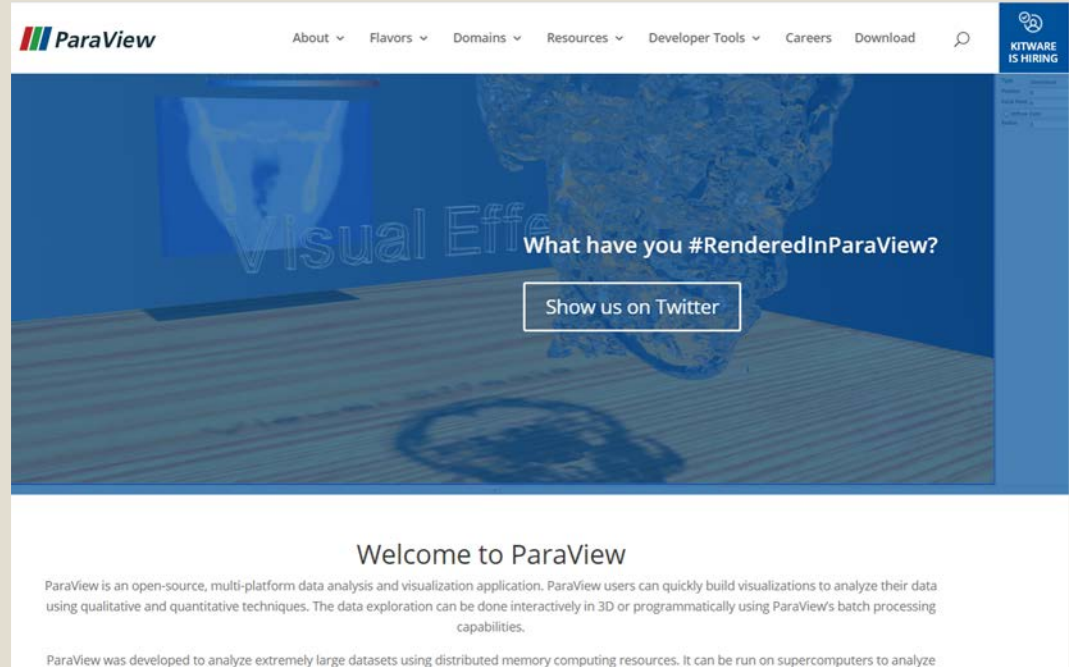
2. Microsoft Power BI (<https://www.finereport.com/>)



Microsoft Power BI is another online data analysis and visualization tool **perfect for generating and publishing reports** for business intelligence. It allows to import and process data, creating rich and interactive reports with visual analytics.

3. ParaView (<https://www.paraview.org/>)

ParaView is an **open-source application** especially useful to **scientists** and researchers for data analysis and visualization. It allows users to import, visualize, and analyze data. The exploration of the scientific data can also be done **interactively in 3D** or programmatically.



The screenshot shows the ParaView website homepage. At the top, there is a navigation bar with the ParaView logo on the left and menu items: About, Flavors, Domains, Resources, Developer Tools, Careers, and Download. On the far right of the navigation bar is a search icon and a 'KITWARE IS HIRING' button. The main content area features a large blue background with a 3D visualization of a human skull. Overlaid on this is the text 'Visual Effects' and a call to action: 'What have you #RenderedInParaView?' with a 'Show us on Twitter' button. Below this, the text reads 'Welcome to ParaView' followed by a paragraph: 'ParaView is an open-source, multi-platform data analysis and visualization application. ParaView users can quickly build visualizations to analyze their data using qualitative and quantitative techniques. The data exploration can be done interactively in 3D or programmatically using ParaView's batch processing capabilities.' At the bottom, a smaller paragraph states: 'ParaView was developed to analyze extremely large datasets using distributed memory computing resources. It can be run on supercomputers to analyze

4. Tableau Public (<https://public.tableau.com/en-us/s/>)



Data Storytelling

Easily create stunning interactive visualizations on our free platform. No coding required.



Spark Conversation

Connect with authors from around the world. Embed your visualizations on a personal website, blog, or social media.



Be Inspired

Explore and interact with the most extensive library of data visualizations in the world with over 1 million user-generated possibilities.

WHAT IS TABLEAU PUBLIC? LEARN MORE —

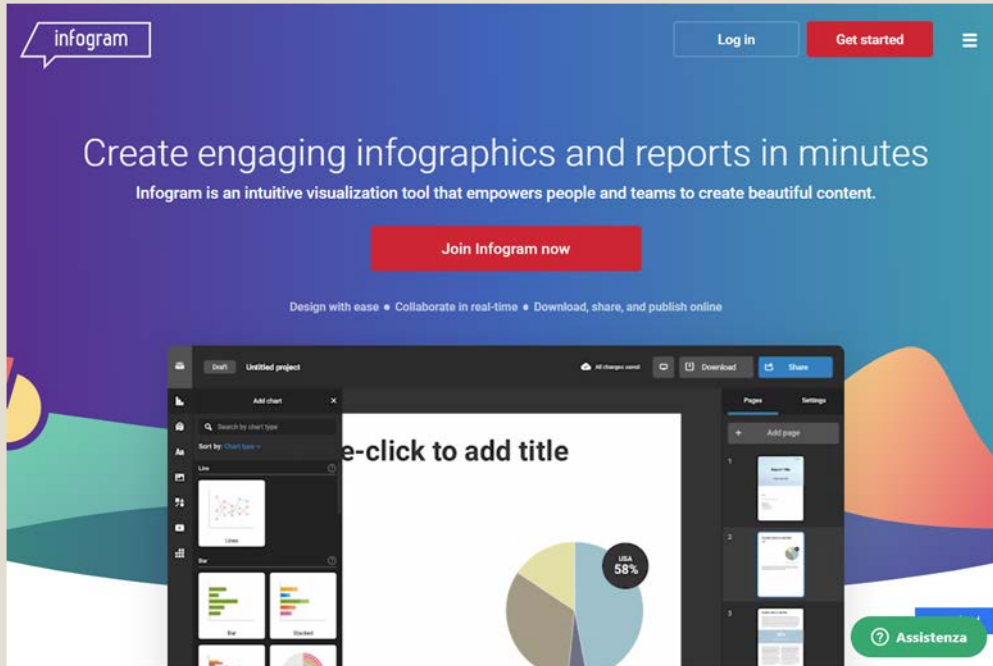
Tableau Public is an **online data visualization tool** largely used for many different projects, including **data journalism**. It allows users to create interactive data visualizations, analytics and reports. The different creations made with it can be **shared** and explored online.

5. D3.js (<https://d3js.org/>)

D3.js is a **JavaScript library** useful to people that have some **skill in programming**, or at least in **using HTML, SVG, and CSS**, for developing dynamic and interactive information visualizations. It allows users to create data visualizations in **web browsers**, combining powerful visualization components and the manipulation of documents based on data.



6. Infogr.am (<https://infogram.com/>)

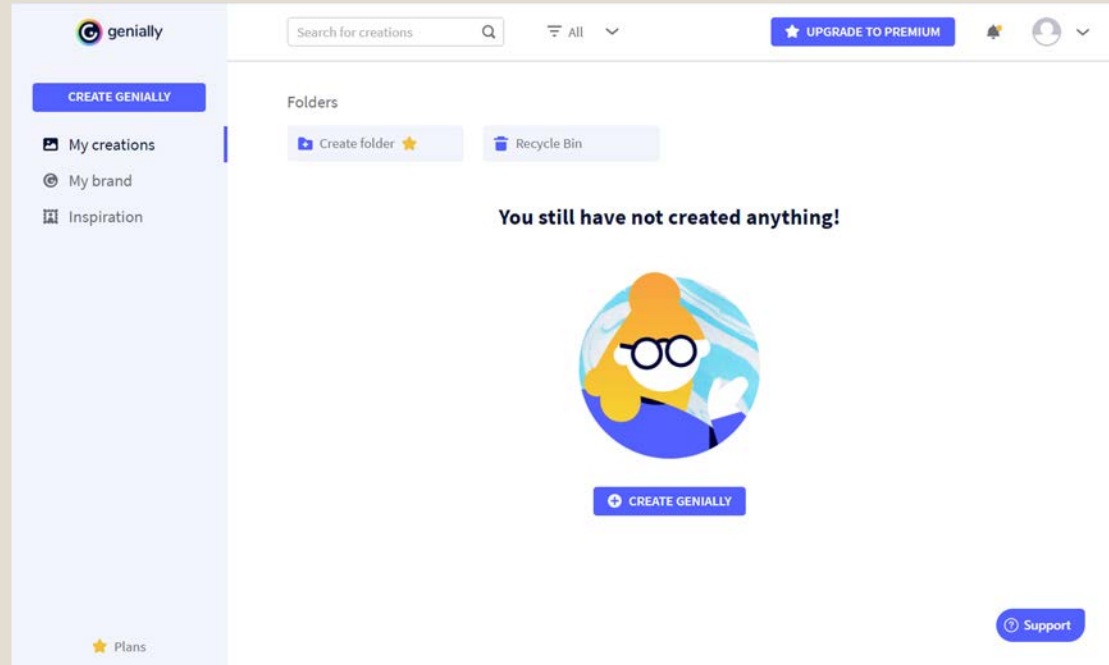


Infogr.am is an **intuitive web-based tool** for creating infographics and visualizing data. It allows users to make and share engaging visuals, reports, and interactive charts and maps.

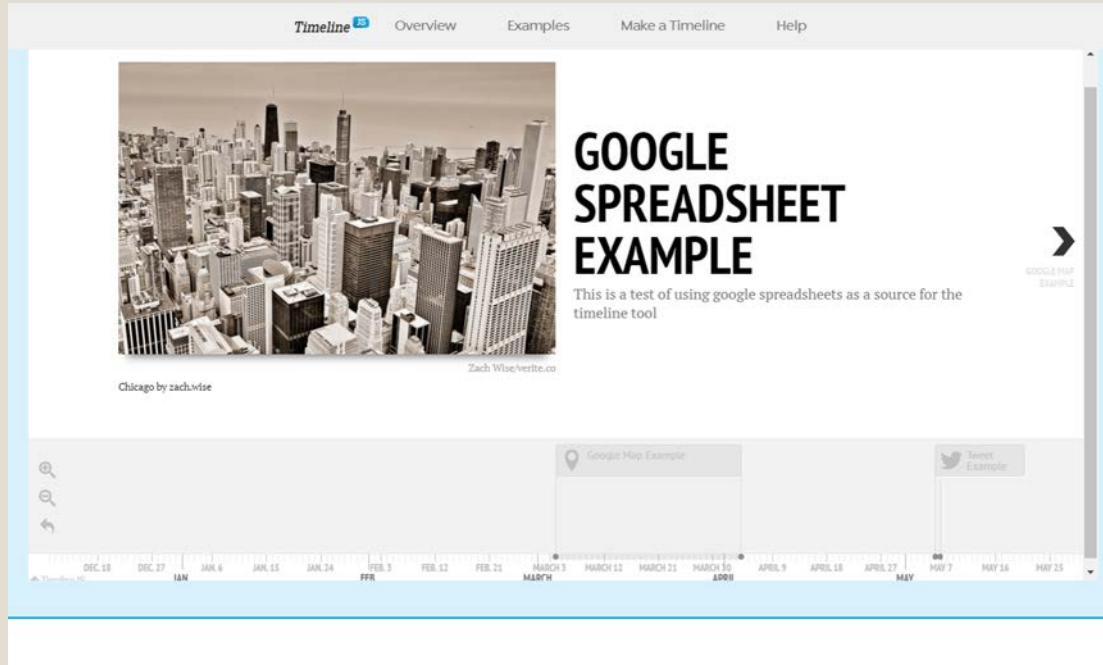
Other similar tools are: Visme (<https://www.visme.co/>), Venngage (<https://venngage.com/>), Easel.ly (<https://www.easel.ly/>), etc.

7. Genial.ly (<https://www.genial.ly/>)

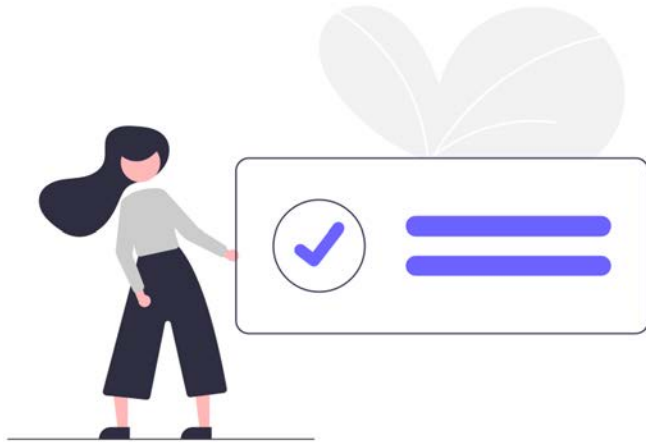
Genial.ly is another **web-based tool** suitable for making **interactive presentations, infographics and quizzes**. It allows users to create video presentations and information visualizations, with interactive contents, too.



8. TimelineJS (<https://timeline.knightlab.com/>)



TimelineJS is an **open-source tool** that enables users to build **interactive timelines**. Beginners can create a timeline using Google spreadsheet, experts can use their JSON skills.



Conclusions

Thanks to the skills acquired with this lesson, students will be able to increase their references about the different applications of information visualization and the most suitable online tools to create them, so that they can make more informed choices when creating their infographics.

Thank you for your attention!

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