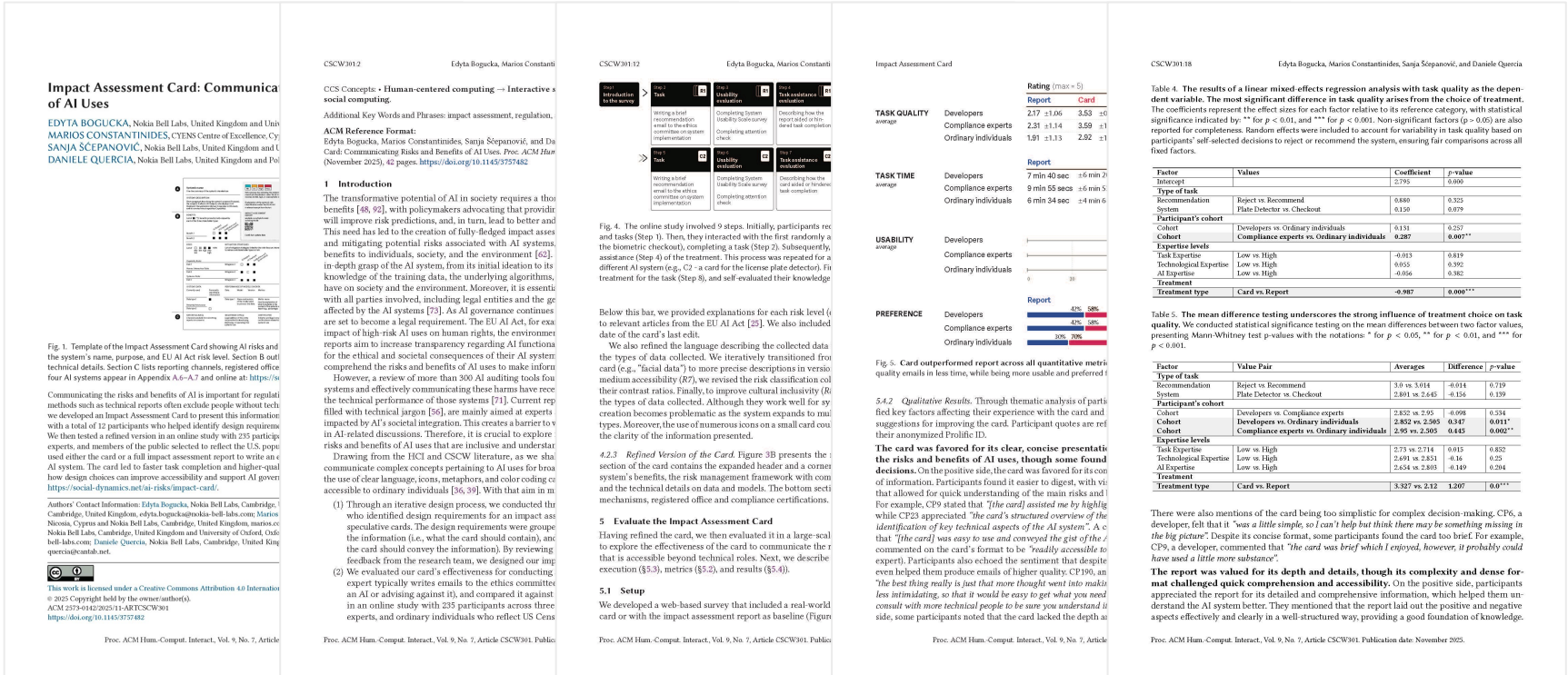
Tips & Tricks for Charts

How to make your report look great

Congrats, you wrote a report!



Impact Assessment Card: Communica
of AI Uses

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Fig. 1. Template of the Impact Assessment Card showing AI risks and
the system's name, purpose, and EU AI Act risk level. Section B outl
technical details. Section C lists reporting channels, registered office
four AI systems appear in Appendix A.6–A.7 and online at: https://s

Communicating the risks and benefits of AI is important for regulati
methods such as technical reports often exclude people without techn
we developed an Impact Assessment Card to present this information
with a total of 12 participants who helped identify design requirems
We then tested a refined version in an online study with 235 particip
experts, and members of the public selected to reflect the U.S. popu
used either the card or a full impact assessment report to write an e
AI system. The card led to faster task completion and higher-qual
how design choices can improve accessibility and support AI gover
https://social-dynamics.net/ai-risks/impact-card/.

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CCS Concepts: • **Human-centered computing** → **Interactive s
social computing.**

Additional Key Words and Phrases: impact assessment, regulation,

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1 Introduction

The transformative potential of AI in society requires a tho
benefits [48, 92], with policymakers advocating that providir
will improve risk predictions, and, in turn, lead to better and
This need has led to the creation of fully-fledged impact asses
and mitigating potential risks associated with AI systems,
benefits to individuals, society, and the environment [62].
in-depth grasp of the AI system, from its initial ideation to its
knowledge of the training data, the underlying algorithms,
have on society and the environment. Moreover, it is essenti
with all parties involved, including legal entities and the ge
affected by the AI systems [73]. As AI governance continues
are set to become a legal requirement. The EU AI Act, for exa
impact of high-risk AI uses on human rights, the environme
reports aim to increase transparency regarding AI functiona
for the ethical and societal consequences of their AI system
comprehend the risks and benefits of AI uses to make inform

However, a review of more than 300 AI auditing tools fou
systems and effectively communicating these harms have rece
the technical performance of those systems [71]. Current rep
filled with technical jargon [56], are mainly aimed at experts
impacted by AI's societal integration. This creates a barrier to v
in AI-related discussions. Therefore, it is crucial to explore
risks and benefits of AI uses that are inclusive and understar

Drawing from the HCI and CSCW literature, as we shal
communicate complex concepts pertaining to AI uses for broa
the use of clear language, icons, metaphors, and color coding ca
accessible to ordinary individuals [36, 39]. With that aim in m

(1) Through an iterative design process, we conducted thr
who identified design requirements for an impact ass
speculative cards. The design requirements were groupe
the information (i.e., what the card should contain), anc
the card should convey the information). By reviewing
feedback from the research team, we designed our imp
(2) We evaluated our card's effectiveness for conducting
expert typically writes emails to the ethics committee
an AI or advising against it), and compared it against
in an online study with 235 participants across three
experts, and ordinary individuals who reflect US Cens

Step 1 Introduction to the survey
Step 2 Task
Step 3 Usability evaluation
Step 4 Task assistance evaluation
Writing a brief recommendation email to the ethics committee on system implementation
Completing System Usability Scale survey
Completing attention check
Describing how the report aided or hindered task completion
Step 5 Task
Step 6 Usability evaluation
Step 7 Task assistance evaluation
Writing a brief recommendation email to the ethics committee on system implementation
Completing System Usability Scale survey
Completing attention check
Describing how the card aided or hinderec task completion

Fig. 4. The online study involved 9 steps. Initially, participants rec
and tasks (Step 1). Then, they interacted with the first randomly a
the biometric checkout), completing a task (Step 2). Subsequently,
assistance (Step 4) of the treatment. This process was repeated for a
different AI system (e.g., C2 –a card for the license plate detector). Fi
treatment for the task (Step 8), and self-evaluated their knowledge

Below this bar, we provided explanations for each risk level (
to relevant articles from the EU AI Act [25]. We also included
date of the card's last edit.

We also refined the language describing the collected data
the types of data collected. We iteratively transitioned fro
card (e.g., "facial data") to more precise descriptions in versio
medium accessibility (*R7*), we revised the risk classification col
their contrast ratios. Finally, to improve cultural inclusivity (*R*
the types of data collected. Although they work well for sy
creation becomes problematic as the system expands to mu
types. Moreover, the use of numerous icons on a small card cou
the clarity of the information presented.

4.2.3 Refined Version of the Card. Figure 3B presents the
section of the card contains the expanded header and a corne
system's benefits, the risk management framework with com
and the technical details on data and models. The bottom secti
mechanisms, registered office and compliance certifications.

5 Evaluate the Impact Assessment Card

Having refined the card, we then evaluated it in a large-scal
to explore the effectiveness of the card to communicate the r
that is accessible beyond technical roles. Next, we describe
execution (§5.3), metrics (§5.2), and results (§5.4)).

5.1 Setup

We developed a web-based survey that included a real-world
card or with the impact assessment report as baseline (Figur

Rating (max = 5)

		Report	Card
TASK QUALITY average	Developers	2.17 ±1.06	3.53 ±0
	Compliance experts	2.31 ±1.14	3.59 ±1
	Ordinary individuals	1.91 ±1.13	2.92 ±1

		Report
TASK TIME average	Developers	7 min 40 sec ±6 min 2
	Compliance experts	9 min 55 secs ±6 min 5
	Ordinary individuals	6 min 34 sec ±4 min 6

USABILITY average: Developers, Compliance experts, Ordinary individuals (0 … 30)

		Report
PREFERENCE	Developers	42% 58%
	Compliance experts	42% 58%
	Ordinary individuals	30% 70%

Fig. 5. **Card outperformed report across all quantitative metri**
quality emails in less time, while being more usable and preferred t

5.4.2 Qualitative Results. Through thematic analysis of parti
fied key factors affecting their experience with the card and
suggestions for improving the card. Participant quotes are ref
their anonymized Prolific ID.

**The card was favored for its clear, concise presentatio
the risks and benefits of AI uses, though some found
decisions.** On the positive side, the card was favored for its con
of information. Participants found it easier to digest, with vis
that allowed for quick understanding of the main risks and
For example, CP9 stated that *"[the card] assisted me by highlig*
while CP23 appreciated *"the card's structured overview of the*
identification of key technical aspects of the AI system". A c
that *"[the card] was easy to use and conveyed the gist of the A*
commented on the card's format to be *"readily accessible to*
expert). Participants also echoed the sentiment that despite
even helped them produce emails of higher quality. CP190, an
"the best thing really is just that more thought went into makin
less intimidating, so that it would be easy to get what you need
consult with more technical people to be sure you understand it
side, some participants noted that the card lacked the depth a

Table 4. **The results of a linear mixed-effects regression analysis with task quality as the dependent variable. The most significant difference in task quality arises from the choice of treatment.** The coefficients represent the effect sizes for each factor relative to its reference category, with statistical significance indicated by: ** for $p < 0.01$, and *** for $p < 0.001$. Non-significant factors ($p > 0.05$) are also reported for completeness. Random effects were included to account for variability in task quality based on participants' self-selected decisions to reject or recommend the system, ensuring fair comparisons across all fixed factors.

Factor	Values	Coefficient	p-value
Intercept		2.795	0.000
Type of task			
Recommendation	Reject vs. Recommend	0.880	0.325
System	Plate Detector vs. Checkout	0.150	0.079
Participant's cohort			
Cohort	Developers vs. Ordinary individuals	0.131	0.257
Cohort	**Compliance experts vs. Ordinary individuals**	**0.287**	**0.007****
Expertise levels			
Task Expertise	Low vs. High	-0.013	0.819
Technological Expertise	Low vs. High	0.055	0.392
AI Expertise	Low vs. High	-0.056	0.382
Treatment			
Treatment type	**Card vs. Report**	**-0.987**	**0.000*****

Table 5. **The mean difference testing underscores the strong influence of treatment choice on task quality.** We conducted statistical significance testing on the mean differences between two factor values, presenting Mann-Whitney test p-values with the notations: * for $p < 0.05$, ** for $p < 0.01$, and *** for $p < 0.001$.

Factor	Value Pair	Averages	Difference	p-value
Type of task				
Recommendation	Reject vs. Recommend	3.0 vs. 3.014	-0.014	0.719
System	Plate Detector vs. Checkout	2.801 vs. 2.645	-0.156	0.139
Participant's cohort				
Cohort	Developers vs. Compliance experts	2.852 vs. 2.95	-0.098	0.534
Cohort	**Developers vs. Ordinary individuals**	**2.852 vs. 2.505**	**0.347**	**0.011***
Cohort	**Compliance experts vs. Ordinary individuals**	**2.95 vs. 2.505**	**0.445**	**0.002****
Expertise levels				
Task Expertise	Low vs. High	2.73 vs. 2.714	0.015	0.852
Technological Expertise	Low vs. High	2.691 vs. 2.851	-0.16	0.25
AI Expertise	Low vs. High	2.654 vs. 2.803	-0.149	0.204
Treatment				
Treatment type	**Card vs. Report**	**3.327 vs. 2.12**	**1.207**	**0.0*****

There were also mentions of the card being too simplistic for complex decision-making, CP6, a developer, felt that it *"was a little simple, so I can't help but think there may be something missing in the big picture"*. Despite its concise format, some participants found the card too brief. For example, CP9, a developer, commented that *"the card was brief which I enjoyed, however, it probably could have used a little more substance"*.

The report was valued for its depth and details, though its complexity and dense format challenged quick comprehension and accessibility. On the positive side, participants appreciated the report for its detailed and comprehensive information, which helped them understand the AI system better. They mentioned that the report laid out the positive and negative aspects effectively and clearly in a well-structured way, providing a good foundation of knowledge.

https://social-dynamics.net/ai-risks/impact-card

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But honestly, this is how most people (incl. managers) will read it

Rule #1 Keep it skimmable:
Readers should be able to understand the flow and main results of your research just by looking at the figures and their captions.

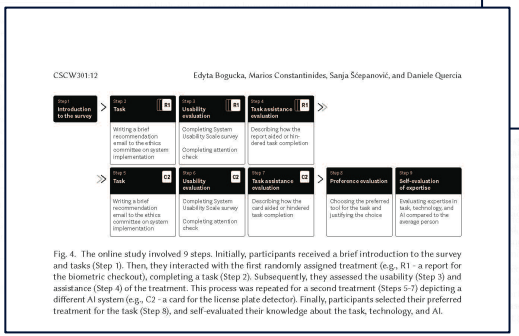

Fig. 4. The online study involved 9 steps. Initially, participants received a brief introduction to the survey and tasks (Step 1). Then, they interacted with the first randomly assigned treatment (e.g., R1 - a report for the biometric checkout), completing a task (Step 2). Subsequently, they assessed the usability (Step 3) and assistance (Step 4) of the treatment. This process was repeated for a second treatment (Steps 5-7) depicting a different AI system (e.g., C2 - a card for the license plate detector). Finally, participants selected their preferred treatment for the task (Step 8), and self-evaluated their knowledge about the task, technology, and AI.

Fig. 5. **Card outperformed report across all quantitative metrics and cohorts.** It helped produce higher quality emails in less time, while being more usable and preferred for the task.

Table 4. **The results of a linear mixed-effects regression analysis with task quality as the dependent variable. The most significant difference in task quality arises from the choice of treatment.** The coefficients represent the effect sizes for each factor relative to its reference category, with statistical significance indicated by: ** for $p < 0.01$, and *** for $p < 0.001$. Non-significant factors ($p > 0.05$) are also reported for completeness. Random effects were included to account for variability in task quality based on participants' self-selected decisions to reject or recommend the system, ensuring fair comparisons across all fixed factors.

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https://social-dynamics.net/ai-risks/impact-card

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Part 1

Discuss common chart types you may need for your paper

Part 2

Write clear, self-contained captions for your figures

Part 3

Avoid the most common figure mistakes

Part 4

Improve your figure production pipeline

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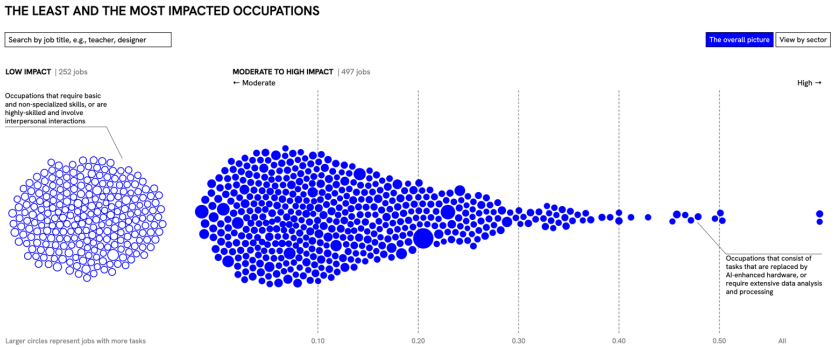
Part 1

Discuss common chart types you may need for your paper

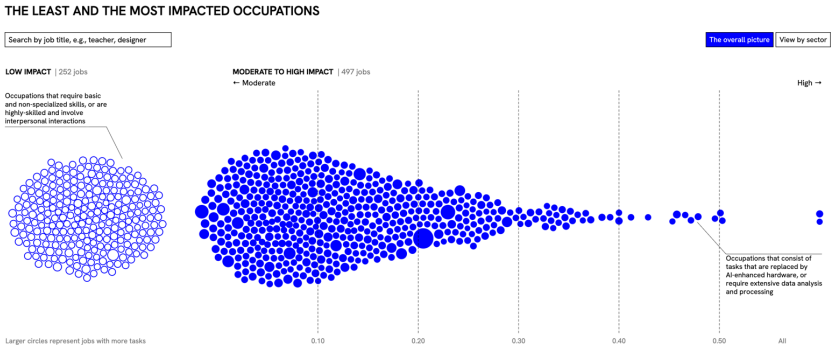
Two chart types often used in papers



Data-driven charts for your experiments and results

https://social-dynamics.net/aii

Two chart types often used in papers



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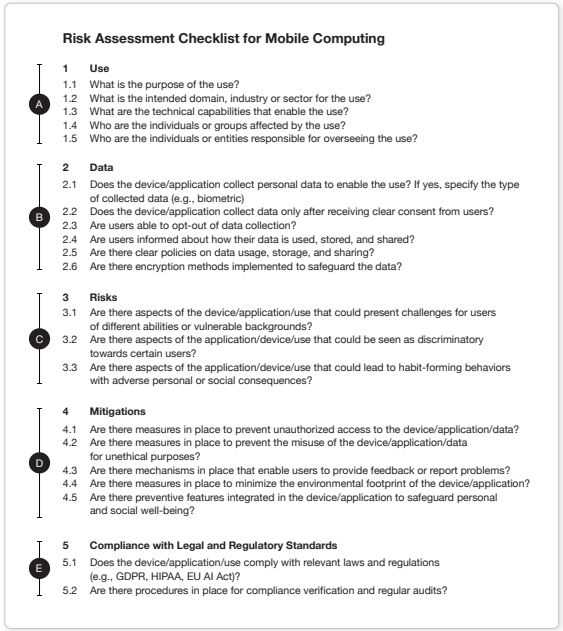

Risk Assessment Checklist for Mobile Computing

A

1 Use

1.1 What is the purpose of the use?
1.2 What is the intended domain, industry or sector for the use?
1.3 What are the technical capabilities that enable the use?
1.4 Who are the individuals or groups affected by the use?
1.5 Who are the individuals or entities responsible for overseeing the use?

B

2 Data

2.1 Does the device/application collect personal data to enable the use? If yes, specify the type of collected data (e.g., biometric)
2.2 Does the device/application collect data only after receiving clear consent from users?
2.3 Are users able to opt-out of data collection?
2.4 Are users informed about how their data is used, stored, and shared?
2.5 Are there clear policies on data usage, storage, and sharing?
2.6 Are there encryption methods implemented to safeguard the data?

C

3 Risks

3.1 Are there aspects of the device/application/use that could present challenges for users of different abilities or vulnerable backgrounds?
3.2 Are there aspects of the application/device/use that could be seen as discriminatory towards certain users?
3.3 Are there aspects of the application/device/use that could lead to habit-forming behaviors with adverse personal or social consequences?

D

4 Mitigations

4.1 Are there measures in place to prevent unauthorized access to the device/application/data?
4.2 Are there measures in place to prevent the misuse of the device/application/data for unethical purposes?
4.3 Are there mechanisms in place that enable users to provide feedback or report problems?
4.4 Are there measures in place to minimize the environmental footprint of the device/application?
4.5 Are there preventive features integrated in the device/application to safeguard personal and social well-being?

E

5 Compliance with Legal and Regulatory Standards

5.1 Does the device/application/use comply with relevant laws and regulations (e.g., GDPR, HIPAA, EU AI Act)?
5.2 Are there procedures in place for compliance verification and regular audits?

Diagrams of your methods, workflows, and final products (e.g., tools you built)

https://social-dynamics.net/docs/risky-mobile.pdf

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Designing charts around a single insight

- **Focus each chart on one idea:** ensure every chart answers one specific research question or illustrates one key insight.

- **Run the Aha-test:** ask yourself, “What’s the one ‘Aha!’ message this chart should deliver to my readers?”
  - Reveal a striking correlation between two variables?
  - Show an important change over time?
  - Showcase my new co-design methodology?
  - Clarify my user study setup?
- Once you’re clear on the message, the choice of charts becomes easier!

- **Design around your one insight**: Chart type, layout, labels, and annotations should all reinforce that one key idea.
- **Prioritize quality over quantity:** 2–3 well-designed, relevant charts beat ten random ones straight from Matplotlib ;-)

How to choose the right chart type for your paper? Tool 1

Deviation

Emphasise variations (+/-) from a fixed reference point. Typically the reference point is zero but it can also be a target or a long-term average. Can also be used to show sentiment (positive/neutral/negative).

Example FT uses
Trade surplus/deficit, climate change

Diverging bar

A simple standard bar chart that can handle both negative and positive magnitude values.

Diverging stacked bar

Perfect for presenting survey results which involve sentiment (eg disagree/neutral/agree).

Spine

Splits a single value into two contrasting components (eg male/female).

Surplus/deficit filled line

The shaded area of these charts allows a balance to be shown – either against a baseline or between two series.

Correlation

Show the relationship between two or more variables. Be mindful that, unless you tell them otherwise, many readers will assume the relationships you show them to be causal (i.e. one causes the other).

Example FT uses
Inflation and unemployment, income and life expectancy

Scatterplot

The standard way to show the relationship between two continuous variables, each of which has its own axis.

Column + line timeline

A good way of showing the relationship between an amount (columns) and a rate (line).

Connected scatterplot

Usually used to show how the relationship between 2 variables has changed over time.

Bubble

Like a scatterplot, but adds additional detail by sizing the circles according to a third variable.

XY heatmap

A good way of showing the patterns between 2 categories of data, less effective at showing fine differences in amounts.

Ranking

Use where an item's position in an ordered list is more important than its absolute or relative value. Don't be afraid to highlight the points of interest.

Example FT uses
Wealth, deprivation, league tables, constituency election results

Ordered bar

Standard bar charts display the ranks of values much more easily when sorted into order.

Ordered column

See above.

Ordered proportional symbol

Use when there are big variations between values and/or seeing fine differences between data is not so important.

Dot strip plot

Dots placed in order on a strip are a space-efficient method of laying out ranks across multiple categories.

Slope

Perfect for showing how ranks have changed over time or vary between categories.

Lollipop

Lollipops draw more attention to the data value than standard bar/column and can also show rank and value effectively.

Bump

Effective for showing changing rankings across multiple dates. For large datasets, consider grouping lines using colour.

Distribution

Show values in a dataset and how often they occur. The shape (or 'skew') of a distribution can be a memorable way of highlighting the lack of uniformity or equality in the data.

Example FT uses
Income distribution, population (age/sex) distribution, revealing inequality

Histogram

The standard way to show a statistical distribution – keep the gaps between columns small to highlight the 'shape' of the data.

Dot plot

A simple way of showing the change or range (min/max) of data across multiple categories.

Dot strip plot

Good for showing individual values in a distribution, can be a problem when too many dots have the same value.

Barcode plot

Like dot strip plots, good for displaying all the data in a table, they work best when highlighting individual values.

Boxplot

Summarise multiple distributions by showing the median (centre) and range of the data

Violin plot

Similar to a box plot but more effective with complex distributions (data that cannot be summarised with simple average).

Population pyramid

A standard way for showing the age and sex breakdown of a population distribution; effectively, back to back histograms.

Cumulative curve

A good way of showing how unequal a distribution is: y axis is always cumulative frequency; x axis is always a measure.

Frequency polygons

For displaying multiple distributions of data. Like a regular line chart, best limited to a maximum of 3 or 4 datasets.

Beeswarm

Use to emphasise individual points in a distribution. Points can be sized to an additional variable. Best with medium-sized datasets

Change over Time

Give emphasis to changing trends. These can be short (intra-day) movements or extended series traversing decades or centuries. Choosing the correct time period is important to provide suitable context for the reader.

Example FT uses
Share price movements, economic time series, sectoral changes in a market

Line

The standard way to show a changing time series. If data are irregular, consider markers to represent data points.

Column

Columns work well for showing change over time – but usually best with only one series of data at a time.

Column + line timeline

A good way of showing the relationship over time between an amount (columns) and a rate (line).

Slope

Good for showing changing data as long as the data can be simplified into 2 or 3 points without missing a key part of story.

Area chart

Use with care – these are good at showing changes to total, but seeing change in components can be very difficult.

Candlestick

Usually focused on day-to-day activity, these charts show opening/closing and high/low points of each day.

Fan chart (projections)

Use to show the uncertainty in future projections – usually this grows the further forward to projection.

Connected scatterplot

A good way of showing changing data for two variables whenever there is a relatively clear pattern of progression.

Calendar heatmap

A great way of showing temporal patterns (daily, weekly, monthly) – at the expense of showing precision in quantity.

Priestley timeline

Great when date and duration are key elements of the story in the data.

Magnitude

Show size comparisons. These can be relative (just being able to see larger/bigger) or absolute (need to see fine differences). Usually these show a 'counted' number (for example, barrels, dollars or people) rather than a calculated rate or per cent.

Example FT uses
Commodity production, market capitalisation, volumes in general

Column

The standard way to compare the size of things. Must always start at 0 on the axis.

Bar

See above. Good when the data are not time series and labels have long category names.

Paired column

As per standard column but allows for multiple series. Can become tricky to read with more than 2 series.

Paired bar

See above.

Marimekko

A good way of showing the size and proportion of data at the same time – as long as the data are not too complicated.

Proportional symbol

Use when there are big variations between values and/or seeing fine differences between data is not so important.

Isotype (pictogram)

Excellent solution in some instances – use only with whole numbers (do not slice off an arm to represent a decimal).

Lollipop

Lollipop charts draw more attention to the data value than standard bar/column – does not have to start at zero (but preferable).

Radar

A space-efficient way of showing value of multiple variables– but make sure they are organised in a way that makes sense to reader.

Parallel coordinates

An alternative to radar charts – again, the arrangement of the variables is important. Usually benefits from highlighting values.

Part-to-whole

Show how a single entity can be broken down into its component elements. If the reader's interest is solely in the size of the components, consider a magnitude-type chart instead.

Example FT uses
Fiscal budgets, company structures, national election results

Stacked column/bar

A simple way of showing part-to-whole relationships but can be difficult to read with more than a few components.

Marimekko

A good way of showing the size and proportion of data at the same time – as long as the data are not too complicated.

Pie

A common way of showing part-to-whole data – but be aware that it's difficult to accurately compare the size of the segments.

Donut

Similar to a pie chart – but the centre can be a good way of making space to include more information about the data (eg total).

Treemap

Use for hierarchical part-to-whole relationships; can be difficult to read when there are many small segments.

Voronoi

A way of turning points into areas – any point within each area is closer to the central point than any other centroid.

Arc

A hemicycle, often used for visualising parliamentary composition by number of seats.

Gridplot

Good for showing % information, they work best when used on whole numbers and work well in small multiple layout form.

Venn

Generally only used for schematic representation.

Waterfall

Can be useful for showing part-to-whole relationships where some of the components are negative.

Spatial

Aside from locator maps only used when precise locations or geographical patterns in data are more important to the reader than anything else.

Example FT uses
Population density, natural resource locations, natural disaster risk/impact, catchment areas, variation in election results

Basic choropleth (rate/ratio)

The standard approach for putting data on a map – should always be rates rather than totals and use a sensible base geography.

Proportional symbol (count/magnitude)

Use for totals rather than rates – be wary that small differences in data will be hard to see.

Flow map

For showing unambiguous movement across a map.

Contour map

For showing areas of equal value on a map. Can use deviation colour schemes for showing +/- values

Equalised cartogram

Converting each unit on a map to a regular and equally-sized shape – good for representing voting regions with equal value.

Scaled cartogram (value)

Stretching and shrinking a map so that each area is sized according to a particular value.

Dot density

Used to show the location of individual events/locations – make sure to annotate any patterns the reader should see.

Heat map

Grid-based data values mapped with an intensity colour scale. As choropleth map – but not snapped to an admin/political unit.

Flow

Show the relative volumes or intensity of movement between two or more states or conditions. These might be logical sequences or geographical locations.

Example FT uses
Movement of funds, trade, migrants, lawsuits, information; relationship graphs.

Sankey

Shows changes in flows from one condition to at least one other; good for tracing the eventual outcome of a complex process.

Waterfall

Designed to show the sequencing of data through a flow process, typically budgets. Can include +/- components.

Chord

A complex but powerful diagram which can illustrate 2-way flows (and net winner) in a matrix.

Network

Used for showing the strength and inter-connectedness of relationships of varying types.

Visual vocabulary

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Spine

Splits a single value into two contrasting components (eg male/female).

Surplus/deficit filled line

The shaded area of these charts allows a balance to be shown – either against a baseline or between two series.

Connected scatterplot

Usually used to show how the relationship between 2 variables has changed over time.

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Like a scatterplot, but adds additional detail by sizing the circles according to a third variable.

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Effective for showing changing rankings across multiple dates. For large datasets, consider grouping lines using colour.

Dot strip plot

Good for showing individual values in a distribution, can be a problem when too many dots have the same value.

Barcode plot

Like dot strip plots, good for displaying all the data in a table, they work best when highlighting individual values.

Boxplot

Summarise multiple distributions by showing the median (centre) and range of the data

Violin plot

Similar to a box plot but more effective with complex distributions (data that cannot be summarised with simple average).

Population pyramid

A standard way for showing the age and sex breakdown of a population distribution; effectively, back to back histograms.

Cumulative curve

A good way of showing how unequal a distribution is: y axis is always cumulative frequency; x axis is always a measure.

Frequency polygons

For displaying multiple distributions of data. Like a regular line chart, best limited to a maximum of 3 or 4 datasets.

Beeswarm

Use to emphasise individual points in a distribution. Points can be sized to an additional variable. Best with medium-sized datasets

Column + line timeline

A good way of showing the relationship over time between an amount (columns) and a rate (line).

Slope

Good for showing changing data as long as the data can be simplified into 2 or 3 points without missing a key part of story.

Area chart

Use with care – these are good at showing changes to total, but seeing change in components can be very difficult.

Candlestick

Usually focused on day-to-day activity, these charts show opening/closing and high/low points of each day.

Fan chart (projections)

Use to show the uncertainty in future projections – usually this grows the further forward to projection.

Connected scatterplot

A good way of showing changing data for two variables whenever there is a relatively clear pattern of progression.

Calendar heatmap

A great way of showing temporal patterns (daily, weekly, monthly) – at the expense of showing precision in quantity.

Priestley timeline

Great when date and duration are key elements of the story in the data.

Circle timeline

Good for showing discrete values of varying size across multiple categories (eg earthquakes by continent).

Vertical timeline

Presents time on the Y axis. Good for displaying detailed time series that work especially well when scrolling on mobile.

Seismogram

Another alternative to the circle timeline for showing series where there are big variations in the data.

Streamgraph

A type of area chart; use when seeing changes in proportions over time is more important than individual values

Paired column

As per standard column but allows for multiple series. Can become tricky to read with more than 2 series.

Paired bar

See above.

Marimekko

A good way of showing the size and proportion of data at the same time – as long as the data are not too complicated.

Proportional symbol

Use when there are big variations between values and/or seeing fine differences between data is not so important.

Isotype (pictogram)

Excellent solution in some instances – use only with whole numbers (do not slice off an arm to represent a decimal).

Lollipop

Lollipop charts draw more attention to the data value than standard bar/column – does not have to start at zero (but preferable).

Radar

A space-efficient way of showing value of multiple variables– but make sure they are organised in a way that makes sense to reader.

Parallel coordinates

An alternative to radar charts – again, the arrangement of the variables is important. Usually benefits from highlighting values.

Bullet

Good for showing a measurement against the context of a target or performance range.

Grouped symbol

An alternative to bar/column charts when being able to count data or highlight individual elements is useful.

Pie

A common way of showing part-to-whole data – but be aware that it's difficult to accurately compare the size of the segments.

Donut

Similar to a pie chart – but the centre can be a good way of making space to include more information about the data (eg total).

Treemap

Use for hierarchical part-to-whole relationships; can be difficult to read when there are many small segments.

Voronoi

A way of turning points into areas – any point within each area is closer to the central point than any other centroid.

Arc

A hemicycle, often used for visualising parliamentary composition by number of seats.

Gridplot

Good for showing % information, they work best when used on whole numbers and work well in small multiple layout form.

Venn

Generally only used for schematic representation.

Waterfall

Can be useful for showing part-to-whole relationships where some of the components are negative.

Flow map

For showing unambiguous movement across a map.

Contour map

For showing areas of equal value on a map. Can use deviation colour schemes for showing +/- values

Equalised cartogram

Converting each unit on a map to a regular and equally-sized shape – good for representing voting regions with equal value.

Scaled cartogram (value)

Stretching and shrinking a map so that each area is sized according to a particular value.

Dot density

Used to show the location of individual events/locations – make sure to annotate any patterns the reader should see.

Heat map

Grid-based data values mapped with an intensity colour scale. As choropleth map – but not snapped to an admin/political unit.

Chord

A complex but powerful diagram which can illustrate 2-way flows (and net winner) in a matrix.

Network

Used for showing the strength and inter-connectedness of relationships of varying types.

Visual vocabulary

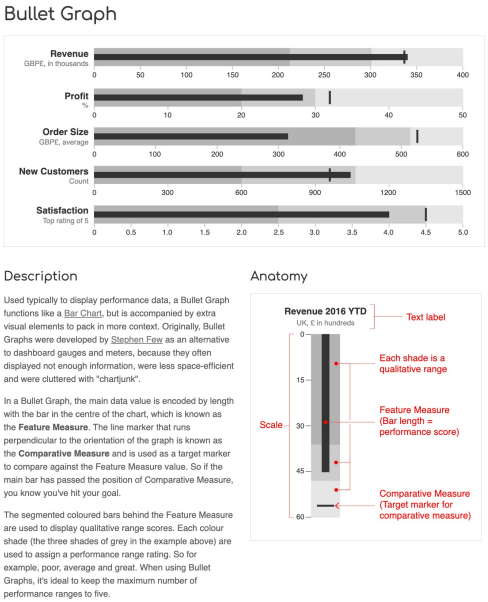
Designing with data

There are so many ways to visualise data - how do we know which one to pick? Use the categories across the top to decide which data relationship is most important in your story, then look at the different types of chart within the category to form some initial ideas about what might work best. This list is not meant to be exhaustive, nor a wizard, but is a useful starting point for making informative and meaningful data visualisations.

FT graphic: Alan Smith; Chris Campbell; Ian Bott; Liz Faunce; Graham Parrish; Billy Ehrenberg-Shannon; Paul McCallum; Martin Stabe
Inspired by the Graphic Continuum by Jon Schwabish and Severino Ribecca

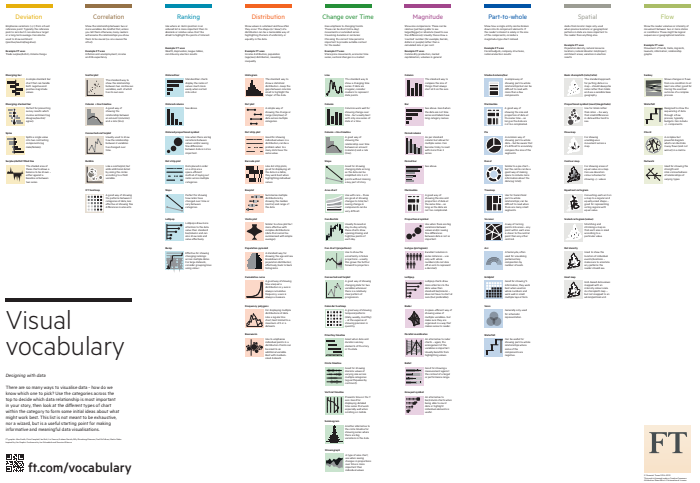
ft.com/vocabulary

How to choose the right chart type for your paper? Tool 2



The Data Visualisation Catalogue

https://datavizcatalogue.com



Visual Vocabulary by Financial Times

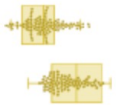
http://ft.com/vocabulary

How to choose the right chart type for your paper? (1)

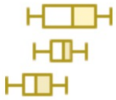
Distribution

Barcode Plot

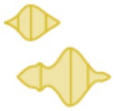
Bean Plot



Bee Swarm Box Plot



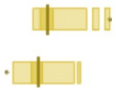
Box Plot



Box-Percentile Plot

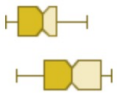
Density Plot

Dot Distribution Plot



HDR Box Plot

Histogram



Notched Box Plot

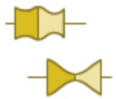
Population Pyramid

Q-Q Plot

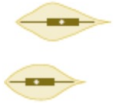
Ridgeline Plot

Sina Plots

Stem & Leaf Plot



Vase Plot



Violin Plot

https://datavizcatalogue.com/blog/chart-selection-guide/

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How to choose the right chart type for your paper? (2)

Ranges and Correlations

Barbell Plot

Gantt Chart

Ranged Area Graph

Span Chart

Bubble Chart

Correlation Matrix

Heatmap

Scatterplot

https://datavizcatalogue.com/blog/chart-selection-guide/

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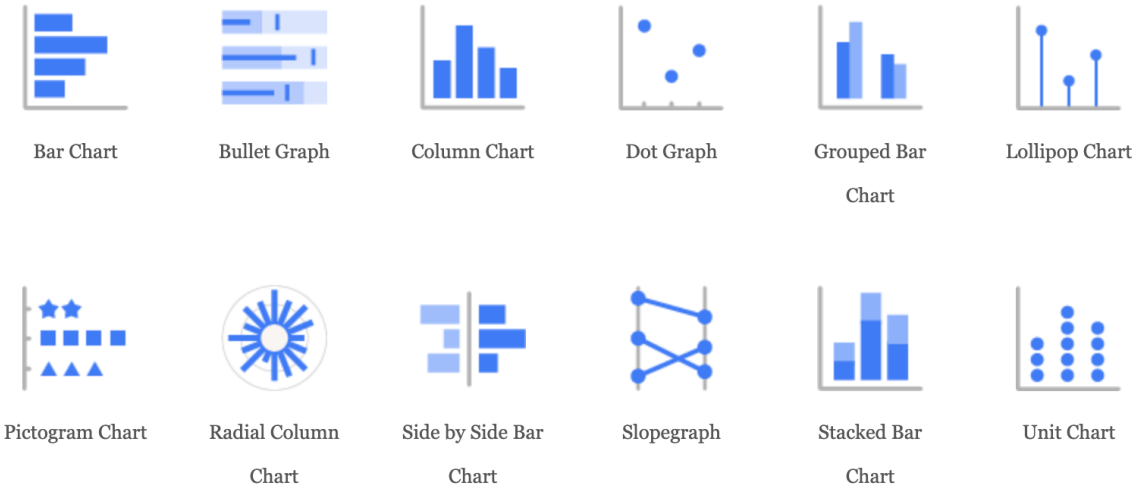
How to choose the right chart type for your paper? (3)

Comparisons (e.g., across categories)



https://datavizcatalogue.com/blog/chart-selection-guide/

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How to choose the right chart type for your paper? (4)

Proportions (e.g., a parts-to-a-whole relationship)


Bubble Chart


Bubble Map


Circle Packing


Demers Cartogram


Dorling Map


Marimekko Chart


Parallel Sets


Pie Chart


Proportional Area Chart


Sankey Diagram


Treemap


Unit Chart (Area)


100% Stacked Bar Chart


Donut Chart


Marimekko Chart


Pie Chart


Treemap


Waffle Chart

https://datavizcatalogue.com/blog/chart-selection-guide/

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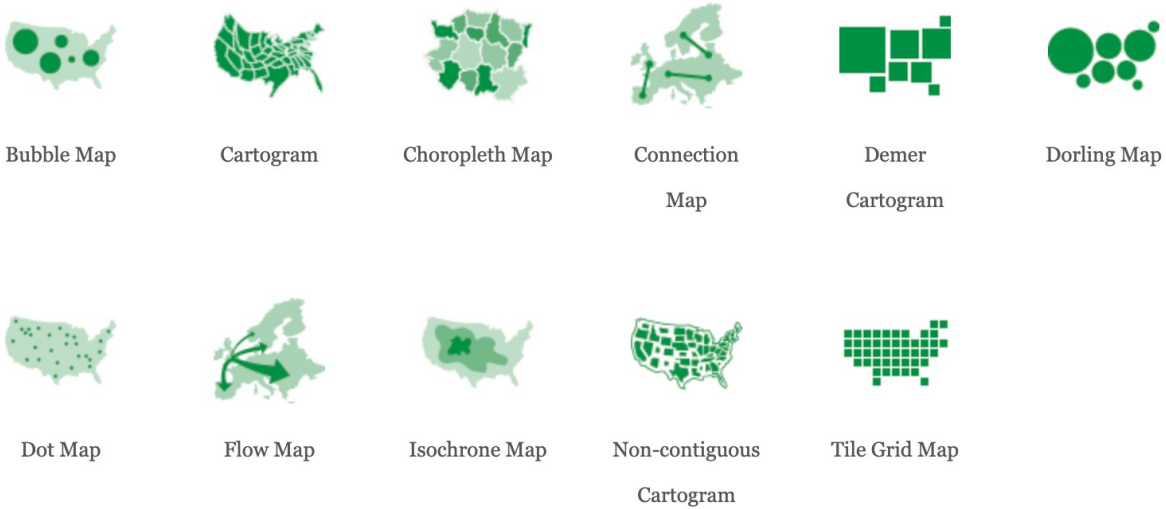
How to choose the right chart type for your paper? (5)

Geographical



https://datavizcatalogue.com/blog/chart-selection-guide/

How to choose the right chart type for your paper? (6)

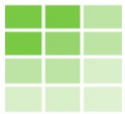
Data over time

Area Graph

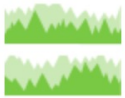
Connected Scatterplot

Control Chart

Gantt Chart



Heatmap



Horizon Plot

Line Graph

Run Chart

Spiral Plot

Stacked Area Graph

Streamgraph

Timeline

https://datavizcatalogue.com/blog/chart-selection-guide/

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How to choose the right chart type for your paper? (7)

Hierarchy

Circular Tree Diagram

Circular Treemap

Icicle Chart

Sunburst Diagram

Tree Diagram

Treemap

https://datavizcatalogue.com/blog/chart-selection-guide/

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How to choose the right chart type for your paper? (7)

Illustration (Teaser of a 3-prompt method)

Prompt 1

Generating realistic uses of AI in Mobile and Wearable Computing

How can LLMs actively generate realistic uses of AI in Mobile and Wearable Computing, along with the necessary information for risk assessment?

Manual validation N=2

Crowdsourcing study N=9

Checking whether the listed uses are correct and realistic

Prompt 2

Classifying a use's risks

How can LLMs actively assess the extent to which each use is low risk, high risk, or unacceptable and why?

Manual validation N=1

Crowdsourcing study N=9

Checking whether the uses are low risk, high risk, or unacceptable

Prompt 3

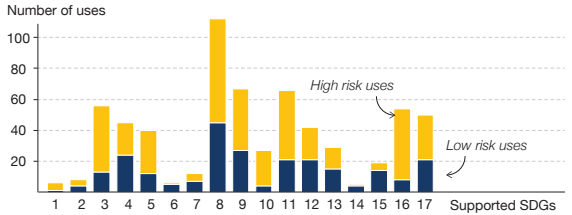
Determining a use's benefits

How can LLMs actively assess the extent to which each use supports Sustainable Development Goals and why?

Manual validation N=1

Crowdsourcing study N=9

Checking whether the uses support any of the 17 SDGs



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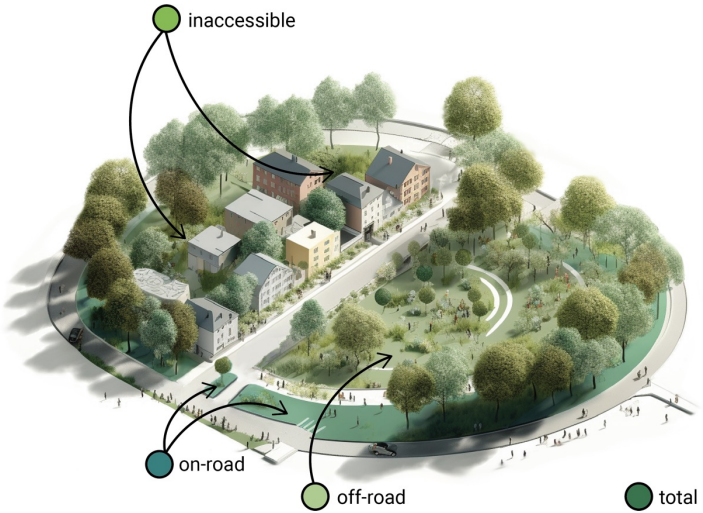
How to choose the right chart type for your paper? (7)

Illustration



(E) System role

```
messages = [
    {
    'role': 'system',
    'content': """You are an experienced regulatory compliance specialists who works in the field of AI technology regulation. You are thoughtful, decisive, experienced and conscientious.
    You have access to the entirety of the EU AI Act and its amendments, which outline how various AI technologies are to be regulated and risk-classified within the European Union."""
    },
```

(A) Instructions

(1) Classification
(2) Four steps
(3) Make accurate judgments
(4) Consider all regulations

```
    Classify the following AI system by utilizing a three-tier classification: 1) Unacceptable Risk,
    2) High Risk, and 3) Not Classified as High Risk or Unacceptable Risk.
    Follow these four steps below:
    1. Write a brief description of the AI system, using similar language to the EU AI Act. The description
    should start with "The AI system intended to be used ...", and be no longer than two sentences.
    2. Determine whether the AI system is of Unacceptable Risk or High Risk, providing the exact text from
    the EU AI Act and explaining the reasoning. Be very strict and verify the reasoning.
    Assume High Risk unless there is clear evidence for Unacceptable Risk. Pay particular attention
    to the subject and user of the AI system, as this is critical for classification.
    Ensure that the subject and user align with the text. They are very important. Also, ensure that you
    understand the purpose and the capability of the AI system as this is highly critical for the risk classification.
    For example, the capability to verify patient identities by using AI technology implies the use of biometric
    identification of patients. Be aware of these and similar cases.
    3. Go through all the amendments to the EU AI Act and ensure that nothing has changed that would
    affect the classification.
    If something has changed, update the classification accordingly and explicitly reference the amendment
    that most closely resembles the AI system.
    The amendments can be found under the text: "Here are some important amendments to the Act:"
    4. If the AI system is neither High Risk nor Unacceptable Risk, classify it as Not Classified as High Risk
    or Unacceptable Risk.
    It is of utmost importance to exercise precision and make accurate judgments when classifying the risk
    associated with the AI system.
    Please carefully consider all the regulations listed below during the risk classification of the AI system:
```

(B) Legal documents
Relevant Section of the EU AI Act (for what is unacceptable and high-risk) and its amendments

```
    The relevant portions of the Act for what is unacceptable:
    5.2.2. PROHIBITED ARTIFICIAL INTELLIGENCE PRACTICES (TITLE II)
    Title II establishes a list of prohibited AI [continued ...]
    The relevant portions of the Act for what is high risk:
    CLASSIFICATION OF AI SYSTEMS AS HIGH-RISK
    Article 6. Classification rules for high-risk AI systems [continued ...]
    Here are some important amendments to the EU AI Act: It is very important to consider them for the risk
    classification. Please read them carefully:
    Amendment 709
    Proposal for a regulation. Annex III – paragraph 1 – introductory part
    High-risk AI systems pursuant to Article 6(2) are the AI systems listed in any of the following areas:
    [continued ...]
```

(C) Placeholder for an LLM-generated use to be assessed along five risk concepts

```
    Here are the details of the AI technology:
    "{}",
    "{}",
    "{}",
    "{}",
    "{}"
```

(D) Output structure

```
    Please return the classification in the following format:
    {
       "Description": "The AI system intended to be used ...",
       "Classification": ["Unacceptable Risk"/"High Risk"/"Not Classified as High Risk or Unacceptable Risk"],
       "Relevant Text from the EU AI Act": "[Quotation if applicable] - Include the amendment or EU AI Act
       section that mostly closely resembles the text.",
       "Reasoning": "[Explanation]"
    }
    ]

response = get_completion_from_messages(messages)
print(response)
```

maximum output token length = 1000

Part 2

Write clear, self-contained captions for your figures

Write captions that do more than just name the chart

State what is being measured and what the reader should notice - highlight the pattern or anomaly.

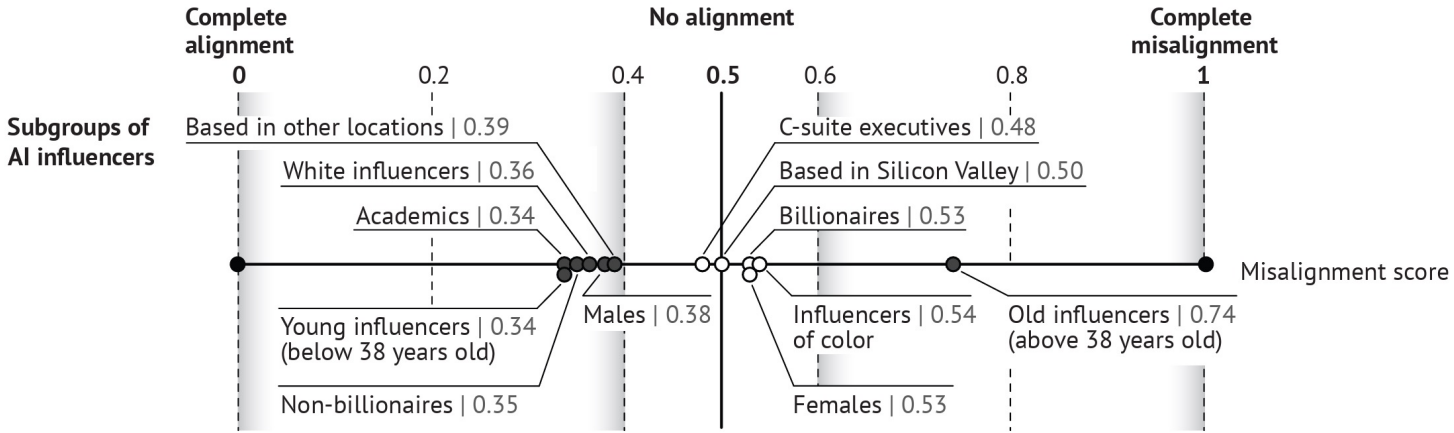


Figure 6: Misalignment scores between subgroups of AI influencers and participants representative of the U.S. population. Young influencers' views are most closely aligned with those of our participants, followed by academics and non-billionaires.

https://social-dynamics.net/docs/fears-and-hopes.pdf

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Write captions that do more than just name the chart

Include extra details for more complex charts:

- Any transformations or scales used
- Statistical notes (e.g., error bars show 95% CI)

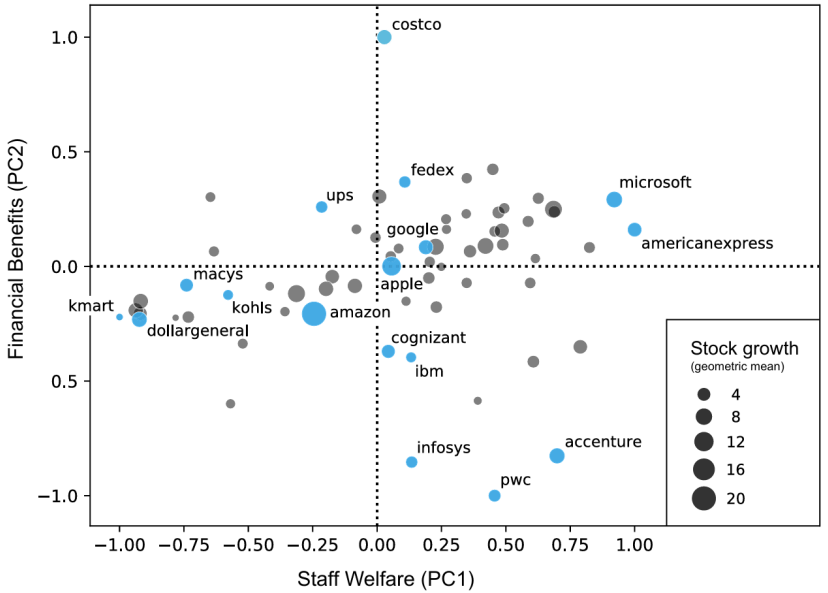

Fig. 7 Scatterplot of the scores of each company's staff welfare vs. financial benefits. The size of a company's dot represents its stock growth. We highlighted in blue some of the companies to assess them qualitatively. Consumer staples and discretionary companies like Kmart, Macy's, and Kohl's scored low for both types of sustainability. Traditional IT companies like Infosys, IBM, and Accenture scored high for staff welfare sustainability but not for financial benefits sustainability.

https://social-dynamics.net/docs/insider-stories-nature.pdf

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How to choose the right chart type for your paper? (7)

Link each part of the figure to the caption text

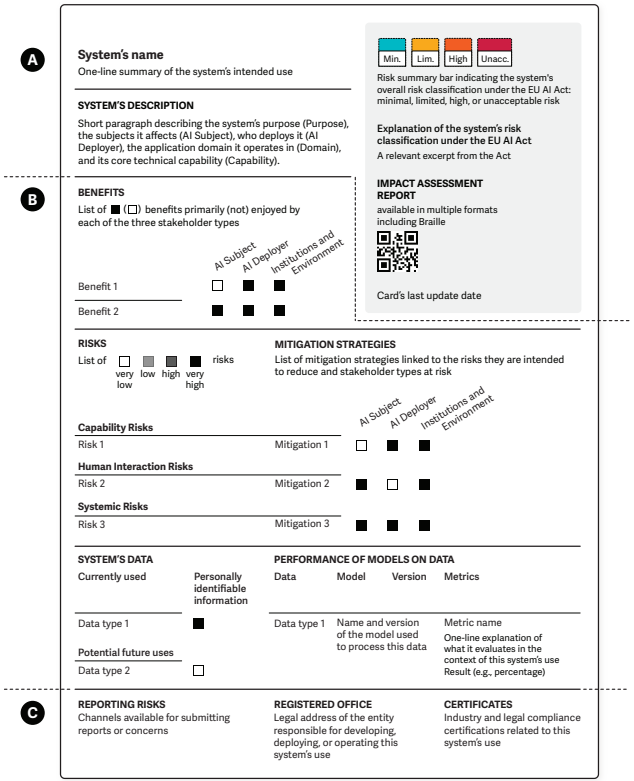

Fig. 1. **Template of the Impact Assessment Card showing AI risks and benefits in plain terms.** Section A includes the system's name, purpose, and EU AI Act risk level. Section B outlines benefits, risks with mitigations, and technical details. Section C lists reporting channels, registered office, and certifications. Examples of cards for four AI systems appear in Appendix A.6–A.7 and online at: https://social-dynamics.net/ai-risks/impact-card/.

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Part 3

Avoid the most common figure mistakes

Chart organization

- **One figure for all key metrics:** For quantitative results, it's good to have one figure that shows all the key metrics.

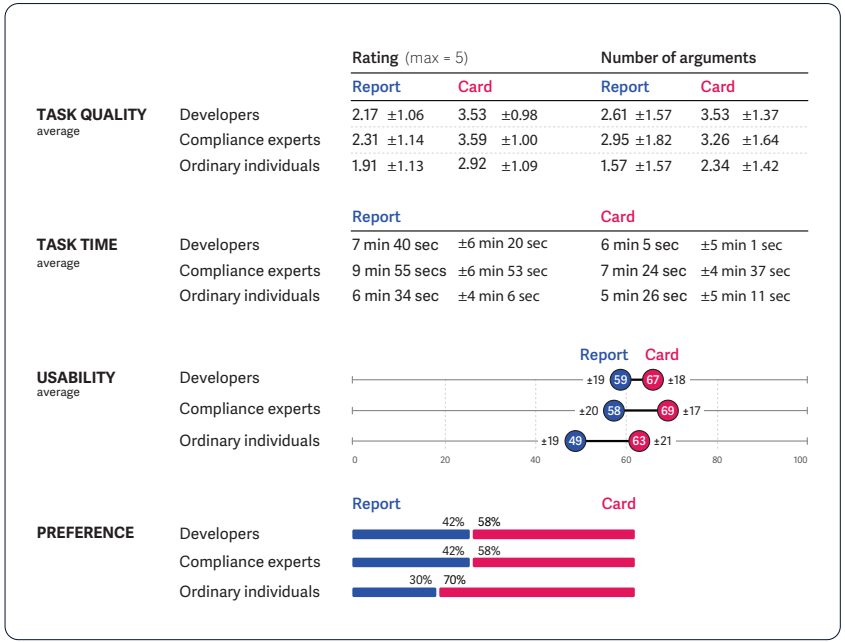
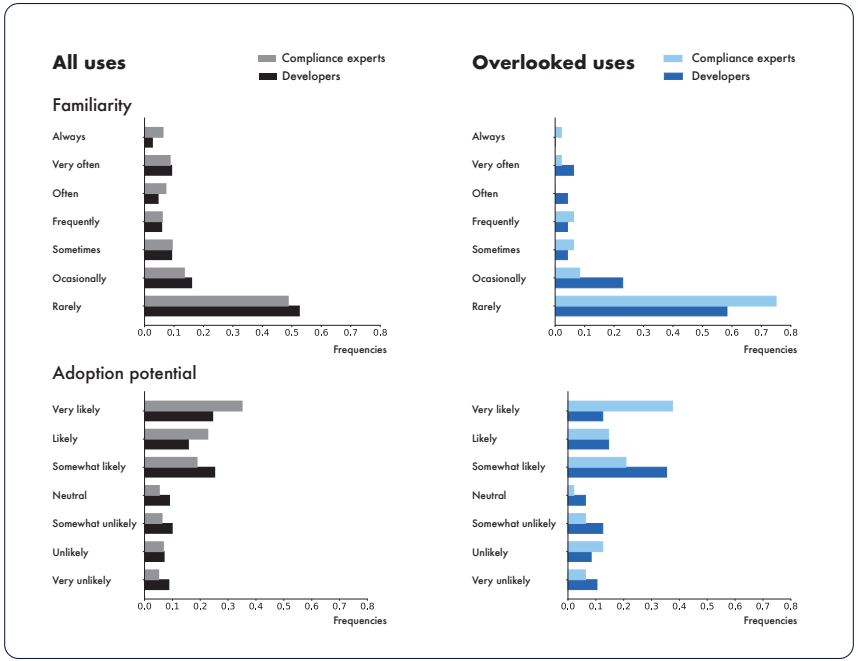
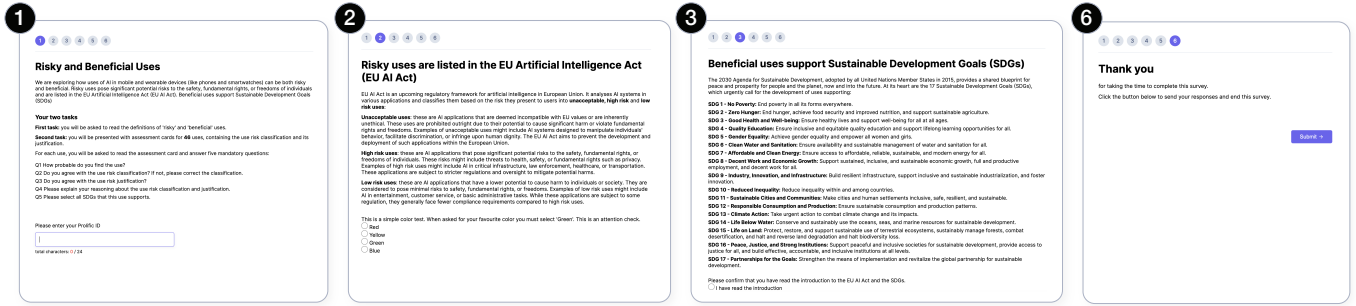


Chart organization

- **One figure for all key metrics:** For quantitative results, it's good to have one figure that shows all the key metrics.
- **Split when needed:** if a chart must cover multiple related insights, use panels instead of crowding everything into one image.





4 5

Annotate uses for their risk classification and support for SDGs

Use #1

Enhancing security through facial recognition using high-performance cameras in smartphones

High risk use

Justification: The AI system is used for biometric identification, which is listed as a high-risk AI system under Article 6(2) and Annex III of the EU AI Act. However, it does not fall under the category of 'Unacceptable Risk' as it does not violate any of the prohibitions listed under Article 5 of the Act. The amendments 710 and 711 further clarify that biometric and biometrics-based systems are considered high-risk, but the system in question does not fall under the exceptions mentioned in Article 5, thus confirming its classification as 'High Risk'.

Q1 How probable do you find this use?

- ◯ Existing
- ◯ Upcoming
- ◯ Unrealistic

Q2 Do you agree with the risk classification? ⓘ

- ◯ Yes
- ◯ No

Q3 Do you agree with the risk justification?

- ◯ Yes
- ◯ No

Q4 Please explain your reasoning about the use risk classification and justification.

Q5 Please select all Sustainable Development Goals that this use supports ⓘ

- ☐ No Poverty
- ☐ Zero Hunger
- ☐ Good Health and Well-being
- ☐ Quality Education
- ☐ Gender Equality
- ☐ Clean Water and Sanitation
- ☐ Affordable and Clean Energy
- ☐ Decent Work and Economic Growth
- ☐ Industry, Innovation, and Infrastructure
- ☐ Reduced Inequality
- ☐ Sustainable Cities and Communities
- ☐ Responsible Consumption and Production
- ☐ Climate Action
- ☐ Life Below Water
- ☐ Life on Land
- ☐ Peace, Justice, and Strong Institutions
- ☐ Partnerships for the Goals

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Chart organization

- **One figure for all key metrics:** For quantitative results, it's good to have one figure that shows all the key metrics.
- **Split when needed:** if a chart must cover multiple related insights, use panels instead of crowding everything into one image.
- **Place charts strategically:** position each chart as close as possible to its first mention in the text, ideally at the top or bottom of the page for easy reference → you can use a dummy placeholder pdf while writing

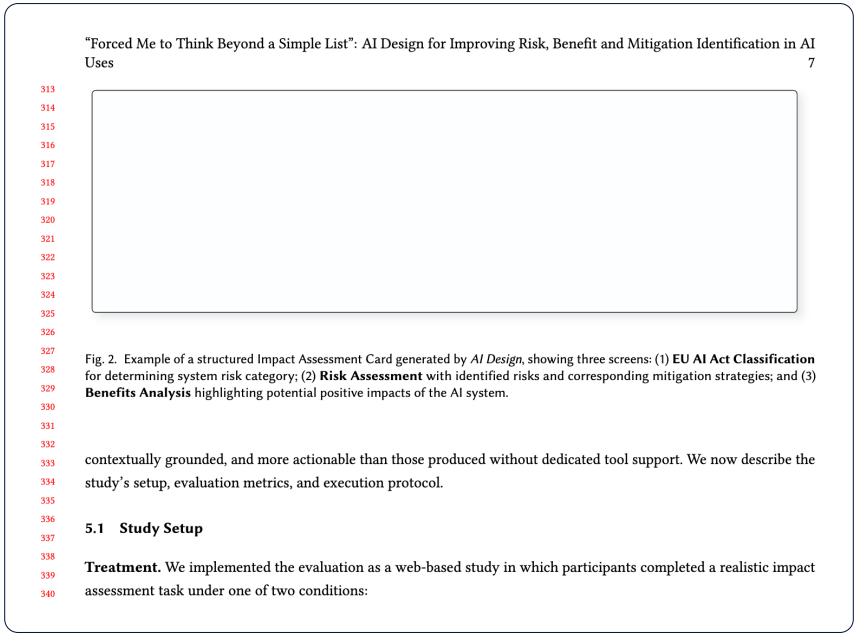
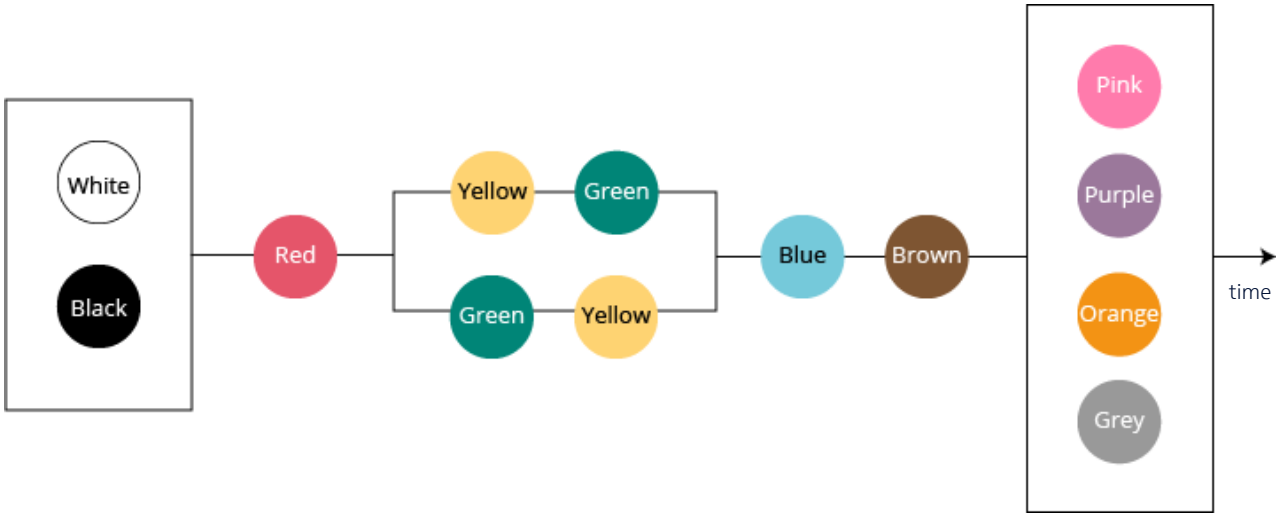


Chart design principles (1)

Don't use too many colors!

The order of appearance of colour names in languages around the world is fixed and far away from rainbow ;-)

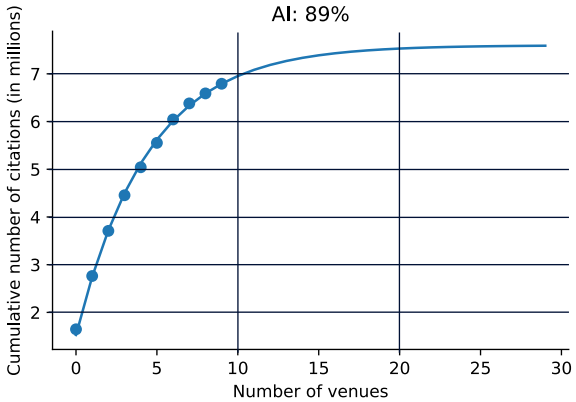


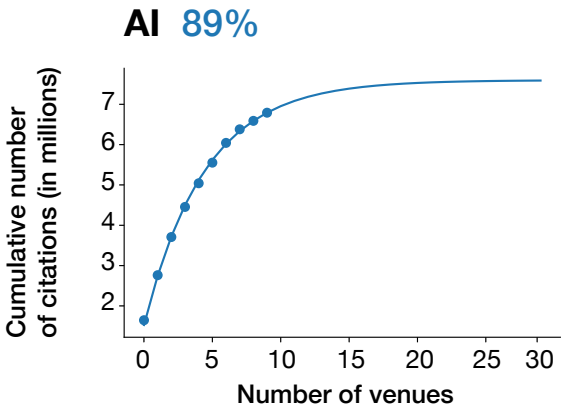
Berlin and Kay (1969); https://www.eea.europa.eu/data-and-maps/daviz/learn-more/chart-dos-and-donts

Chart design principles (2)

Use less “ink”

- Remove redundant gridlines, 3D effects, and backgrounds to make your insights pop -> Save your charts as a .pdf and edit them in vector graphic software like Adobe Illustrator, Canvas, or Inkscape
- Use legible fonts: choose a clear sans-serif typeface (e.g., Arial, Helvetica) and set font sizes large enough to remain readable when the chart is resized or printed

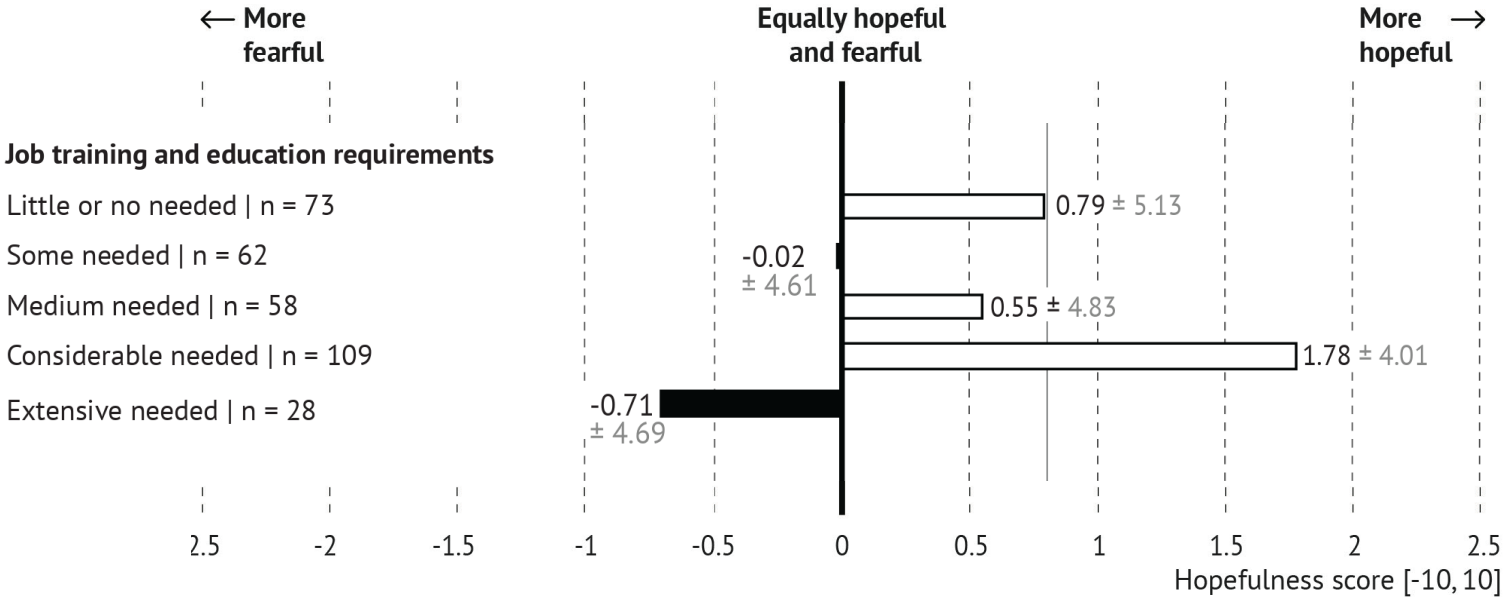




https://social-dynamics.net/docs/rai-impact.pdf

Chart design principles (3)

Sort and group by size or relevance - not A to Z!



https://social-dynamics.net/docs/fears-and-hopes.pdf

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Chart design principles (4)

Label like a human

- Use real words, not variable names
- Make axes and legends understandable without reading the full report and twisting your head
- Include sample size (N) when relevant

Chart design principles (4)

Label like a human

patient, image, planning

module, robot, machine

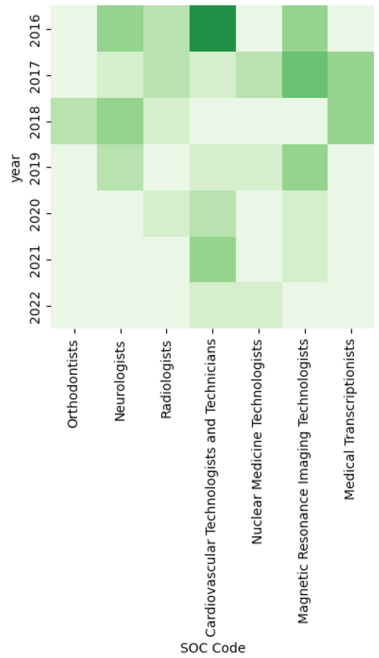
patient, device, medical

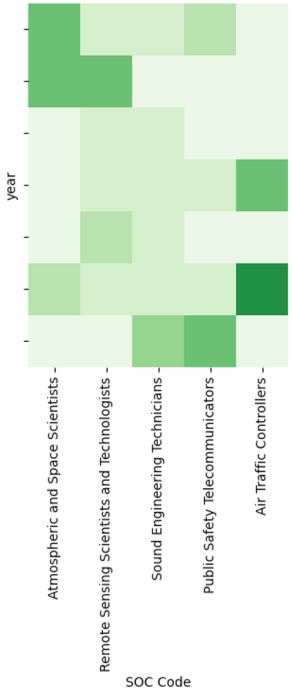
computer, test, state

neural network, data, analysis

control, planning, path

control, image, neural network





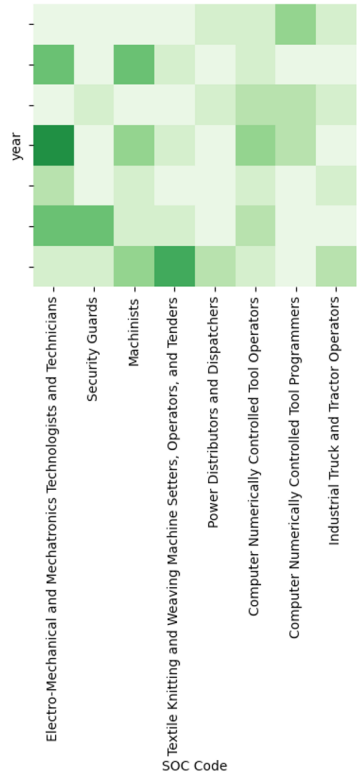


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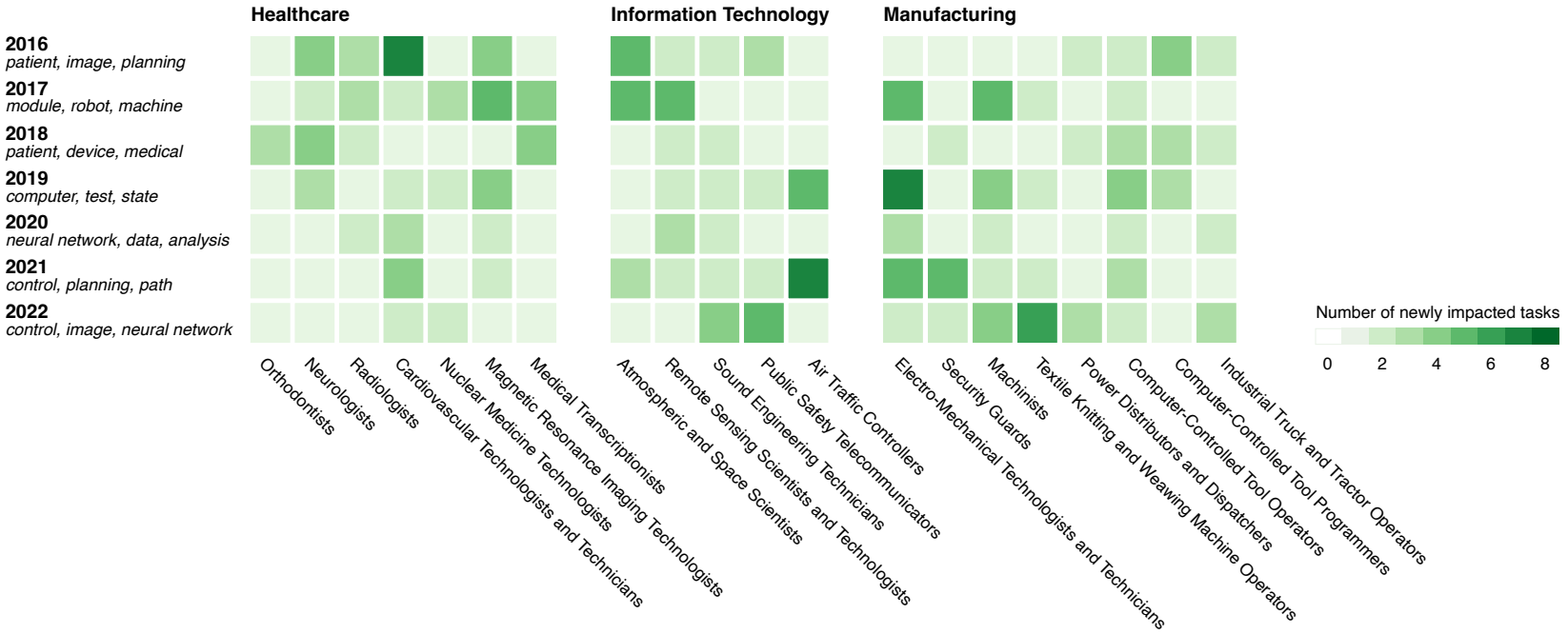
Chart design principles (4)

Label like a human

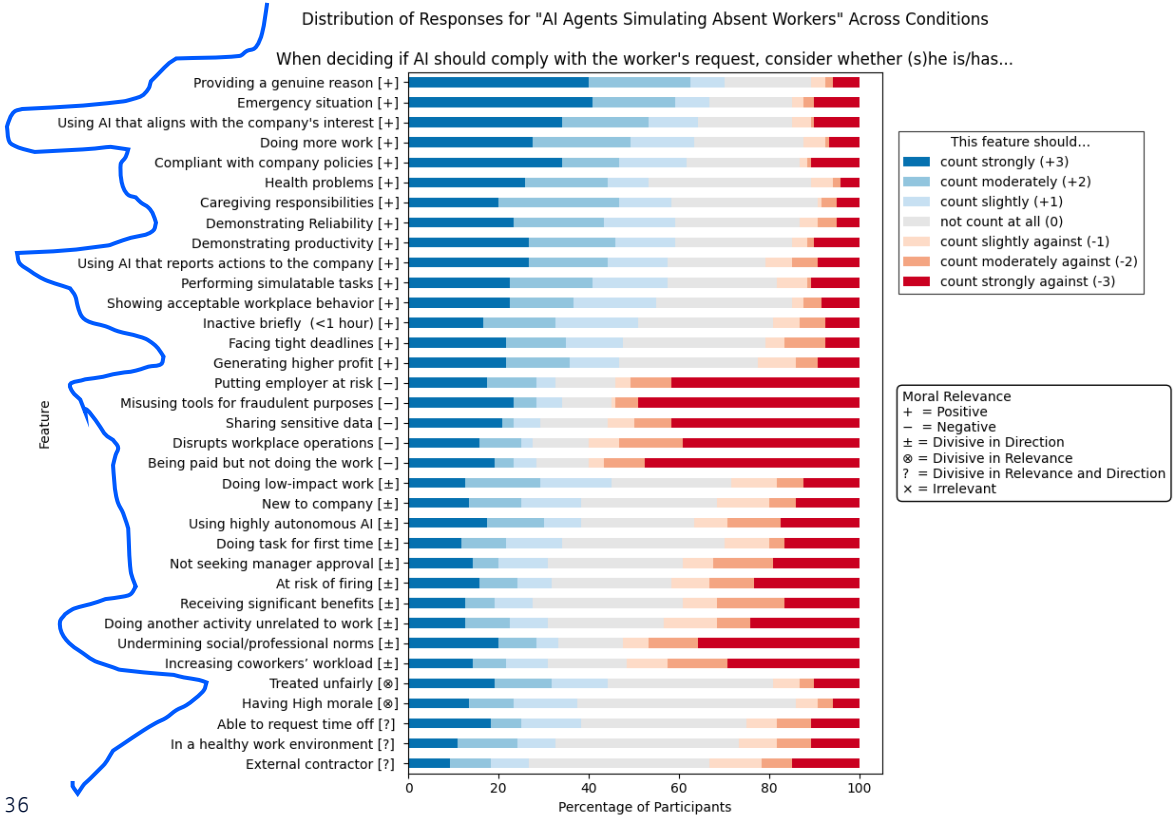


https://social-dynamics.net/docs/aii.pdf

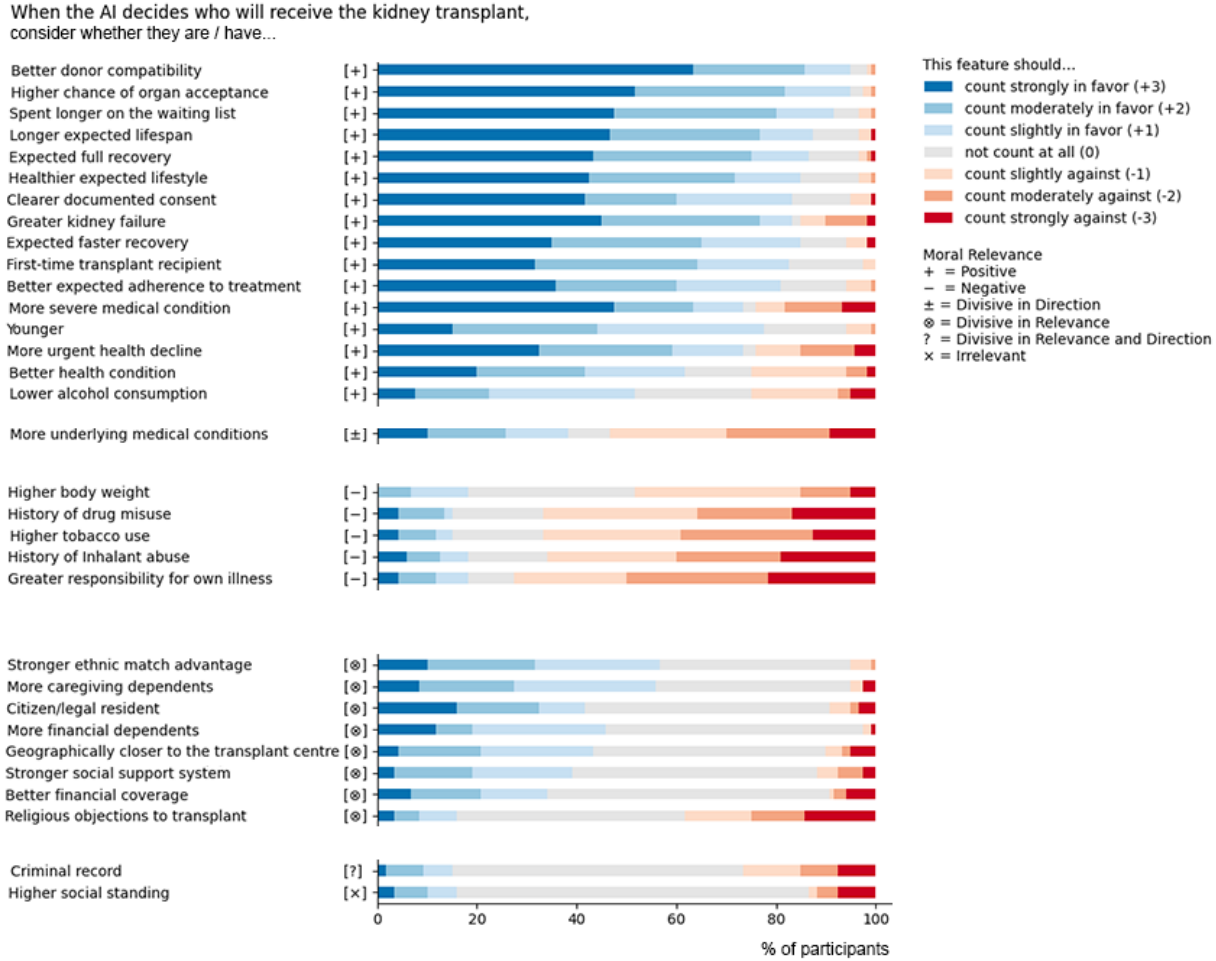
Chart design principles (4)

Guide the reader's eye

V1 of the chart



V2 of the chart



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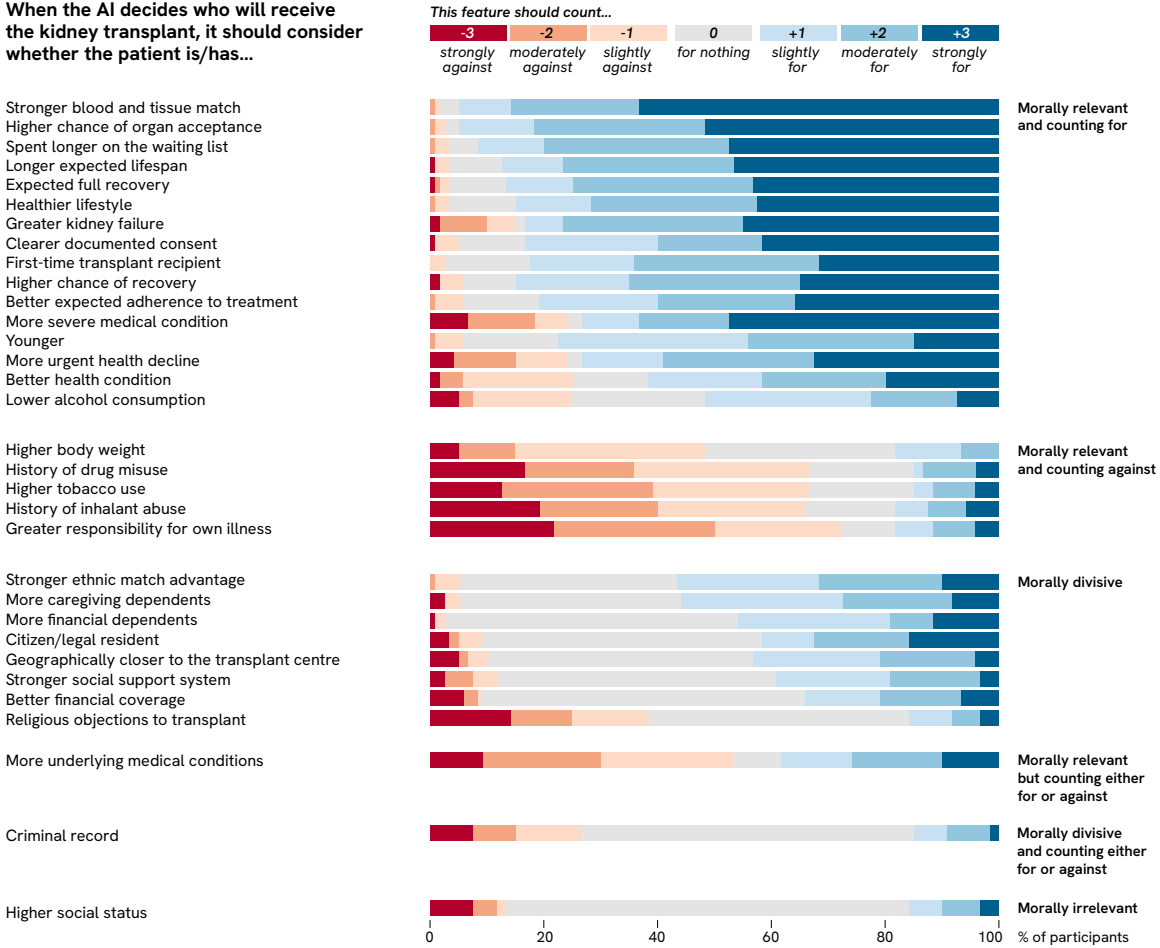
When the AI decides who will receive the kidney transplant, it should consider whether the patient is/has...



V3 of the chart

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Part 4

Improve your figure production pipeline

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Small Python tweaks

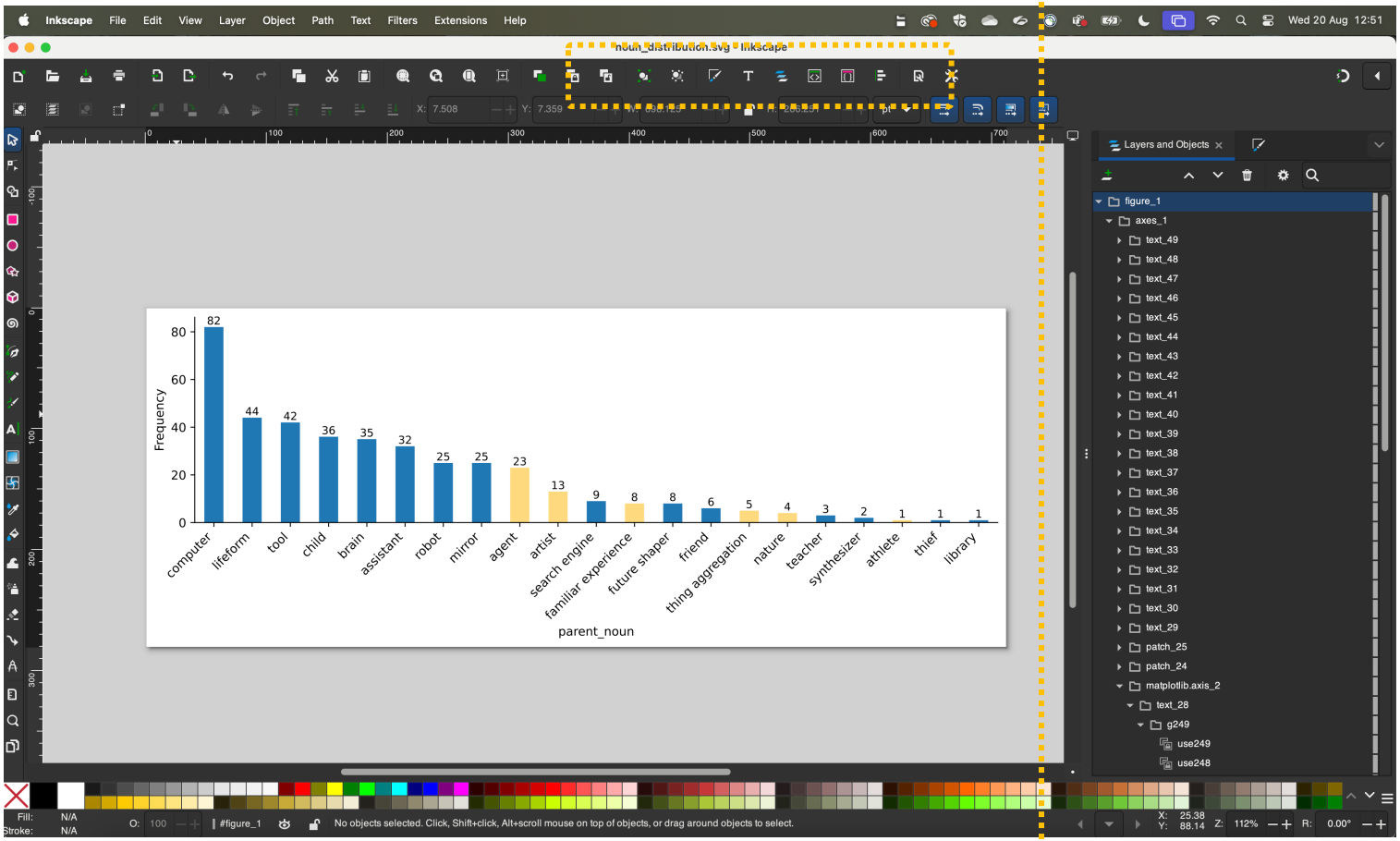
- **Set global styles with rcParams**: Define font family, font size (!!!), line widths, and color palette once, and reuse them across all figures for consistency.

- Tool for picking up the colors: https://mapcolpal.github.io/

- **Simplify the look**: Remove unnecessary axes, spines, and redundant ticks to keep the focus on the data.

```
ax.spines["top"].set_visible(False)
ax.spines["right"].set_visible(False)
```

- **Export in vector format**: Save figures as **PDF or SVG**, not PNG, for publication-quality results.
- **Iterate manually**: Do a final pass in Inkscape, Illustrator, or PowerPoint for hand-crafted refinement.



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