Airflow @ Monzo

Evolving our Data Platform as the Bank Scales

Jonathan Rainer
Ed Sparkes

Airflow Summit
Let's flow together

September 19-21, 2023,
Toronto, Canada

September 2022

Jonathan Rainer
Backend Engineer
(Data Platform)

Ed Sparkes
Senior Backend Engineer
(Data Platform)

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Who are we?

Making Money Work For Everyone

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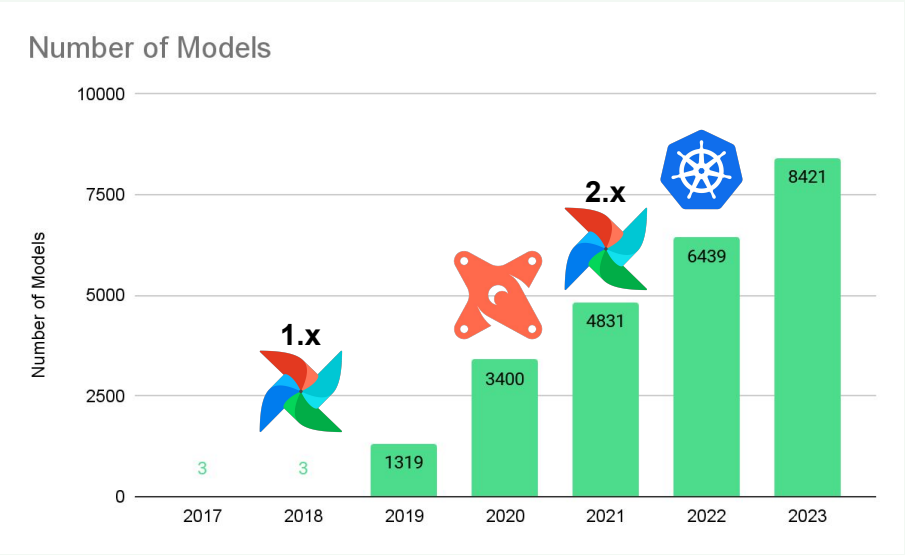
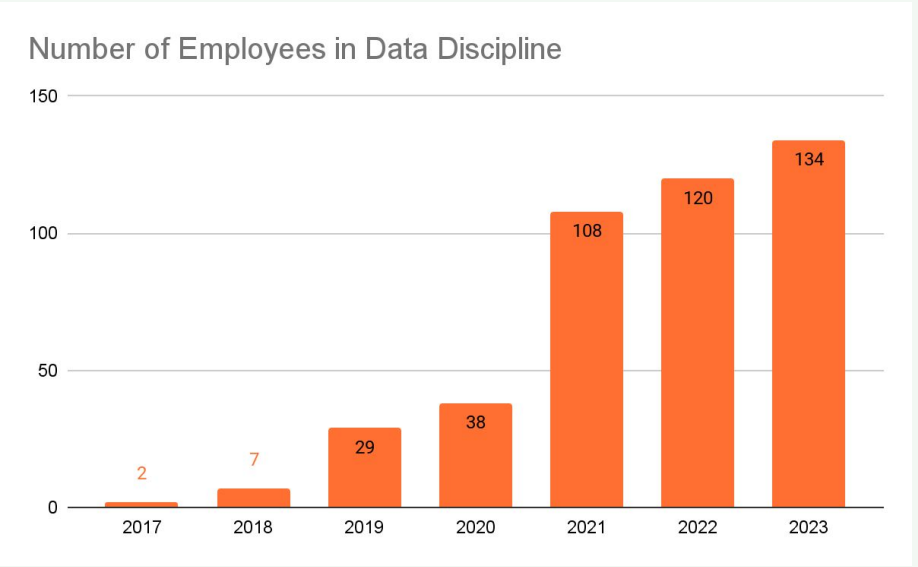
History of Data At Monzo





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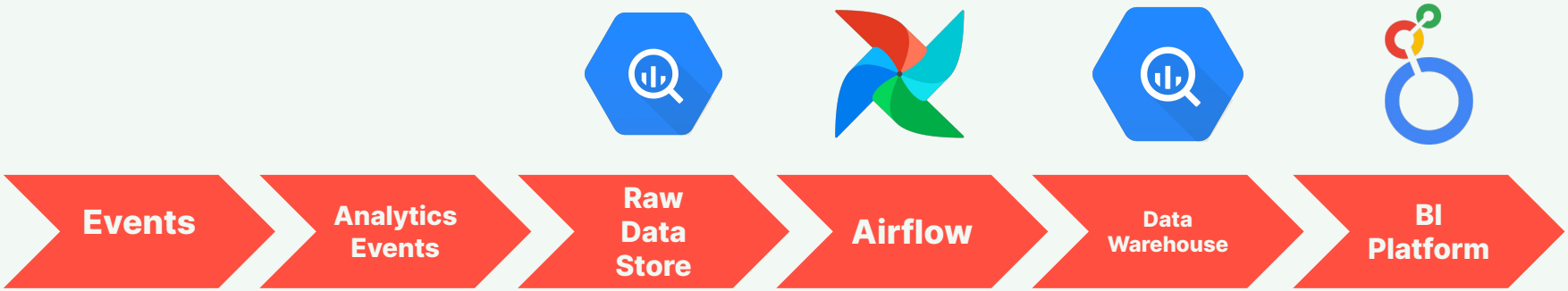
Monzo Data Architecture



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DAGS

Airflow + dbt

28 8421 141 529 2

- Dags dynamically defined using `dbt` model selectors
- SQL pre-rendered in CI by `dbt` and run in Airflow with Python + BigQuery SDK
- Final DAG defined at runtime by building the graph from the model selector and interleaving python workloads
- BigQuery copy optimisation for shard merging
- Indirect selects allow configurable cross DAG dependencies

```
dag_builder = MonzoDAGBuilder(Config(
    start_date=pendulum.datetime(
        year=2019, month=5, day=20, hour=0, minute=0, tz="Europe/London"
    ),
    execution_timeout=timedelta(hours=6),
))

dag_builder.add_tasks(
    # We manually exclude expensive dependencies from running in near realtime, as it
    # takes longer than 15 minutes.
    # That means that if you model is not explicitly tagged as "run=near_realtime"
    # then this DAG will not run it.
    dbt_model_selectors="--models tag:run=near_realtime",
    cron_paths=[  "cron_a", "cron_b", "cron_c", "cron_d", "cron_e", "cron_f"        ]
,
)

dag = dag_builder.build(
    name="near-realtime",
    schedule="*/30 5-23 * * *",  # Every 30 minutes, between 05:00 and 23:00
)
```

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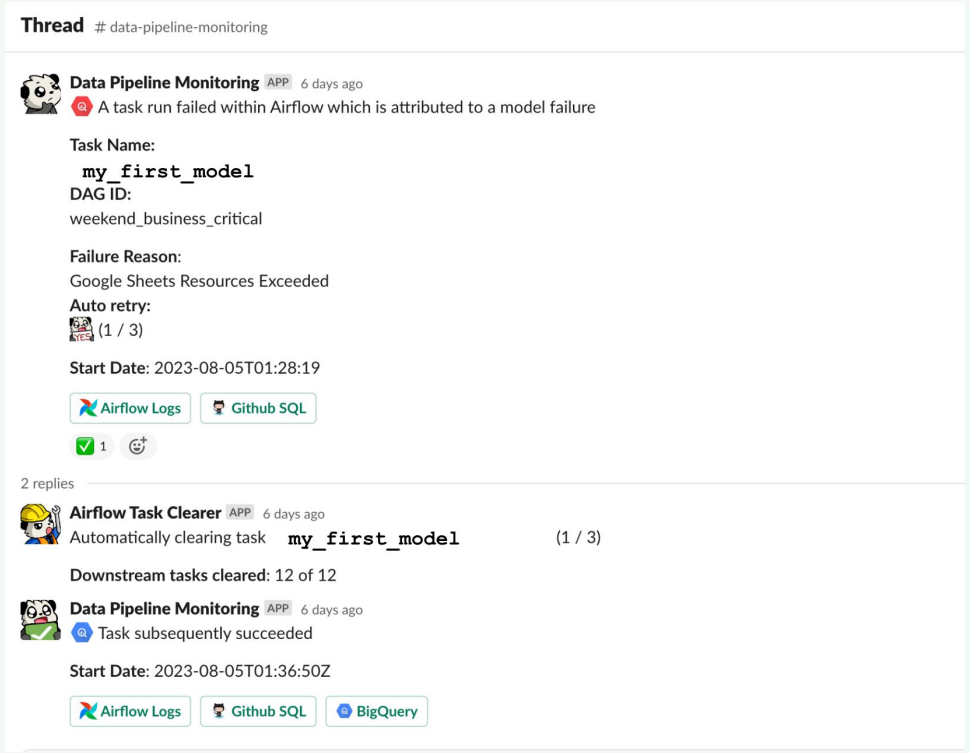
Automatic Retry

Retrying Transient Errors

- Failure is inspected via callback and for certain classes of failure tasks are scheduled for retry
- Subsequent successes unblock pipelines automatically and enable us to meet SLAs
- Allow models on our core path alert to a common shared channel on failure
- Persistent failures trigger our internal paging system



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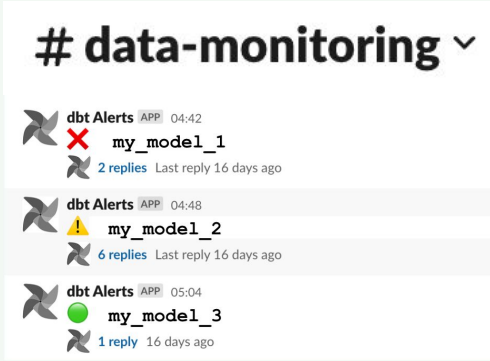
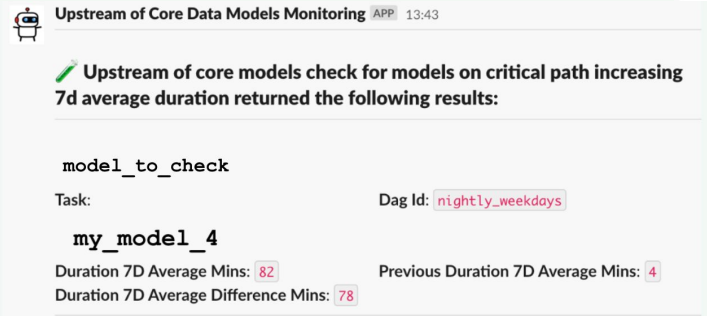
Monitoring

Notifying for quick incident identification

- Model owners can configure how and where they want to be notified when their models are run
- Contextual information to enable debugging is threaded
- Model degradation notifications





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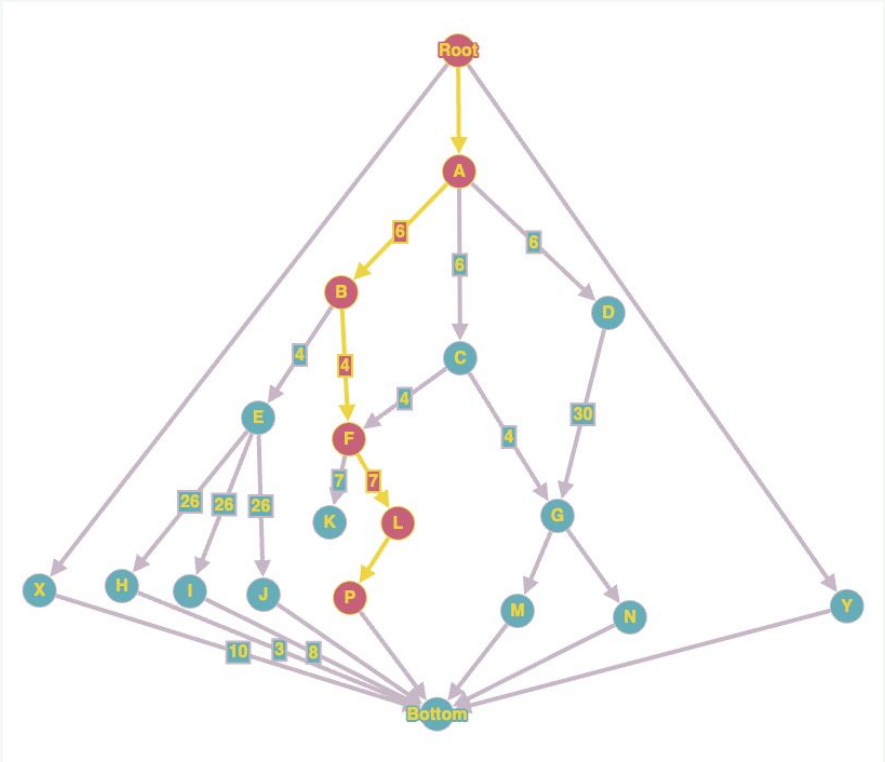
Calculating Critical Paths From DAGs

- We want to ensure that our DAGs don't degrade in performance
- We built tooling to retrieve Airflow DAGs and then calculate their critical paths to focus optimisations



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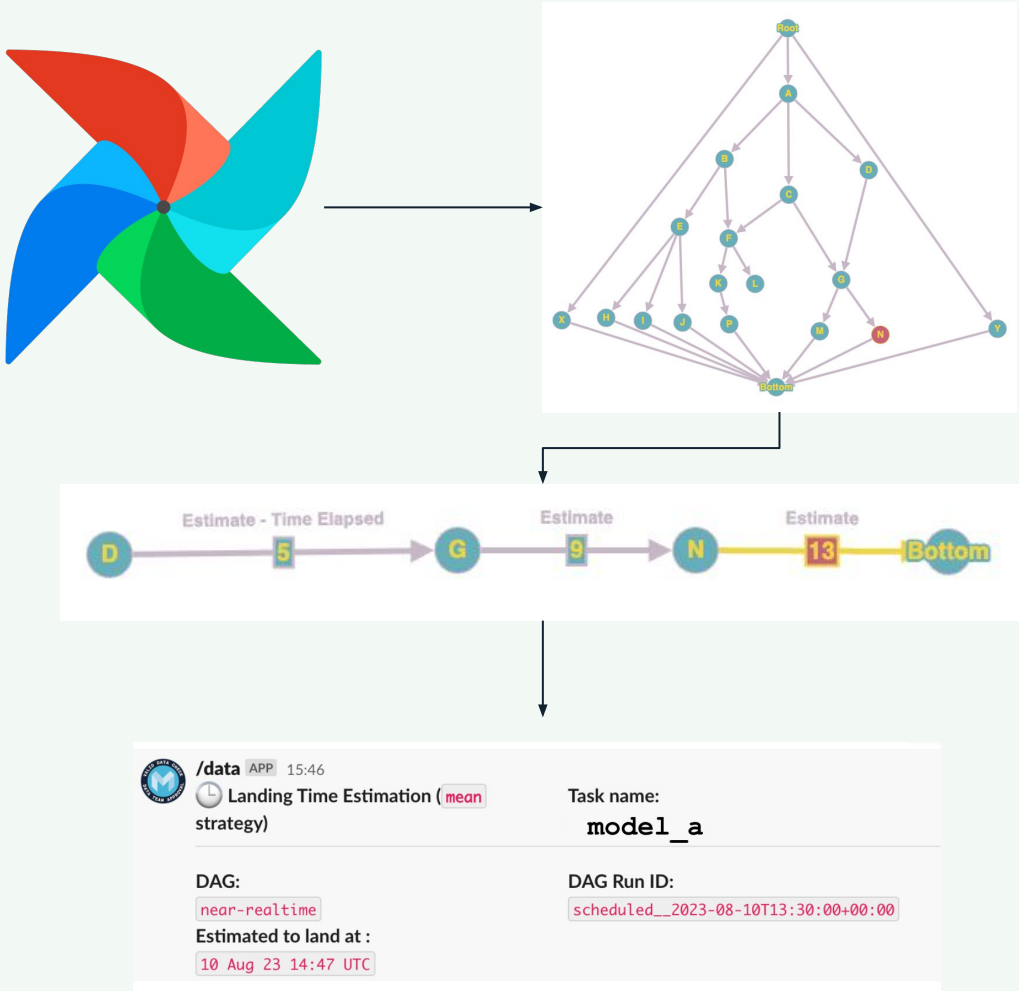
Estimated Landing Times

Landing Times From Critical Paths

- Our SLOs are based on model landing times
- We can re-use our critical path calculations, combined with estimates to give estimates on when a model will complete



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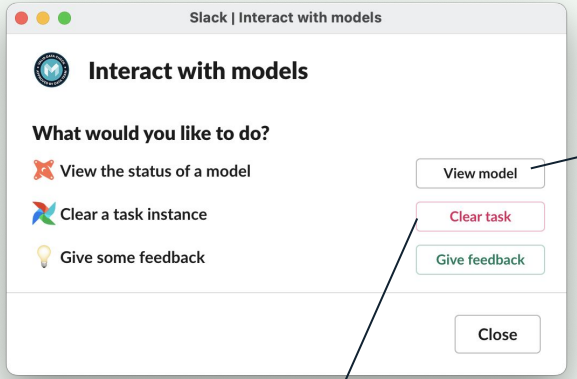
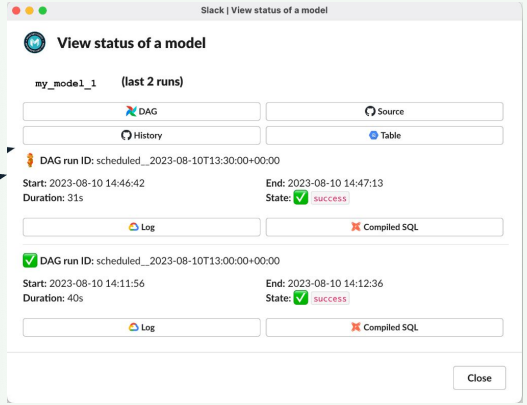
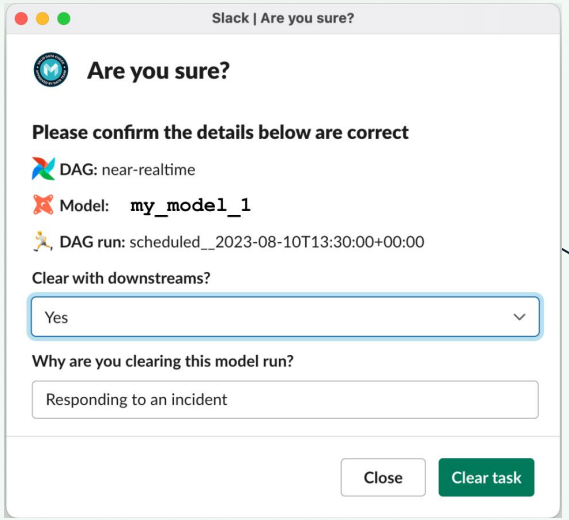
Slack App

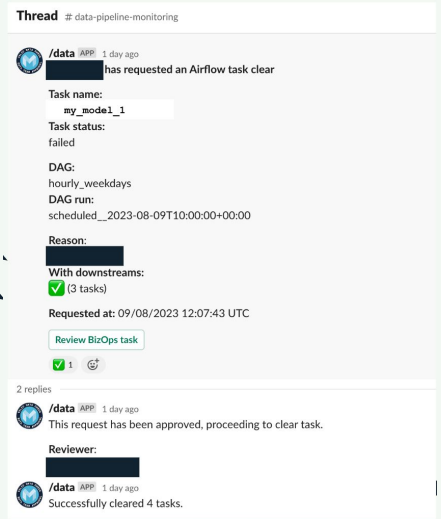
Exposing Our Tools

- We expose our tools via a Slack App to reduce the bar to entry for Data Discipline Members
- You can clear tasks, get statuses and estimate landing times
- Potentially destructive tasks (clearing tasks) protected by Multi Party Approval









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Moving Forwards

Airflow Upgrades

We'd like to upgrade from 2.3.4 to take advantage of new features.

Further Cost Reductions

Autoscaling

Deferrable Operators & Triggers

dbt Upgrades & Better DAG Build

We would like to move to 1.5

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Questions?

Optionally share some contact info like email, blog or social media handles

How to navigate this deck:

Section 1 - Title slides
Section 2 - Written content
Section 3 - Tables & Timelines
Section 4 - Using Emojis
Section 5 - Using Graphs

Navigators

Slides in this colourway are navigation slides and not intended to be used as part of your presentations.

Sub copy section

~~Sub copy section Over two lines~~

Longer Sub copy section

When using the pill, please try keep the copy as short as possible and on one line.
If necessary please extend the pill rather than drop copy onto second line.

1. Title slides

Below you will find a section of title slides
to choose from.

September 2022

Hero title goes here

monzo

September 2022

Hero title goes here

monzo

Title slide

You can use these slides to break up your presentation into sections

September 2022

Longer headline copy written across two lines

Sub title copy

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Sub copy section

Headline message

Short intro to paragraph (H3)

This space can be used to speak in detail about your work. The paragraphs are broken down into two sections to allow for easy reading. The use of a shorter line length makes the copy more digestible.

By pressing the enter key you can create a paragraph break. The shorter we can keep copy the better.

Short intro to paragraph (H3)

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By pressing the enter key you can create a paragraph break. The shorter we can keep copy the better.

Sub copy section

This space could be used as a short introduction to your presentation.

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Title slide

You can use these slides to break up your presentation into sections

Sub copy section

1,000,000+ customers

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2. Written content

Below you will find a section slides which can be used to display copy.

Sub copy section

Longer headlines can run across two lines

Short intro to paragraph (H3)

This space can be used to speak in detail about your work. The paragraphs are broken down into two sections to allow for easy reading. The use of a shorter line length makes the copy more digestible.

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By pressing the enter key you can create a paragraph break. The shorter we can keep copy the better.

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Sub copy section

1

Space for copy step 1

Moving away from agencies and growing our capabilities to help us power growth

2

Space for copy step 2

Moving away from agencies and growing our capabilities to help us power growth

3

Space for copy step 3

Moving away from agencies and growing our capabilities to help us power growth

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Sub copy section

Goals for next meeting.

1. Short and concise steps can help the reader digest information. Bring them on your journey.

2. Short and concise steps can help the reader digest information. Bring them on your journey.

3. Short and concise steps can help the reader digest information. Bring them on your journey.

4. Short and concise steps can help the reader digest information. Bring them on your journey.

monzo

Sub copy section

Headline message

Subheader paragraph (H3)

We're a species of skim readers. We've got more to read than any humans in history, on smaller and smaller screens, with less and less time to do it. So one of our toughest jobs is just to hold people's attention.

That's where subheadings come in.

Subheader paragraph (H3)

We're a species of skim readers. We've got more to read than any humans in history, on smaller and smaller screens, with less and less time to do it. So one of our toughest jobs is just to hold people's attention.

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Subheader paragraph (H3)

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Sub copy section

Longer headlines can run across two lines

Subheader paragraph (H3)

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Sub copy section

With this slide you should be able to take these steps (H4)

1

Write in steps about your process and the journey. Use these blocks of text to bring the reader on a journey. Help them understand your process by walking them through the steps you took.

2

Write in steps about your process and the journey. Use these blocks of text to bring the reader on a journey. Help them understand your process by walking them through the steps you took.

3

Write in steps about your process and the journey. Use these blocks of text to bring the reader on a journey. Help them understand your process by walking them through the steps you took.

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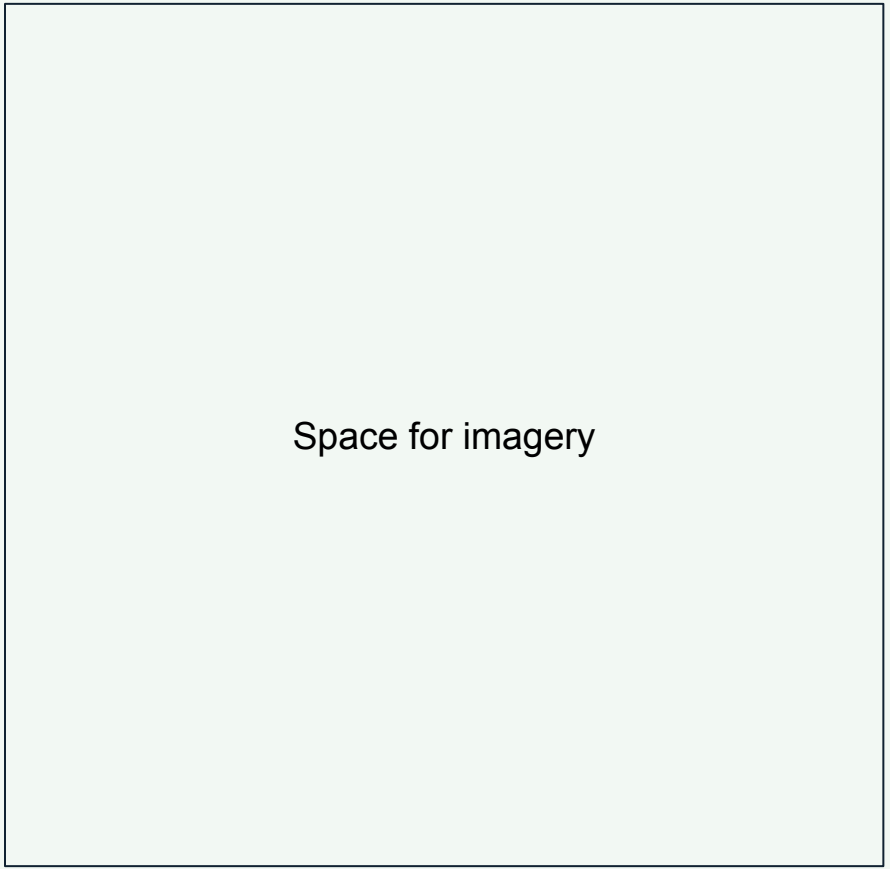
Sub copy section

Developing longer headline copy examples

Short intro to paragraph (H4)

On slides with large imagery you can insert any image you like. Simply cllck the Hot Coral square, then click the “replace image” button and choose your new image you would like to insert.



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Sub copy section

Short lists of bullet points

Our advice on bullet points is pretty simple. Big lists of bullets are no easier to read than big blocks of text. So they should be:

- Text size drops to 11.5
- Spacing set to 1.5
- No more than a (short) sentence
- Under 6 per list
- Use two columns if needed
- Related to each other
- Consistent in style

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Sub copy section

What you want to say, in steps

1. Short and concise steps can help the reader digest information. Bring them on your journey.

2. Short and concise steps can help the reader digest information. Bring them on your journey.

3. Short and concise steps can help the reader digest information. Bring them on your journey.

4. Short and concise steps can help the reader digest information. Bring them on your journey.

monzo

Sub copy section

Short lists of bullet points

Our advice on bullet points is pretty simple. Big lists of bullets are no easier to read than big blocks of text. So they should be:

- Text size drops to 16
- Spacing set to 1.5
- No more than a (short) sentence
- Under 6 per list

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Sub copy section

“Including a quote: Monzo changed my life, I am finally in control of my spending and it feels great!”

– Jake Peralta

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To replace the above image just select the box and select the “replace image” tab above.

You can use this space for a little blurb about the new starter.

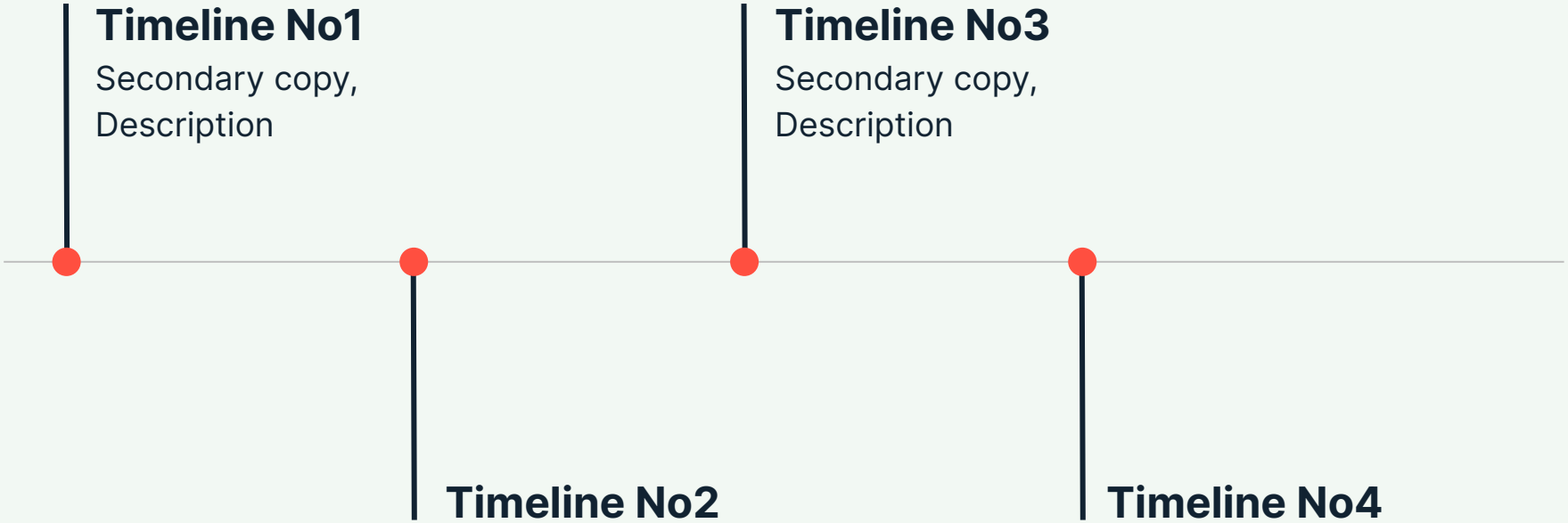
3. Tables & timelines content

Below you will find a section of slides which can be used to display information within tables and timelines to take the viewer on a journey.

Sub copy section

	Category 1	Category 2	Category 3	Category 4
Level 1	7.895	5.874	9.670	2.565
Level 2	7.445	6.543	7.883	9.224
Level 3	4.663	2.668	8.437	9.548

Sub copy section



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Sub copy section

March	April	May	June	July
Sub copy section	Sub copy section	Sub copy section	Sub copy section	Sub copy section
Lorem ipsum dolor sit amet, consectetur adipiscing elit.	Lorem ipsum dolor sit amet, consectetur adipiscing elit.	Lorem ipsum dolor sit amet, consectetur adipiscing elit.	Lorem ipsum dolor sit amet, consectetur adipiscing elit.	Lorem ipsum dolor sit amet, consectetur adipiscing elit.
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Sub copy section

With this slide you should be able to take these steps (timeline)

Write in steps about your process and the journey. Use these blocks of text to bring the reader on a journey. Help them understand

Write in steps about your process and the journey. Use these blocks of text to bring the reader on a journey. Help them understand

Write in steps about your process and the journey. Use these blocks of text to bring the reader on a journey. Help them understand

Write in steps about your process and the journey. Use these blocks of text to bring the reader on a journey. Help them understand

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Breaking content Into categories

Short intro to paragraph (H4)

On slides with large imagery you can insert any image you like. Simply cllck the Hot Coral square, then click the “replace image” button and choose your new image you would like to insert.

Category one	Lorem ipsum dolor sit amet. Quo tempora placeat aut enim blanditiis et voluptas eius aut architecto eaque eos quia corrupti
Category two	Lorem ipsum dolor sit amet. Quo tempora placeat aut enim blanditiis et voluptas eius aut architecto eaque eos quia corrupti
Category three	Lorem ipsum dolor sit amet. Quo tempora placeat aut enim blanditiis et voluptas eius aut architecto eaque eos quia corrupti
Category four	Lorem ipsum dolor sit amet. Quo tempora placeat aut enim blanditiis et voluptas eius aut architecto eaque eos quia corrupti
Category five	Lorem ipsum dolor sit amet. Quo tempora placeat aut enim blanditiis et voluptas eius aut architecto eaque eos quia corrupti

Sub copy section

What you want to say (H4)

With this slide you can insert four images. You can insert any image you like. Simply cllck the Hot Coral square, then click the “replace image” button and choose your new image you would like to insert.

Write in steps about your process and the journey. Use these blocks of text to bring the reader on a journey. Help them understand

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Sub copy section

Category One

Category Two

Category Three

Category Four

Category Five

Category Six

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4. Using Emojis and illustrations

Below you will find a section of slides which explains how we can best use emojis and illustrations in our presentations

Sub copy section

Using emojis

Emojis set us apart and reflect what we’re like as people: colourful, friendly and open to new ideas. So feel free to use them, especially if it helps the slide

Using emojis

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Emojis set us apart and reflect what we’re like as people: colourful, friendly and open to new ideas. So feel free to use them, especially if it helps the slide

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Sub copy section

Using emojis

To use more emojis you can use https://emojipedia.org/.

Simply type in your keyword and then copy the Emoji and paste it into the doc.

Using emojis

Emojis can help to break up copy and create a visual aid for your point.

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Sub copy section

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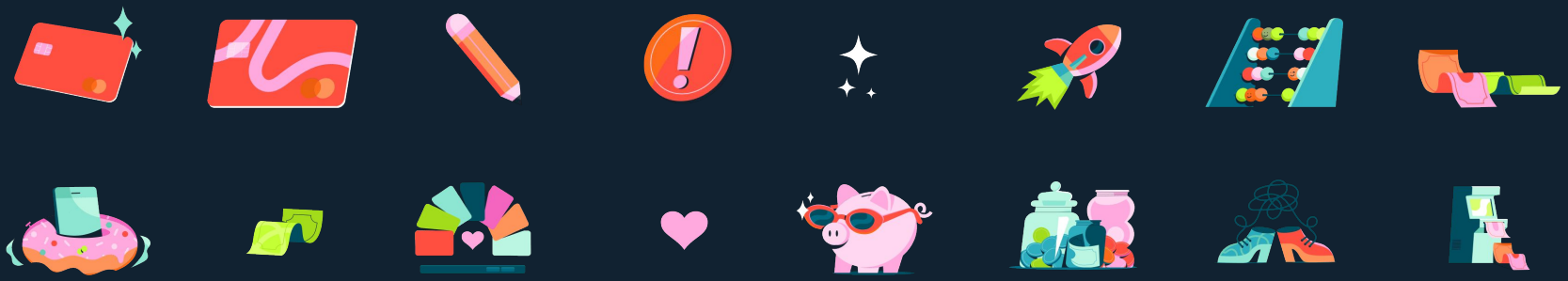
Sub copy section



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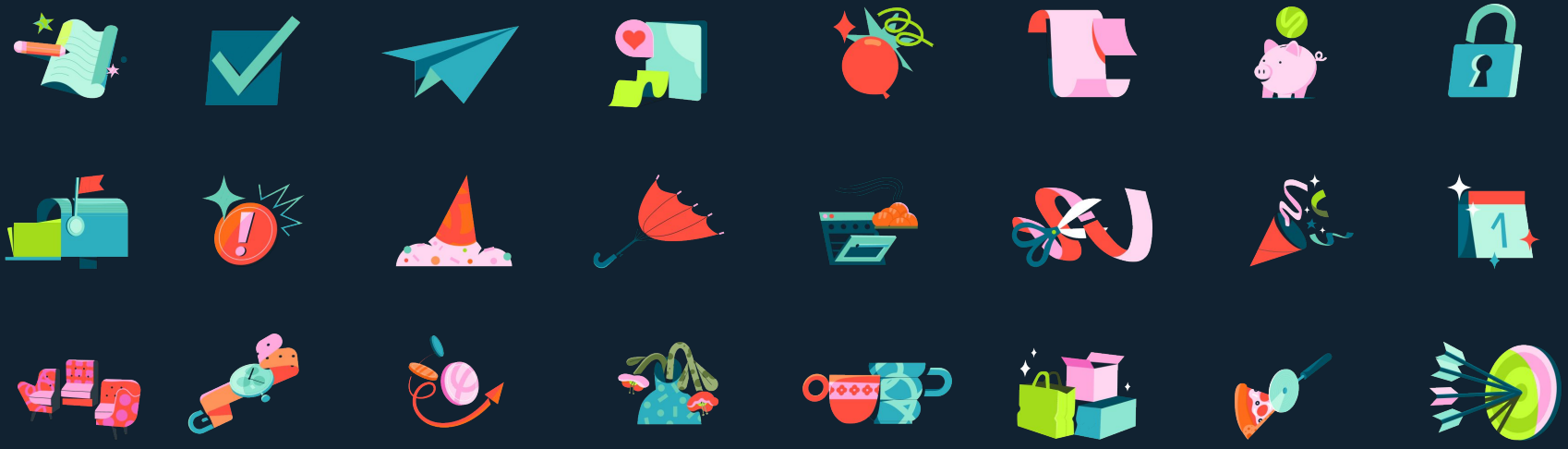
Sub copy section



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5. Using Graphs

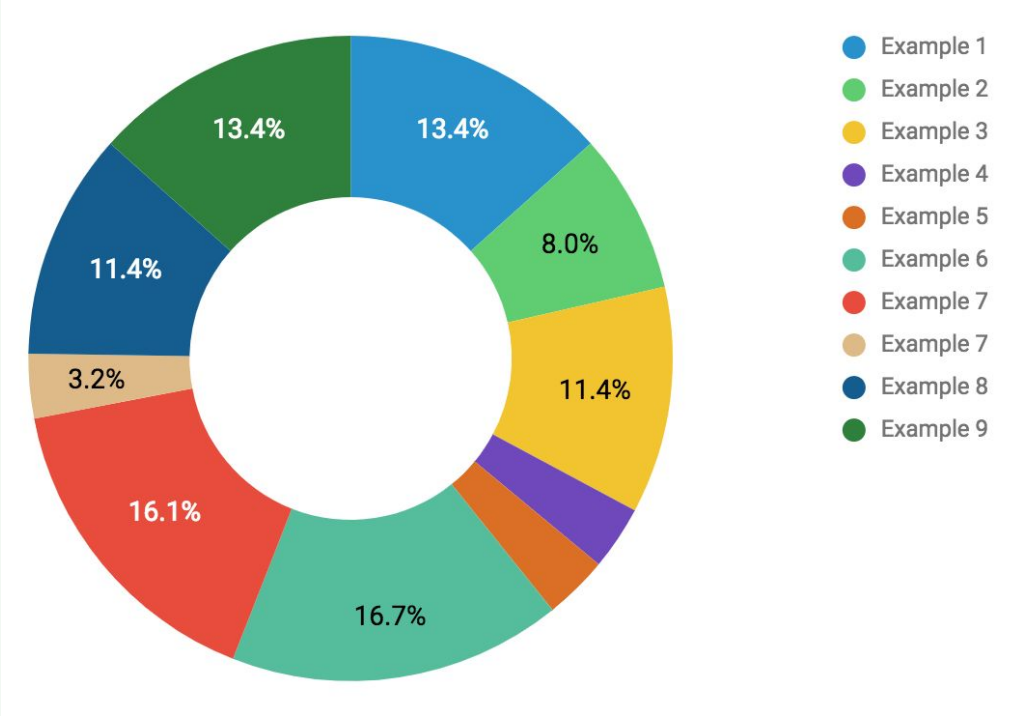
Below you will find a section of slides which allows you to drop in your graphs and add a description. These slides use a whistle background, allowing you to drop in screenshots of your charts, graphs etc.

Sub copy section

Pie chart example

Sub header

Most charts will tend to be created outside of slides and imported in on a white background. To insert your own chart you can click on the existing image, select “replace image” from the button above, and then choose your replacement image from your computer.



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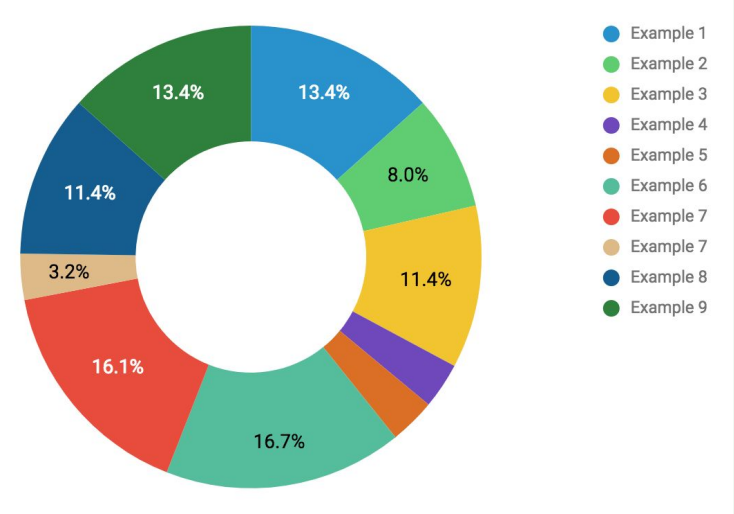
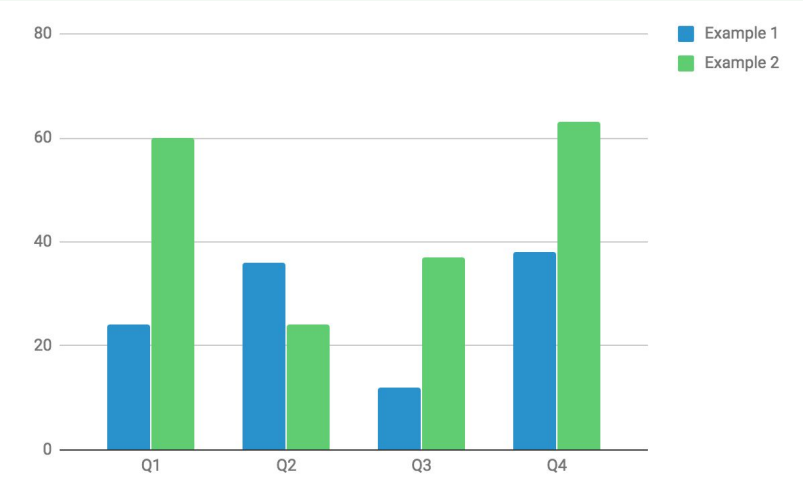
Sub copy section

Space for a tag-line where you can give context for the graphs and help the viewer understand.





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Sub copy section

Space for a tag-line where you can give context for the content and help the viewer understand.

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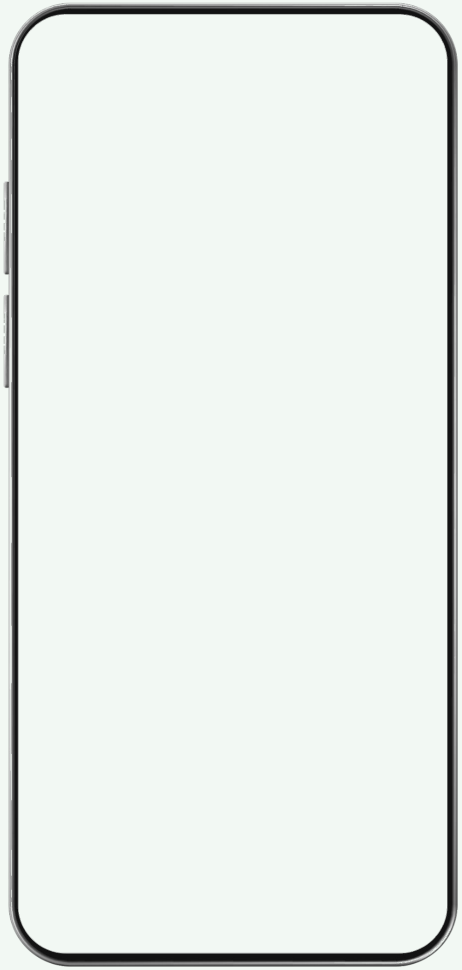
5. Mockups



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