AI PRODUCT MANAGEMENT 2 · DETAILED COURSE

Product Analytics and Data-Driven Decision Making

The data skills a PM uses to answer questions, measure behaviour and run experiments that inform decisions.

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CHAPTER 07

Product Analytics and Data-Driven Decision Making

The data skills a PM uses to answer questions, measure behaviour and run experiments that inform decisions.

Data Fundamentals for Product Managers

Data types, sources, quality, events vs tables, and the habit of asking what decision the data should inform.

Data types include numbers, categories, timestamps and text. Events record what a user did, while tables store entities such as accounts. Before analysing anything, ask what decision the data should inform.

Descriptive Statistics

Mean, median, mode, spread and percentiles to summarise data; prefer medians and percentiles for skewed metrics.

Mean, median, mode, spread and percentiles summarise data. Use medians and percentiles for skewed measures such as session length, because a few very long sessions distort the mean.

Probability Fundamentals

Likelihood, conditional probability and distributions, the basis for reasoning under uncertainty.

Probability measures how likely an outcome is. Conditional probability asks how likely an outcome is given another event, such as churn given a failed payment. Distributions describe the range of possible values for a metric.

Hypothesis Testing

Testing whether an observed difference is likely due to chance, using null hypothesis, p-values and significance level.

Hypothesis testing asks whether an observed difference is likely due to chance. The null hypothesis states there is no difference. A p-value below a pre-set threshold, often 0.05, suggests the difference is unlikely to be chance, but it does not measure business importance.

SQL Fundamentals

SELECT, WHERE, GROUP BY, ORDER BY and LIMIT to query tables.

SELECT, WHERE, GROUP BY, ORDER BY and LIMIT let you query tables. Example: SELECT city, COUNT(*) FROM orders WHERE status = 'paid' GROUP BY city returns paid orders per city.

SQL Joins and Aggregations

Combining tables (inner, left) and summarising with COUNT, SUM, AVG across groups.

Joins combine tables on keys. Inner joins keep matches only; left joins keep all rows from the left table. Aggregations such as COUNT, SUM and AVG summarise groups. Check row counts after each join to avoid double counting.

Advanced SQL for Product Analytics

Window functions, CTEs, date handling and cohort queries for retention and funnel analysis.

Window functions, common table expressions and date functions answer product questions such as "what share of users returned on day 7?" Build cohort tables step by step and check each intermediate result.

Excel and Google Sheets

Pivot tables, lookups, formulas and charts for fast analysis and sharing.

Pivot tables, lookups, formulas and charts are fast tools for analysis and sharing. Use them for quick exploration and small datasets. Move to SQL and a BI tool when data grows or needs refreshing.

Data Visualisation

Choosing charts that make comparisons obvious, with clear labels and no distortion.

Choose charts that make the comparison obvious: bars for categories, lines for trends. Label axes clearly, start bars at zero and avoid decorative effects that distort the message.

Tableau and Power BI

BI tools for interactive dashboards and self-serve reporting on warehouse data.

These BI tools build interactive dashboards and self-serve reports on warehouse data. Good dashboards show a small set of decisions and the metric definitions beside them, so people interpret the numbers the same way.

Product Analytics Fundamentals

Tracking user behaviour as events with properties, then analysing funnels, cohorts and paths.

Product analytics records user behaviour as events with properties, then analyses funnels, cohorts and paths. Clean event names and a tracking plan prevent confusing results later.

Funnel Analysis

Measuring conversion between steps to find where users drop off.

A funnel measures conversion between steps, such as visit, signup, activation and purchase. The biggest drop is a starting point for investigation, not an answer. Segment the funnel by source and device to see who drops off.

Cohort Analysis

Grouping users by a shared start (such as signup week) and following them over time.

A cohort groups users by a shared start, such as signup week. Following each cohort shows whether newer users behave better or worse than older ones over time.

Retention Analysis

How many users return over days or weeks; the retention curve flattening signals product-market fit.

Retention shows how many users return over days or weeks. A retention curve that flattens at a healthy level is a common sign of product-market fit, while a curve that keeps falling signals a problem.

Churn Analysis

Why and when customers leave, using exit surveys, usage patterns and segment comparison.

Churn analysis asks why and when customers leave, using exit surveys, usage before cancellation and segment comparisons. Churn usually follows a clear drop in usage, so track engagement as an early warning.

Conversion Rate Optimisation

Improving the share of visitors who complete a goal through research, tests and friction removal.

CRO improves the share of visitors who complete a goal through research, testing and friction removal. Start with the steps where users stall, then test changes against a clear hypothesis.

Customer Segmentation

Grouping users by behaviour, value or needs to tailor products and messages.

Segments group users by behaviour, value or need. A segment is useful when it suggests a different product choice or message. Segments based only on demographics often fail to change any decision.

A/B Testing

Randomly split users between versions and compare a pre-chosen metric to measure causal impact.

An A/B test randomly splits users between two versions and compares a pre-chosen metric. Randomisation makes the difference causal. Decide the sample size and duration before starting, and do not stop early because one result looks good.

Multivariate Testing

Testing combinations of multiple elements at once; needs more traffic than A/B.

Multivariate tests vary several elements at once to find the best combination. They need far more traffic than A/B tests. Use them only when you have enough users and a clear reason to test interactions.

Experimentation Frameworks

A repeatable process: hypothesis, metric, sample size, guardrails, run length, analysis and decision.

A framework sets a repeatable process: hypothesis, primary metric, guardrails, sample size, run length, analysis and decision rule. Teams that follow one framework make fewer false conclusions.

Event Tracking

Defining and logging user actions with a consistent naming plan so analysis is trustworthy.

Event tracking defines and logs user actions with a consistent naming plan, for example "checkout_started" with properties. Review the plan when features change so historical data remains comparable.

Product Analytics Dashboards

Live views of key metrics for the team, with a clear owner, definitions and thresholds for action.

A dashboard shows key metrics for the team, with a clear owner, definitions and thresholds that trigger action. A dashboard without an owner tends to be ignored within months.

Mixpanel

Event-based product analytics for funnels, retention and cohorts.

Mixpanel is event-based analytics for funnels, retention and cohorts. It suits teams that want quick self-serve analysis of user behaviour in web and mobile products.

Amplitude

Product analytics platform with behavioural cohorts, journeys and experimentation.

Amplitude offers behavioural cohorts, user journeys and experimentation tools. Like Mixpanel, it works from events, so the quality of the tracking plan determines the quality of the analysis.

Google Analytics

Web and app analytics for traffic, acquisition and conversion.

Google Analytics measures web and app traffic, acquisition channels and conversions. It is a common starting point for marketing data. Its event model and reports differ from product analytics tools, so check definitions before comparing numbers.

Data-Driven Product Decisions

Combining quantitative data with qualitative insight, stating the decision rule in advance.

Combine quantitative data with qualitative insight. Write the decision rule before looking at results, for example "we will launch if activation rises by at least 3 points without lowering revenue per user". This prevents rationalising the result afterward.

Summary of terms

Term	Meaning
Data Fundamentals for Product Managers	Data types, sources, quality, events vs tables, and the habit of asking what decision the data should inform.
Descriptive Statistics	Mean, median, mode, spread and percentiles to summarise data; prefer medians and percentiles for skewed metrics.
Probability Fundamentals	Likelihood, conditional probability and distributions, the basis for reasoning under uncertainty.

Hypothesis Testing	Testing whether an observed difference is likely due to chance, using null hypothesis, p-values and significance level.
SQL Fundamentals	SELECT, WHERE, GROUP BY, ORDER BY and LIMIT to query tables.
SQL Joins and Aggregations	Combining tables (inner, left) and summarising with COUNT, SUM, AVG across groups.
Advanced SQL for Product Analytics	Window functions, CTEs, date handling and cohort queries for retention and funnel analysis.
Excel and Google Sheets	Pivot tables, lookups, formulas and charts for fast analysis and sharing.
Data Visualisation	Choosing charts that make comparisons obvious, with clear labels and no distortion.
Tableau and Power BI	BI tools for interactive dashboards and self-serve reporting on warehouse data.
Product Analytics Fundamentals	Tracking user behaviour as events with properties, then analysing funnels, cohorts and paths.
Funnel Analysis	Measuring conversion between steps to find where users drop off.
Cohort Analysis	Grouping users by a shared start (such as signup week) and following them over time.
Retention Analysis	How many users return over days or weeks; the retention curve flattening signals product-market fit.
Churn Analysis	Why and when customers leave, using exit surveys, usage patterns and segment comparison.
Conversion Rate Optimisation	Improving the share of visitors who complete a goal through research, tests and friction removal.
Customer Segmentation	Grouping users by behaviour, value or needs to tailor products and messages.
A/B Testing	Randomly split users between versions and compare a pre-chosen metric to measure causal impact.
Multivariate Testing	Testing combinations of multiple elements at once; needs more traffic than A/B.
Experimentation Frameworks	A repeatable process: hypothesis, metric, sample size, guardrails, run length, analysis and decision.
Event Tracking	Defining and logging user actions with a consistent naming plan so analysis is trustworthy.
Product Analytics Dashboards	Live views of key metrics for the team, with a clear owner, definitions and thresholds for action.
Mixpanel	Event-based product analytics for funnels, retention and cohorts.
Amplitude	Product analytics platform with behavioural cohorts, journeys and experimentation.
Google Analytics	Web and app analytics for traffic, acquisition and conversion.
Data-Driven Product Decisions	Combining quantitative data with qualitative insight, stating the decision rule in advance.

Practice exercise: Write SQL for a weekly signup-to-activation funnel and week-1 retention on a sample dataset, and state what decision each result supports.

Self-check

1. Explain Data Fundamentals for Product Managers in two sentences to a non-technical stakeholder, then say what you would measure for it.
2. Explain Retention Analysis in two sentences to a non-technical stakeholder, then say what you would measure for it.
3. Explain Data-Driven Product Decisions in two sentences to a non-technical stakeholder, then say what you would measure for it.

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Context window

Context window: what a model can see at once

The context window is the most tokens a model can consider in one request. It covers your prompt, any documents you paste, the conversation so far and the reply. Anything outside it is invisible to the model. For PMs: a longer window fits more material but costs more and can slow responses; put the most important facts near the instructions; use retrieval (RAG) rather than pasting whole libraries; and test answers on long inputs, where quality can drop.

Context engineering course Context windows in the AI PM 2 course

Tokens and context in the Grokbot course

AI-First Product Management

Resources for Product Managers

The PM Master Handbook, AI and product tools with their official websites, interview practice, a frameworks cheat sheet, a PRD template and free courses.

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23 modules and 620+ pages: 12 Product Core modules, an 11-class AI Tools Lab, frameworks, case studies, projects and interview prep.

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Product Core modules

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2Product Strategy and Strategic Thinking*Handbook chapter, detailed PDF, handbook and class slides*PDF Detailed PDF Handbook Class Slides
3Problem Discovery and Market Research*Handbook chapter, detailed PDF, handbook and class slides*PDF Detailed PDF Handbook Class Slides
4Problem Framing and Prioritization*Handbook chapter, detailed PDF, handbook and class slides*PDF Detailed PDF Handbook Class Slides
5UX and Design Collaboration*Handbook chapter, detailed PDF, handbook and class slides*PDF Detailed PDF Handbook Class Slides
6Effective Communication and Stakeholder Management*Handbook chapter, detailed PDF, handbook and class slides*PDF Detailed PDF Handbook Class Slides
7Product Analytics and Metrics*Handbook chapter, detailed PDF, handbook and class slides*PDF Detailed PDF Handbook Class Slides
8Product Launch, Growth, and Monetization*Handbook chapter, detailed PDF, handbook and class slides*PDF Detailed PDF Handbook Class Slides
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10LLMs, RAGs, and AI Foundations*Handbook chapter, detailed PDF, handbook and class slides*PDF Detailed PDF Handbook Class Slides
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AI Tools Lab

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Business AI Stack (chapters 24 to 31)

24The business AI stack: tools and where to learn themPDF ↗ 25Next.js: customer-facing dashboardsPDF ↗ 26Zoho CRM: managing customers and leadsPDF ↗ 27WhatsApp Business Platform: customer messagingPDF ↗ 28Deployment with Vercel and AWSPDF ↗ 29Jira: tracking product and development workPDF ↗ 30Meta Business Suite, social media marketing and Google AdsPDF ↗ 31A one-page website that generates leadsPDF ↗

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Complete AI tool guides (one PDF, 30 pages) ↗

Libraries

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PM interview practice (free, on the original sites)

Hand-picked public question banks and guides from other PM communities. Each link opens the original page in a new tab.

PM frameworks cheat sheet

Framework	Use it to	How it works
RICE	Prioritise a backlog	Reach × Impact × Confidence ÷ Effort. Score each idea, then sanity-check the ranking.
Kano	Decide which features delight	Classify features as Must-be, Performance, Attractive, Indifferent or Reverse using a short survey.
MoSCoW	Scope a release	Must have, Should have, Could have, Won't have (this time).
Jobs-to-be-done	Understand motivation	When [situation], I want to [motivation], so I can [outcome].
AARRR (Pirate metrics)	Map the growth funnel	Acquisition, Activation, Retention, Referral, Revenue.
HEART	Measure user experience	Happiness, Engagement, Adoption, Retention, Task success, each with goals, signals and metrics.
North Star metric	Align the team	One metric that captures the value users get, supported by input metrics the team can move.
Five whys	Find the root cause	Ask 'why?' repeatedly until you reach a cause you can act on.
CIRCLES	Answer product design questions	Comprehend, Identify users, Report needs, Cut through prioritisation, List solutions, Evaluate trade-offs, Summarise.

PRD template

PRD: [Feature name] Owner: [Name] · Status: Draft · Last updated: [Date] 1. Problem Who has the problem, what it is, and the evidence (data, interviews, tickets). 2. Goal and success metrics Primary metric (with baseline and target), secondary metrics, guardrails. 3. Users and use cases Target segment, top 3 user stories: "As a [user], I want [action] so that [benefit]." 4. Solution What we'll build (link designs), what's out of scope, open questions. 5. AI behaviour (if applicable) Inputs, model, prompt/approach, what it must never do, human review, evaluation set and pass criteria, cost per request. 6. Launch plan Experiment design, rollout stages, support and comms, rollback criteria. 7. Risks and dependencies Technical, legal/privacy, operational; owners and mitigations.

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