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Hidden Integration Costs in Online Controlled Experimentation Platforms

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Director, Data Science Clinic
University of Chicago

Presentation Overview

- Introduction
- Presentation Motivation
- Build vs. Buy
- Some Thoughts and Ramblings
  - Integration Cost Spirals
  - Historical Data / Exporting Data
  - Rabbit Holes
  - Unavailable Features
- Conclusion

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About me

- University of Chicago (2022-Present)
  - Director, Data Science Clinic
  - Instructional Professor
- Director of Backend Engineering & Data Science at The Meta (Not FB, Kovaak) 2020-2022
- Assistant Professor of Data Science at USF (2014-2020)
  - Director of Industry-Academic Partnership
- Director of Analytics at Sega (2014-2015)
- Director of Analytics, Backend Engineering and User Acquisition at TinyCo (2011-2014)
- PhD UCLA 2011 (Management)
- Senior Consultant Bates White (2002-2006)

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Some Games I've Worked on

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Talk Motivation

- Online Controlled Experiments (”OCE”s) are a powerful tool in product development.
- Deciding how to implement them is a *classic* build-vs-buy decision that can have far reaching and long-term effects on a product.
- Tons of good resources on this decision but it tends to deemphasize (or gloss over completely) *integration* costs.
- This talk will highlight a number of these “hidden” integration costs and how they can bite you in the a**.

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Build vs. Buy

- There are a host of 3rd party systems for OCEs:
  - Optimizely
  - KISS Metrics
  - Split
  - Google Optimize
  - Launch Darkly

- The question is should we use one of these or build our own?

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Build vs. Buy: Strategic

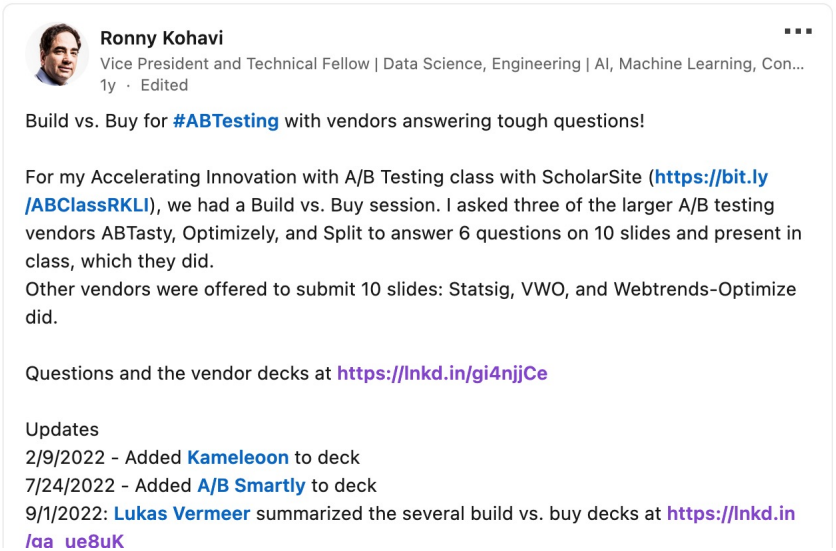
- Taken from Graham McNicoll's Medium Page, but very representative.
- Lots and lots and lots of version of this can be found.

	Build	Buy
Pro	• Tight integration into your code base • Uses existing metrics and data, including custom metrics • Aware of advanced caching • Easy to target audiences	• Almost immediately able to test • Proven statistics engine • Self-service front end testing admin - testing may done by non technical teams • Slick admin interface • Very easy to use • New features rolled out independently of your team
Con	• High opportunity costs to build • High maintenance costs • Generally poor user experience • Takes months to build right • High risks for incorrect results • Have to build trust • No self-service front end testing • Engineering often required to implement tests	• Ongoing subscription costs - some platforms can be expensive • Limited integration with code base • Yet another place for user data • 3rd party tracking often blocked • Most only support binomial metrics • Front end testing can cause flickering • Limited customization - not all tests can be run • Sometimes there can be "too many cooks" running A/B tests

Build vs. Buy: Costing

- Ronny Kohavi has a great series of posts and documents around different vendors, their products and pricing.
- Much of the work focuses on specific features of the platform and price (duh).
- Logic: Minimize cost given a set of requirements

Ronny Kohavi's Post



Ronny Kohavi
Vice President and Technical Fellow | Data Science, Engineering | AI, Machine Learning, Con...
1y · Edited

Build vs. Buy for **#ABTesting** with vendors answering tough questions!

For my Accelerating Innovation with A/B Testing class with ScholarSite (**https://bit.ly/ABClassRKLI**), we had a Build vs. Buy session. I asked three of the larger A/B testing vendors ABTasty, Optimizely, and Split to answer 6 questions on 10 slides and present in class, which they did.
Other vendors were offered to submit 10 slides: Statsig, VWO, and Webtrends-Optimize did.

Questions and the vendor decks at **https://lnkd.in/gi4njjCe**

Updates
2/9/2022 - Added **Kameleoon** to deck
7/24/2022 - Added **A/B Smartly** to deck
9/1/2022: **Lukas Vermeer** summarized the several build vs. buy decks at **https://lnkd.in/qa_ue8uK**

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Build vs. Buy

- If you read through the build vs. buy literature, you will find a few consistent take-aways:
  - Building costs are way more than you thought
  - Deciding on which 3rd party to go with it a fraught decision and many people get it wrong.
- There is a lot of information, but much of this conversation shies away from the *integration* aspects.
- Integration aspects are company and code base specific.
- So, given that this is already expensive and hard, what do you want to add to the conversation?

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Hot Take

Integration Costs are much higher than you think and, in many cases, should bias you toward building it yourself.

Why?

- We (almost always) make the build vs. buy decision against the backdrop of our existing tools and infrastructure
- Getting an OCE platform “working” vs. getting an OCE Platform “Integrated”
- *Integrating* and using a suite of 3rd party tools and internal infrastructure is costly.
- Sooo… what do you mean by “Integrating”?
  - To explain this, lets give some more context if we decide to “Buy” an OCE platform

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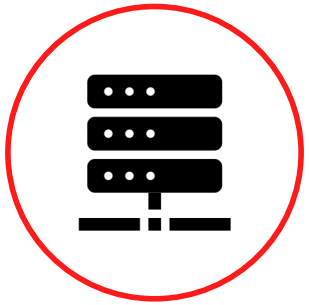
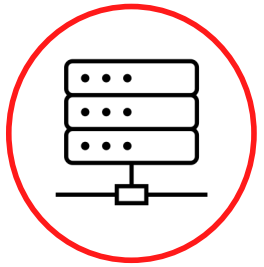
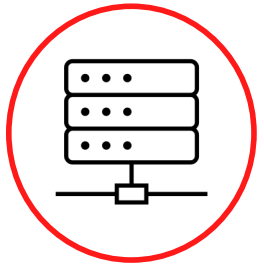
Typical (simplified) Systems Diagram e-commerce platform

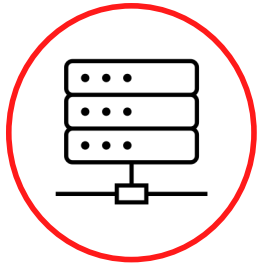


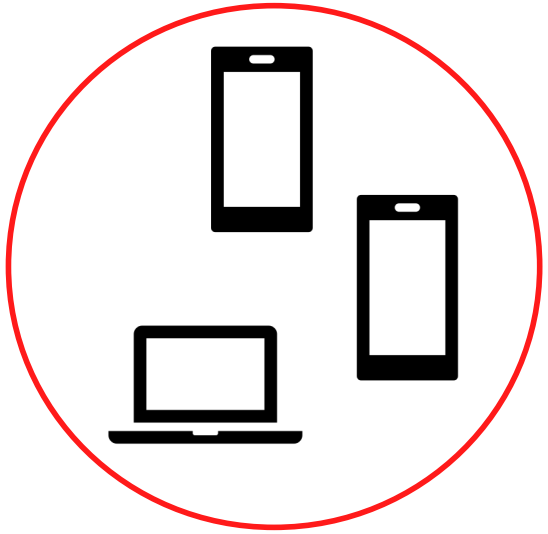
Internal Servers

3rd Party Systems









Client Devices

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External APIs / 3rd party systems

- Marketing APIs:
  - Push Notifications
  - Emails services
  - CRM Services (HubSpot, Salesforce)
  - Attribution Systems
- ML systems which do overnight batch process
- A/B Testing System
- External Analytics Systems
- Inventory Management System
- Shipping system
- Etc.

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Simple Example: e-commerce platform

- Our internal server currently keeps track of purchases
- Run an A/B test on a new sales flow and want to know if it increases sales to both “new” customers as well as “existing” customers.
- What information must be sent where?

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Simple Example: e-commerce platform

- Our internal server currently keeps track of purchases
- Run an A/B test on a new sales flow and want to know if it increases sales to both “new” customers as well as “existing” customers.
- What information must be sent where?
  - Client <> AB Test system to know which sales flow
  - Internal Server <> AB Test system to know sales status
  - **Historical** Data must be loaded into the AB Test system in order to balance the cohorts and ID new vs. existing sales

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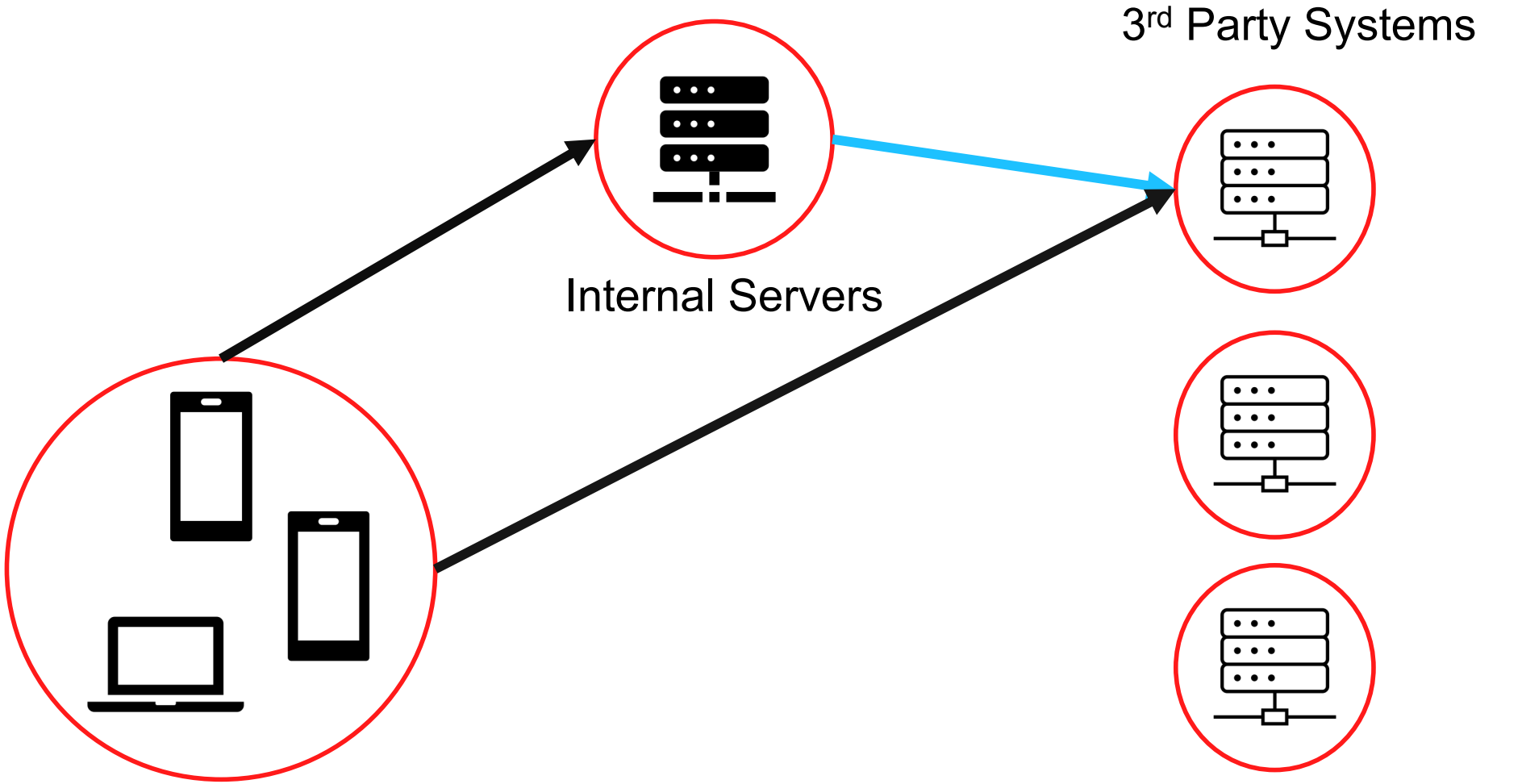
Typical Systems Diagram



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Simple Example: e-commerce platform

- I want to run a test on email marketing:
  - If a person puts something in their cart I want to send them an email
  - Test the format of a few subject lines
  - Same customer breakdown: Existing vs. New customers, etc.
- What information must be sent where?
  - Client <> AB Test system to know which sales flow
  - Server <> AB Test system to know when a sales is completed
  - **Historical** Data must be loaded into the AB Test system in order to balance the cohorts and ID new vs. existing sales
  - Marketing <> AB Test
  - Marketing <> Product

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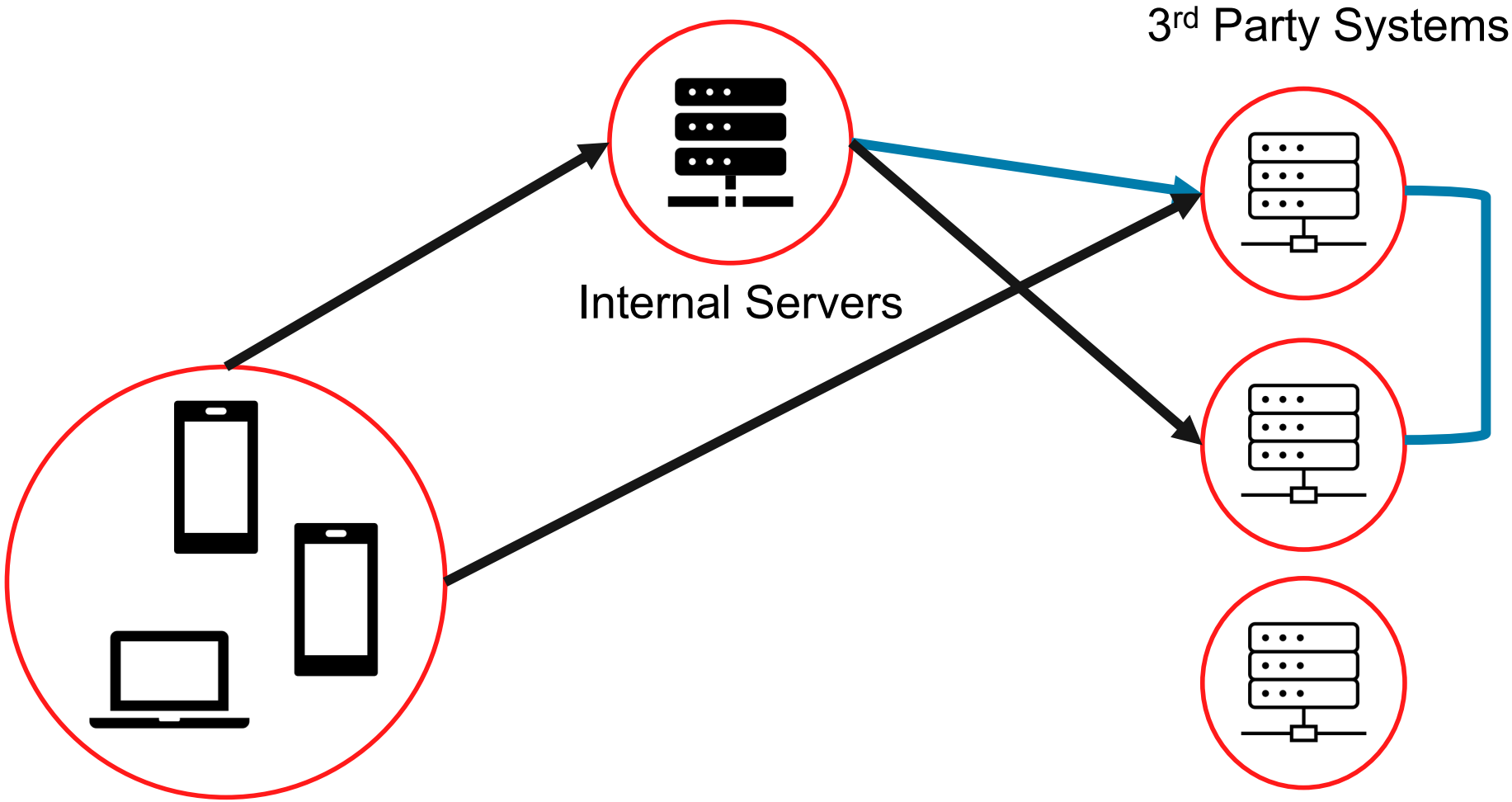
Typical Systems Diagram



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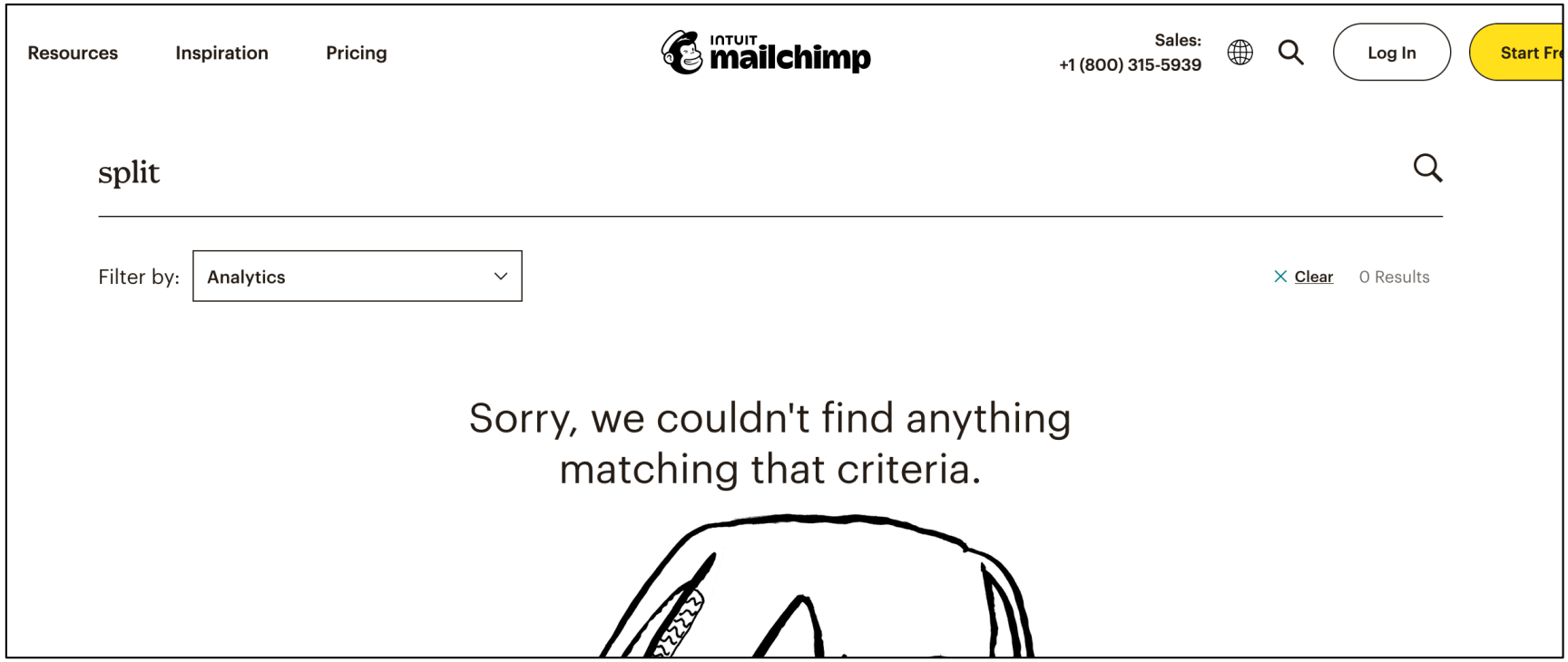
WAIT

- How do I connect mailchimp (our 3rd party email marketing solution) to Split.io (our 3rd party OCE platform)?



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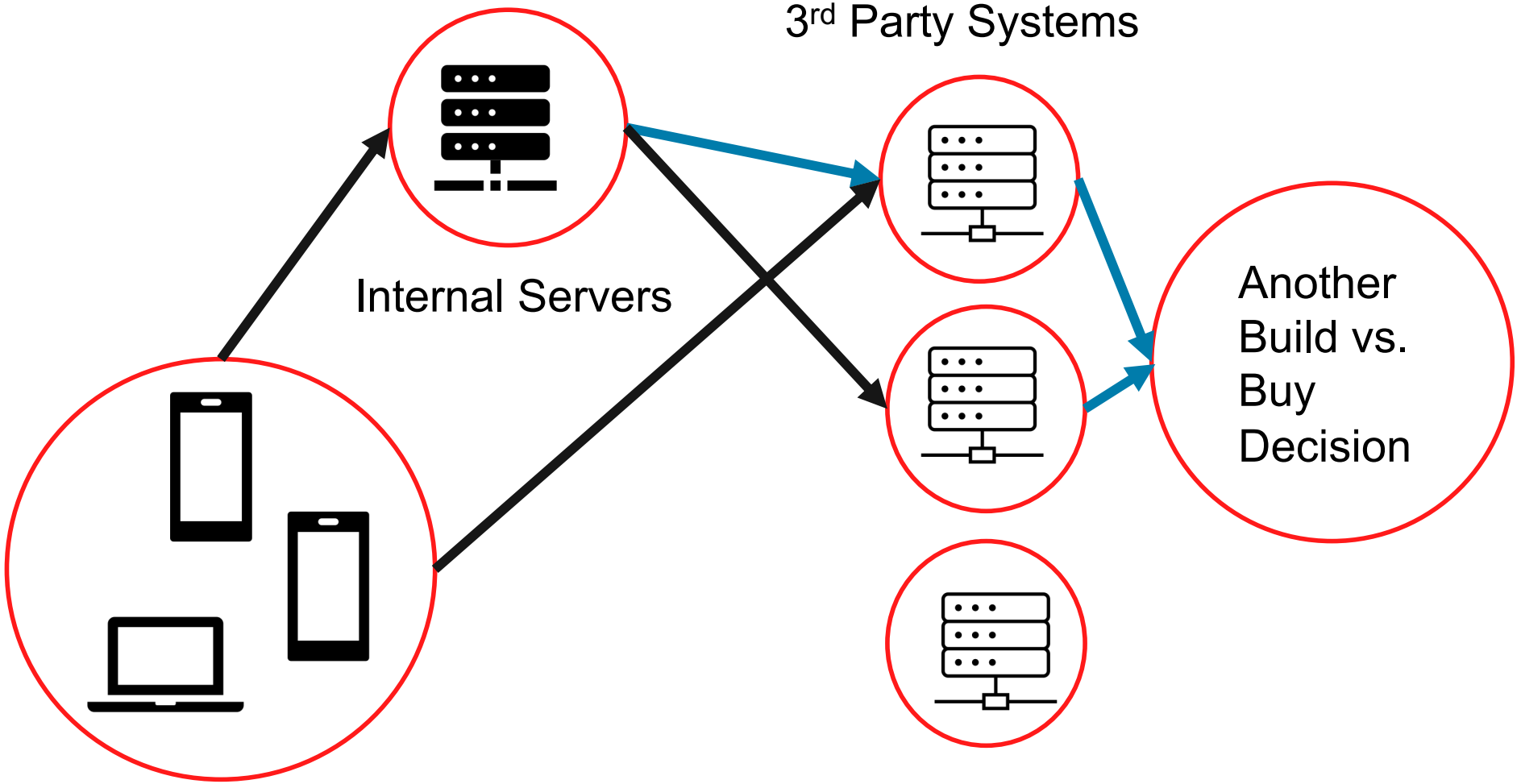

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Future

- You can probably guess what will eventually happen.

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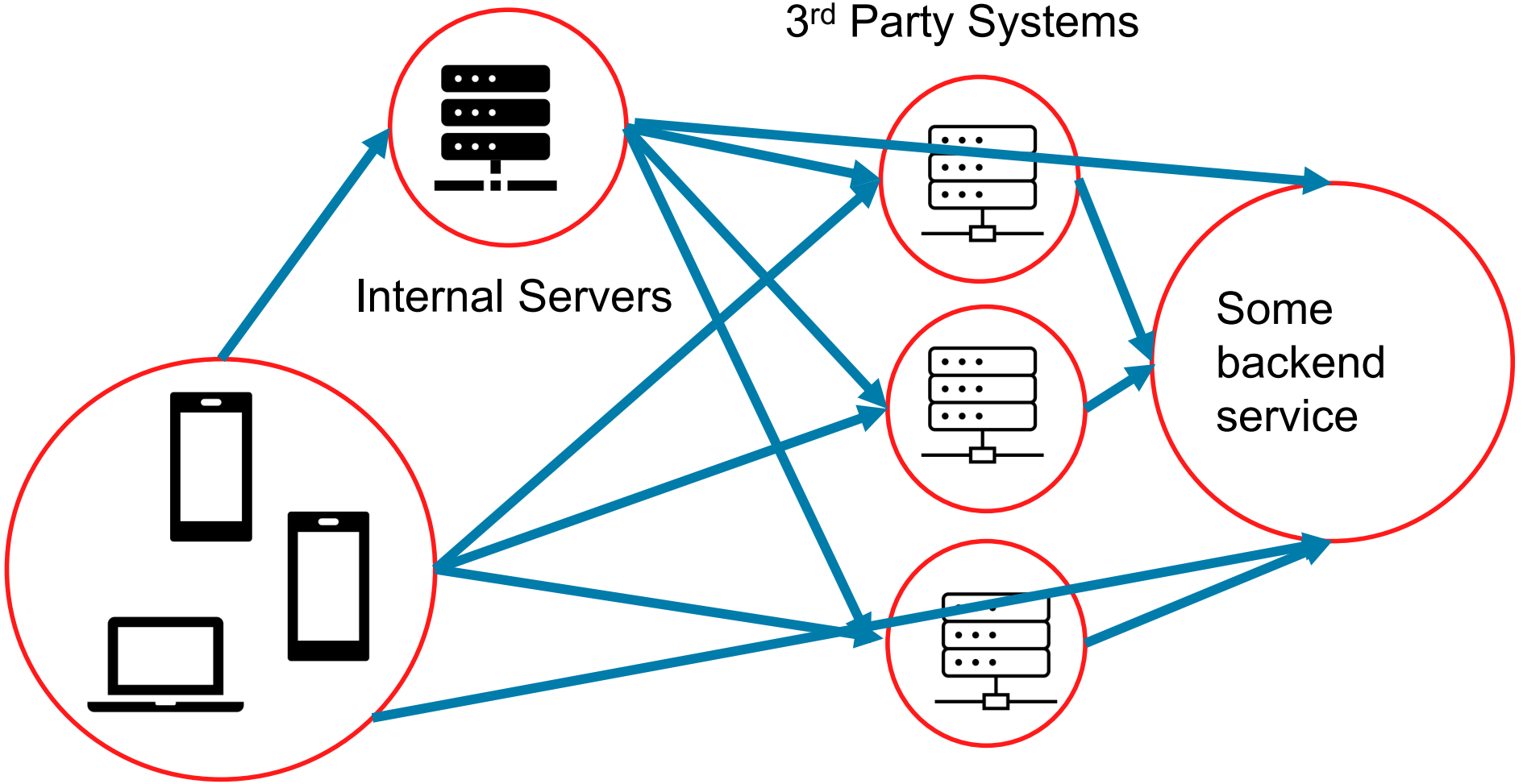
Real World System Diagram



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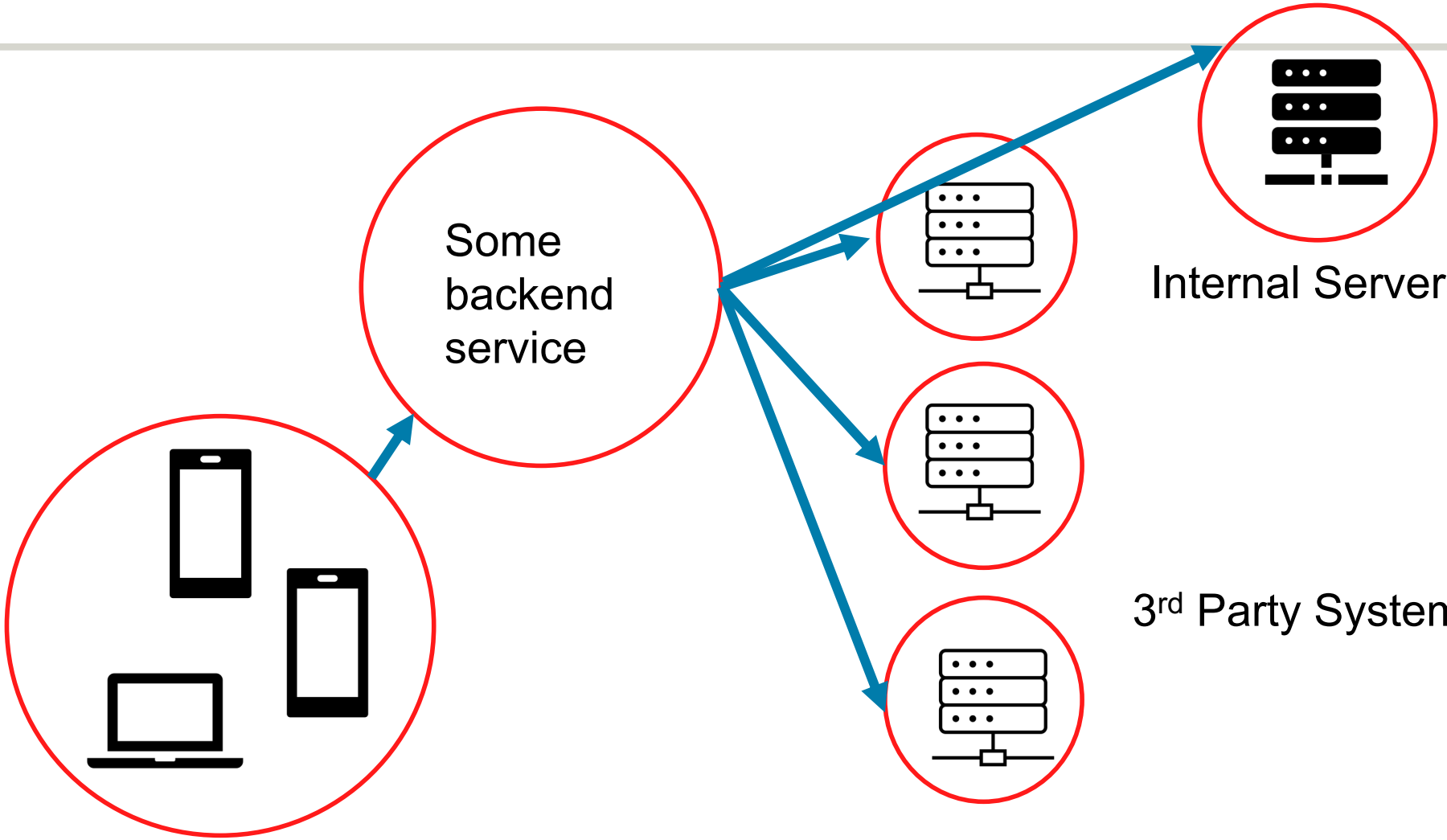
Single Point of Failure Alternative



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Why are these “hidden” costs?

- Moving from “working” to “fully integrated”
- Getting back to build vs. buy:
  - Discussion often centers on *working* – not on full integration
- Moving from “working” to full integration is often more costly than initial working stage:
  - May require deeply leveraging internal systems
    - Or changing them!
  - May require a deep understanding of domain and system context information

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Why are these “hidden” costs?

- **Every Line of Code is Liability / Cost**
- Every connection in that systems diagram requires *beyond the initial build:*
  - Maintenance
  - Updating as new features are added
  - Testing, logging and alerting systems
  - All of which are engineering time ($$)
- You can imagine the conversation:
  - *PM*: Now that our AB testing platform is up and running let's run a test on email!
  - *Engineer*: To do that we need to integrate our marketing provider.
  - *PM*: What? I thought we were already running.
  - *Engineer*: Only for front-end design, not for email testing.

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Example: Exporting Data

- All major OCE platforms can export data if you want to move to another platform (or just keep the data yourself).
- OCE Platforms don't like this – it's a form of vendor lock in.
- Data extraction is usually limited and complex:
  - Ex #1: Requires setting up a special AWS S3 Bucket
  - Ex #2: Creation of special "export" reports which contain subsets of the data.
  - Ex #3: Can only do raw data "going forward"

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Example: Importing Historical Data

- If you want your OCE to be be able to leverage historical data:
  - Different treatments based on specific properties
  - Visualizations, cross-tabs, downstream analysis, etc.
- This historical information needs to be accessible by the OCE:
  - API?
  - Passing the data around (leading to larger payloads)
  - Consistent identification?
- Organizing and providing access requires building additional tooling around your historical data.

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Example: Data Differences / Rabbit Holes

- **Every dashboard is a liability**
- The information in an OCE dashboards is often duplicative of information in already existing dashboards
- What happens when they aren't the same?
- Let's say that:
  - OCE Dashboard says there were 101 sales yesterday
  - Internal dashboard says 99 sales yesterday
- "Hidden" Costs:
  - Reputational
  - Investigation Costs

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Other hidden costs: Unavailable Features

- OCE platforms have features
- Marketing platform have features
- Internal systems have features
- What is available to the end user?

Marketing	Internal System	OCE
Feature #1	Feature #1	Feature #1
Feature #2	Feature #2	Feature #2
Feature #3		Feature #3
Feature #4		Feature #4

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Other hidden costs: Unavailable Features

- OCE platforms have features
- Marketing platform have features
- Internal systems have features
- What is available to the end user?

Marketing	Internal System	OCE
Feature #1	XXX	XXX
Feature #2	Feature #2	XXX
Feature #3	XXX	Feature #3
Feature #4	Feature #4	Feature #4
XXX	XXX	Feature #5
XXX	XXX	Feature #6

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Conclusion

- Most of the build vs. buy discussion shies away from talking about integration costs
  - Company, tech stack and feature-use specific
  - Hard to quantify
- Moving from getting the platform “working” to getting the platform “integrated” is (IMO):
  - Much higher cost than getting an OCE platform “working”
- Specific Costs:
  - Secondary Integrations
  - Unavailable Features
  - Rabbit Holes
  - Historical Data
  - Data Exports

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