

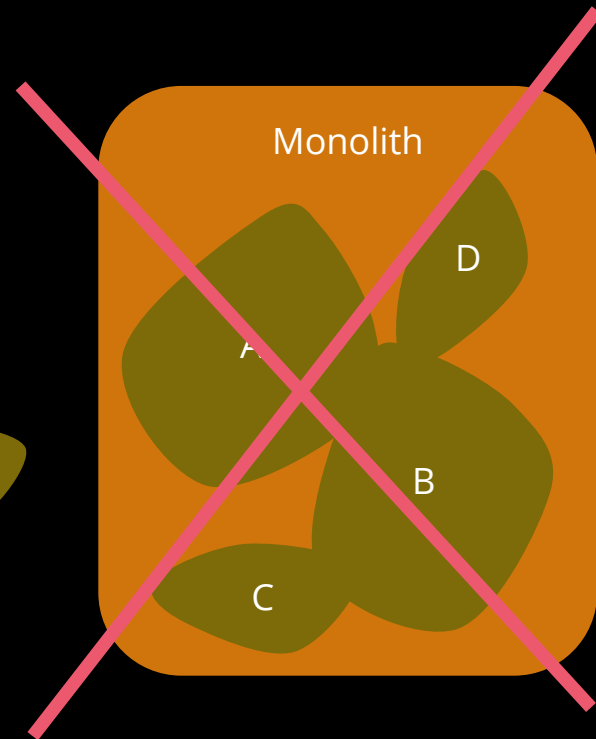
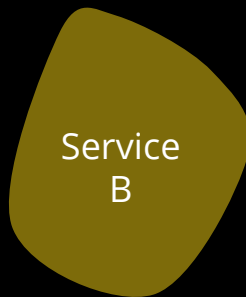


# Microservices Orchestration and Integration using Workflow Automation

Bernd Ruecker

Co-Founder and Chief Technologist

# Microservices



Change is the only constant

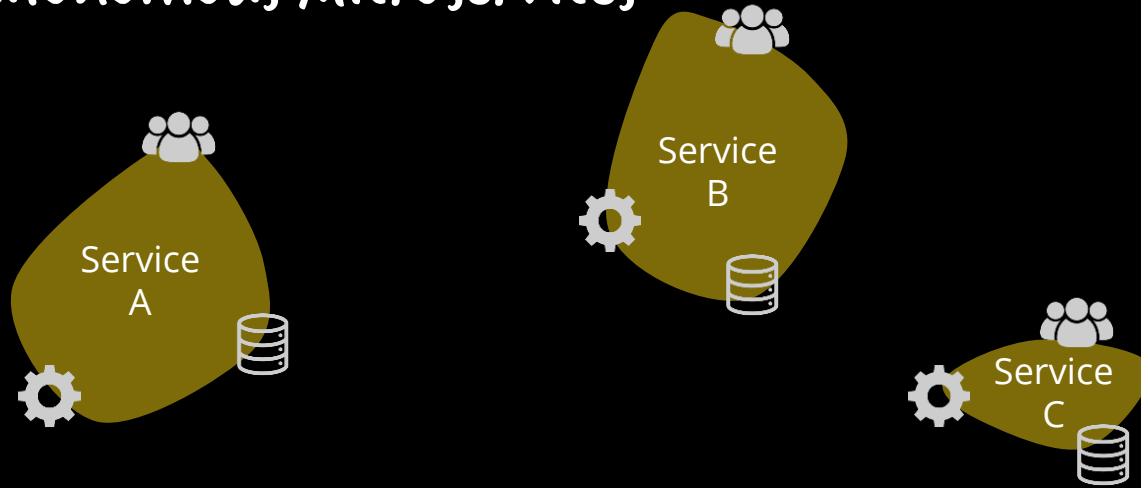
”

We don't know what we will need tomorrow.  
But we do know that we will need something.  
We have to be able to move quickly!

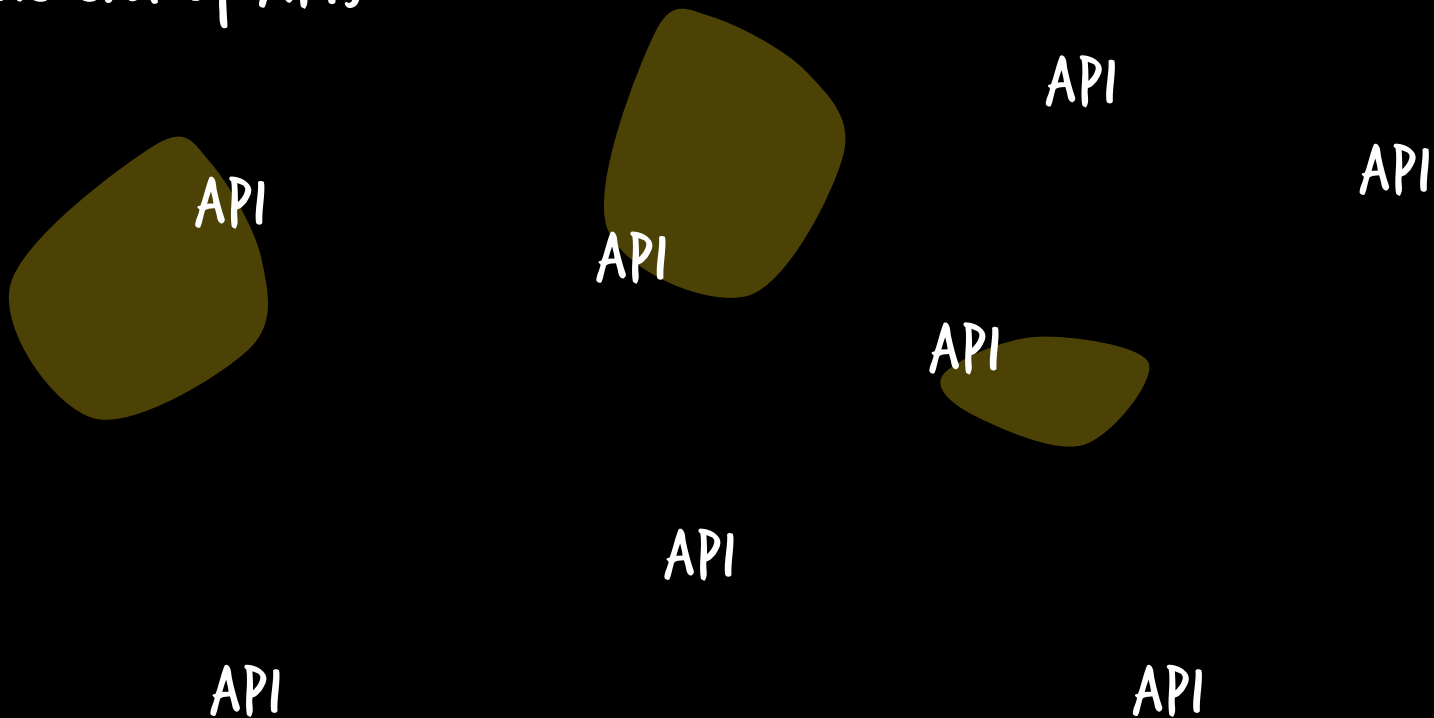
(10 of an insurance company in 2019)

→ Agility

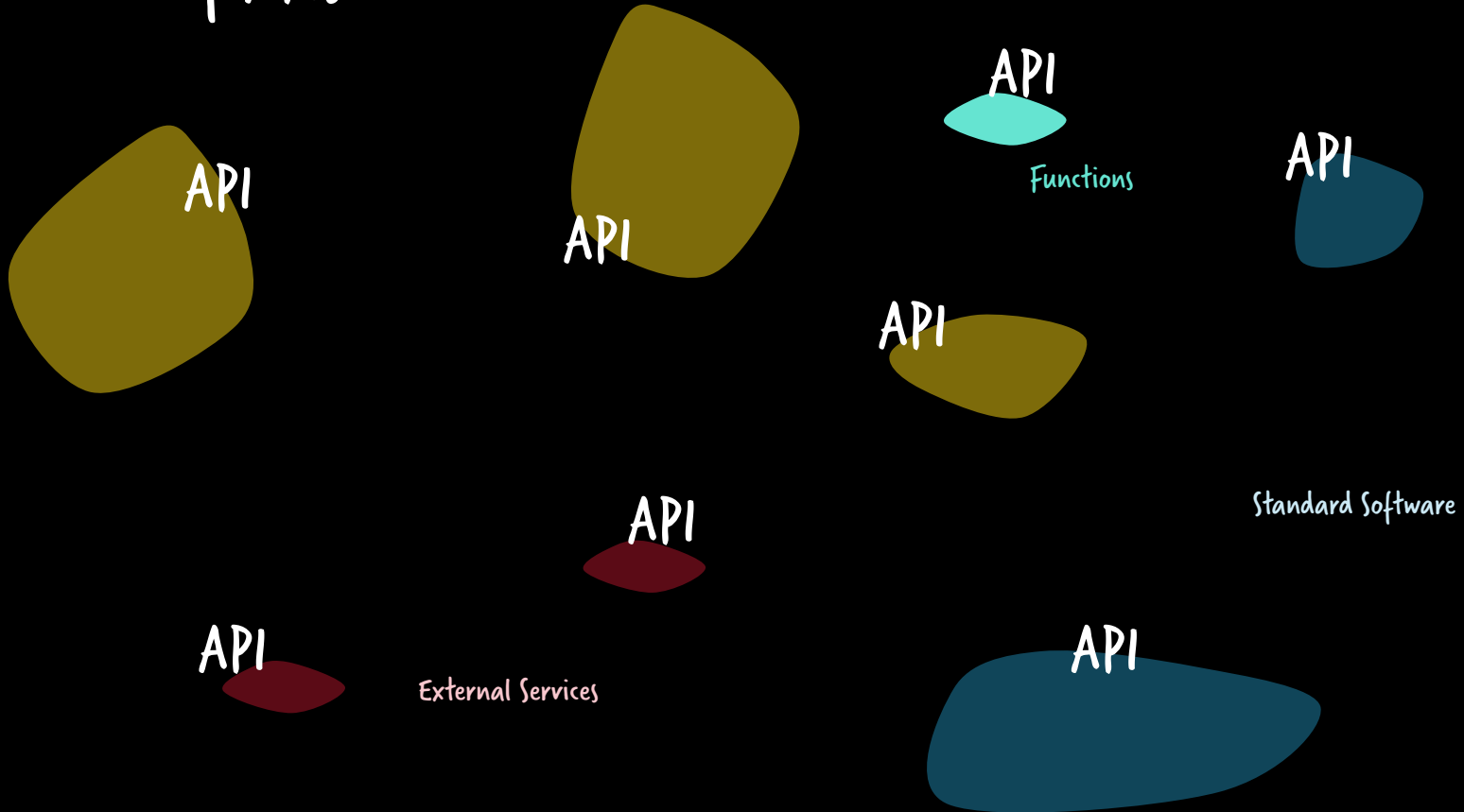
# Autonomous Microservices



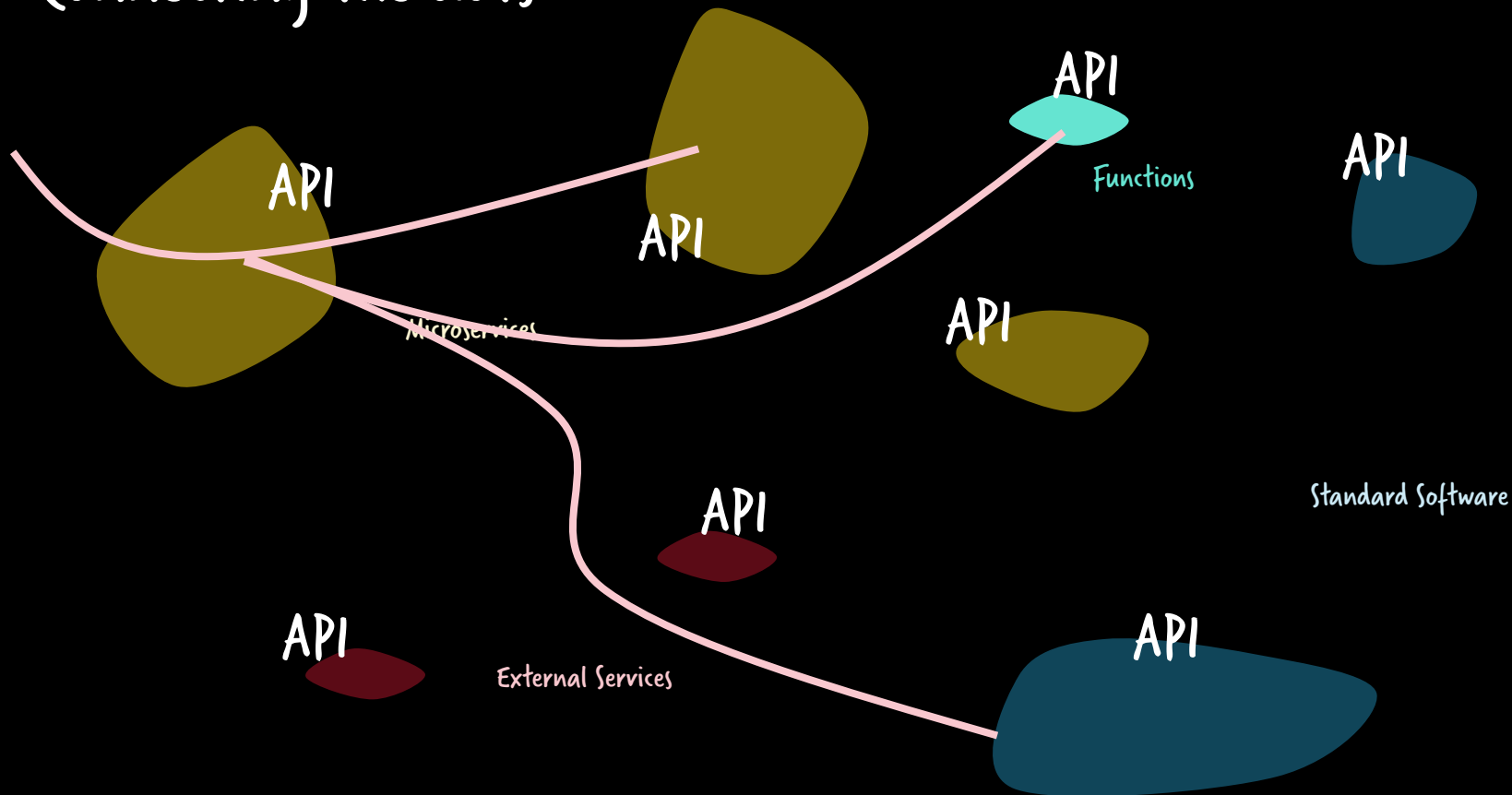
# The era of APIs



# The era of APIs



# Connecting the dots...



# Example

[Home](#) | [Contact](#) | [FAQs](#) | [A A A](#)

[My Bahn](#)

[Search](#) ✓
 [Select](#) ✓
 [Ticket & reservation](#)
[Payment](#)
[Check & book](#)
[Confirmation](#)

## Ticket and reservation

How would you like to receive your ticket?

☒
**Digital ticket**  
 Save it as a PDF or load it in the DB Navigator app

**Please note:**

- Only valid for the passenger stated (and accompanying passengers if applicable). Not transferable. You must present your ID to the ticket inspector on the train.

☐
**Order and receive ticket by post**

**5,90 EUR**  
Postage

**Your journey**

**Outward journey** **Mo, 09.09.2019**  
**15:37** Berlin Hbf (tier)  
**20:42** München Hbf

**Prices**

**Ticket, 2. class** **75,90**  
 1 Adult

**City-Ticket** **incl.**  
 Outward journey

**Total** **75,90 EUR**

**You aren't travelling?**

☐ **Ticket for another person**  
 You have to login for this service

**Our tip: reserve a seat now.** [Questions concerning reservation?](#)

☐ **Reservation of** **1 seat** **4,50 EUR**

[Back](#) [Proceed](#)

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**Die Bahn DB**

[Bitte auf A4 ausdrucken](#)

## OnlineTicket

**Fahrkarte ICE**  
 Gültigkeit: 06.11.2005 - 07.11.2005  
**Normalpreis (Einfache Fahrt)**  
 Klasse: **2**  
 Erw.: **1** mit **1** BICD0 Kinder: **0**  
 von: **Köln**  
 nach: **Ülm**  
 über: **VIA (ICE/K\* LMP UL)**  
 Hinfahrt: **mit ICE**  
 Umtausch-Erstellung ab dem 1. Geltungstag: **15 Euro**.

**Zahlungspositionen und Preis**

Kreditkartenzahlung	Positionen	1	EUR	47,00
Betrag	Fahrtkarten-Hinfahrt			
Datum	04.11.2005	Summe	EUR	47,00
Transaktions-Nr.	123456	Entlastende MwSt. (21) 10%	EUR	6,49
Vu-Nr.	081199123			
Gu-Nr.	012345			

**Hinfahrt:**  
 Zertifikat: **GBCD 1234 WXYZ 1**  
 Zertifikat kurz: **GEF1 0A**  
 Gültig ab: **06.11.2005**

**Herr Mustermensch**  
 Ausweis: **BahnCard 1234**  
 Auftragsnummer: **ZAB234**

**Ihre Reiseverbindung und Reservierung Hinfahrt am 06.11.2005**

Stell	Datum	Zeit	Gleis	Reservierung	Fahrt	Zertifikat
Köln Hbf	ab 13:54	0			ICE 519	siehe oben
Ülm Hbf	an 17:06	2				

**Hinweise:**

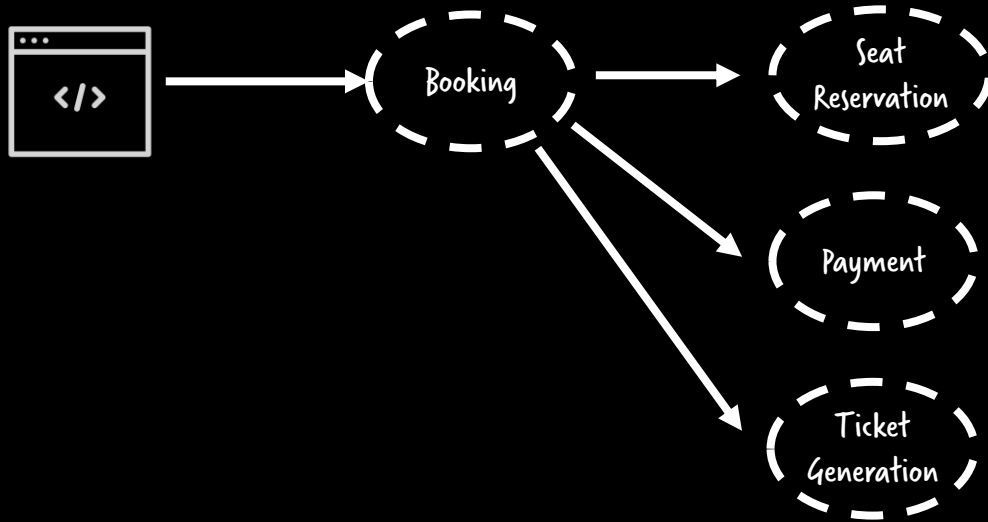
- Die Fahrkarte muss ausgecheckt vorliegen und gilt nur zusammen mit der beim Kauf angegebenen eigenen gültigen Ausweis-ID (BahnCard, Kreditkarte oder EC-Karte (Maestro)).
- Die Kartennummer und bei der Kontrolle zu Prüfziffern in ein Kontrollgerät eingeben.
- Bei Normalpreisen auch in anderen Zügen als in der Reservierung angegeben innerhalb der Geltungsdauer gültig (ggf. Aufpreis für anderen Sitz erforderlich).
- Bei Fragen und Problemen wenden Sie sich bitte an die in Ihrer Auftragsbestätigung angegebenen Servicenummern.
- Keine Einzahlung oder Rücknahme in DB ReiseCentern oder Reisebüros, sondern nur über www.bahn.de oder die Servicenummern.
- Das OnlineTicket gilt nur für den unter "Fahrkarte" angegebenen Reiseabschnitt. Die Übersicht "Ihre Reiseverbindung" enthält zu Ihrer Information ggf. zusätzliche Teilstücke (z. B. Bus, Train zum Zweck, bei bis vor Ort noch ein Ticket erworben werden muss).
- Wenn Ihr Ticket die City-Option beinhaltet, gilt dieses nur am Anreisetag, der ebenfalls bzw. am Abreisetag der Rückfahrt (Reisekarte wie unter "Ihre Reiseverbindung" angegeben). Die Hinfahrt muss durch Zertifikatseinführung anerkannt sein.
- Es gelten die Bahnbetriebsvorschriften der DB AG sowie sonstige geltenden Vorschriften und Bestimmungen.

Wir danken Ihnen für Ihre Buchung und wünschen Ihnen eine angenehme Reise!

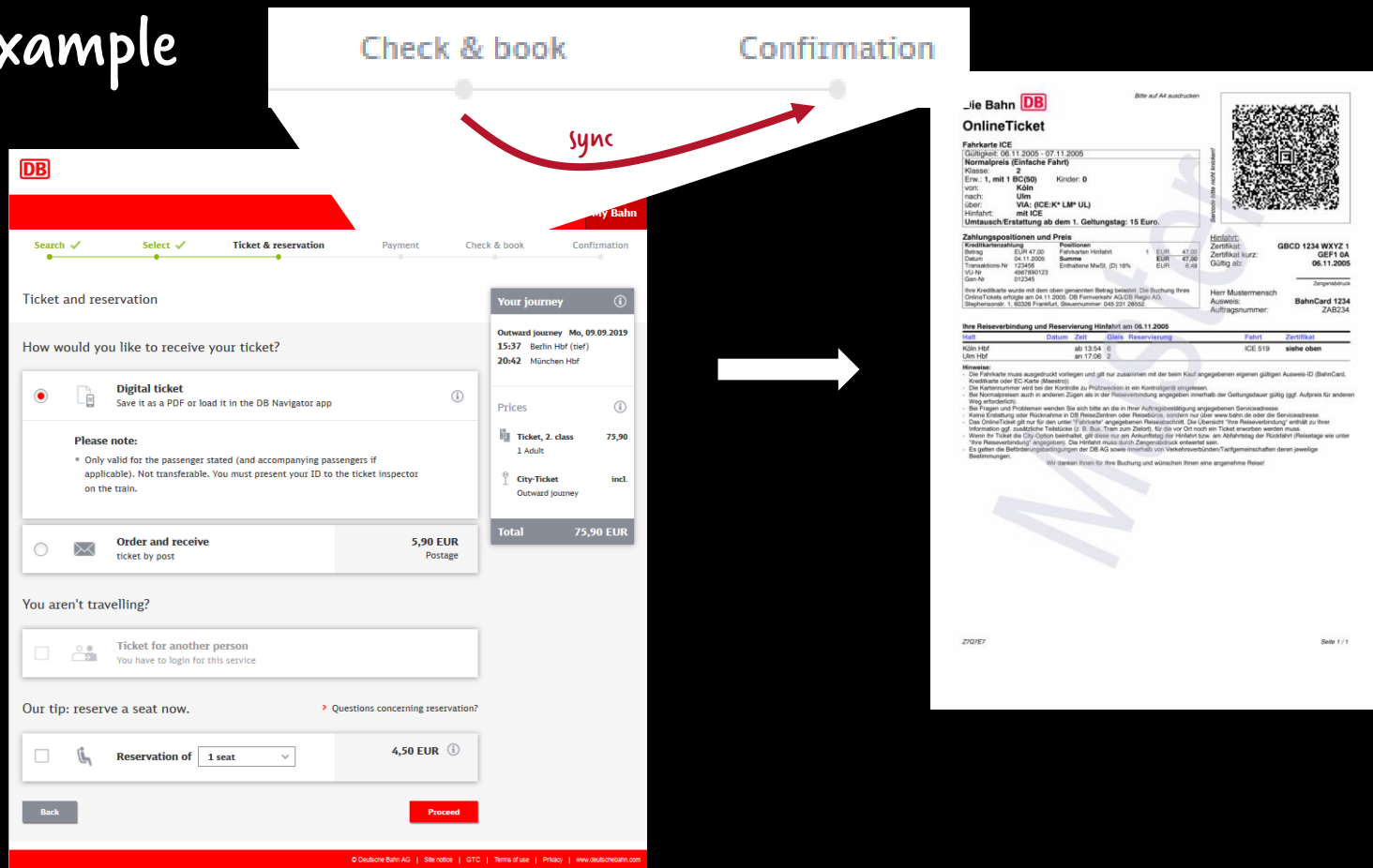
Z101767 Seite 1 / 1



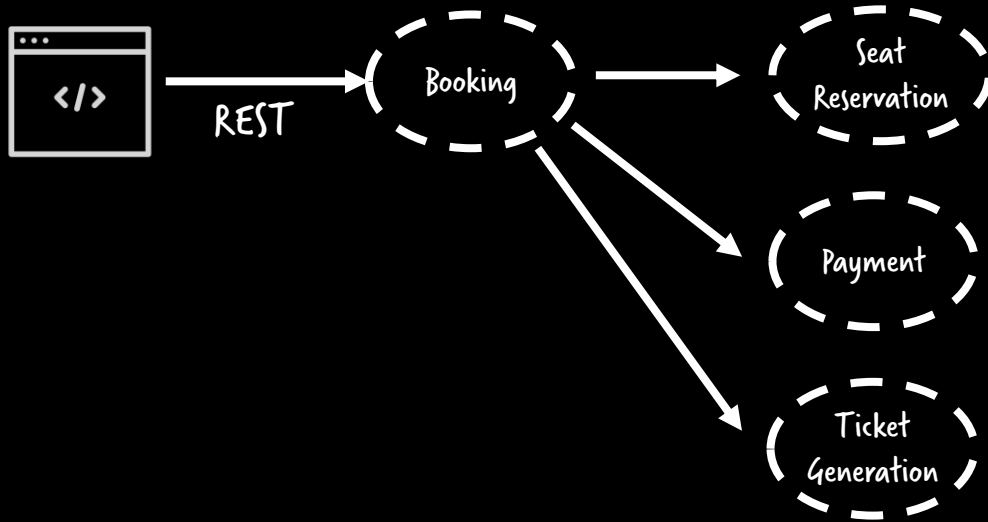
# Example



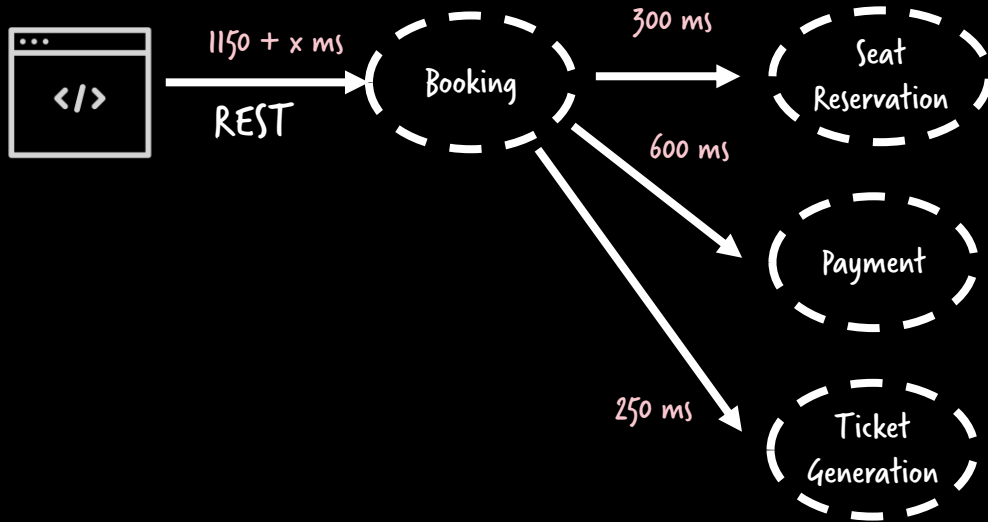
# Example



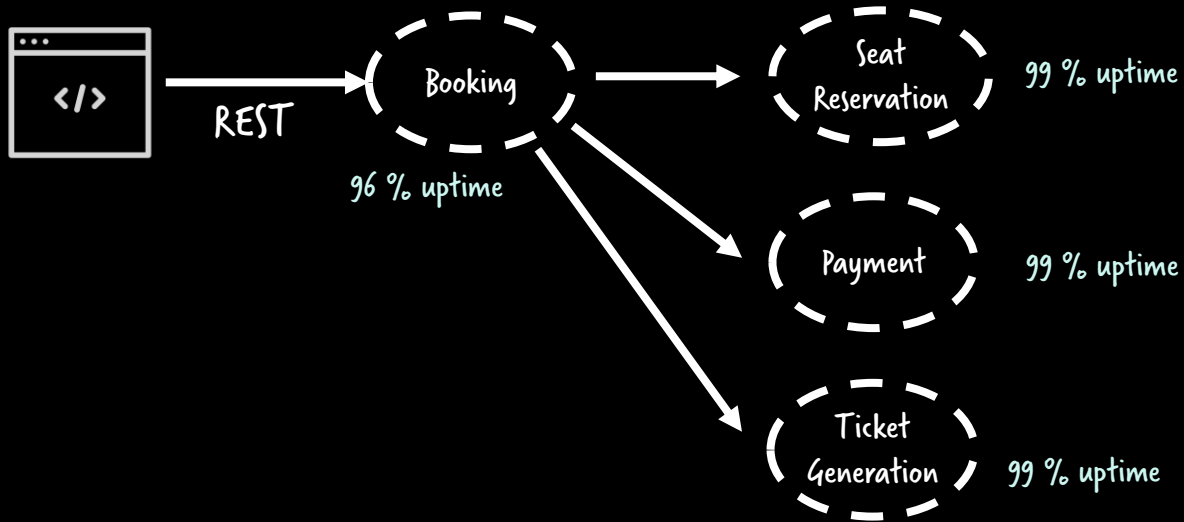
# Weaknesses



# Weaknesses: Latency creep



# Weaknesses: Availability erosion



# Example

DB

Home | Contact | FAQs | A A A

My Bahn

Search ✓

Select ✓

Ticket & reservation


Payment

Check & book

Confirmation


Ticket and reservation

How would you like to receive your ticket?

☒  **Digital ticket**  
Save it as a PDF or load it in the DB Navigator app


**Please note:**

- Only valid for the passenger stated (and accompanying passengers if applicable). Not transferable. You must present your ID to the ticket inspector on the train.

☐  **Order and receive ticket by post**


5,90 EUR  
Postage

You aren't travelling?

☐  **Ticket for another person**  
You have to login for this service

Our tip: reserve a seat now.

[Questions concerning reservation?](#)

☐  **Reservation of**  **4,50 EUR**

Back

Proceed

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DB

Startseite | Kontakt | Häufige Fragen | A A A

Meine Bahn

Logout

Hinweis

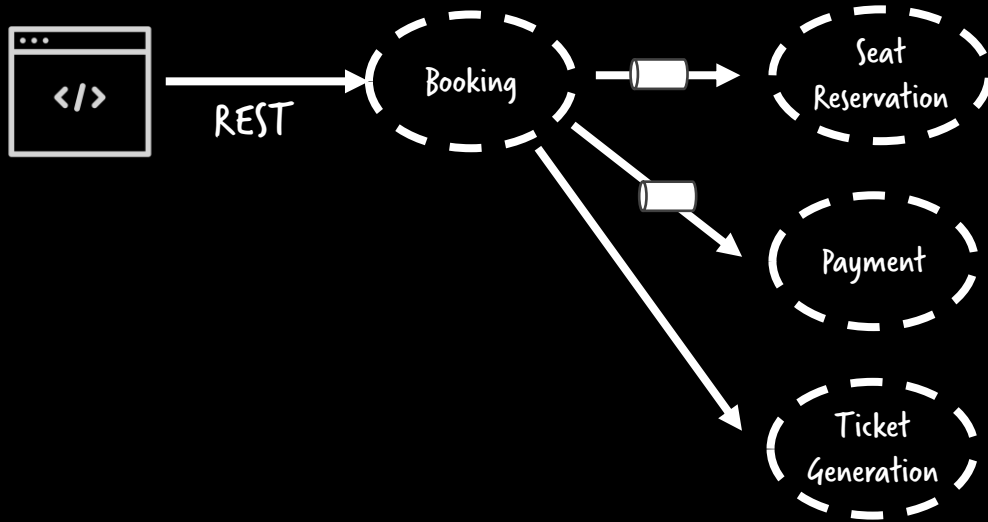
Sehr geehrte Kundin, sehr geehrter Kunde!

Bei der Verarbeitung Ihrer Anforderung ist ein Fehler aufgetreten. Vermutlich haben Sie mehrmals den gleichen Button angeklickt oder eine Funktion aus zwei Fenstern heraus doppelt aufgerufen. Bitte beachten Sie, daß Sie unsere Seiten nur aus einem einzelnen Browser-Fenster heraus bedienen sollten. Wir entschuldigen uns für die Unannehmlichkeiten.

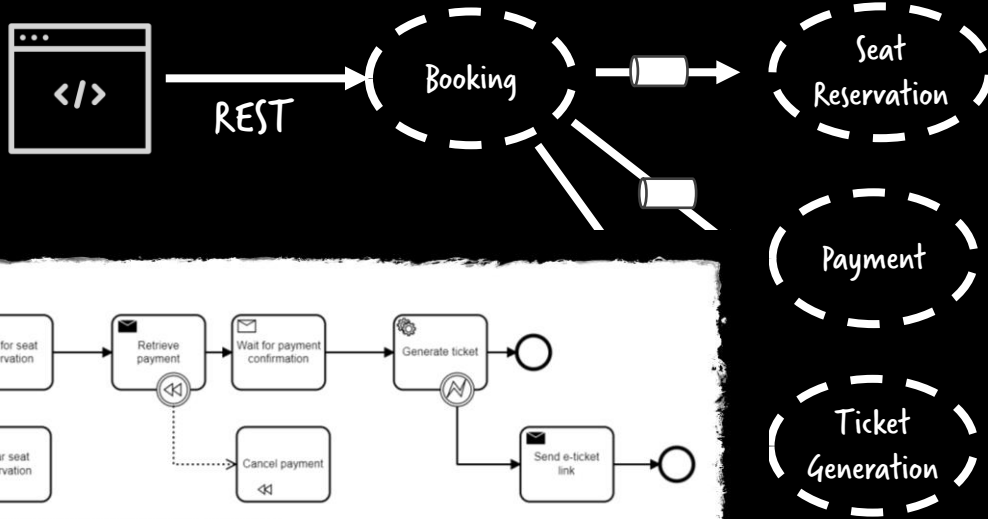
Deutsche Bahn AG

Weiter

And it is even hard to implement

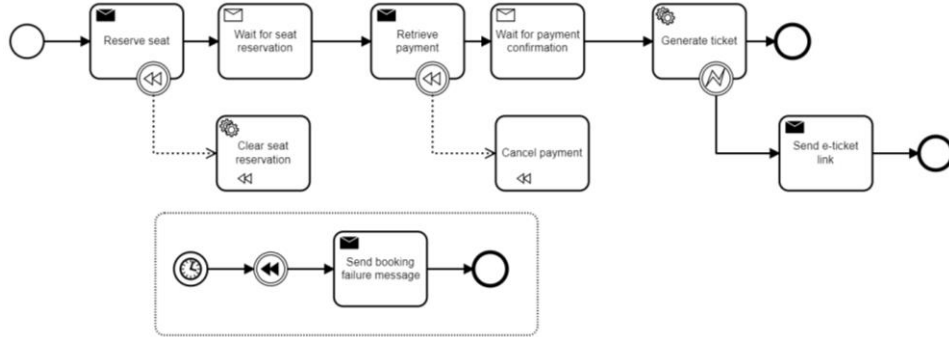
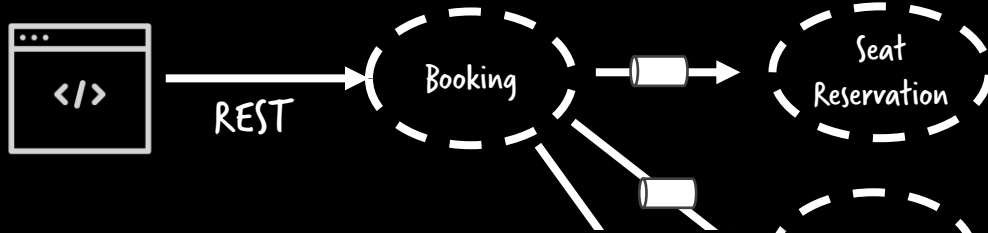


# And it is even hard to implement





# Workflow automation can help



Workflow Automation:

Is stateful

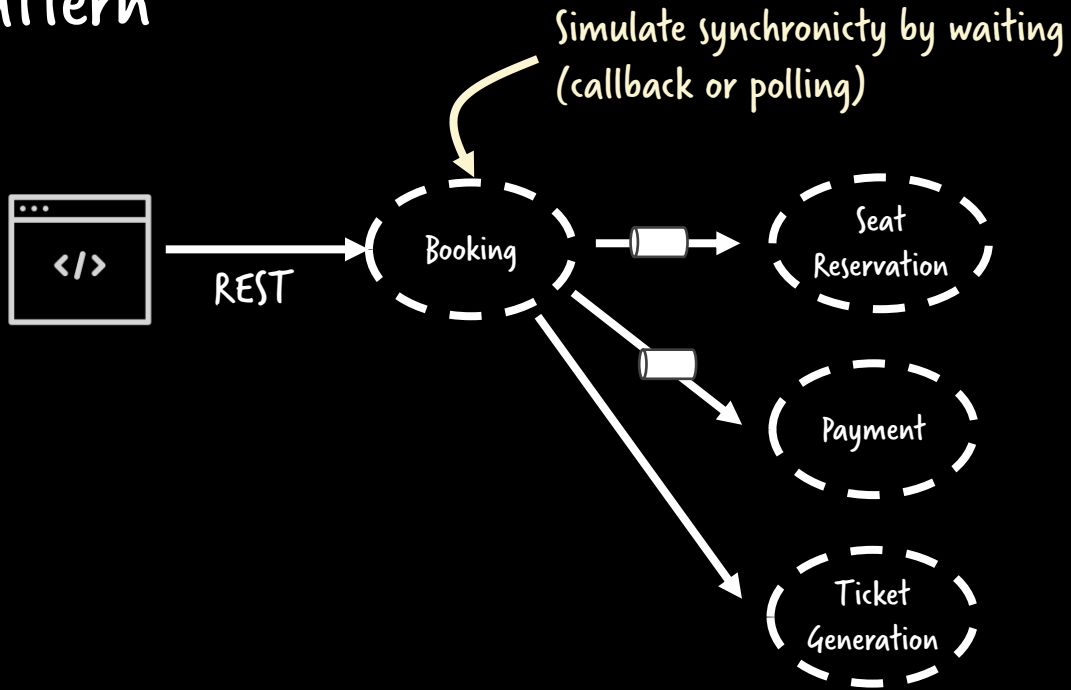
Can wait

Can retry

Can escalate

Can compensate

# Typical pattern



Can your company  
leverage your  
hipster architecture?

You need to  
change **business**  
**processes** and  
**customer**  
**experience!**



# Redesign your business process accordingly!

The screenshot shows the DB website's 'Ticket & reservation' page. The navigation bar includes 'Home', 'Contact', 'FAQs', and 'My Bahn'. The progress bar shows 'Search' and 'Select' as completed steps, with 'Ticket & reservation' as the current step. The main content area asks 'How would you like to receive your ticket?' with options for 'Digital ticket' (PDF or app) and 'Order and receive ticket by post' (5,90 EUR). A 'Please note' section states the ticket is only valid for the passenger stated. Below, there's a section for 'You aren't travelling?' with a checkbox for 'Ticket for another person'. At the bottom, there's a 'Reservation of 1 seat' for 4,50 EUR. A 'Proceed' button is at the bottom right.

happy  
case



Sync in happy case

failure  
case



or some interface  
to poll for status

Async response

# Redesign your business process accordingly!


DB Home | Contact | FAQs | A A A

My Bahn

Search ✓ Select ✓ Ticket & reservation Payment Check & book Confirmation


### Ticket and reservation

How would you like to receive your ticket?


☒  **Digital ticket**  
Save it as a PDF or load it in the DB Navigator app

**Please note:**


- Only valid for the passenger stated (and accompanying passengers if applicable). Not transferable. You must present your ID to the ticket inspector on the train.

☐  **Order and receive ticket by post** **5,90 EUR**  
Postage

You aren't travelling?

☐  **Ticket for another person**  
You have to login for this service


Our tip: reserve a seat now. [Questions concerning reservation?](#)


☐  **Reservation of**  **4,50 EUR**

**Your journey**

Outward journey **Mo, 09.09.2019**  
**15:37** Berlin Hbf (Ibf)  
**20:42** München Hbf

**Prices**

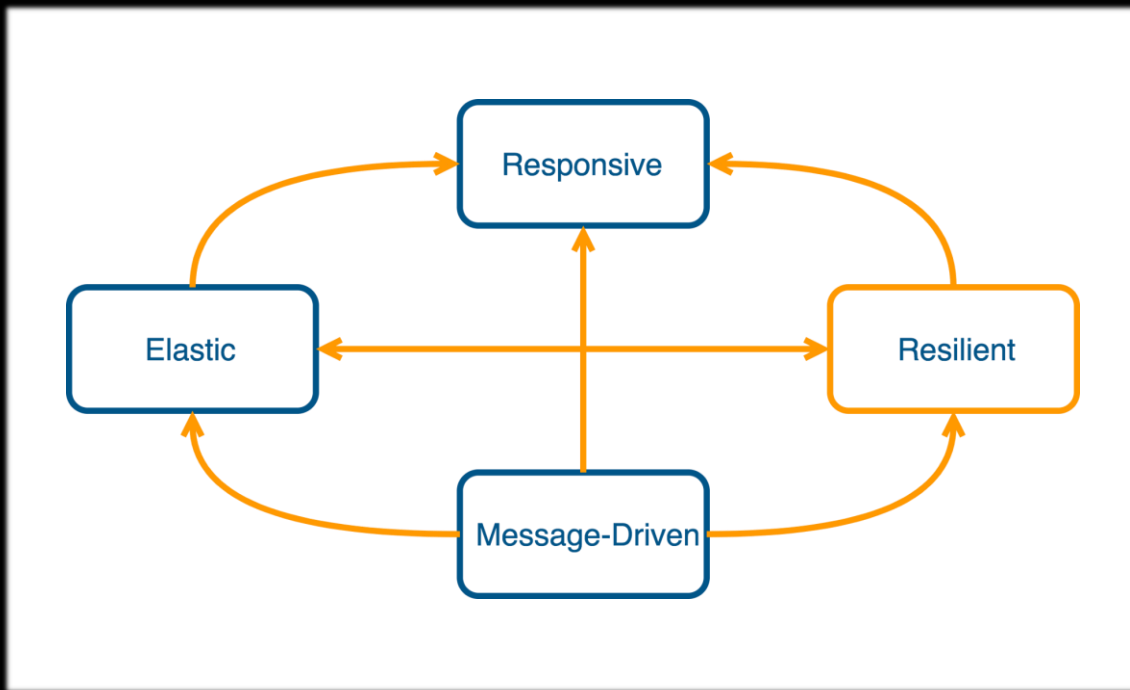
 **Ticket, 2. class** **75,90**  
1 Adult

 **City-Ticket** **Incl.**  
Outward journey

**Total 75,90 EUR**

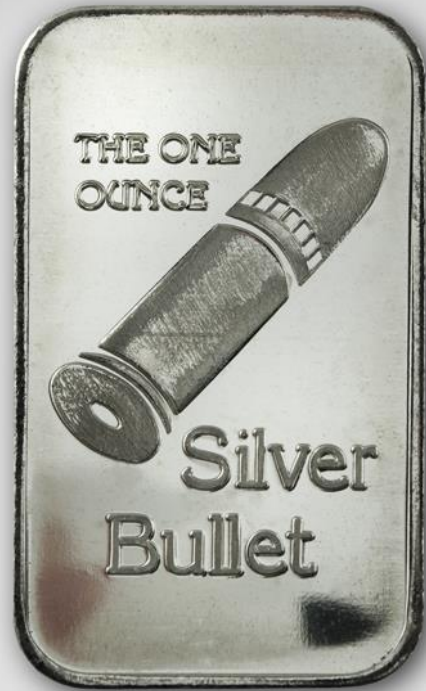
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<https://www.reactivemanifesto.org/>

Yeah!  
Let's go reactive.



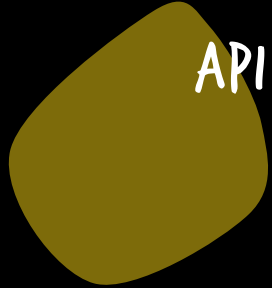


We were suffering from  
Pinball machine Architecture

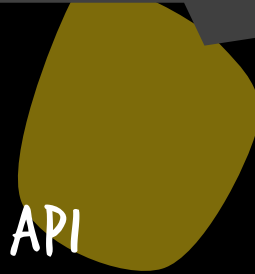




„What the hell just happened?“



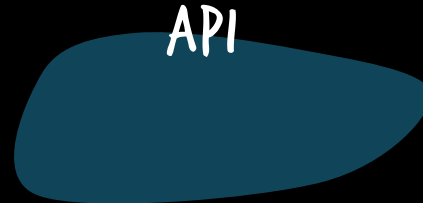
Microservices



Standard Software



External Services



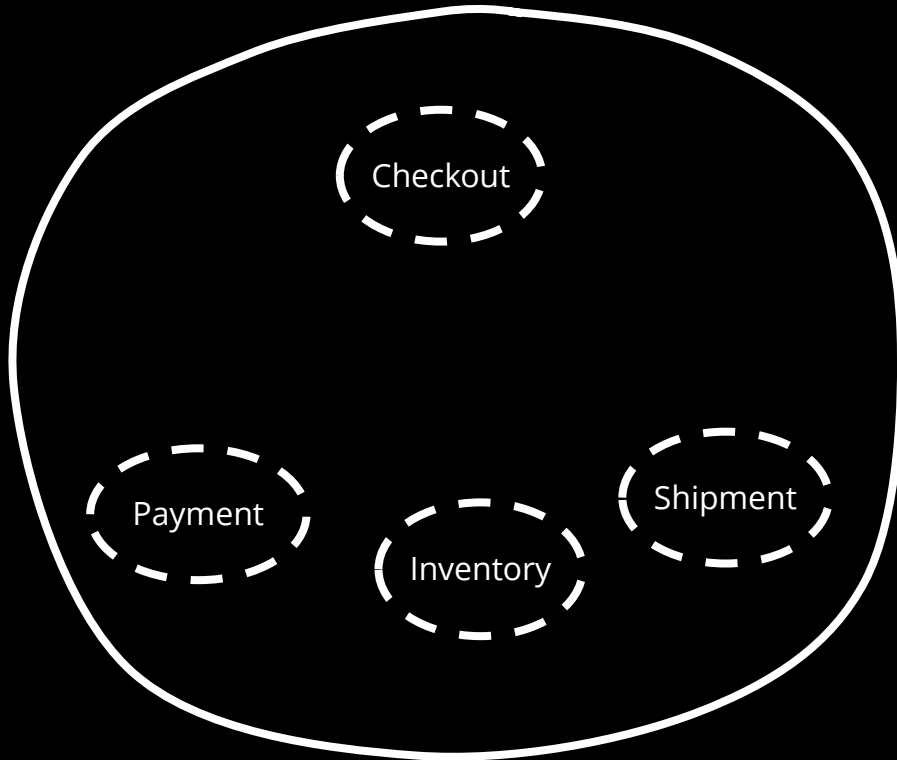
Example:  
order fulfillment via  
dash button



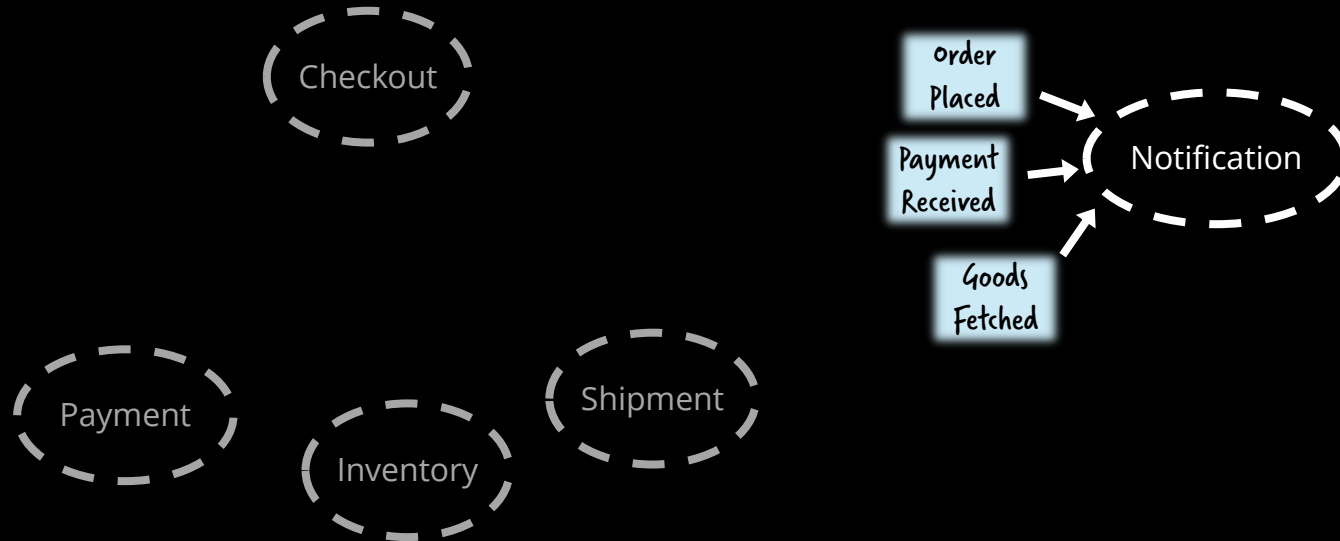
# Three steps...



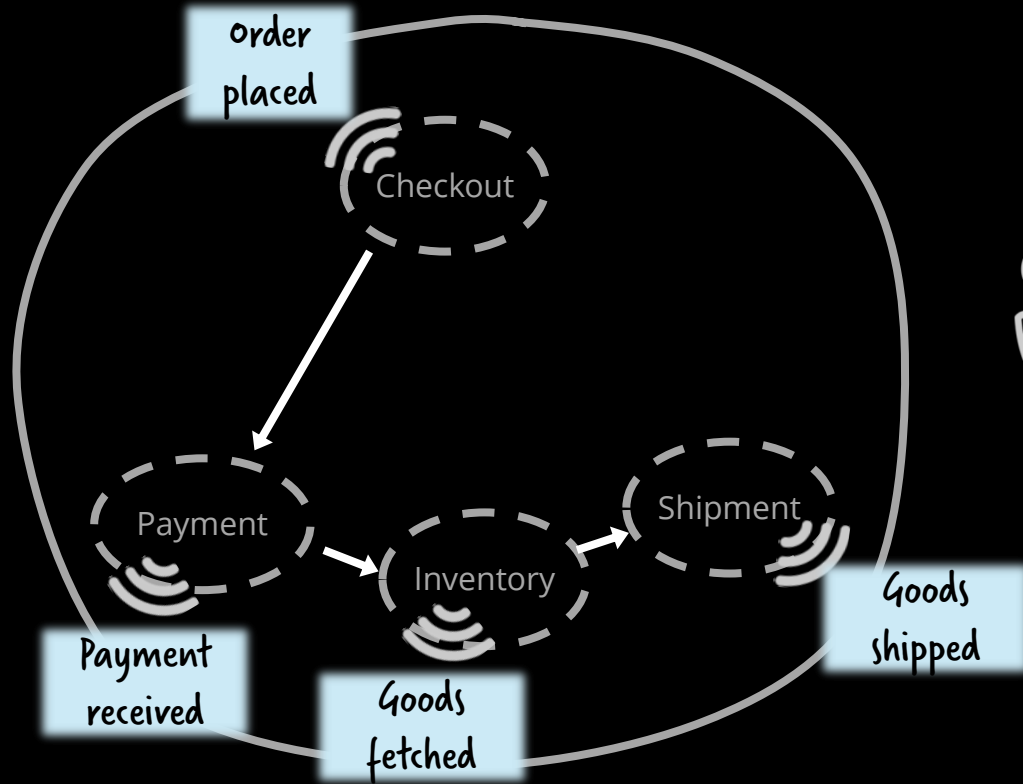
# (Micro-)services



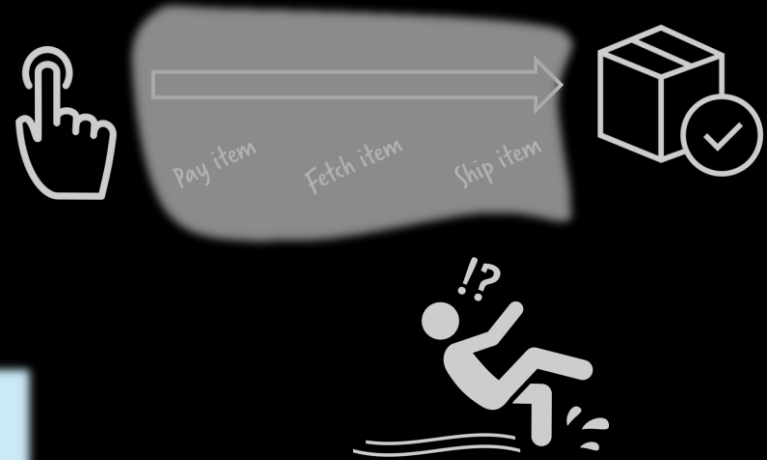
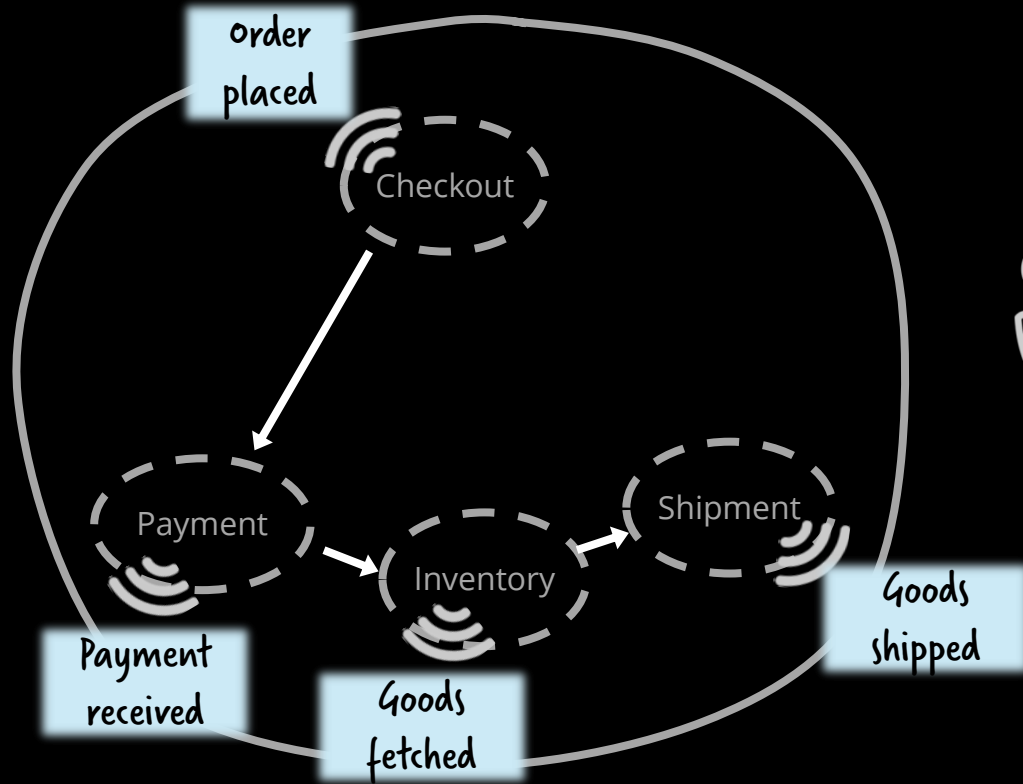
# Event-driven architecture



# Peer-to-peer event chains



# Peer-to-peer event chains





The danger is that it's very easy to make nicely decoupled systems with event notification, without realizing that you're losing sight of that larger-scale flow, and thus set yourself up for trouble in future years.



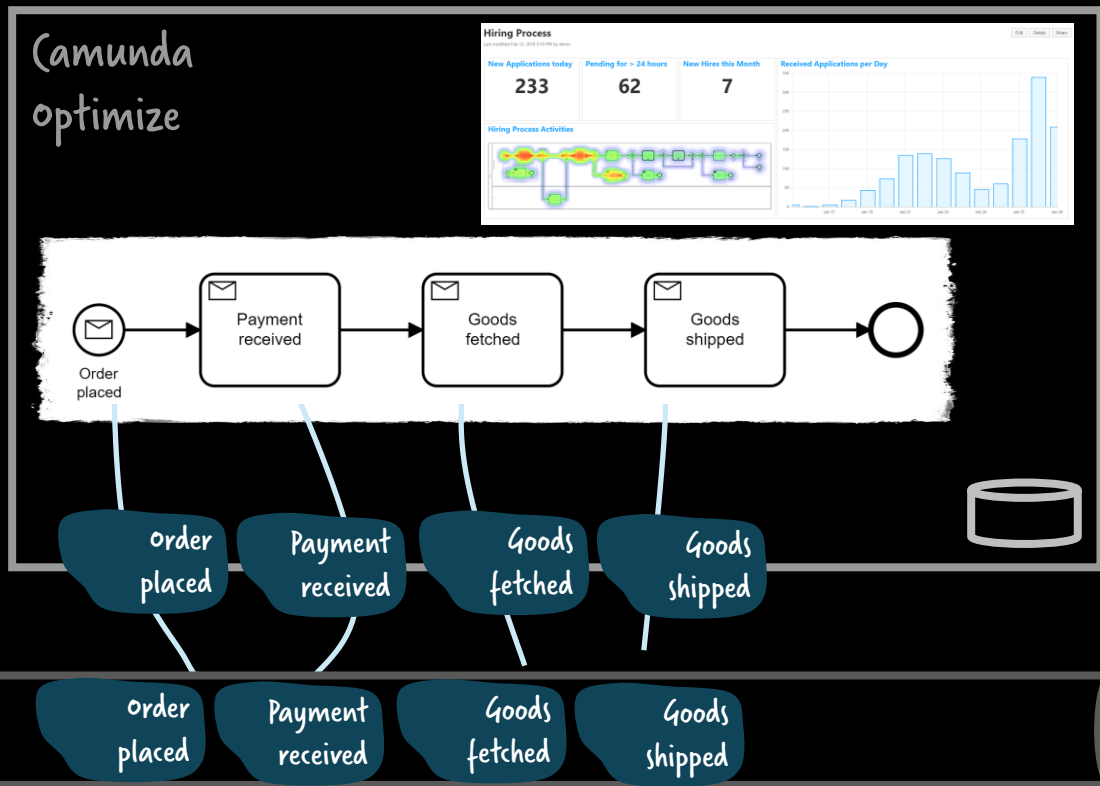


The danger is that it's very easy to make nicely decoupled systems with event notification, without realizing that you're losing sight of that larger-scale flow, and thus set yourself up for trouble in future years.



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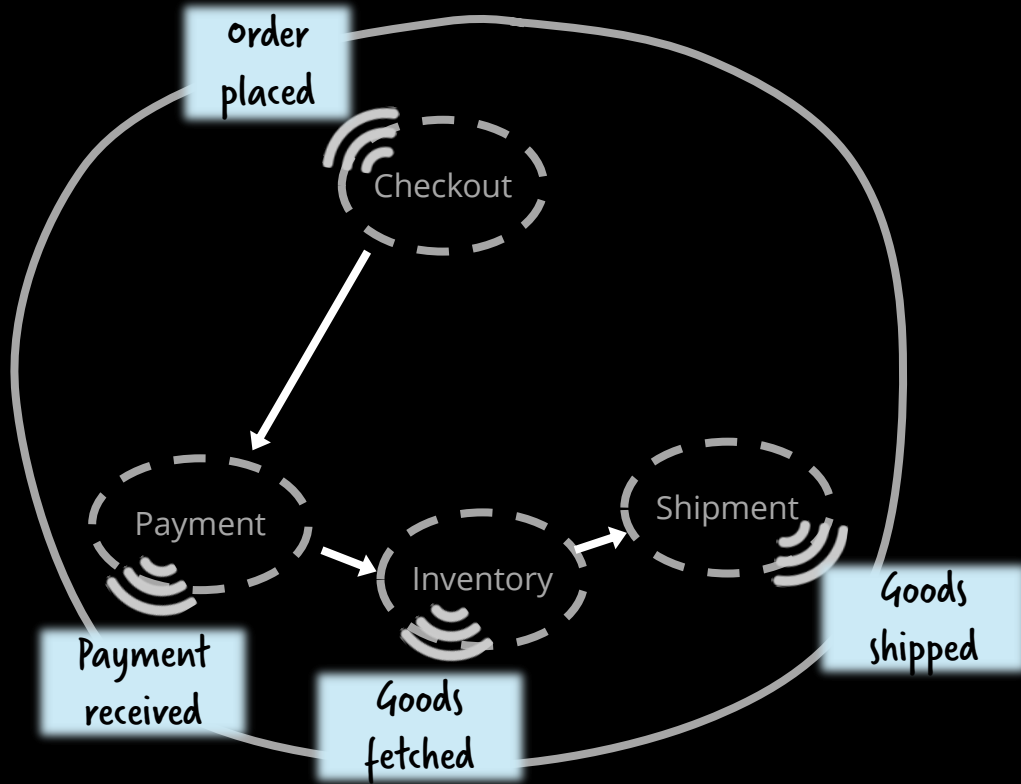
# Process Events Monitoring



Demo



# Peer-to-peer event chains



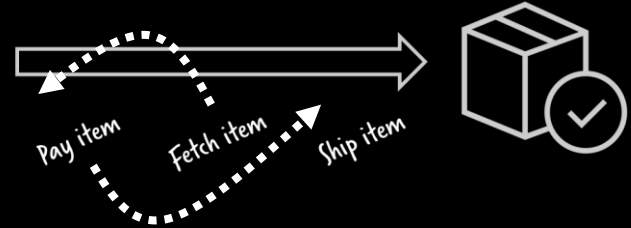
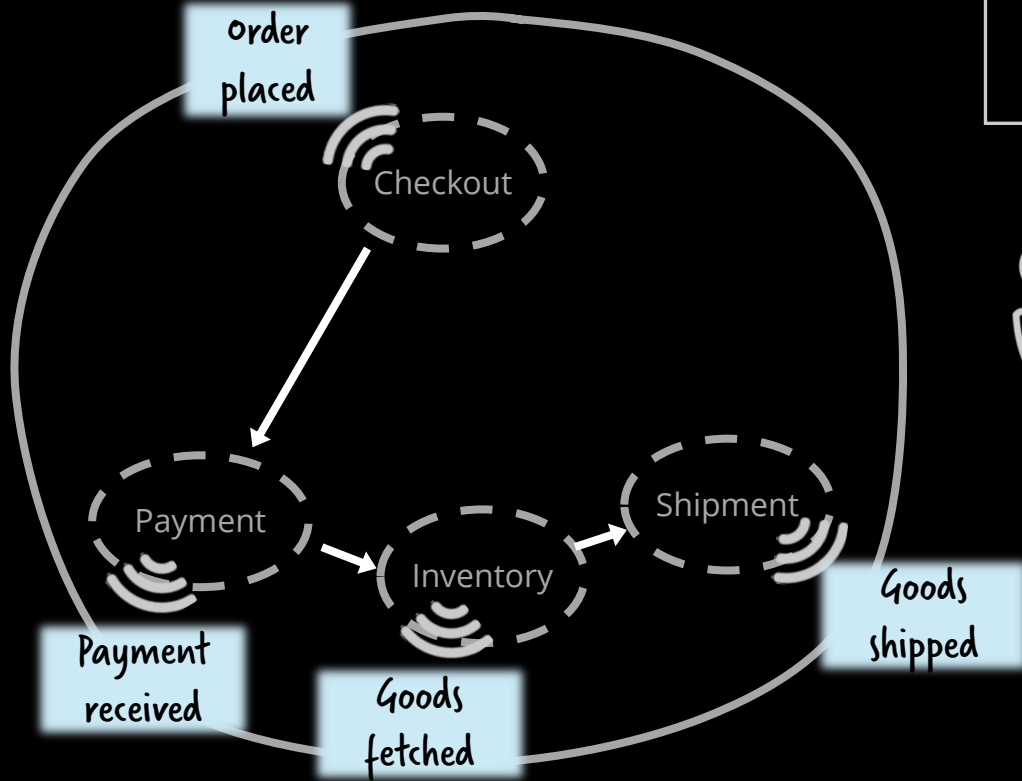




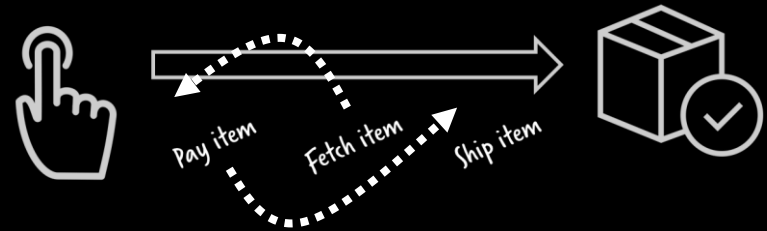
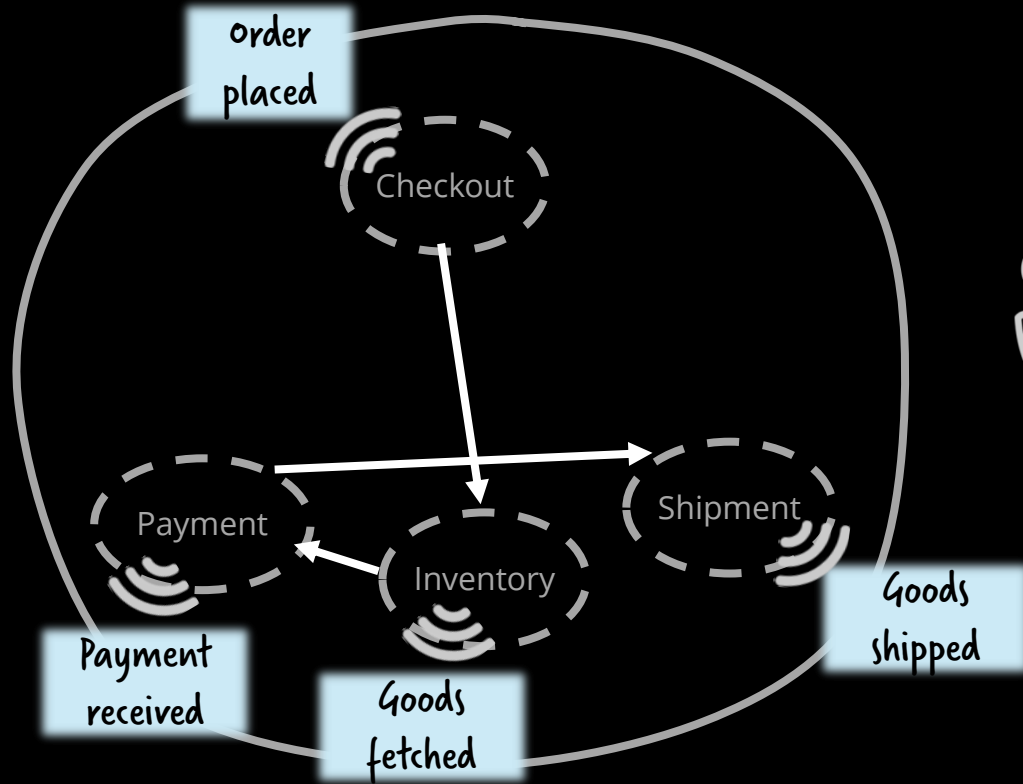
# Peer-to-peer event chains



Fetch the goods **before** the payment

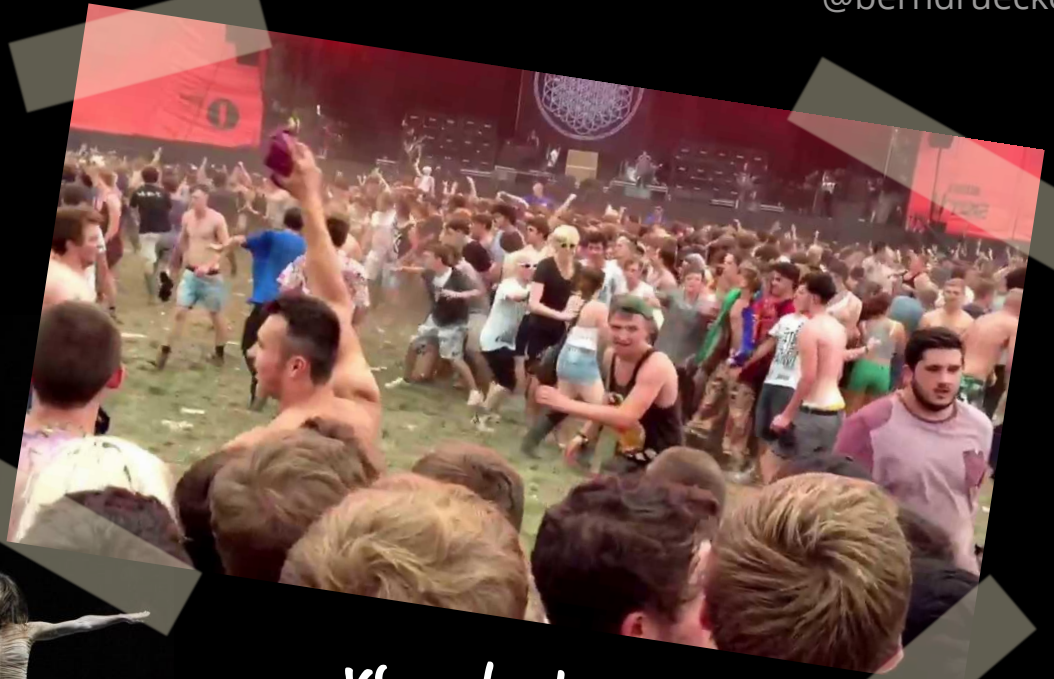


# Peer-to-peer event chains



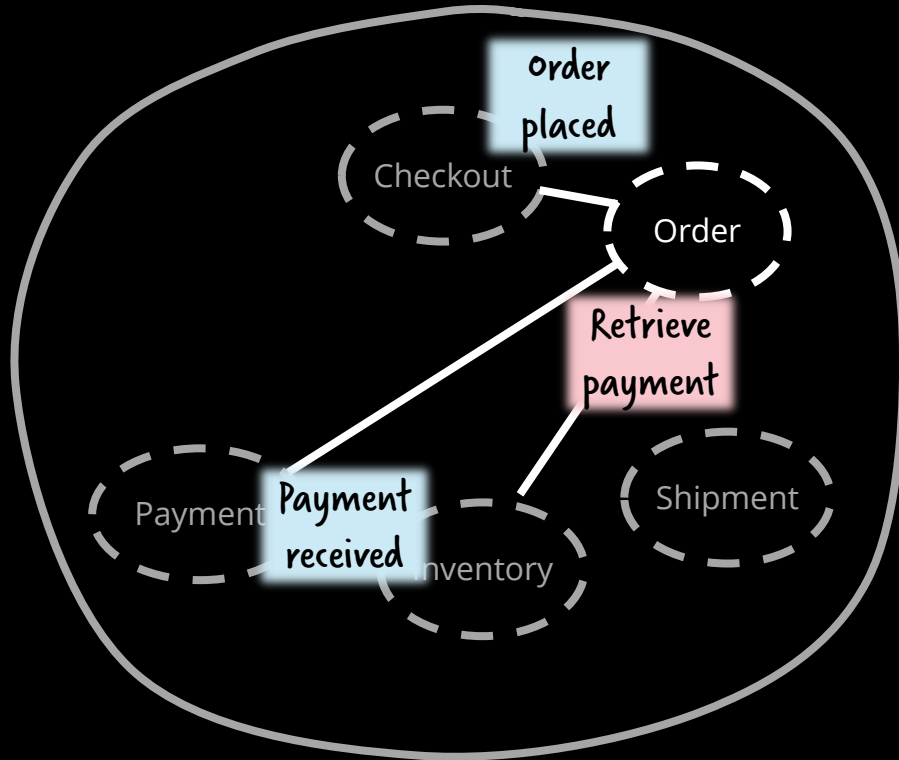


What we wanted

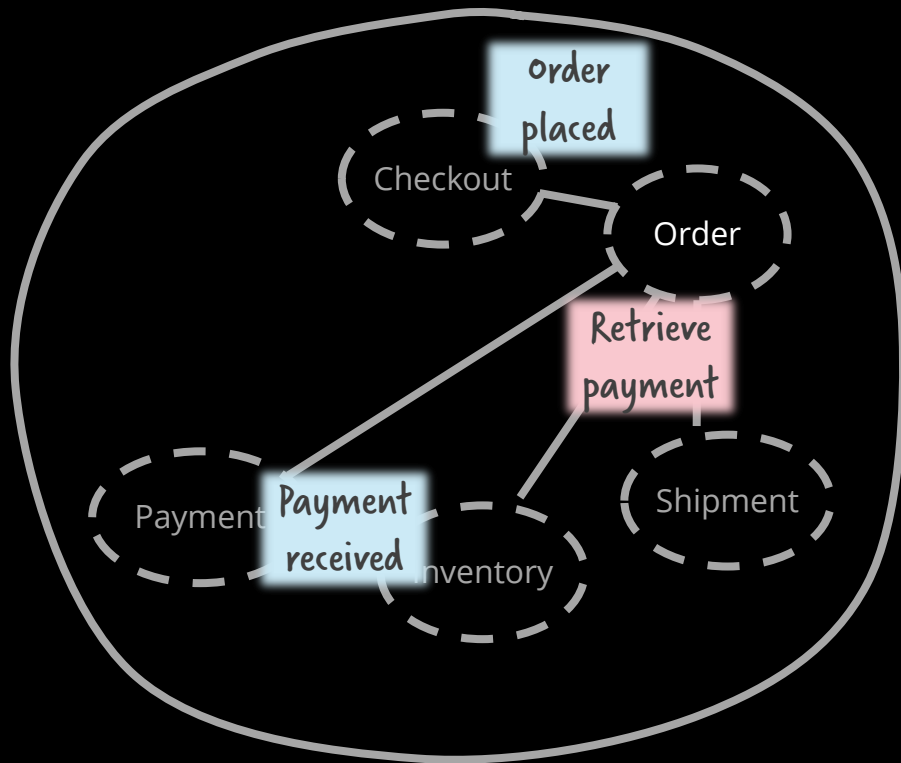


vs. what we got

# Extract the end-to-end responsibility



# Events & Commands



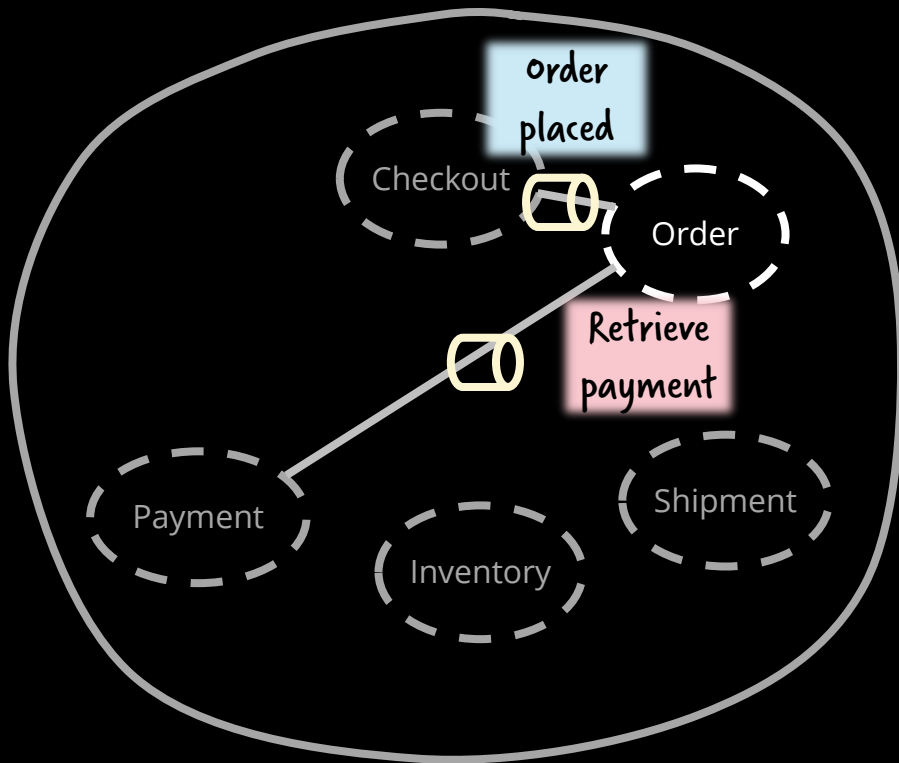
Event

Fact,  
happened in the past,  
immutable

Command

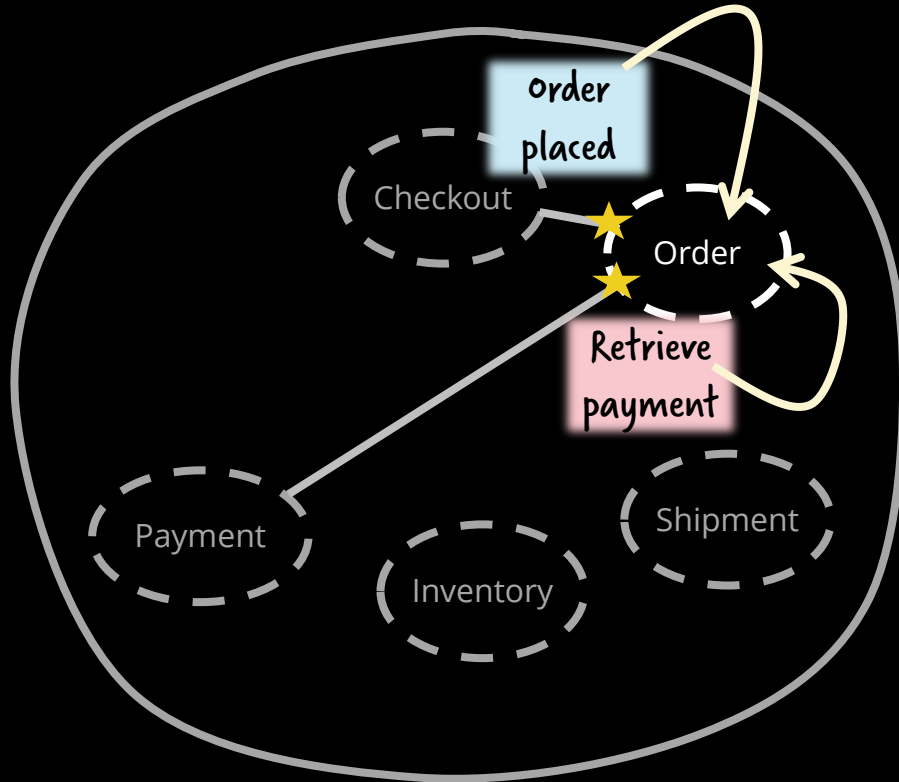
Intend,  
Want s.th. to happen

# It is not about the protocol!



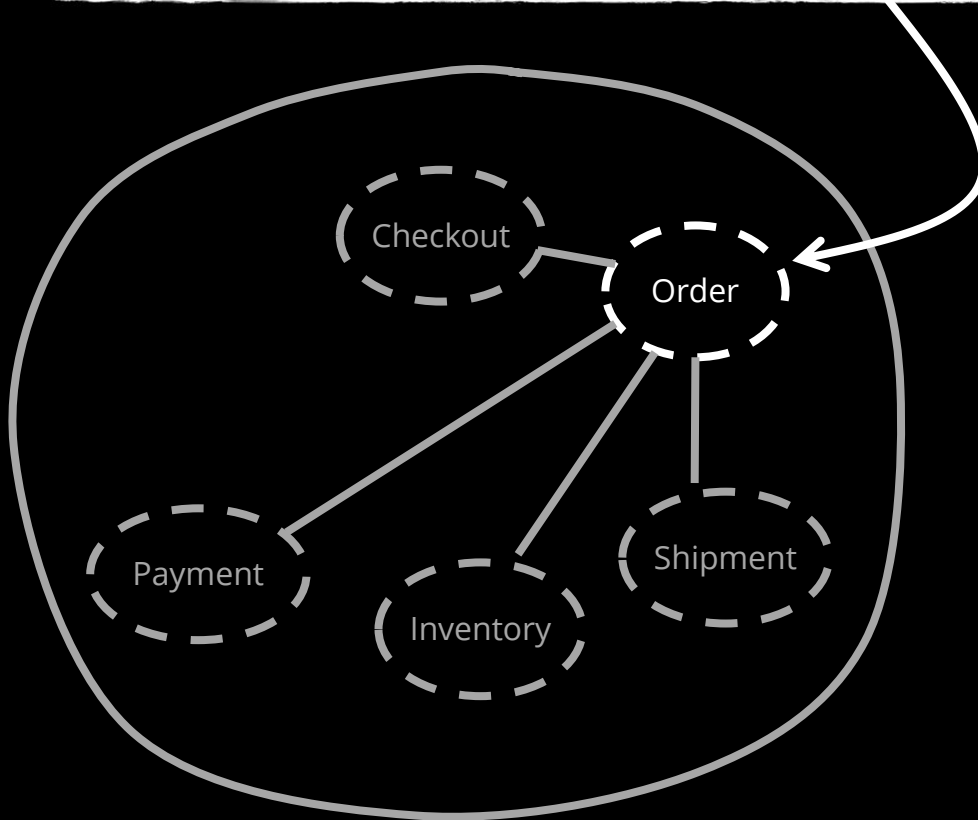
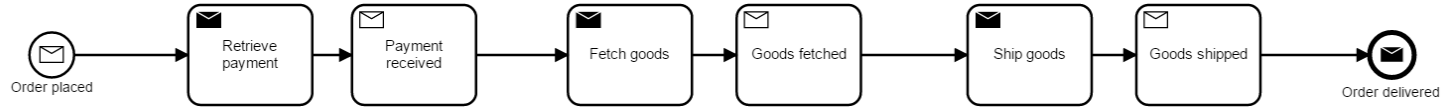
## It can still be messaging!

It is about where to decide about the coupling!



order decides

- . to listen to the event
- . to issue the command



Demo





Reality check

@berndruecker

## FULLFILLMENT PROCESS

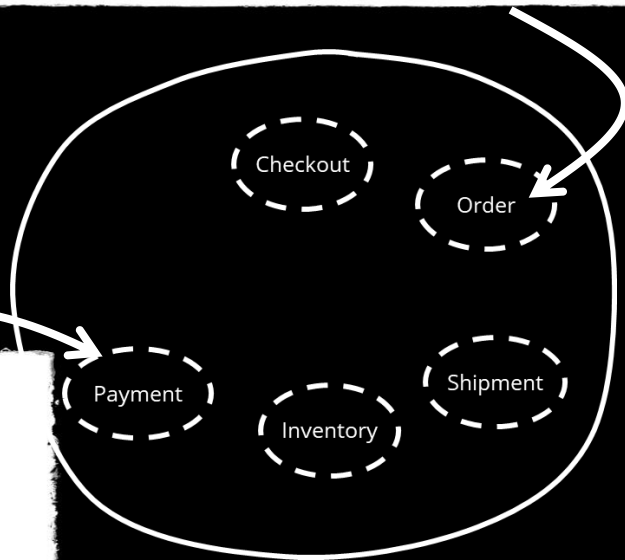
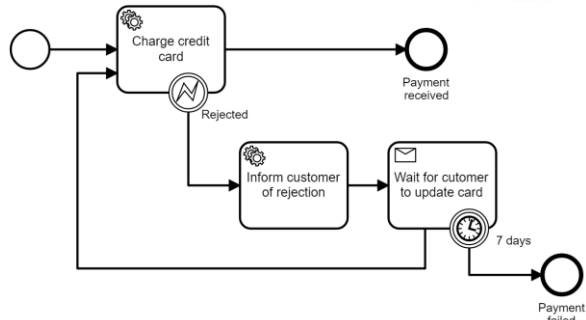
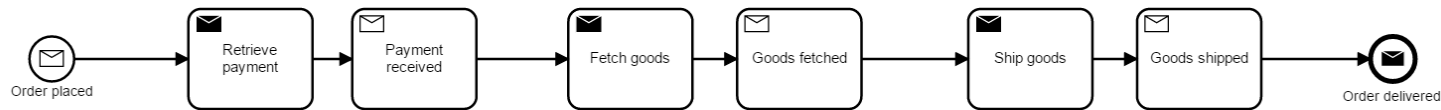


one of the largest online fashion retailers  
in the world (> 14.000 employees) does  
every order fulfillment worldwide  
with Camunda & Kafka

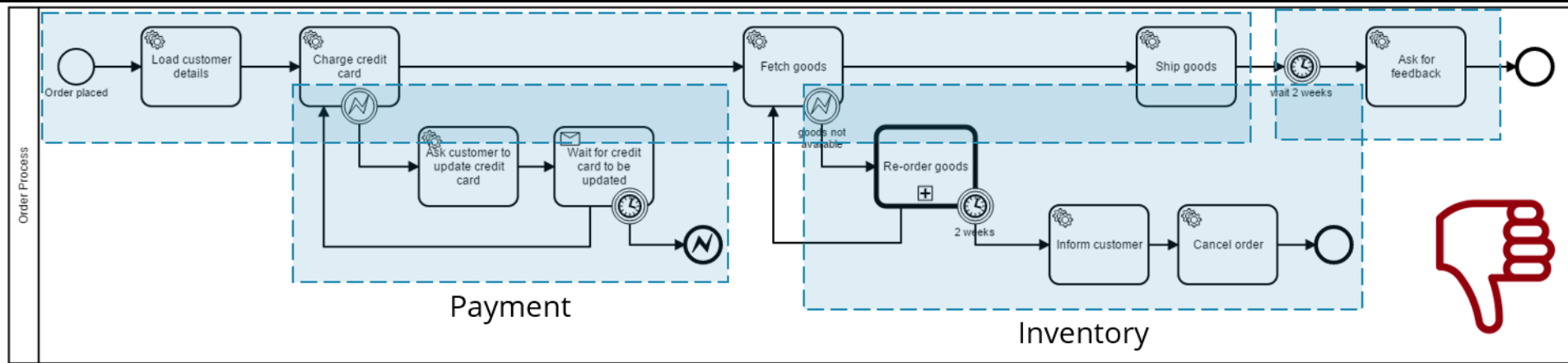
  
**THE SHU**  
TECH INNOVAT

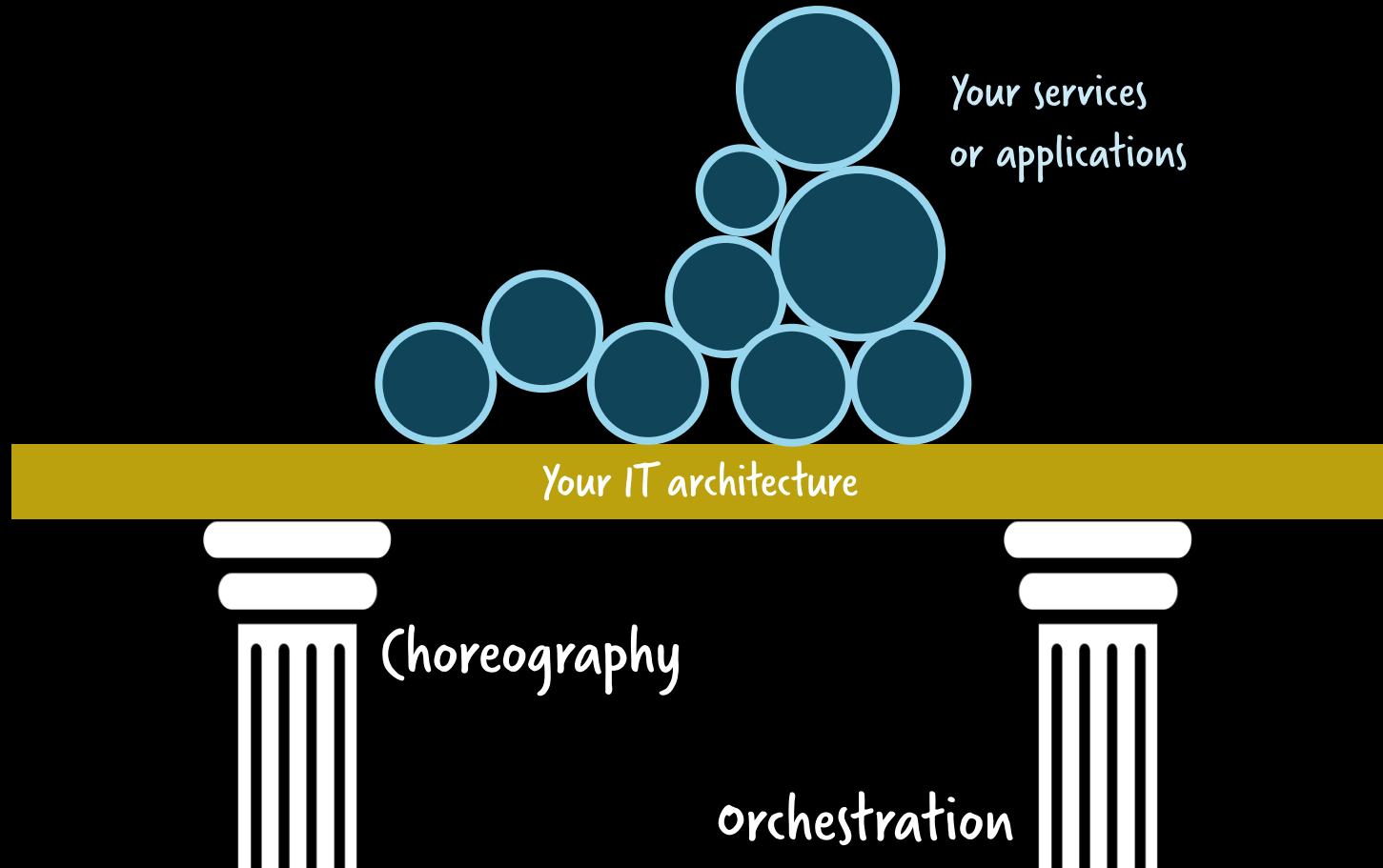


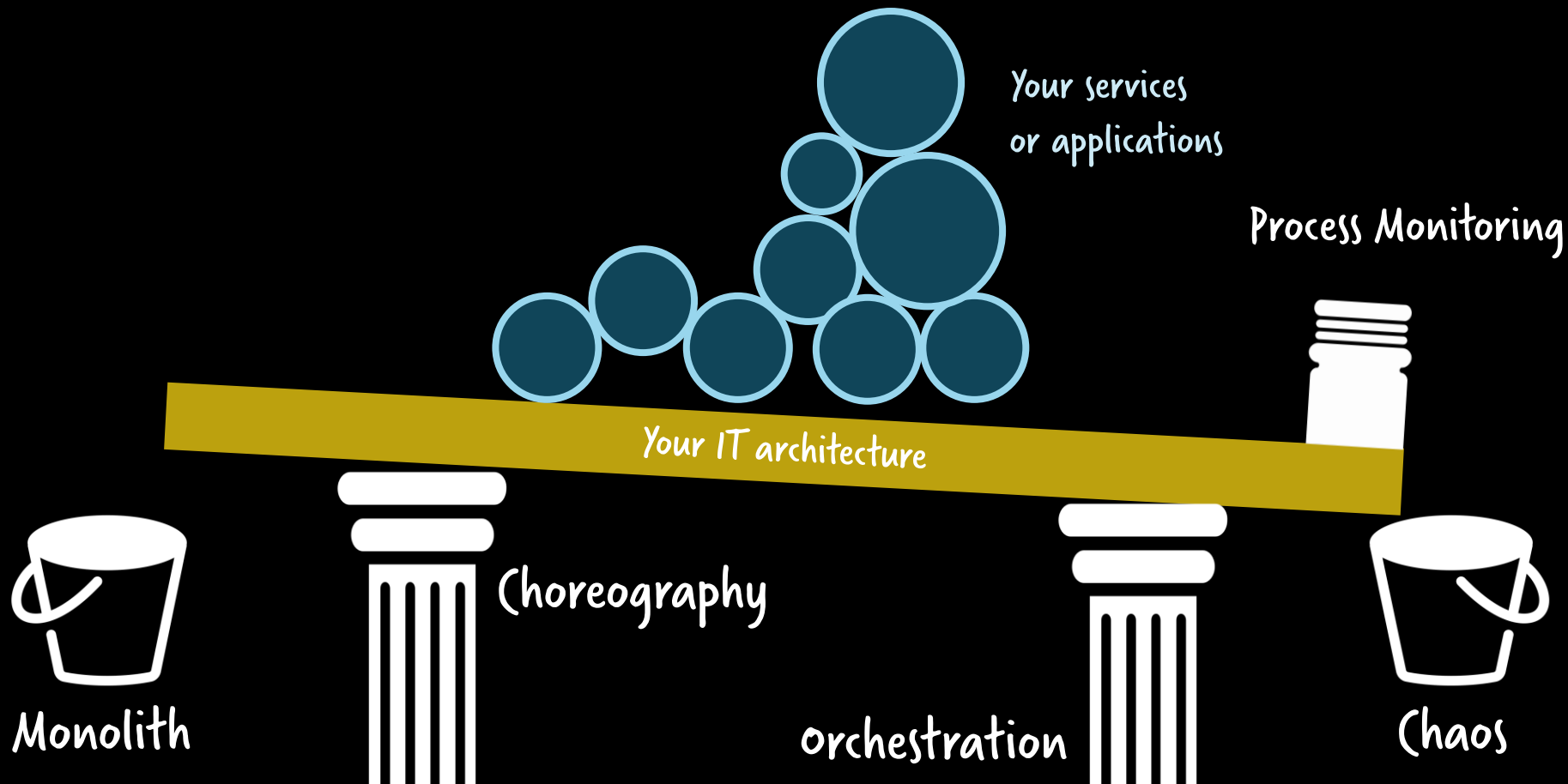
# Workflows live inside service boundaries



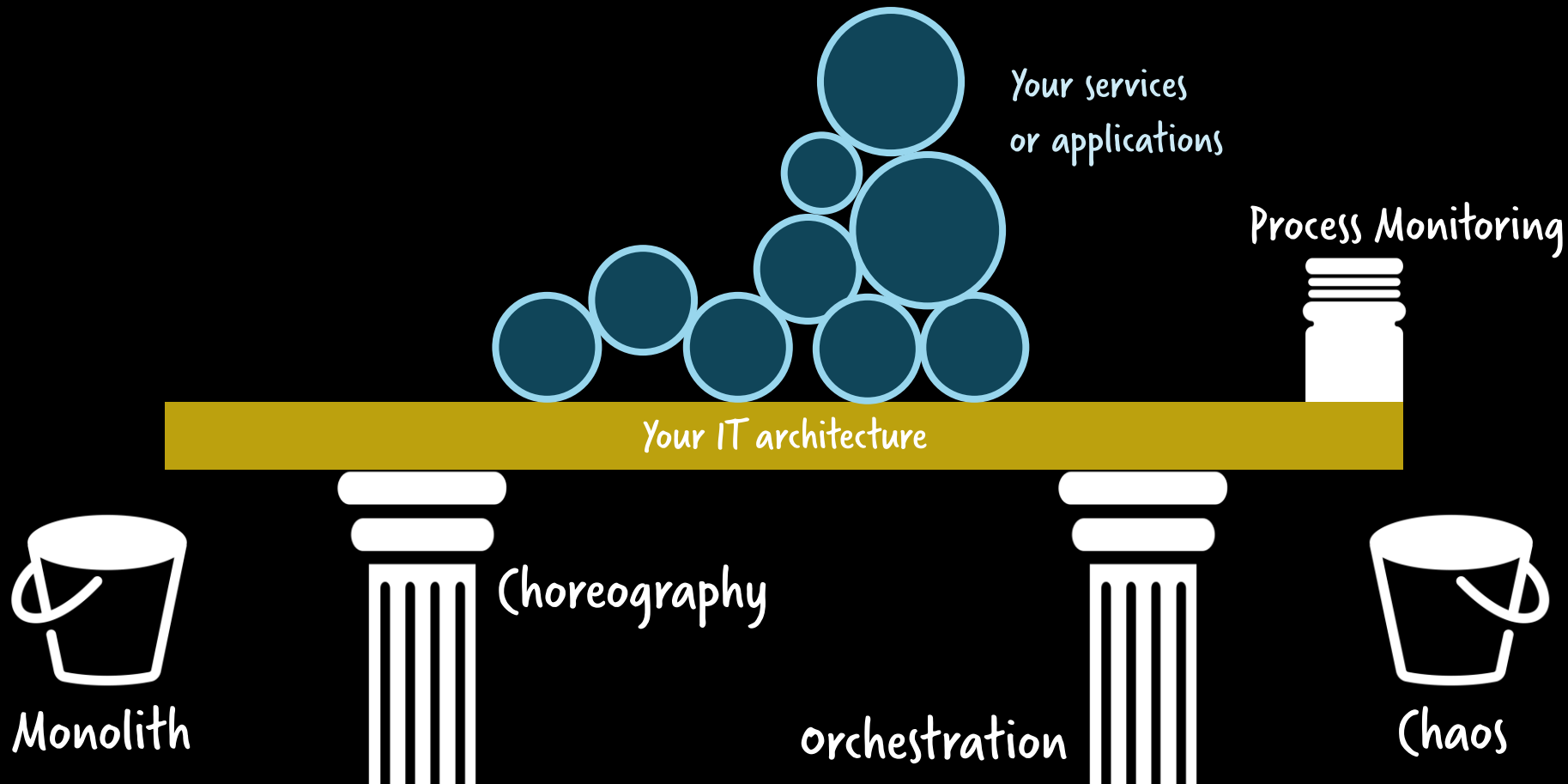
# No BPM(N) monoliths







# Balance choreography and orchestration



## Summary

- Business agility is essential to survive, this is the case for microservices
- Collaboration of services is the new challenge
- Balance orchestration and choreography
- From choreography to orchestration can be a journey
- Workflow automation is a essential building block

Thank you!

