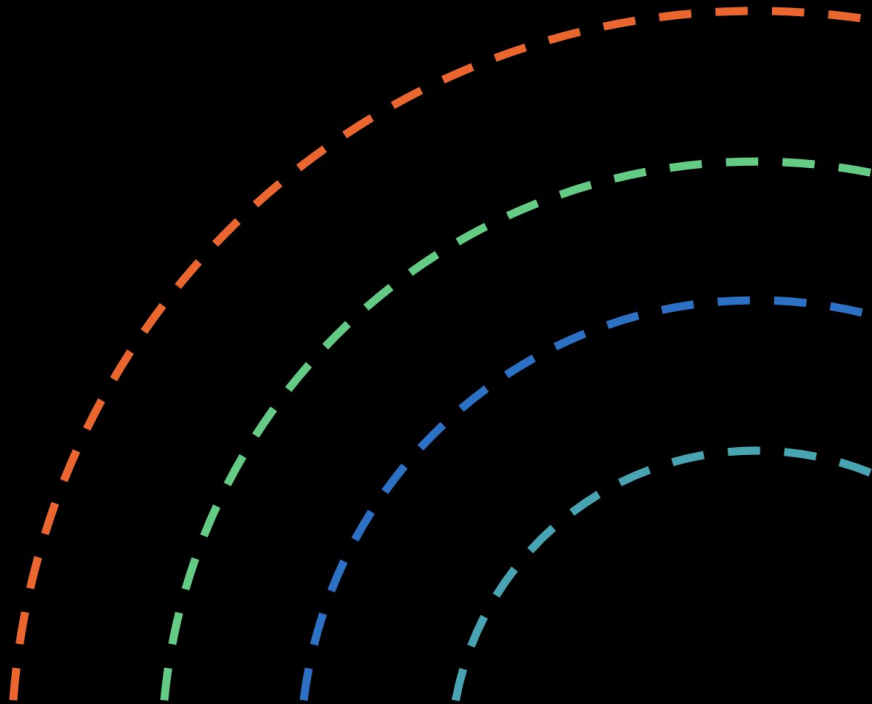
CAMUNDA

Orchestrate the Chaos:

Process automation in modern architectures

UniForum Chicago / February 25, 2025



Poll

- How many use microservice architectures? Or event-driven architectures?
- Anyone struggled to explain data flow/logic to business team (or other engineers)?
- Anyone heard of BPMN? DMN? BPM?
- Anyone heard of Camunda?

Who am I?

Nathan Loding

@NathanLoding

- he/him
- 20 years in software
- Developer Advocate @ Camunda
- Oreo enthusiast
- Wannabe chess player

What is “Modern Software Architecture”

Understandable
Interoperable
Performance
Reliable
Testable
Observable
Fault Tolerant
Available
Usable
Learnable
Agile
Secure
Scalable
Interoperable
Fault Tolerant
Scalable
Observable
Reliable
Fault Tolerant
Scalable

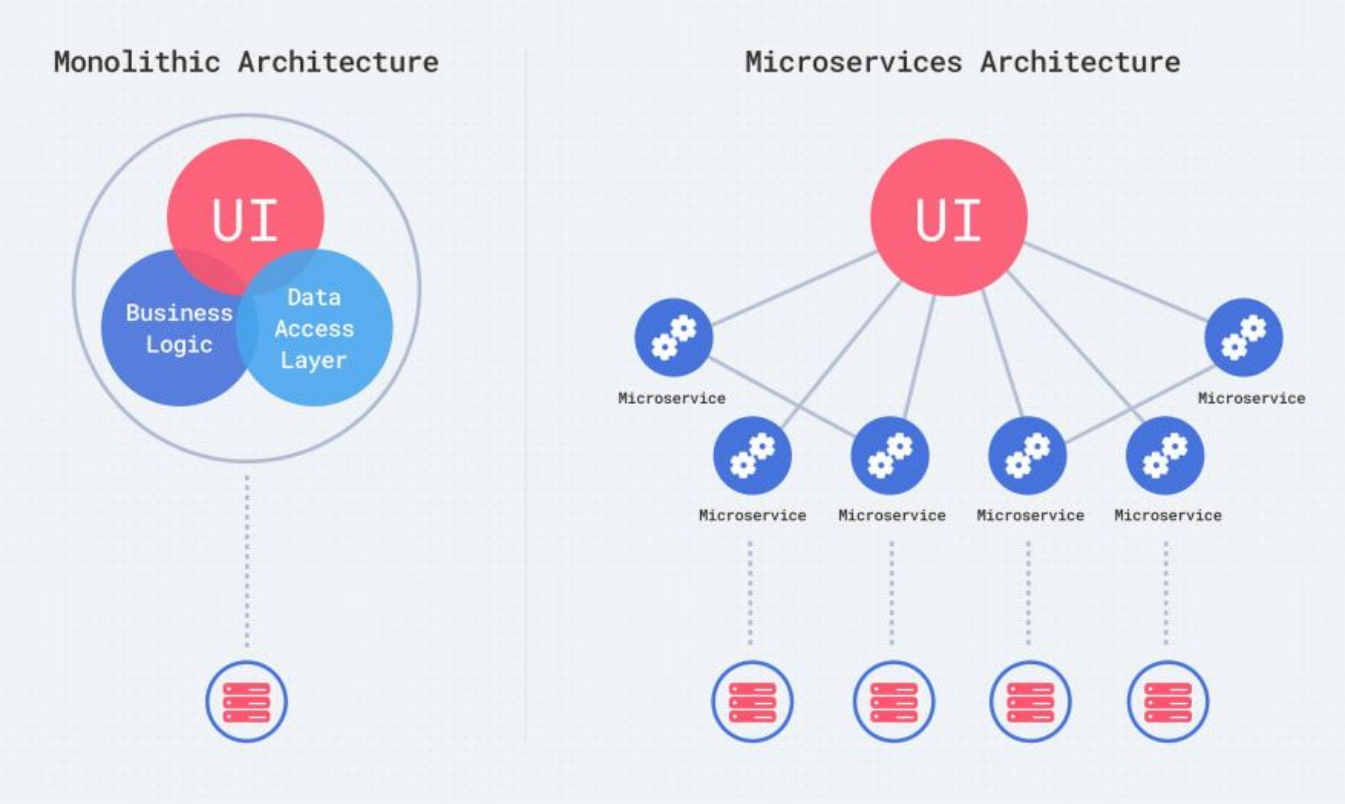
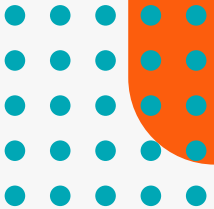
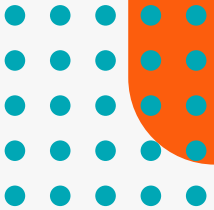


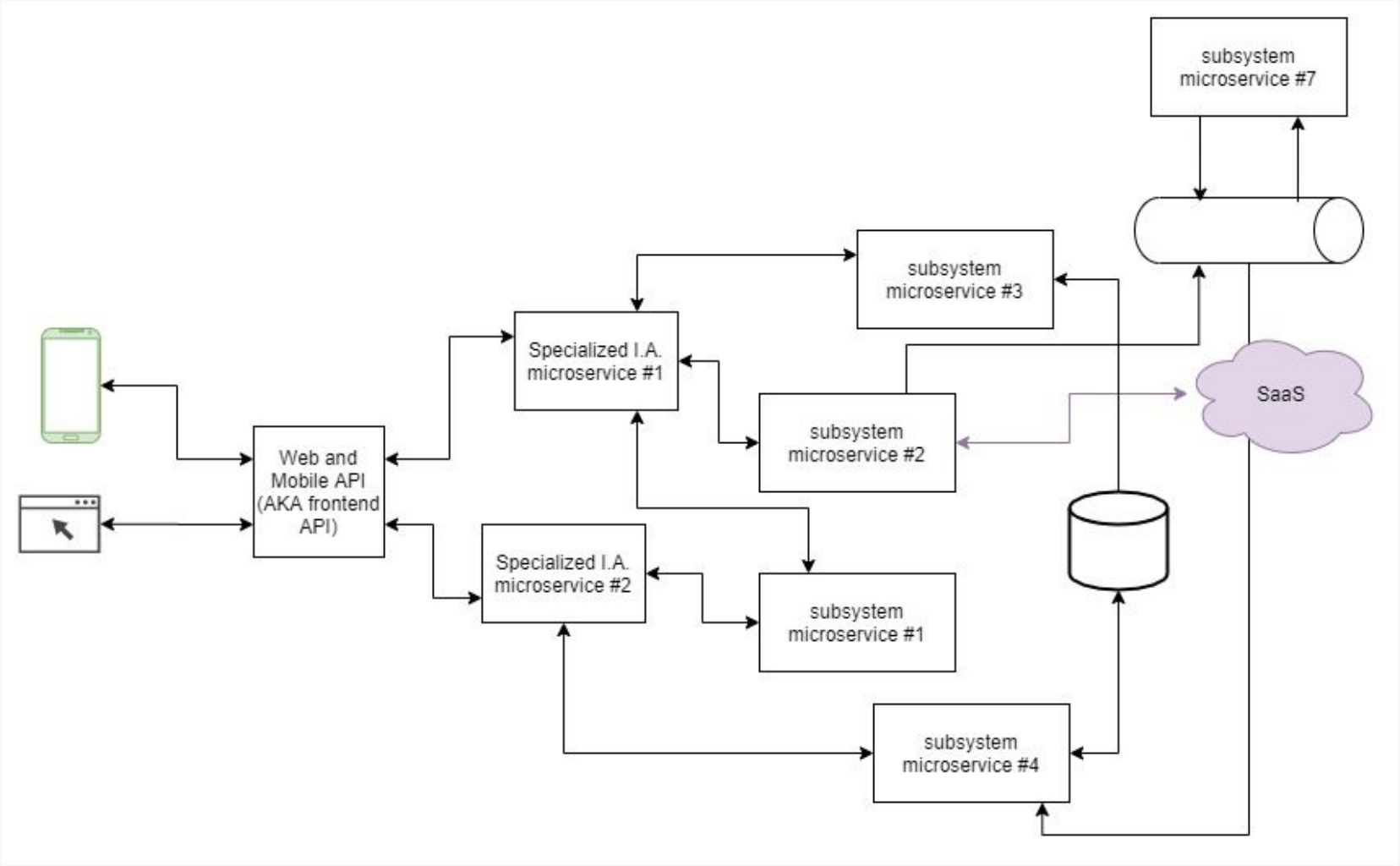
Image: (Cloudinary) https://dev.to/alex_barashkov/microservices-vs-monolith-architecture-4l1m

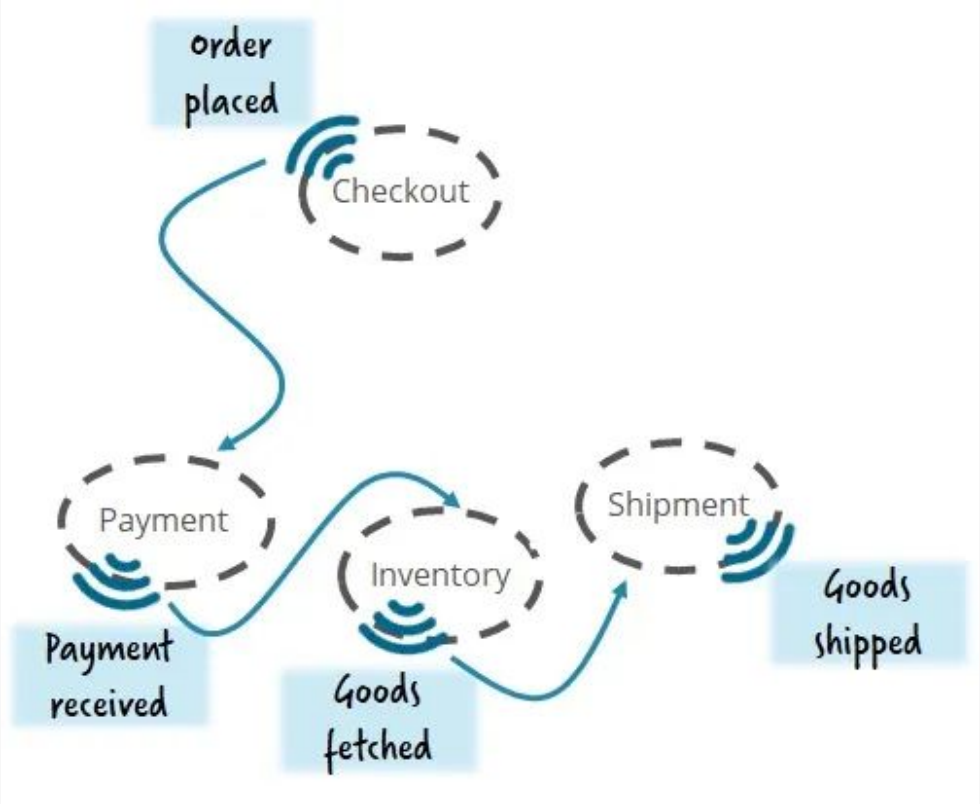
Modern architecture designs are great at optimizing resource usage ...

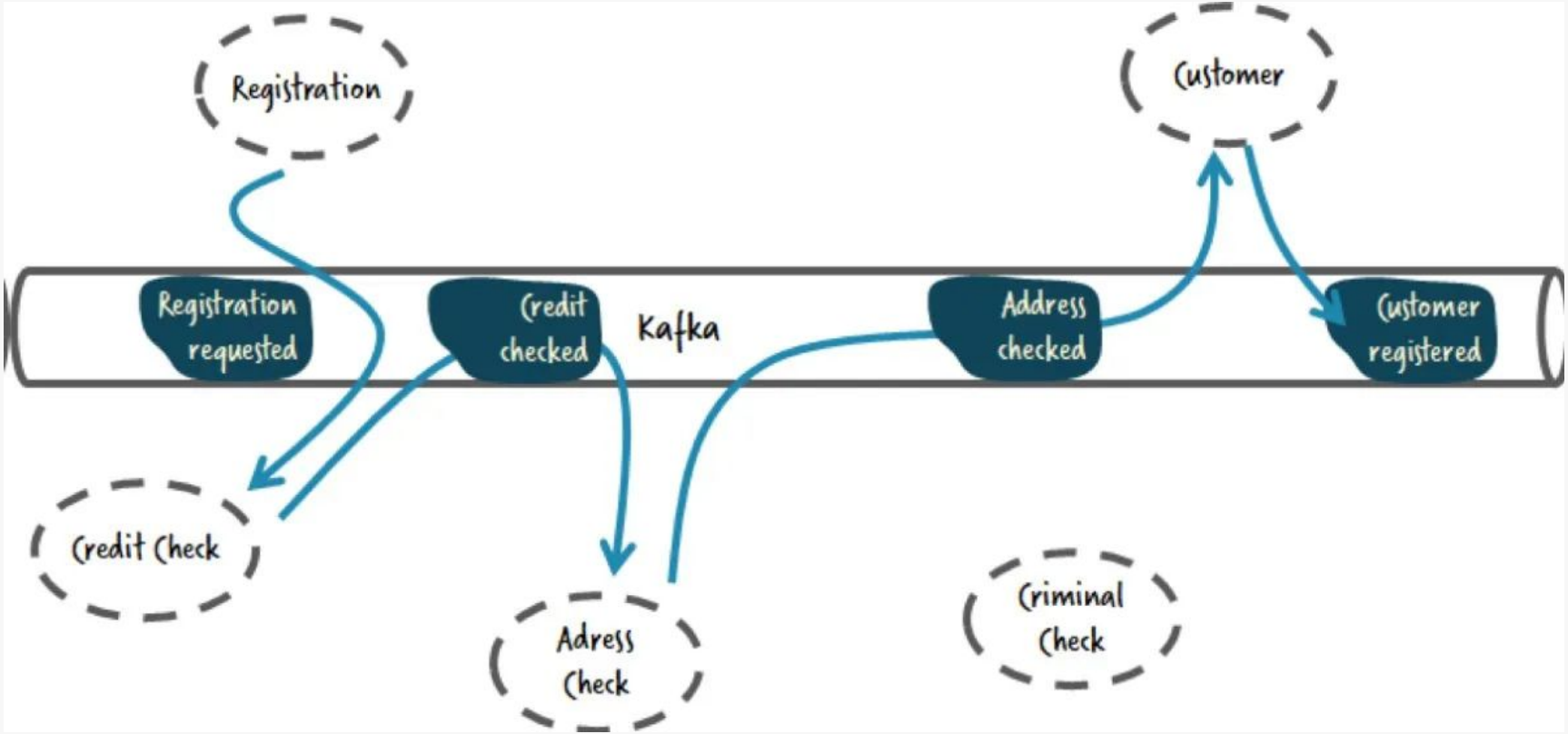




... now diagram the business logic / data flow ...

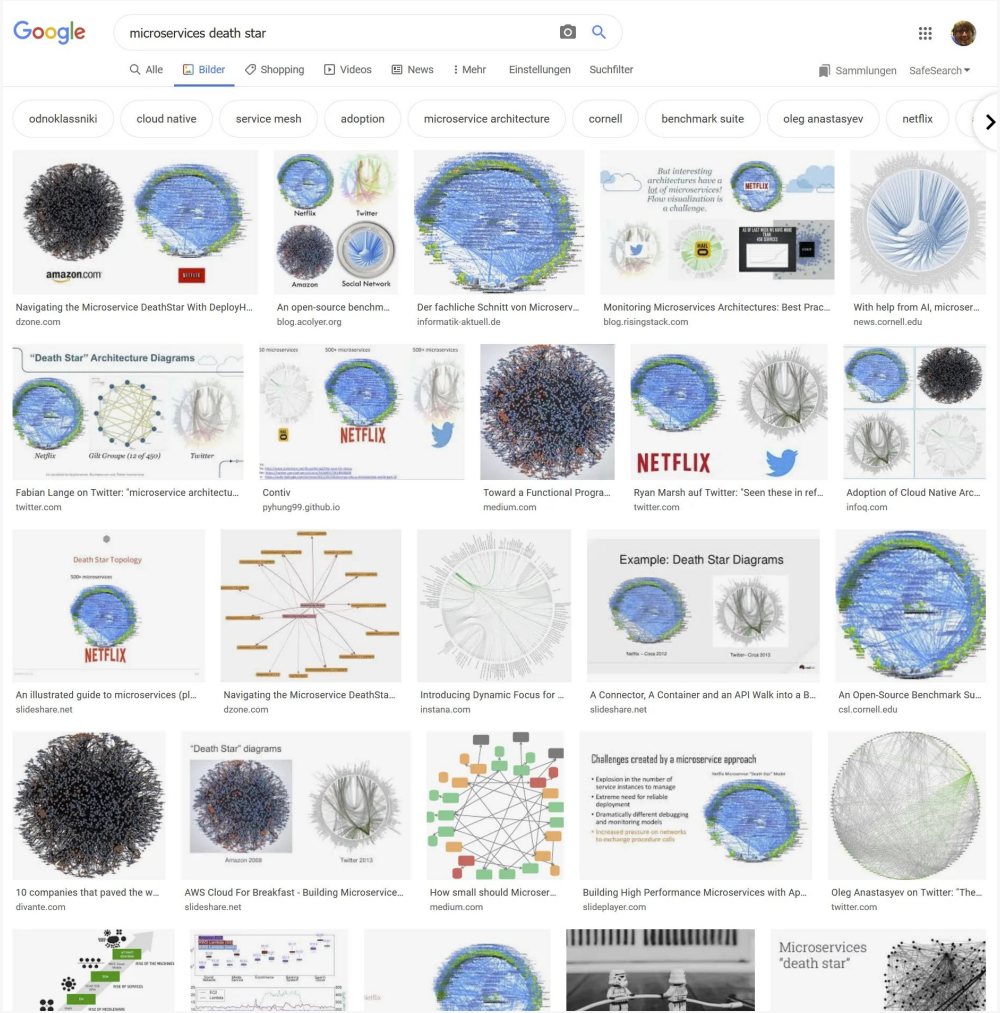

subsystem microservice #7
subsystem microservice #3
Specialized I.A. microservice #1
SaaS
subsystem microservice #2
Web and Mobile API (AKA frontend API)
Specialized I.A. microservice #2
subsystem microservice #1
subsystem microservice #4

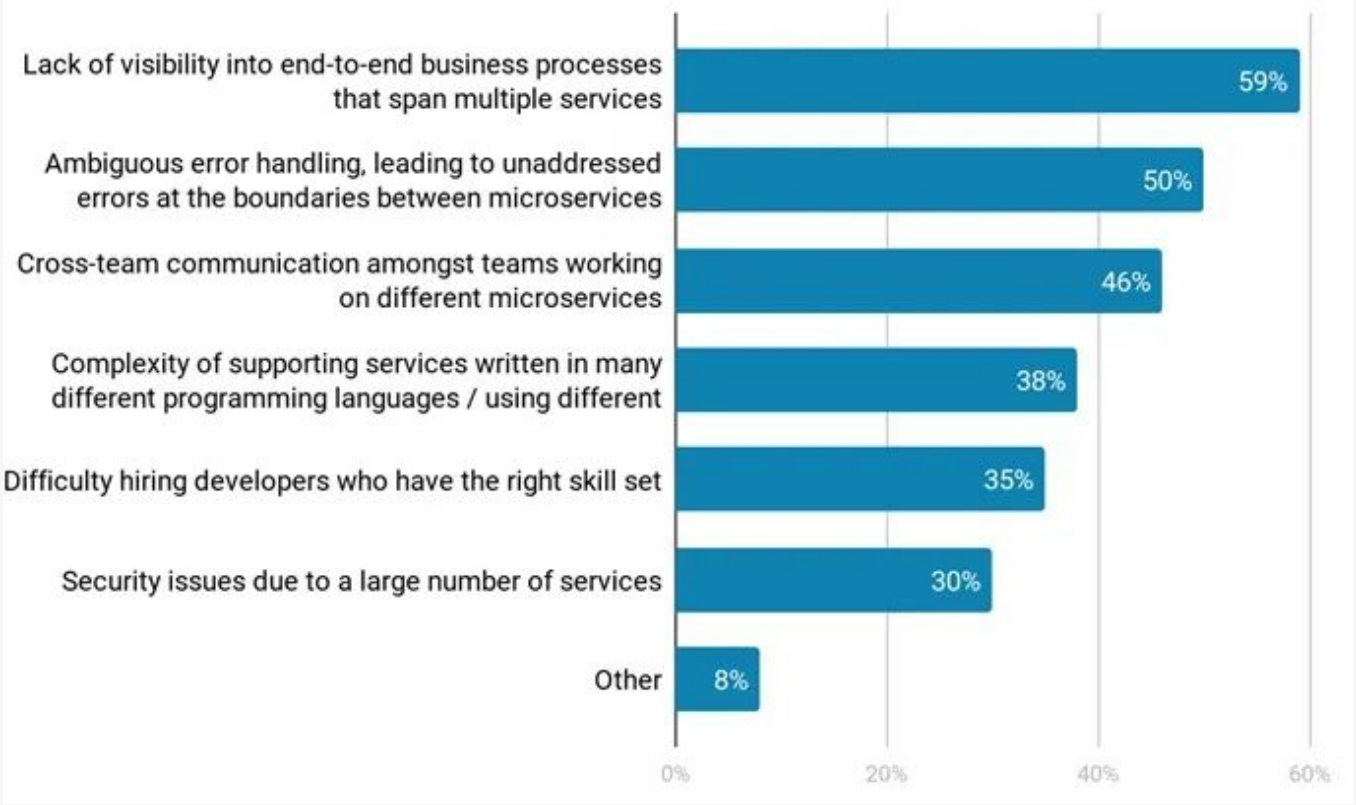

order placed
Checkout
Payment
Payment received
Inventory
Goods fetched
Shipment
Goods shipped


Registration
Customer
Registration requested
Credit checked
Kafka
Address checked
Customer registered
Credit Check
Adress Check
Criminal Check

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.

- Martin Fowler


Google
microservices death star
Alle
Bilder
Shopping
Videos
News
Mehr
Einstellungen
Suchfilter
Sammlungen
SafeSearch
odnoklassniki
cloud native
service mesh
adoption
microservice architecture
cornell
benchmark suite
oleg anastasyev
netflix
Navigating the Microservice DeathStar With DeployH...
dzone.com
An open-source benchm...
blog.acolyer.org
Der fachliche Schnitt von Microserv...
informatik-aktuell.de
Monitoring Microservices Architectures: Best Prac...
blog.risingstack.com
With help from AI, microser...
news.cornell.edu
"Death Star" Architecture Diagrams
Fabian Lange on Twitter: "microservice architectu...
twitter.com
Contiv
pyhung99.github.io
Toward a Functional Progra...
medium.com
Ryan Marsh auf Twitter: "Seen these in ref...
twitter.com
Adoption of Cloud Native Arc...
infoq.com
Death Star Topology
An illustrated guide to microservices (pl...
slideshare.net
Navigating the Microservice DeathSta...
dzone.com
Introducing Dynamic Focus for ...
instana.com
Example: Death Star Diagrams
A Connector, A Container and an API Walk into a B...
slideshare.net
An Open-Source Benchmark Su...
csl.cornell.edu
"Death Star" diagrams
10 companies that paved the w...
divante.com
AWS Cloud For Breakfast - Building Microservice...
slideshare.net
How small should Microser...
medium.com
Challenges created by a microservice approach
Building High Performance Microservices with Ap...
slideplayer.com
Oleg Anastasyev on Twitter: "The...
twitter.com
Microservices "death star"


Lack of visibility into end-to-end business processes that span multiple services
59%
Ambiguous error handling, leading to unaddressed errors at the boundaries between microservices
50%
Cross-team communication amongst teams working on different microservices
46%
Complexity of supporting services written in many different programming languages / using different
38%
Difficulty hiring developers who have the right skill set
35%
Security issues due to a large number of services
30%
Other
8%
0%
20%
40%
60%

Hard problems to solve

Documentation

Data flow diagrams look like spaghetti

Timers

Alerts, stuck/idle processes, notifications

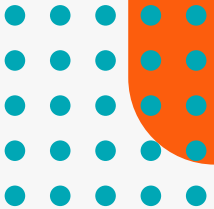
Interrupting messages

Your application is already executing code, but something has changed and you need to interrupt it and handle it differently

Changes to business logic

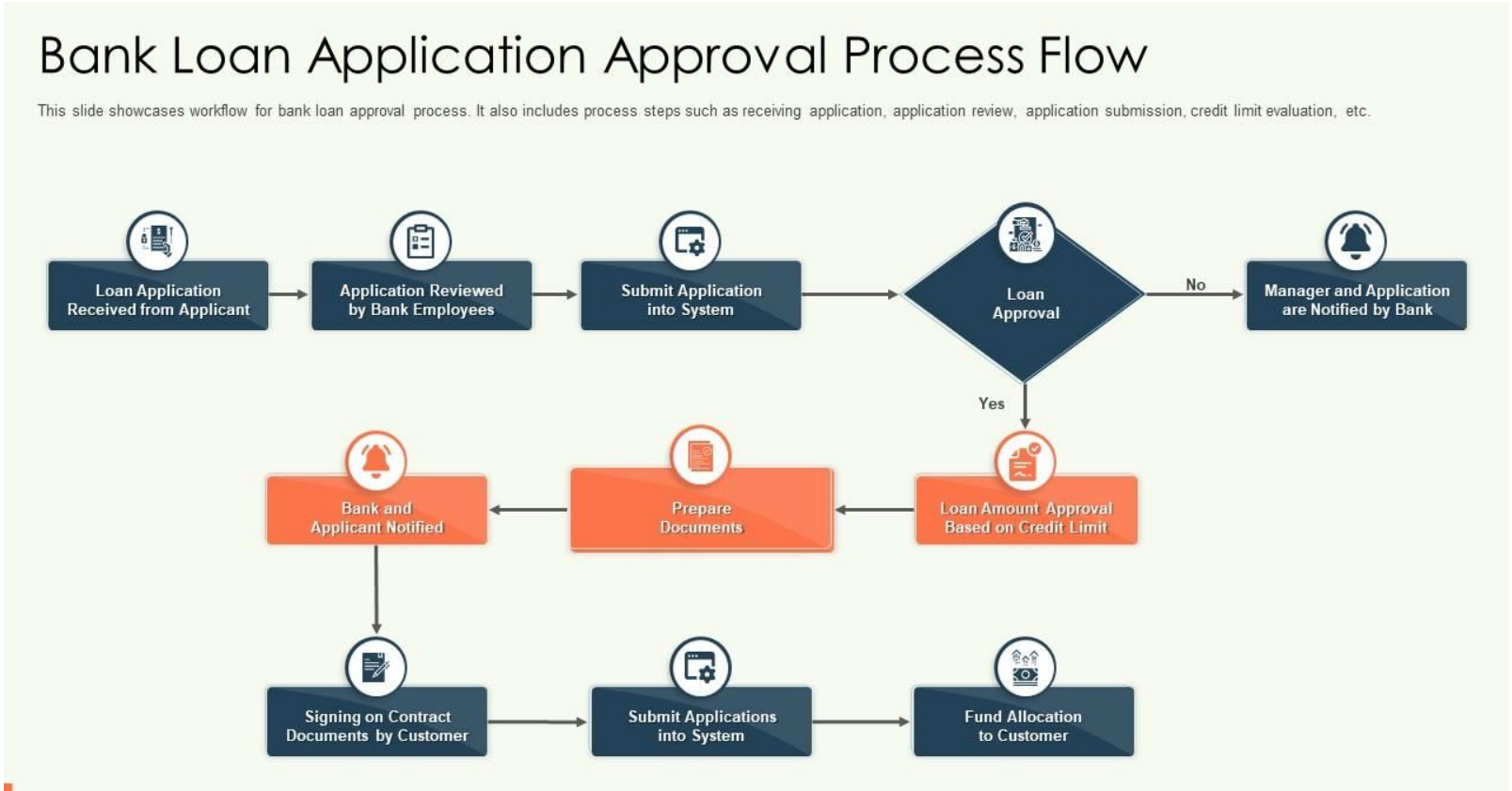
All your services are running nicely together, but now a new service is added that integrates with other existing services ...

Forget services and infrastructure. Let’s think about it in terms of *processes*



“...a collection of related, structured activities or tasks performed by people or equipment”

CAMUNDA



Real World Scenario

Truck Permits

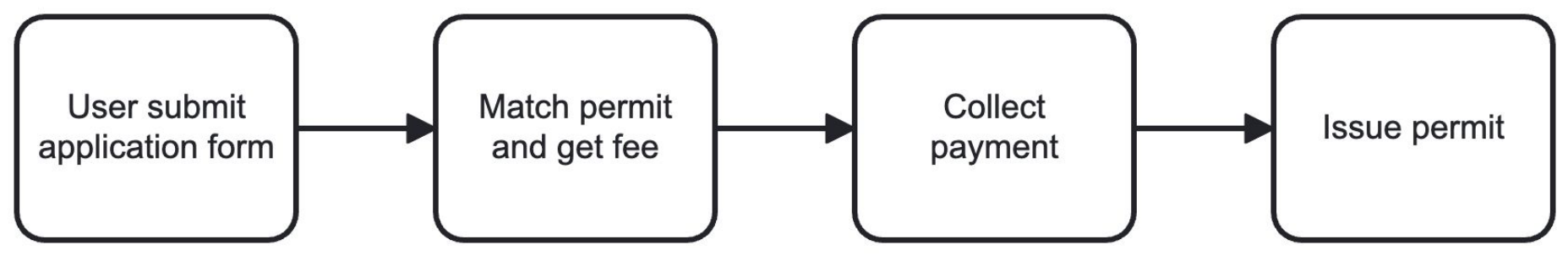
A local municipality needs to issue permits to trucking companies:

- Trucking company fills out a form
- A price is determined for the permit
- The company pays for the permit
- The permit is issued

Truck Permits

A local municipality needs to issue permits to trucking companies:

- Trucking company fills out a form
  -> UserForm microservice
- A price is determined for the permit
  -> PermitMatch microservice
- The company pays for the permit
  -> Payments microservice
- The permit is issued
  -> IssuePermit microservice


User submit application form
Match permit and get fee
Collect payment
Issue permit

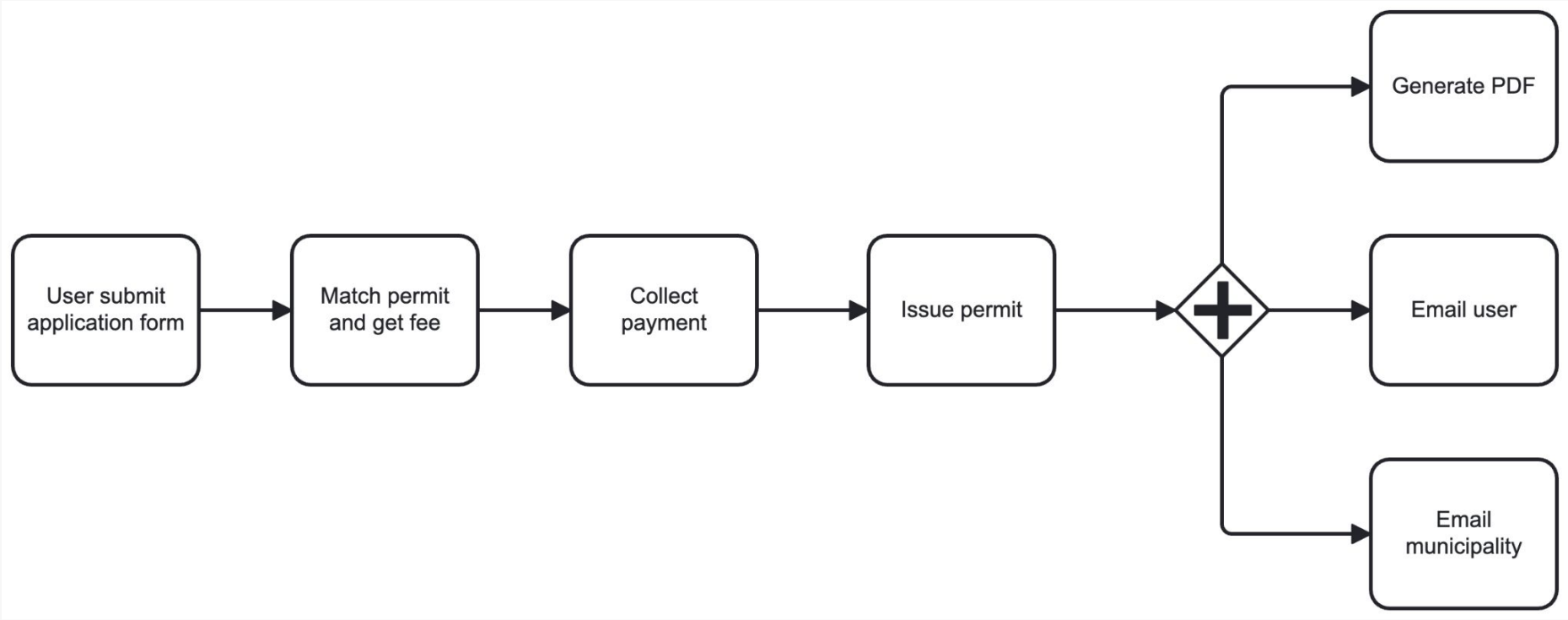
New requirement!

> “We need the permit turned into a PDF, and email notifications to the user and to us”

Truck Permits

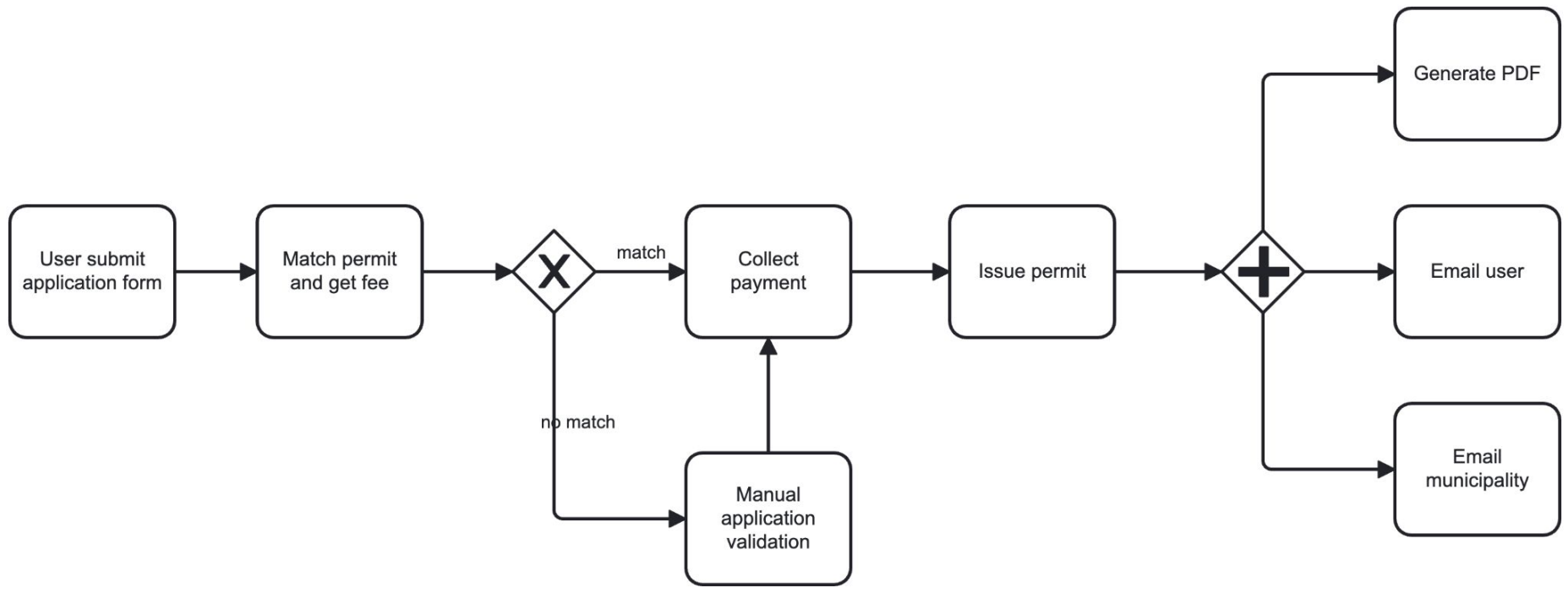
A local municipality needs to issue permits to trucking companies:

- Trucking company fills out a form
  -> UserForm microservice
- A price is determined for the permit
  -> PermitMatch microservice
- The company pays for the permit
  -> Payments microservice
- The permit is issued
  -> IssuePermit microservice
  -> PDF microservice
  -> Email microservice


User submit application form
Match permit and get fee
Collect payment
Issue permit
Generate PDF
Email user
Email municipality

New requirement!

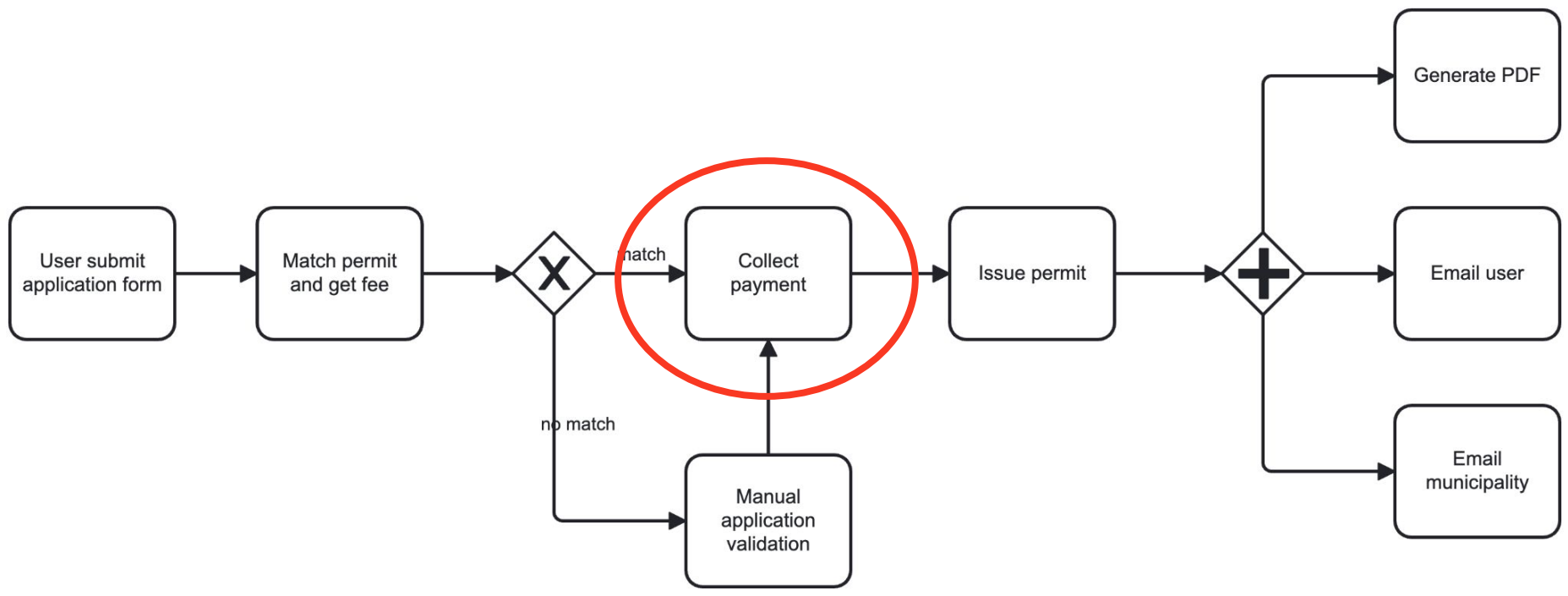
> “A user tried to fill in the form, but it didn’t match a permit!”


User submit application form
Match permit and get fee
match
Collect payment
Issue permit
Generate PDF
Email user
Email municipality
no match
Manual application validation

New requirement!

> “If they don’t pay in X days, the permit needs to be canceled!”

How might you solve this?



Introducing BPMN

Business Process Model and Notation

Maintained spec

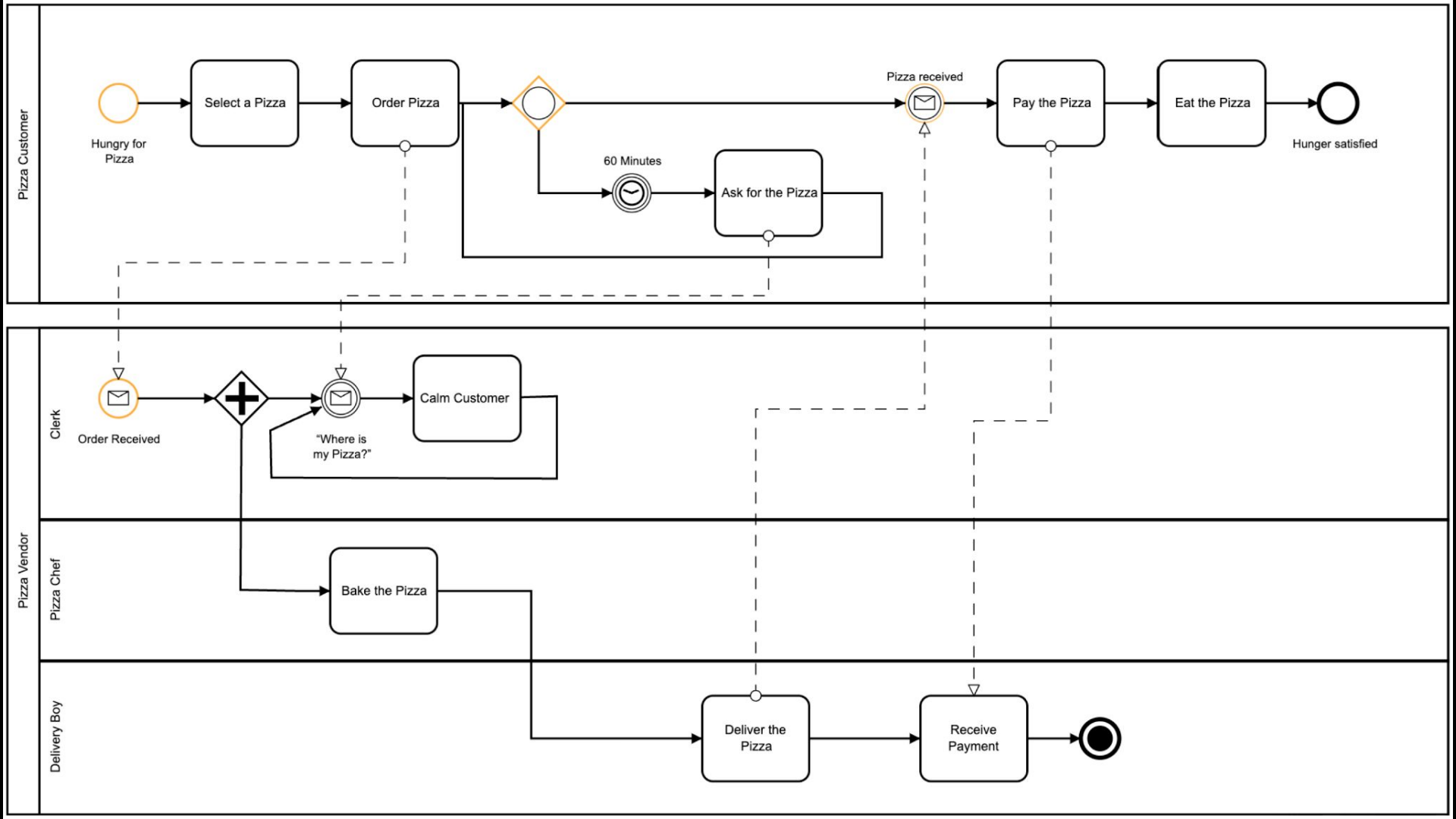
ISO/IEC 19510 spec maintained by OMG (Object Management Group)

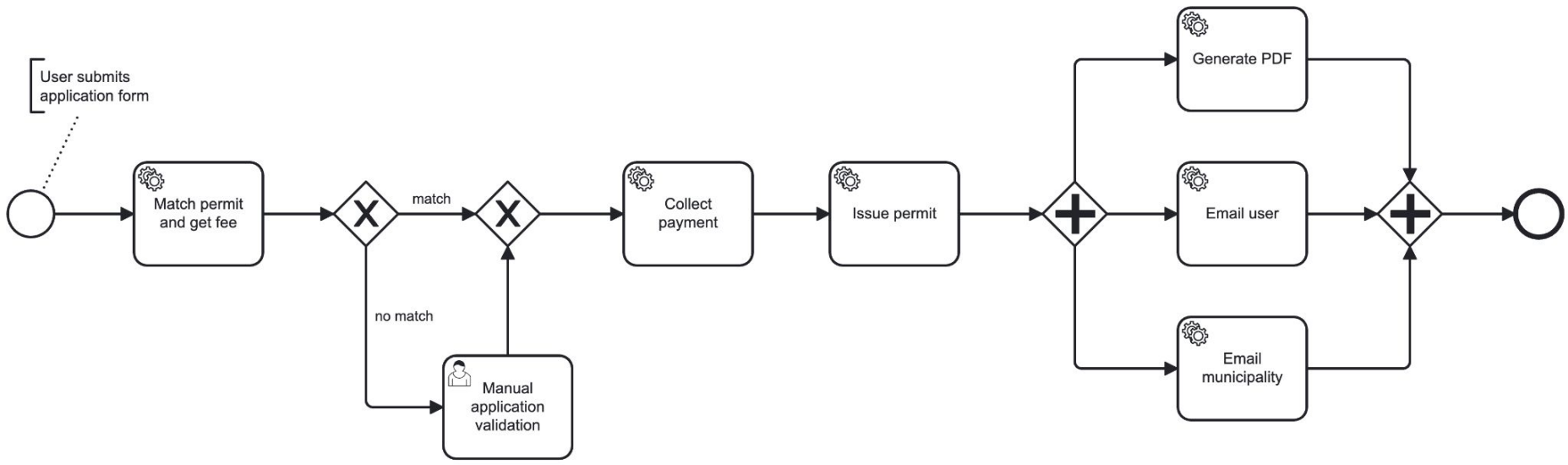
Visualization

Easily understand complex processes; no more spaghetti!

Bridge communication

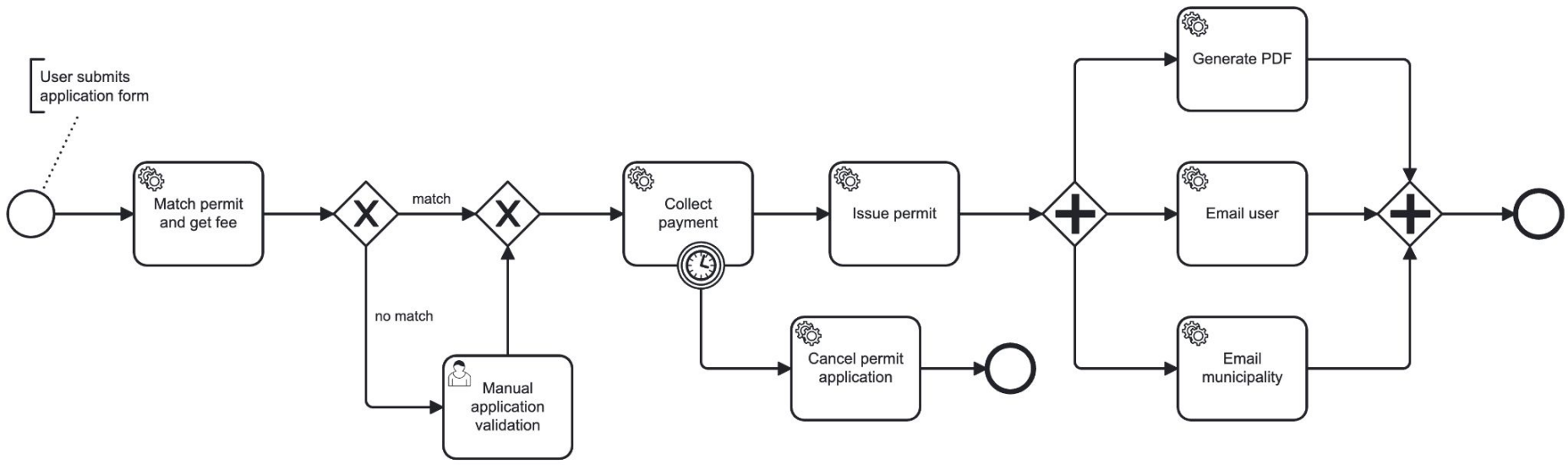
Simplify discussions with stakeholders; unify design and implementation

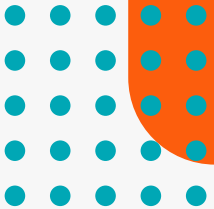

Pizza Customer
Hungry for Pizza
Select a Pizza
Order Pizza
60 Minutes
Ask for the Pizza
Pizza received
Pay the Pizza
Eat the Pizza
Hunger satisfied
Pizza Vendor
Clerk
Order Received
"Where is my Pizza?"
Calm Customer
Pizza Chef
Bake the Pizza
Delivery Boy
Deliver the Pizza
Receive Payment


User submits application form
Match permit and get fee
match
no match
Manual application validation
Collect payment
Issue permit
Generate PDF
Email user
Email municipality

Remember this?

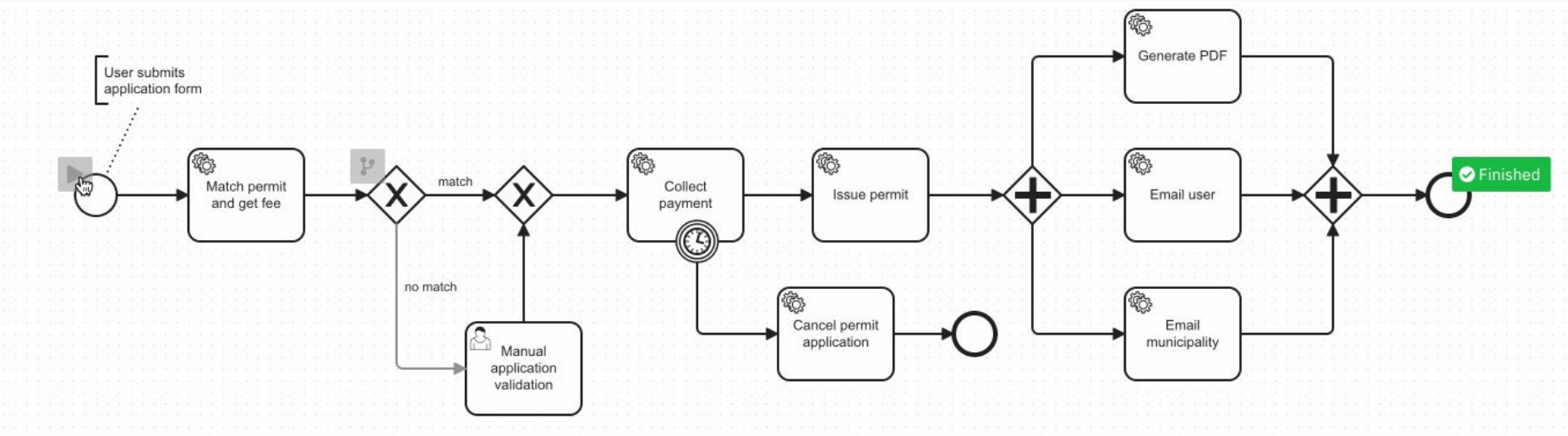
> “If they don’t pay in X days, the permit needs to be canceled!”


User submits application form
Match permit and get fee
match
no match
Manual application validation
Collect payment
Cancel permit application
Issue permit
Generate PDF
Email user
Email municipality



... That’s great, dude, but that’s just a diagram.

… or is it?!


User submits application form
Match permit and get fee
match
no match
Manual application validation
Collect payment
Cancel permit application
Issue permit
Generate PDF
Email user
Email municipality
Finished

BPMN Engines
(Workflow Management Systems)

Many options to choose from

Vendor	Tool	BPMN 2.0	Import	Export	Roundtrip	Demo Participation	Last Test Submission	A Results Submitted	B Results Submitted	C Results Submitted	Schema-valid	Website
Camunda	bpmn.io (Camunda Modeler) 11.5.0	✓	✓ Diff	✓ Diff	✓ Details	2022, 2020, 2019, 2018, 2017, 2016, 2015, 2014, 2013	✓ 2023	✓ 24/24	✓ 8/8	✓ 24/24	✓ 14/14	
BOC Group	ADONIS 14.0	✓	✓ Diff	✓ Diff	✓ Details	2022, 2020, 2019, 2018, 2017, 2016, 2015, 2014, 2013	✓ 2023	✓ 24/24	✓ 8/8	✓ 24/24	✓ 14/14	
Software AG	ARIS 10.0.22	✓	✓ Diff	✓ Diff	✓ Details	2022, 2020, 2019, 2018	✓ 2023	✓ 24/24	✓ 8/8	✓ 24/24	✓ 14/14	
Esteco S.p.A.	Cardanit (prev. BeePMN) 4.9.1	✓	✓ Diff	✓ Diff	✓ Details	2022, 2020, 2019, 2018, 2017, 2016	✓ 2023	16/24	✗ 0/8	✓ 24/24	8/10	
Trisotech	Trisotech Workflow Modeler 10.15.3	✓	✓ Diff	✓ Diff	✓ Details	2022, 2020, 2019, 2018, 2017, 2016, 2015, 2014, 2013	2022	✓ 24/24	✓ 8/8	✓ 24/24	✓ 14/14	
MID GmbH	MID Innovator 15.1.1.11026	✓	✓ Diff	✓ Diff	✓ Details	2022	2022	✓ 24/24	✓ 8/8	✓ 24/24	✓ 14/14	
OMNINET	OMNITRACKER BPMN 12.3	✓	✓ Diff	✓ Diff	✓ Details	2022, 2020	2022	✓ 24/24	✓ 8/8	✓ 24/24	✓ 14/14	
viadee Unternehmensberatung AG	BPMN-Modeler for Confluence Enterprise 3.19.0	✓	✓ Diff	✓ Diff	✓ Details	2022, 2020	2022	22/24	✓ 8/8	✓ 24/24	✓ 14/14	
MID GmbH	MID bpanda 2019.05.0.8393	✓	✓ Diff	✓ Diff	✓ Details	2022	2019	✓ 24/24	✓ 8/8	16/24	✓ 11/11	
KnowProcess Limited	KnowProcess 3.0.0-beta-1	✓	✓ Diff	✓ Diff	✓ Details	2022, 2020, 2019, 2018, 2017, 2016, 2015, 2014, 2013	2018	4/24	2/8	3/24	✗ 0/0	
Signavio GmbH	Signavio Process Editor 10.0.0	✓	✓ Diff	✓ Diff	✓ Details	2022, 2020, 2018, 2017, 2016, 2015, 2014, 2013	2016	✓ 24/24	✓ 8/8	16/24	11/13	
ITESOFT	W4 BPMN+ Composer V.10.4	✓	✓ Diff	✓ Diff	✓ Details	2020, 2019, 2018, 2017, 2016, 2015, 2014, 2013	2019	✓ 24/24	✓ 8/8	20/24	✓ 13/13	
CaseAgile	Enterprise Explorer 1.0.0	✓	✓ Diff	✓ Diff	✓ Details	2020, 2019, 2018, 2017	2019	✓ 24/24	6/8	22/24	9/12	
Boris Zinchenko	BPMN View 1.0.7	✓	✓ Diff	✗	✗ Details	2019, 2018, 2017	2019	6/24	2/8	5/24	✗ 0/0	
Sparx	Enterprise Architect 12.0.1207	✓	✓ Diff	✓ Diff	✓ Details	2019, 2018, 2015	2015	10/24	4/8	✗ 0/24	✓ 7/7	
W4 Software	W4 BPMN+ Composer V.9.4	✓	✓ Diff	✓ Diff	✓ Details	2017, 2016, 2015, 2014, 2013	2016	✓ 24/24	✓ 8/8	16/24	✓ 11/11	
itp-commerce	itp-commerce Process Modeler for MS Visio 6	✓	✓ Diff	✓ Diff	✓ Details	2017, 2016, 2015, 2014, 2013	2015	20/24	✓ 8/8	2/24	✓ 8/8	
Camunda	Camunda Eclipse Plugin 3.0.0	✓	✓ Diff	✓ Diff	✓ Details	2016, 2015, 2014, 2013	2016	20/24	✓ 8/8	16/24	✓ 11/11	
ModelFoundry Pty. Ltd.	ModelFoundry 1.1.1	✓	✓ Diff	✓ Diff	✓ Details	2016	2016	12/24	4/8	8/24	2/11	
Trisotech	Trisotech BPMN Visio Add in 5.0.1	✓	✓ Diff	✓ Diff	✓ Details	2016, 2015, 2014, 2013	2015	20/24	✓ 8/8	16/24	✓ 11/11	
MODELIOSOFT / SOFTEAM	Modelio 3.5	✓	✓ Diff	✓ Diff	✓ Details	2016	2015	18/24	✓ 8/8	16/24	✗ 0/10	
Yaoqiang, Inc.	Yaoqiang BPMN Editor 4.0	✓	✓ Diff	✓ Diff	✓ Details	2016, 2015, 2014, 2013	2015	✓ 24/24	✓ 8/8	4/24	✓ 8/8	
GenMyModel	GenMyModel 0.47	✓	✓ Diff	✓ Diff	✓ Details	2015	2015	16/24	✓ 8/8	16/24	7/8	
Alfresco	Activiti Designer 5.14.1	✓	✓ Diff	✓ Diff	✓ Details	2014	2014	12/24	✗ 0/8	✗ 0/24	✓ 3/3	
IBM	IBM BlueWorks Live April 2014	✓	✓ Diff	✓ Diff	✗ Details	2014	2014	8/24	✗ 0/8	✗ 0/24	✓ 2/2	
Oracle	Oracle BPM Studio 12.1.3	✓	✓ Diff	✗	✗ Details	2014	2014	3/24	✗ 0/8	✗ 0/24	✗ 0/0	
GBTEC Software + Consulting AG	BIC Cloud Design 6.2.0	✓	✓ Diff	✓ Diff	✓ Details	✗ 0	2020	✓ 24/24	7/8	20/24	11/12	
Bonitasoft	Bonita BPM 7.2.3	✓	✓ Diff	✗	✗ Details	✗ 0	2016	21/24	6/8	14/24	3/11	

https://bpmn-miwg.github.io/bpmn-miwg-tools/

Camunda - The Universal Process Orchestrator

CAMUNDA

Orchestrate

Complex process flows across people, systems and devices.

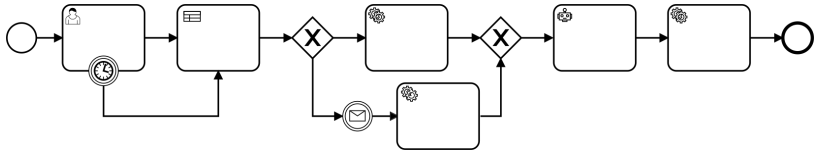
Automate

Any process, anywhere.

Transform

Your organization toward a digital future.

Collaborate



Flexibility

Java

python

JUnit 5

All Endpoints

Human Work

AI

Business Rules

Micro Services

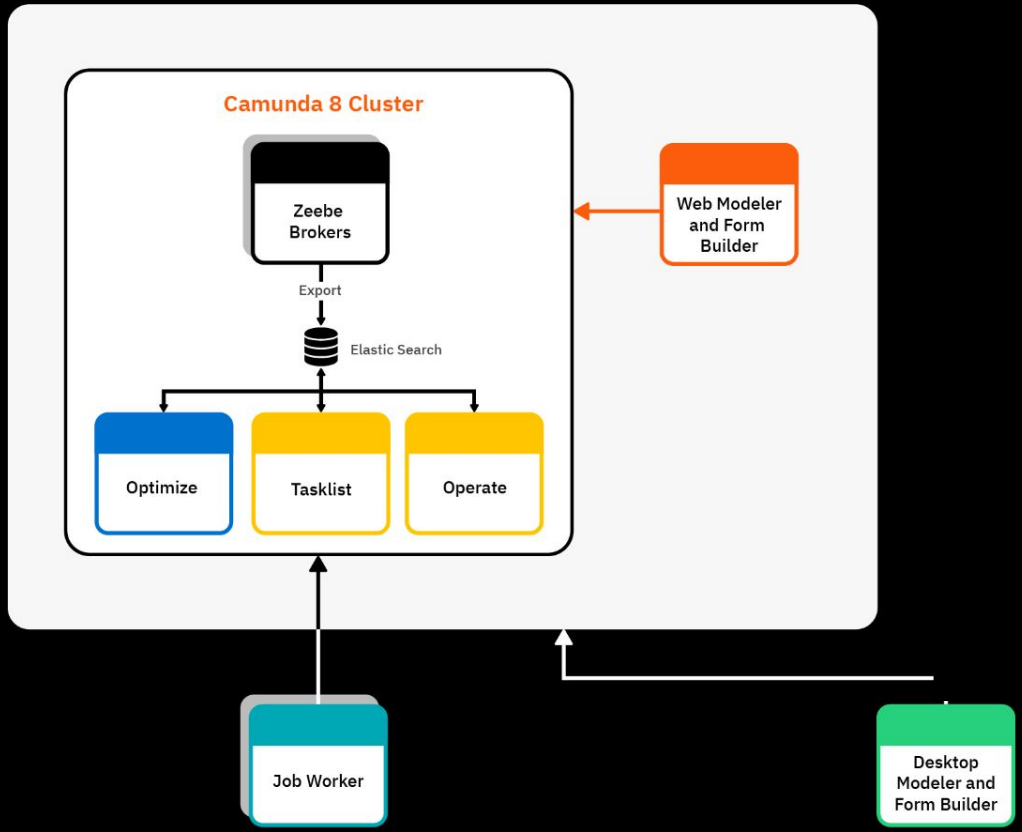
RPA

API

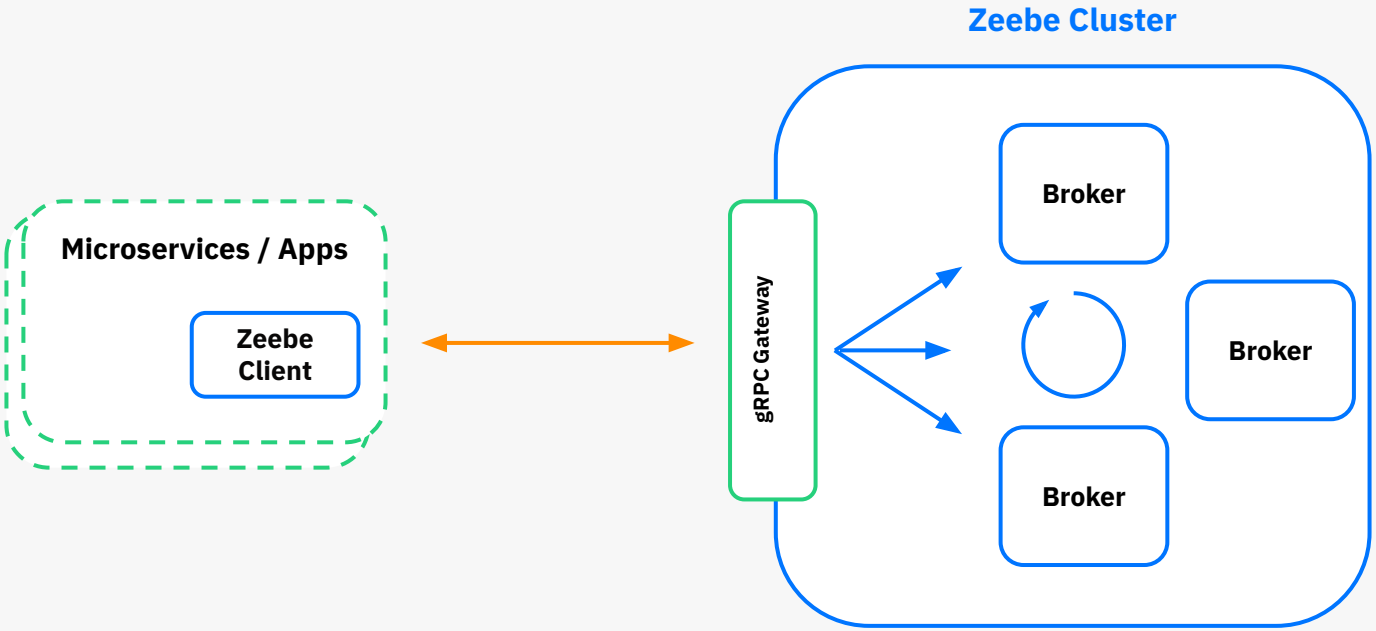
IoT

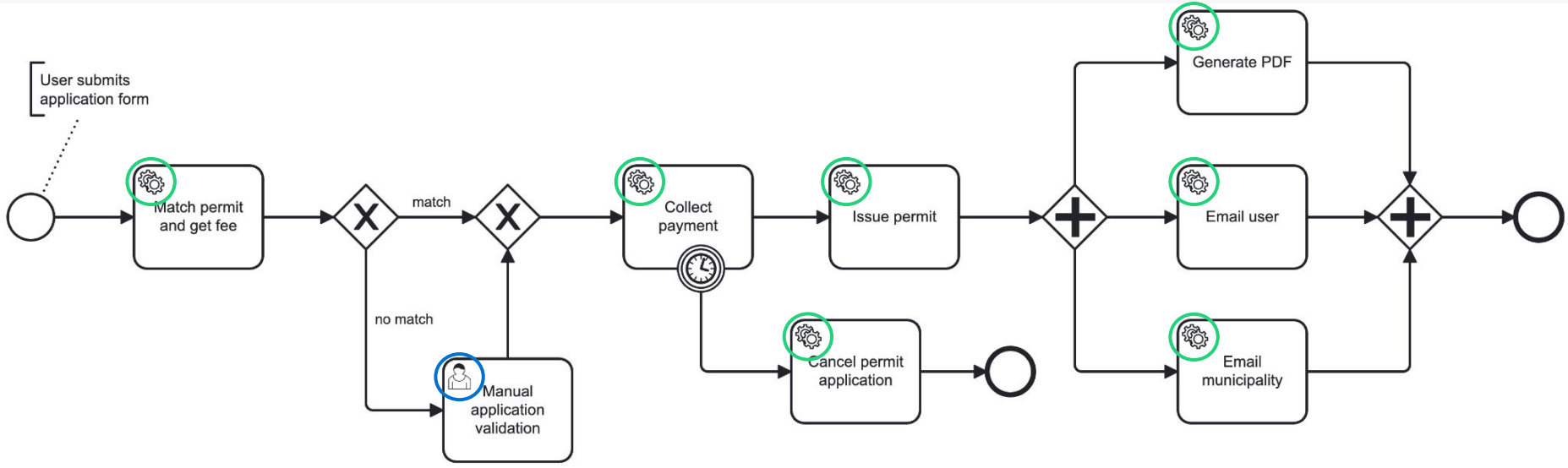
Systems (legacy + homegrown)

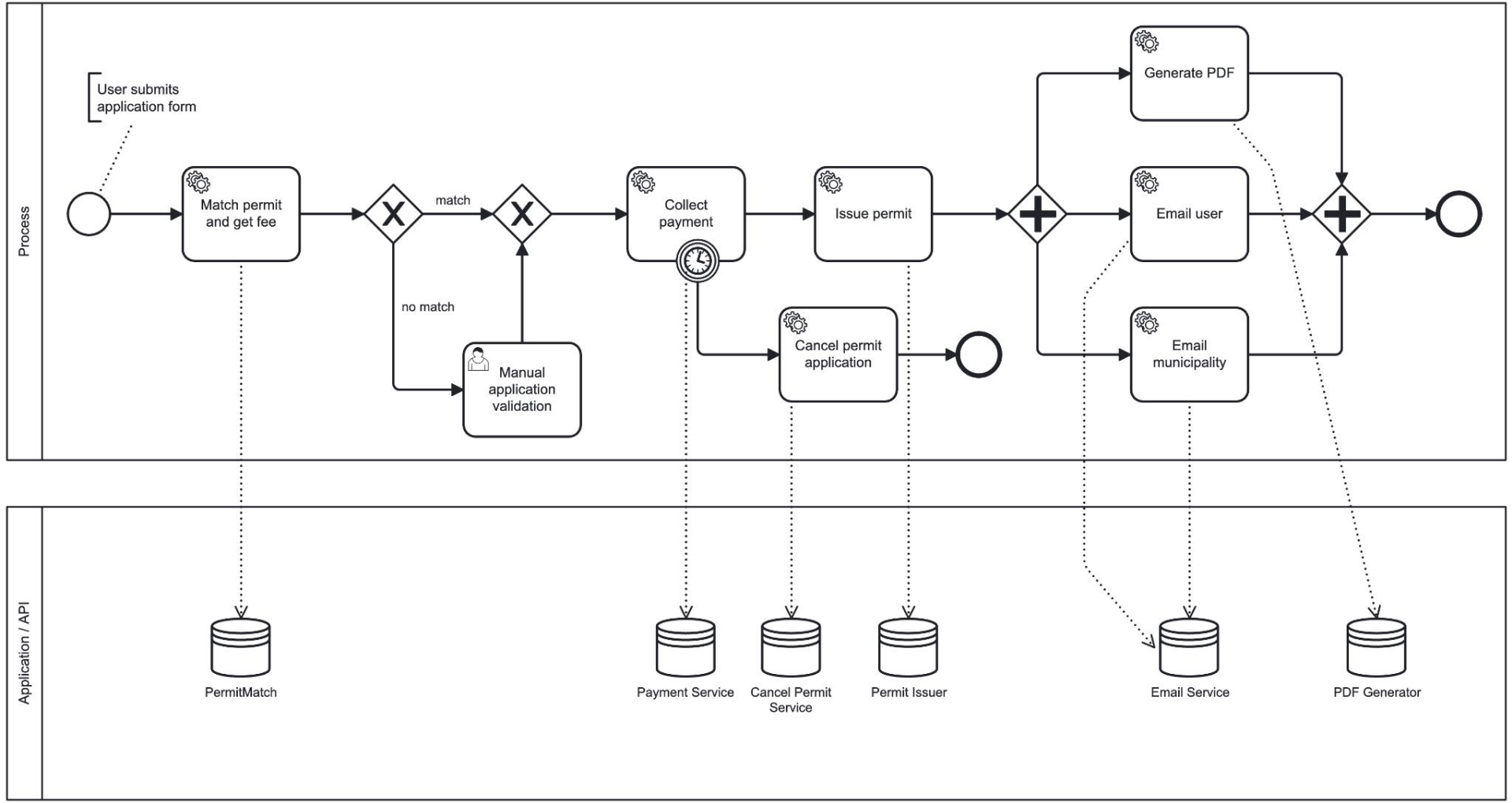
Camunda Platform 8



Zeebe Architecture



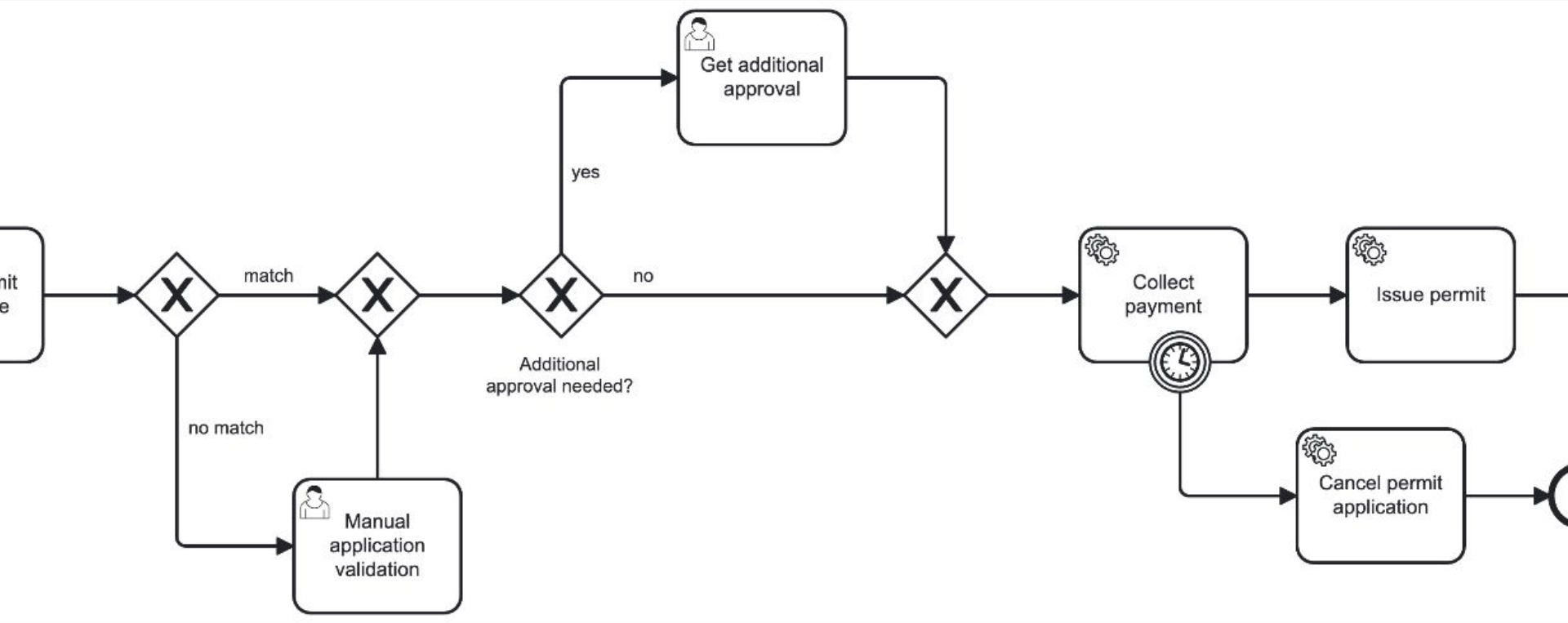

User submits application form
Match permit and get fee
match
no match
Manual application validation
Collect payment
Cancel permit application
Issue permit
Generate PDF
Email user
Email municipality

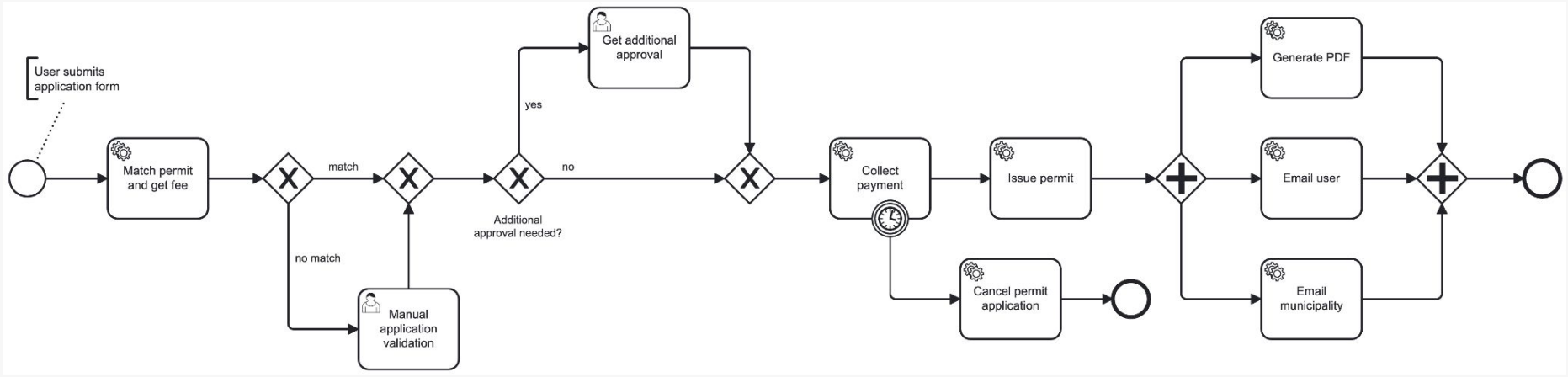

Process
User submits application form
Match permit and get fee
match
no match
Manual application validation
Collect payment
Issue permit
Cancel permit application
Generate PDF
Email user
Email municipality
Application / API
PermitMatch
Payment Service
Cancel Permit Service
Permit Issuer
Email Service
PDF Generator

The state of a process is managed by the workflow engine, not the application. The data is managed by the application, not the engine.

New requirement!

> “For some permits, they need additional approval before collecting payment.”

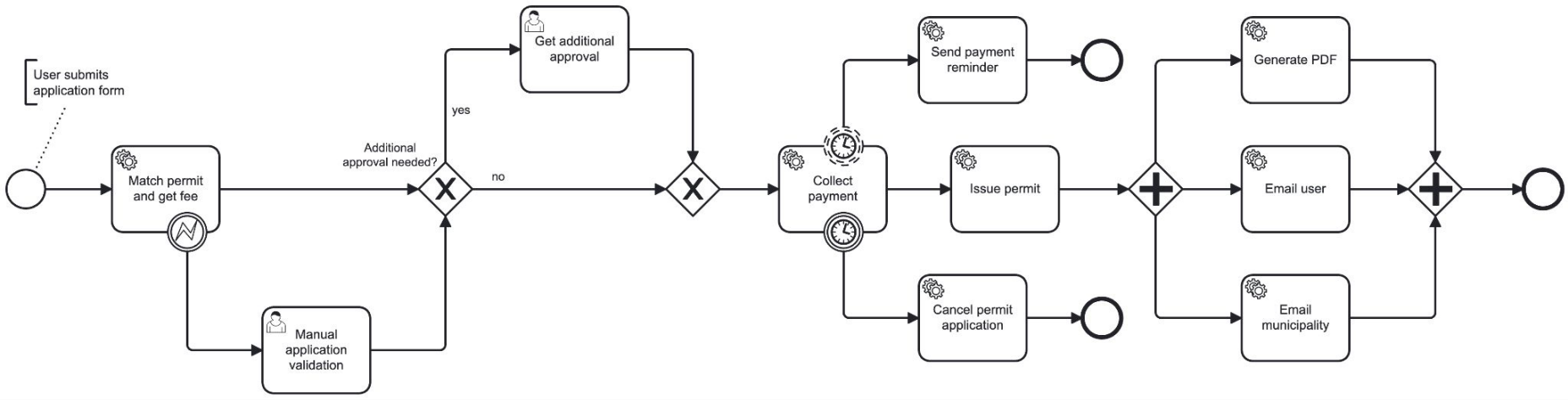

Get additional approval
yes
match
no
Additional approval needed?
Collect payment
Issue permit
no match
Manual application validation
Cancel permit application


User submits application form
Match permit and get fee
match
no match
Manual application validation
Get additional approval
yes
Additional approval needed?
no
Collect payment
Cancel permit application
Issue permit
Generate PDF
Email user
Email municipality

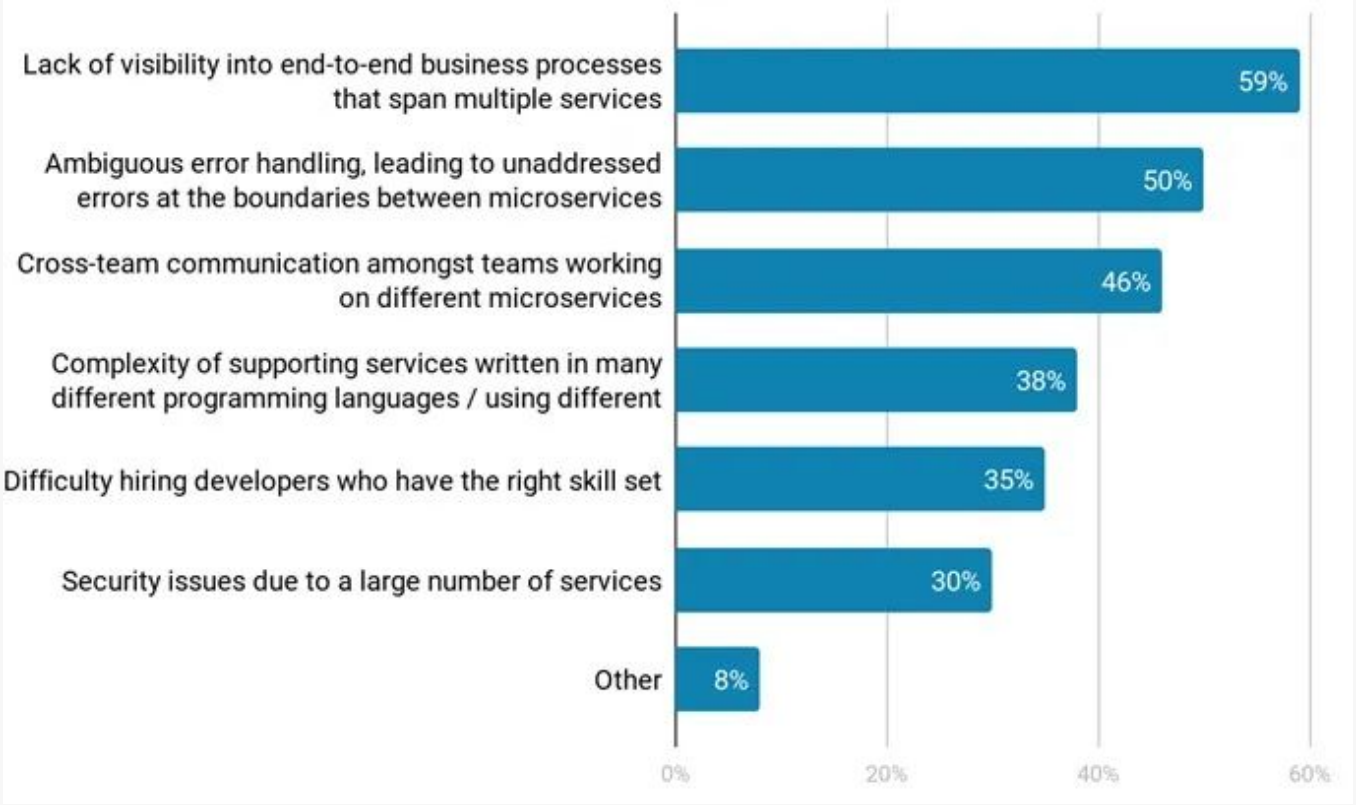
New requirement!

> “Oh, and we should probably send a payment reminder before we cancel the permit.”

Errors and reminders



That was easy!


Lack of visibility into end-to-end business processes that span multiple services
59%
Ambiguous error handling, leading to unaddressed errors at the boundaries between microservices
50%
Cross-team communication amongst teams working on different microservices
46%
Complexity of supporting services written in many different programming languages / using different
38%
Difficulty hiring developers who have the right skill set
35%
Security issues due to a large number of services
30%
Other
8%
0%
20%
40%
60%

~~Hard~~ Easier problems to solve

Documentation

The BPMN model provides living documentation

Timers

By modeling them explicitly, everything is easily updated and configured

Interrupting messages

Assuming all your services are idempotent (they are, right?!), interrupting everything is as easy as interrupting the process, which supports cancellation tokens or compensation events (transactions)

Changes to business logic

New steps are added into the BPMN model and deployed; running processes can migrate to the new version or keep running on the previous version

Let’s review

1

BPMN

Open spec that defines processes in an organized, understandable way

2

BPMN Engines

Execute the process as drawn, connecting tasks to external services. State of each process is controlled by the engine, not the application.

3

Simplified management

Easily add additional tasks without changing existing application; engines provide management tools to monitor performance etc.

"That's all Folks!"
Isberg©