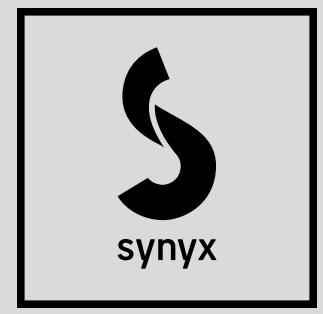


# MICRO-FRONTENDS IN REACT



**Denise Schäfer**  
[\(denise.schaefer@dm.de\)](mailto:denise.schaefer@dm.de)



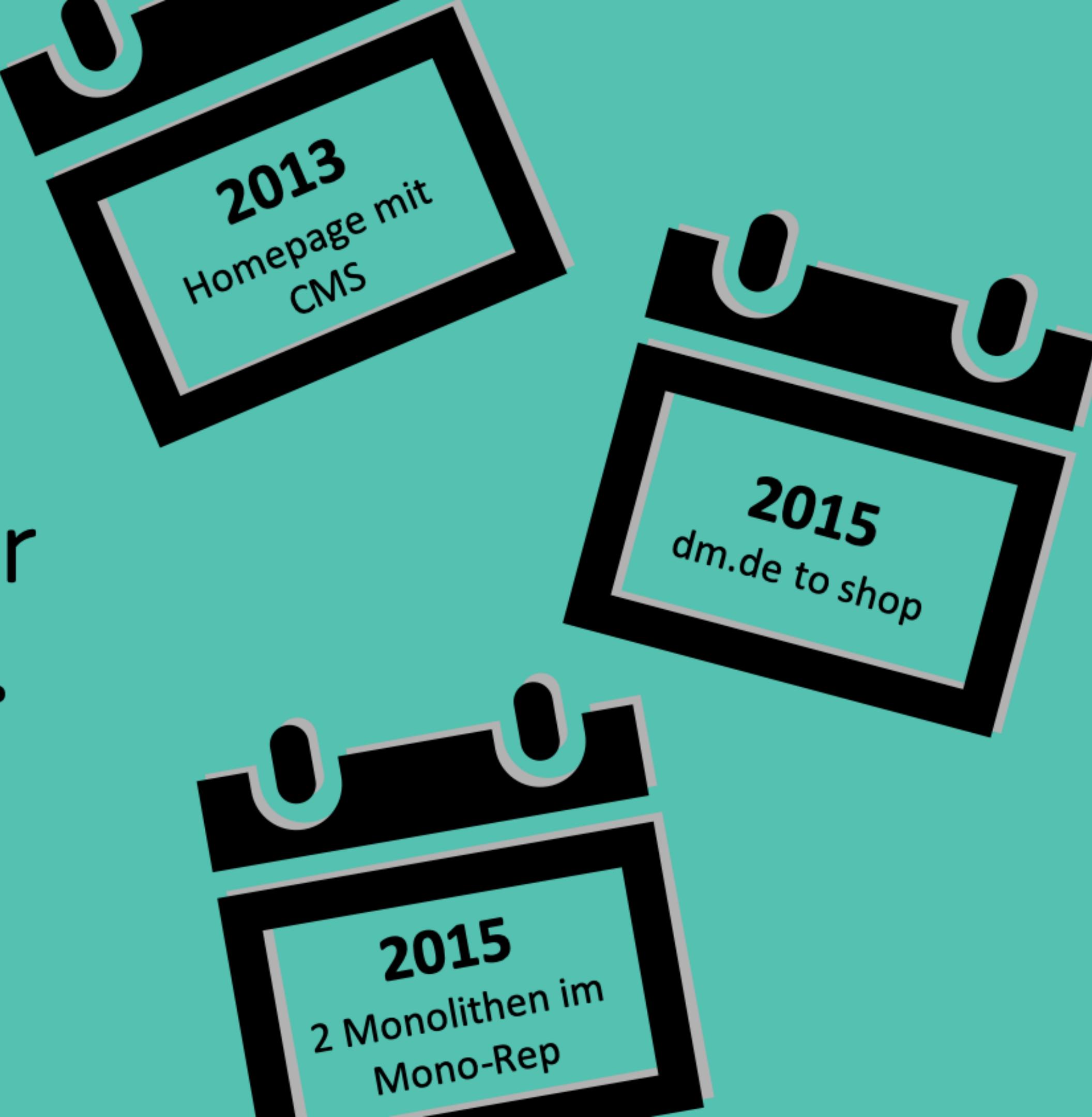
**Benjamin Seber**  
[\(@\\_seebaer\)](https://twitter.com/_seebaer)



# RÜCKBLENDE

---

# Was bisher geschah...

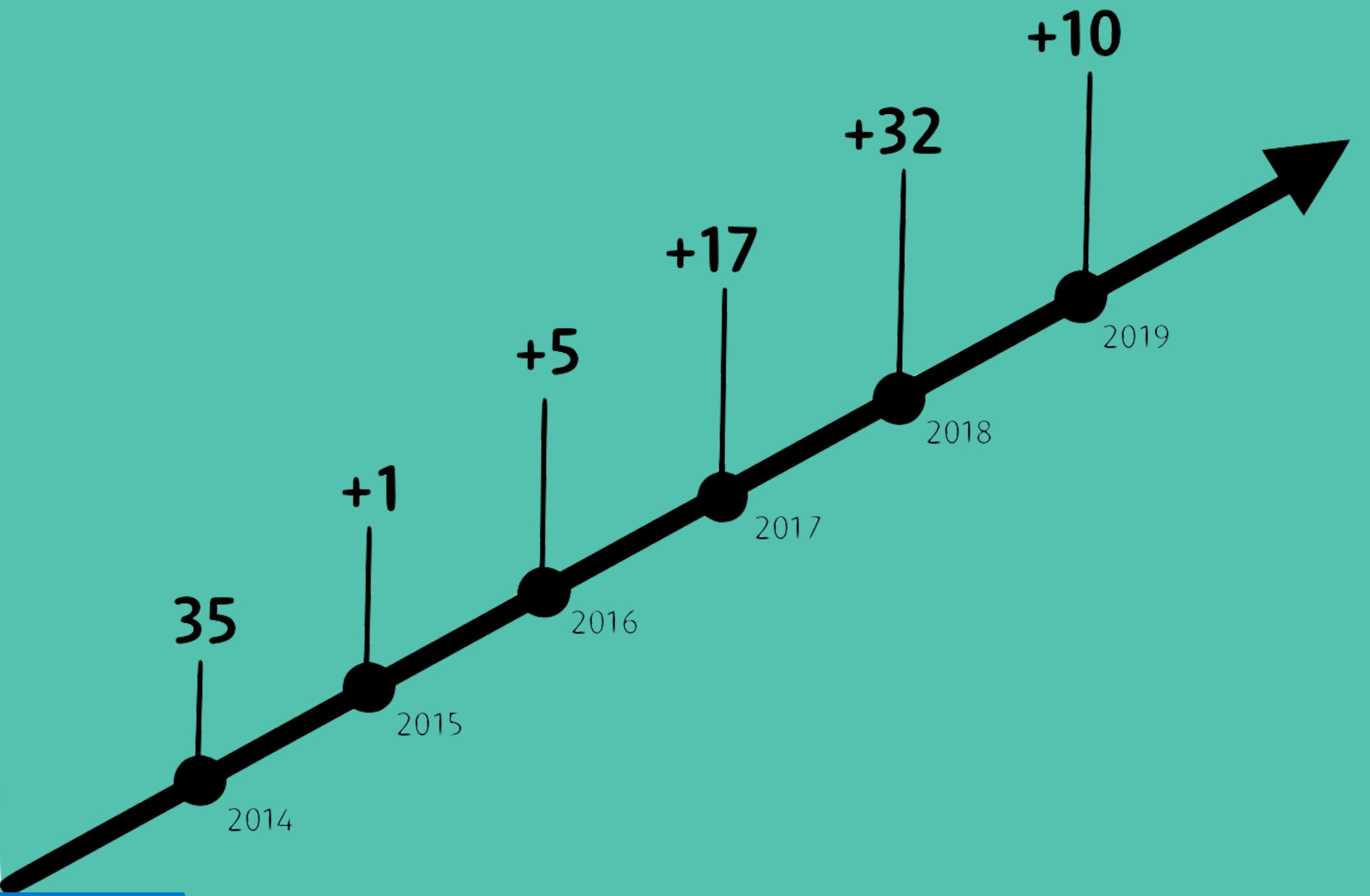


# CoreMedia Git Historie

- 2013

A circular diagram with a black center and a teal outer ring. Inside the black center, there is a list of git commit logs for May 2013, arranged in a spiral pattern. The commits are color-coded: blue for most entries and orange for a few specific ones. The log entries include dates, times, and commit hashes.

- 2013-05-15 - 18:46 0e66126f4f0b3cf30555003
- 2013-05-14 - 16:46 a6283da8901558b657cb5b20ed
- 2013-05-14 - 13:17 36c12ee9120e0dcef5c43e05d0b1
- 2013-05-13 - 14:28 906b6be40bc01f17fcda2673f0c93cd
- May 2013-05-13 - 14:23 c098905fdb1c17fd8dce9593fc74a134
- May 2013-05-13 - 06:37 7f1bddbe57f5282a9239a0baacbae7dc7b
- Mon May 2013-05-13 - 06:36 0e0275dd95646c9fcb1321bf93648e82494
- Fri May 2013-05-10 - 14:38 8964f525b9726a68428e596e55b01f081882
- Fri May 2013-05-10 - 14:24 074c37b8d5d5abfb364d92725a344f87e2b45
- Fri May 2013-05-10 - 12:40 f66bc54c46d84f6665cd276cd8e2fb9a28c1
- Thu May 2013-05-09 - 13:34 01a817ecf6f88d3c59aab69ac22f0a7a3f4ceb
- \* Wed May 2013-05-08 - 16:57 8d35cd896fba908835a8b5012d11966973e30a8
- \* Wed May 2013-05-08 - 09:34 2778dccadd8b015c17fd27b476fa5ea03716410
- \* Wed May 2013-05-08 - 08:26 44d132c640830dbdb0d4d94649ff0156f9410649
- \* Tue May 2013-05-07 - 18:37 82ac7fc59309fccffd87379f0e2cdbacbb7d02e8
- \* Mon May 2013-05-06 - 16:37 3b2dfae8f7c99c6b439f2b87fcaa11c885e518ac
- \* Mon May 2013-05-06 - 16:08 e3156eb80840c8577e759ab21f55455701918e9
- \* Fri May 2013-05-03 - 17:19 e8a3eea664464e0fc09ebdb604d9e9d413dbb2c
- Fri May 2013-05-03 - 17:16 b3d7d0c38d4ded5c56ba983ea38c07094f03202
- Fri May 2013-05-03 - 14:52 b8457c803b0e8430ab4838945867b16dd063bd
- Thu May 2013-05-02 - 17:53 4c190f4cae9346a634e6b61e118147f2d9117
- Thu May 2013-05-02 - 17:42 027f4f4a213b7b0e3b83dca239d5c637108b
- Thu May 2013-05-02 - 14:27 d0241edc44460795ef7b1d66751f3441503
- Apr 2013-04-29 - 16:19 3215bc364646d79f36def6342a3eee3a6c
- Apr 2013-04-29 - 16:18 e58c0d746dd86130d1767fe14fc5a36
- Apr 2013-04-29 - 15:53 8d6bfe2415c32d9c338bad543535aff6
- Apr 2013-04-29 - 15:00 23079093b029198af87944df37d38
- Apr 2013-04-29 - 14:57 dacaa810a76a1f237292a0443c0
- Apr 2013-04-29 - 13:05 56f83a9a9bddae49c33341b
- Apr 2013-04-29 - 10:05 b55583fa3f00f98f3590
- Apr 2013-04-21 c18407604b50b2



Anstieg der  
Contributor

# CoreMedia Git Historie

## - 2016

# Wir brauchen mehr Features!



Was war denn  
Anfang 2016?

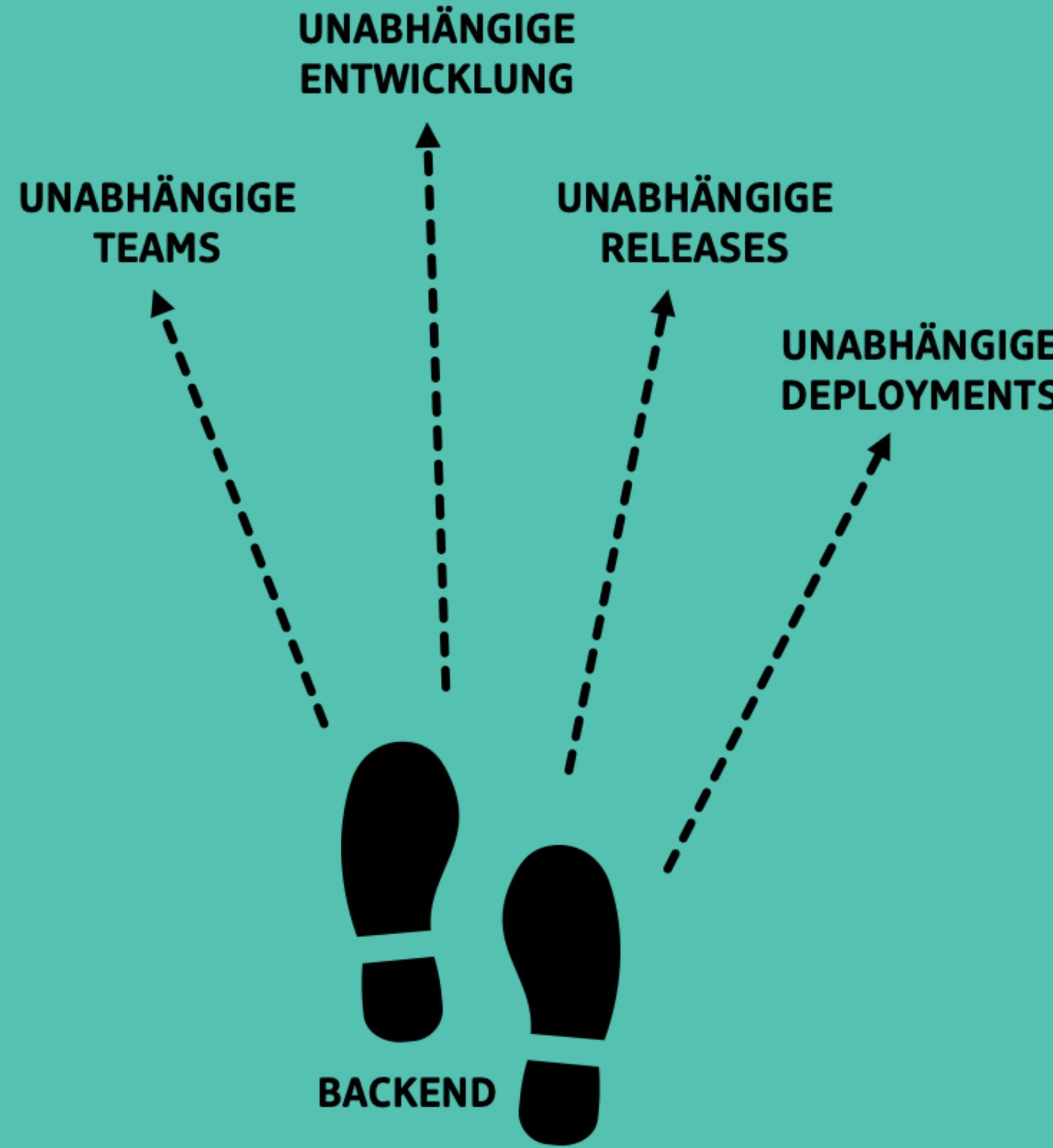
Einiges! Wo soll  
ich anfangen?  
Aaalso...



# Micro-Services im Backend



# Unabhängigkeit nur im Backend



# Skalierung im Backend

BACKEND



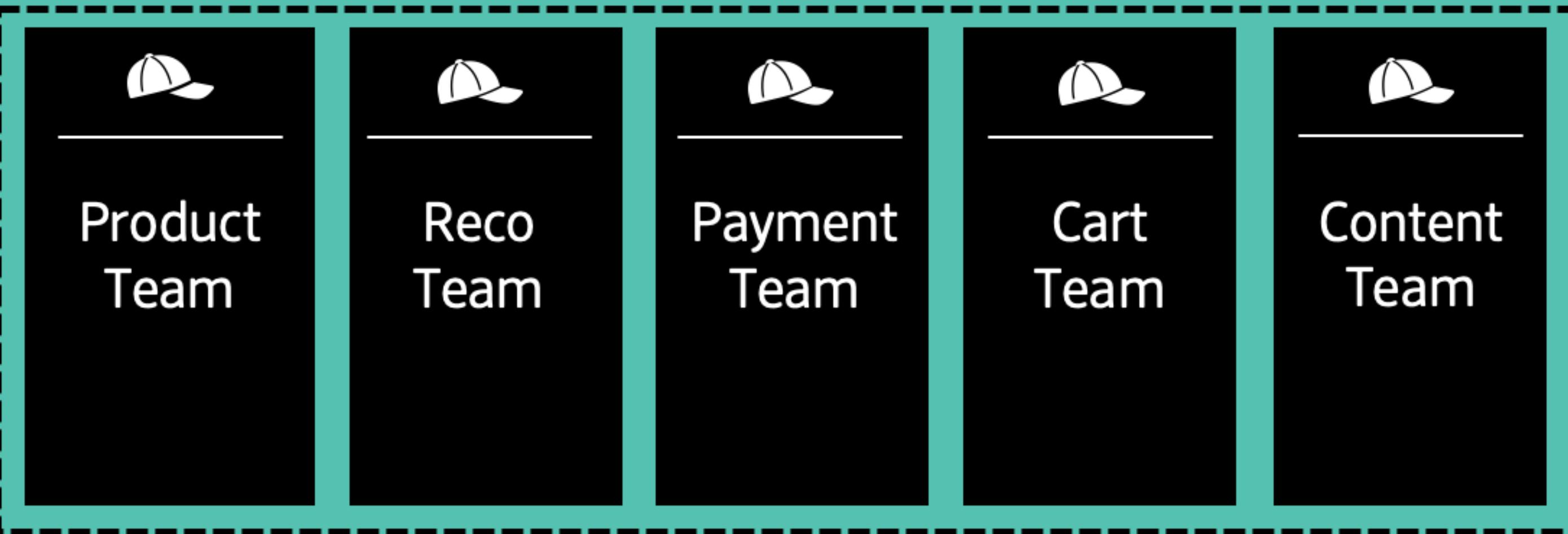
FRONTEND



Frontend-Team



Backend-Teams



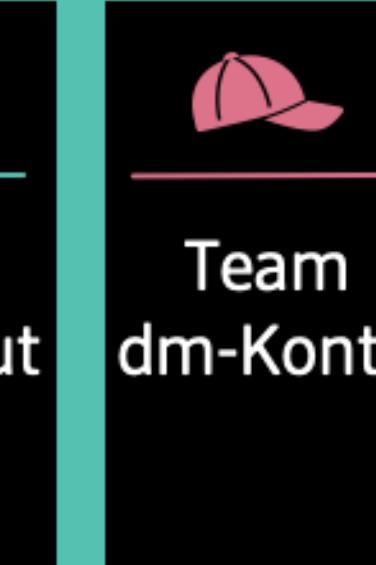
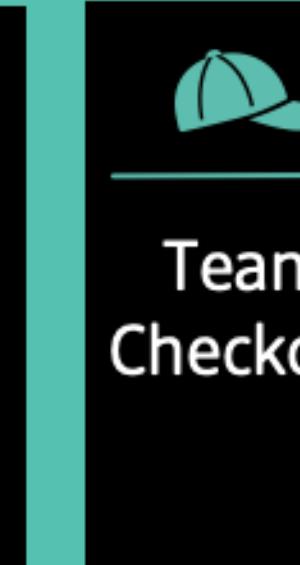
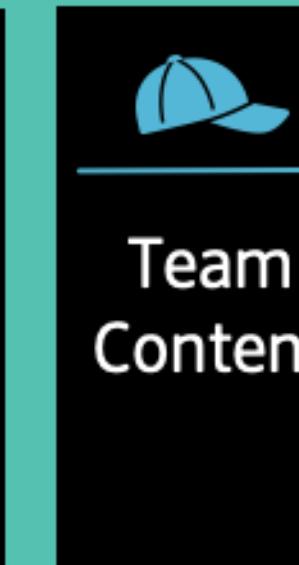
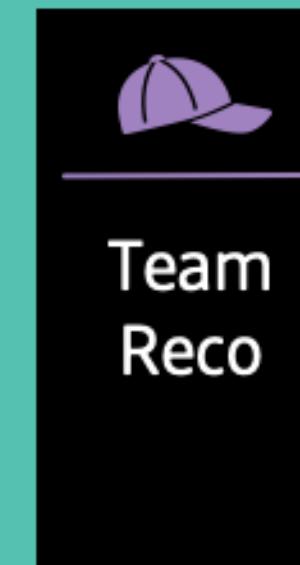
# Auswirkung für den Product Owner





# WANTED

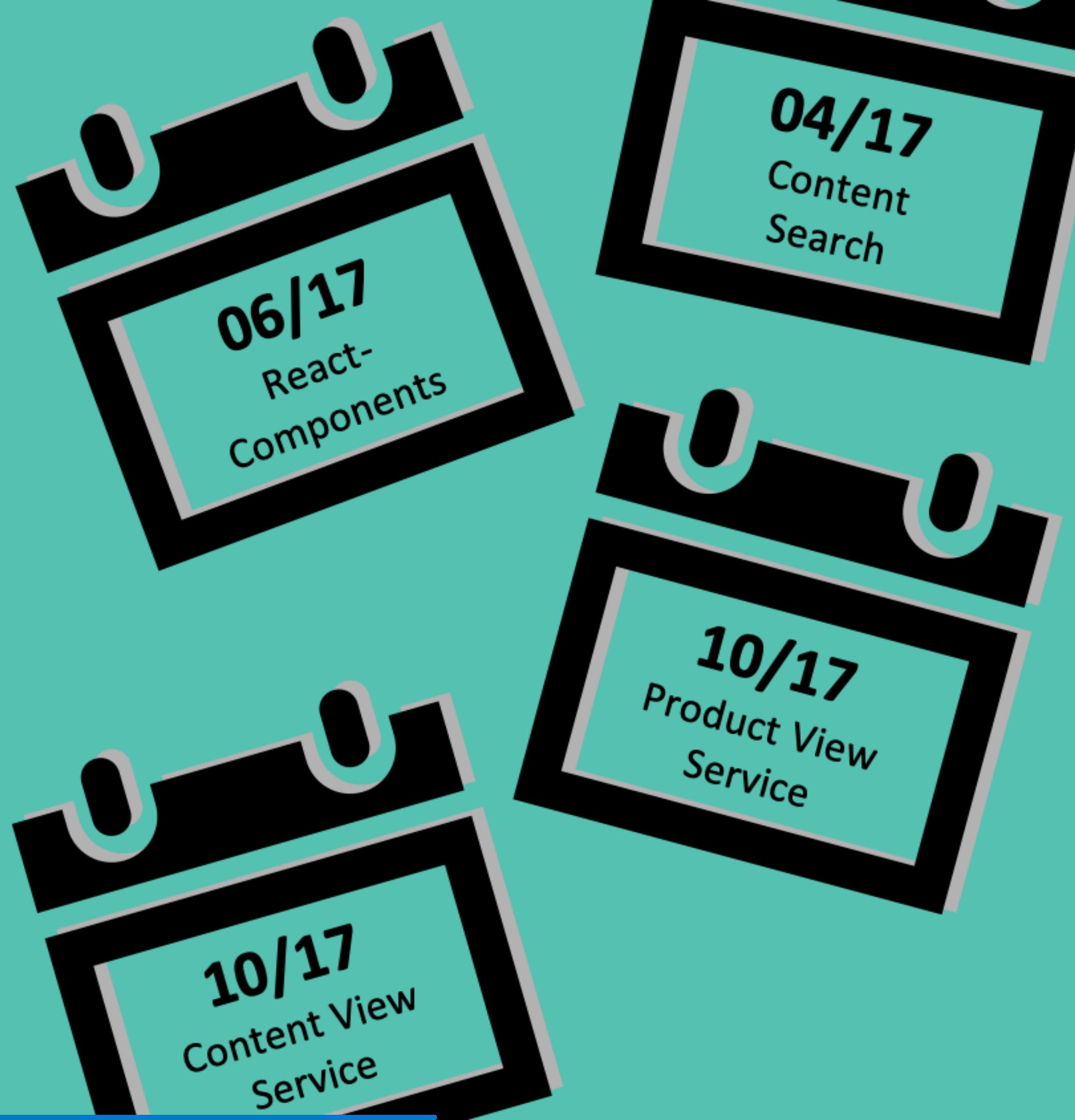
## CROSS-FUNKTIONALE TEAMS

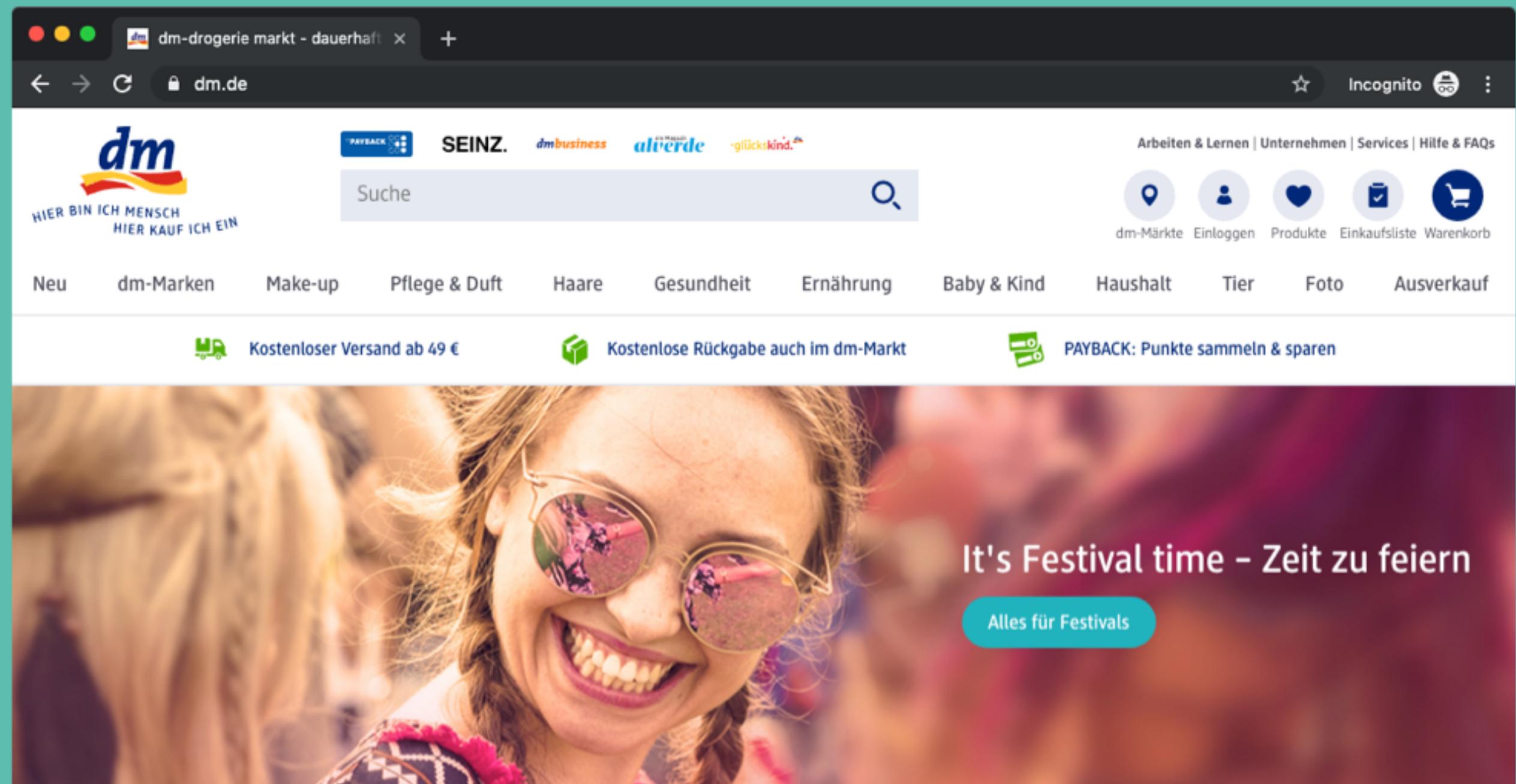


## FRONT- & BACK-END



# Versuche zur Eigenständigkeit





content-view-service



BABEL



ESLint

product-view-service



BABEL



ESLint

content-search-service



BABEL



ESLint

# React Components

GitOverride: endlich hab ich die selectbox fertig

GitOverride: e( ⌂ ⌂ )đ

GitOverride: ganz schön viele extra features wieder...

GitOverride: nativ und gut is...

Front\_Ende: was habt ihr denn gebraucht? wir hätten da was 😅

GitOverride: special styling unterschiedlich auf desktop und mobile versteht sich

The screenshot shows the homepage of the dm-drogerie markt website. At the top, there's a navigation bar with the dm logo, a PAYBACK button, and links for SEINZ., dm business, alverde, and glückskind. Below the navigation is a search bar with a magnifying glass icon. To the right of the search bar are icons for location, user profile, heart, shopping cart, and a link to 'Arbeiten & Lernen | Unternehmen | Services | Hilfe & FAQs'. A horizontal menu bar follows, featuring categories like Neu, dm-Marken, Make-up, Pflege & Duft, Haare, Gesundheit, Ernährung, Baby & Kind, Haushalt, Tier, Foto, and Ausverkauf. Below this menu are promotional banners for 'Kostenloser Versand ab 49 €', 'Kostenlose Rückgabe auch im dm-Markt', and 'PAYBACK: Punkte sammeln & sparen'. The main visual is a woman wearing sunglasses smiling, with the text 'It's Festival time - Zeit zu feiern' and a 'Alles für Festivals' button.

content-view-service



BABEL



ESLint

product-view-service



BABEL



ESLint

content-search-service

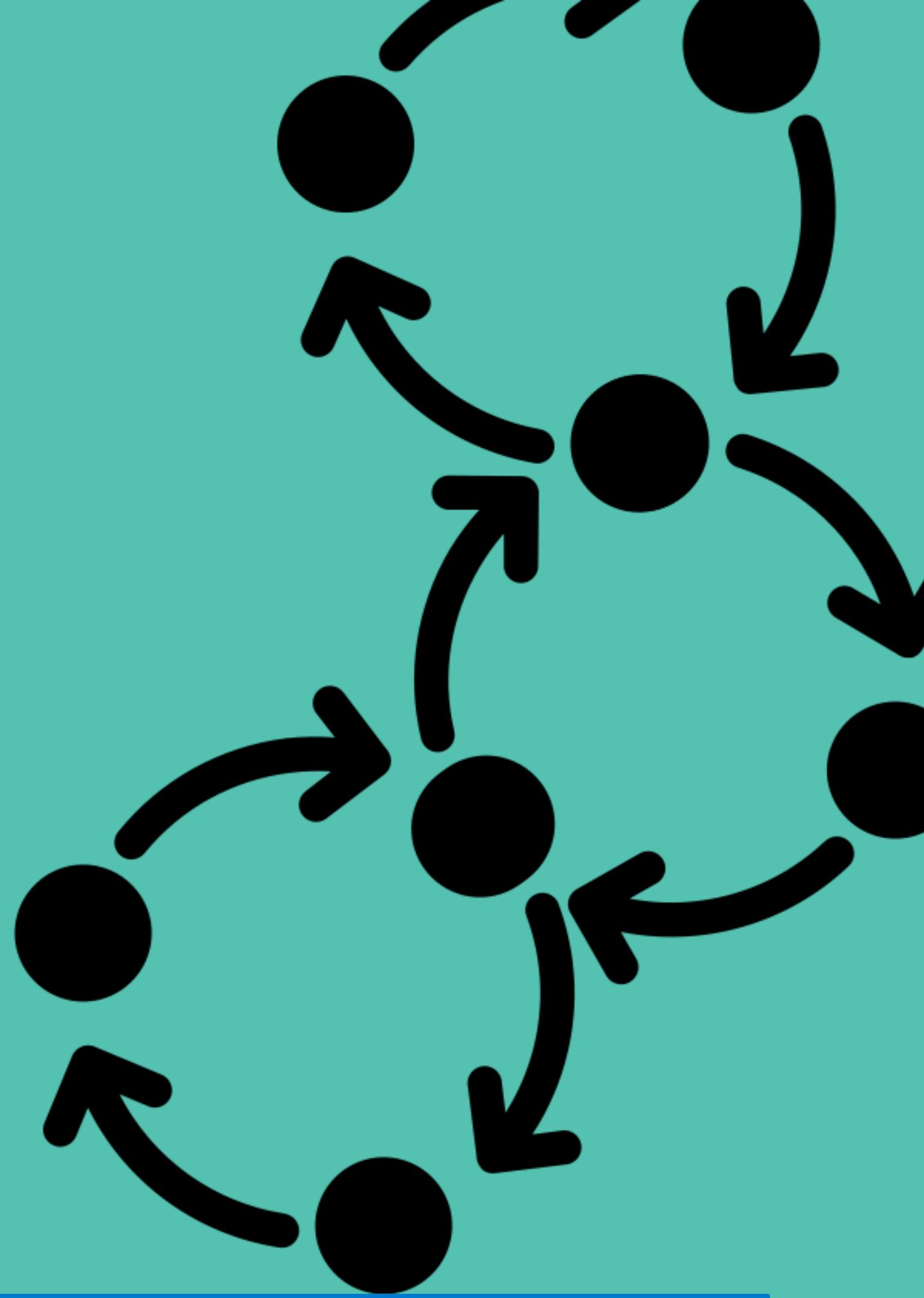


BABEL



ESLint

react-components



Aber erstes Zwischenergebnis:  
**Abhängigkeitszyklen**  
= verteilter Monolith

**321 PUSH!**



# DAS RÄTSEL

---



**WIE TEILEN WIR  
DAS FRONTEND AUF?**

- 1 Domain Produkt
- 2 Domain Shopping-List
- 3 Domain Warenkorb
- 4 Domain Suche
- 5 Domain Filial Verfügbarkeit
- 6 Domain Kundenkonto

# Schauplatz Detailseite

The screenshot shows a product detail page for a Balea MEN shower gel. The page is structured with various sections and interactive elements, each marked with a numbered callout (1 through 6) corresponding to the legend on the right.

**Product Information:**

- Image:** A large image of the product bottle is displayed, labeled with a callout 1.
- Product Name:** Balea MEN Duschgel arctic fresh, 300 ml
- Rating:** ★★★★☆ 5.0 (2) reviews
- Price:** 0,95 €
- Add to Cart:** In den Warenkorb (callout 2)
- Buy for Later:** Auf die Einkaufsliste (callout 3)
- Delivery Status:** Lieferbar (available)

**Store Availability:**

In welchen Filialen ist dieses Produkt verfügbar? Bitte PLZ / Ort angeben (callout 5).

**Customer Information:**

! dm-Dauerpreis nicht erhöht seit 06.03.2015 (callout 6).

**Logos and Buttons:**

- MARKE von dm (callout 1)
- Kostenloser Versand ab 39 € (callout 1)
- Kostenlose Rückgabe (callout 1)
- PAYBACK: Punkte sammeln & sparen (callout 1)
- Suche (Search) button (callout 4)
- dm-Märkte (callout 6)
- Einloggen (Login) (callout 6)
- Produkte (Products) (callout 6)
- Einkaufsliste (Shopping List) (callout 6)
- Warenkorb (Cart) (callout 6)
- Neu (New) (callout 1)
- dm-Marken (dm Brands) (callout 1)
- Make-up (makeup) (callout 1)
- Pflege & Duft (skin care) (callout 1)
- Haare (hair) (callout 1)
- Gesundheit (health) (callout 1)
- Ernährung (nutrition) (callout 1)
- Baby & Kind (babies & children) (callout 1)
- Haushalt (household) (callout 1)
- Tier (pet) (callout 1)
- Foto (photo) (callout 1)
- Ausverkauf (clearance) (callout 1)

**Product Description:**

Produktbeschreibung (Product description) (callout 1).

# Schauplatz Suche

Domain Suche (Rahmen) 1

Domain Produkt-Suche 2

Domain Content-Suche 3

1

dm SEINZ. dm business alverde glückskind.de

Balea

Arbeiten & Lernen | Unternehmen | Services | Hilfe & FAQs

dm-Märkte Einloggen Produkte Einkaufsliste Warenkorb

Neu dm-Marken Make-up Pflege & Duft Haare Gesundheit Ernährung Baby & Kind Haushalt Tier Foto Ausverkauf

Kostenloser Versand ab 49 € Kostenlose Rückgabe am Markt PAYBACK: Punkte sammeln & sparen

Alle Sortimente

Pflege & Duft (457)

Haare (162)

Baby & Kind (3)

Beliebte Filter Anzahl 24 ▾

Marke von dm 621

Vegan 379

Ohne Silikone 114

Für Männer 85

Neu 51

Medizinische Pflege 20

Sortieren nach Beliebtheit ▾

2

3

Suche nach „Balea“

Produkte (623) Beratung (206)

**Balea FUSS HORNHAUT ENTFERNER SOCKEN Feel Well**  
3,95 €

**Balea FUSSCREME UREA**  
1,25 €

**Balea DUSCHÖL**  
1,85 €

**Balea ERFRISCHENDES WASCH GEL**  
0,95 €

**Balea COLORNIQUE**  
2 St (1,98 € je 1 St)

**Balea MEN**  
100 ml (1,25 € je 100 ml)

**Balea Duschöl 250ml,**  
250 ml (0,74 € je 100 ml)

**Balea erfrischendes Waschgel 150ml**  
150 ml (0,63 € je 100 ml)

**Balea Hornhaut Entferner Socken**  
★★★★★ (196)

**Balea Urea Fußcreme, 100 ml**  
★★★★★ (12)

**Balea Duschöl 250ml, 250 ml**  
★★★★★ (10)

**Balea erfrischendes Waschgel 150ml, 150 ml**  
★★★★★ (31)

# Schauplatz Suche

Domain Suche (Rahmen) 1

Domain Produkt-Suche | 2

Domain Content-Suche 3

**1**

dm HIER BIN ICH MENSCH HIER KAUF ICH EIN dm business alverde glückskind.de

Arbeiten & Lernen | Unternehmen | Services | Hilfe & FAQs

dm-Märkte Einloggen Produkte Einkaufsliste Warenkorb

Neu dm-Marken Make-up Pflege & Duft Haare Gesundheit Ernährung Baby & Kind Haushalt Tier Foto Ausverkauf

Kostenloser Versand ab 49 € Kostenlose Rückgabe PAYBACK: Punkte sammeln & sparen

Beitragstypen

<input type="checkbox"/> Redaktionelles	93
<input type="checkbox"/> Specials	79
<input type="checkbox"/> Downloads	15
<input type="checkbox"/> Produkt-Kategorien	9
<input type="checkbox"/> dm-Marken	2
<input type="checkbox"/> Beratung & Information	1
<input type="checkbox"/> Häufige Fragen	7

Anzahl 24 ▾ Sortieren nach Relevanz ▾

**2**

Suche nach „Balea“

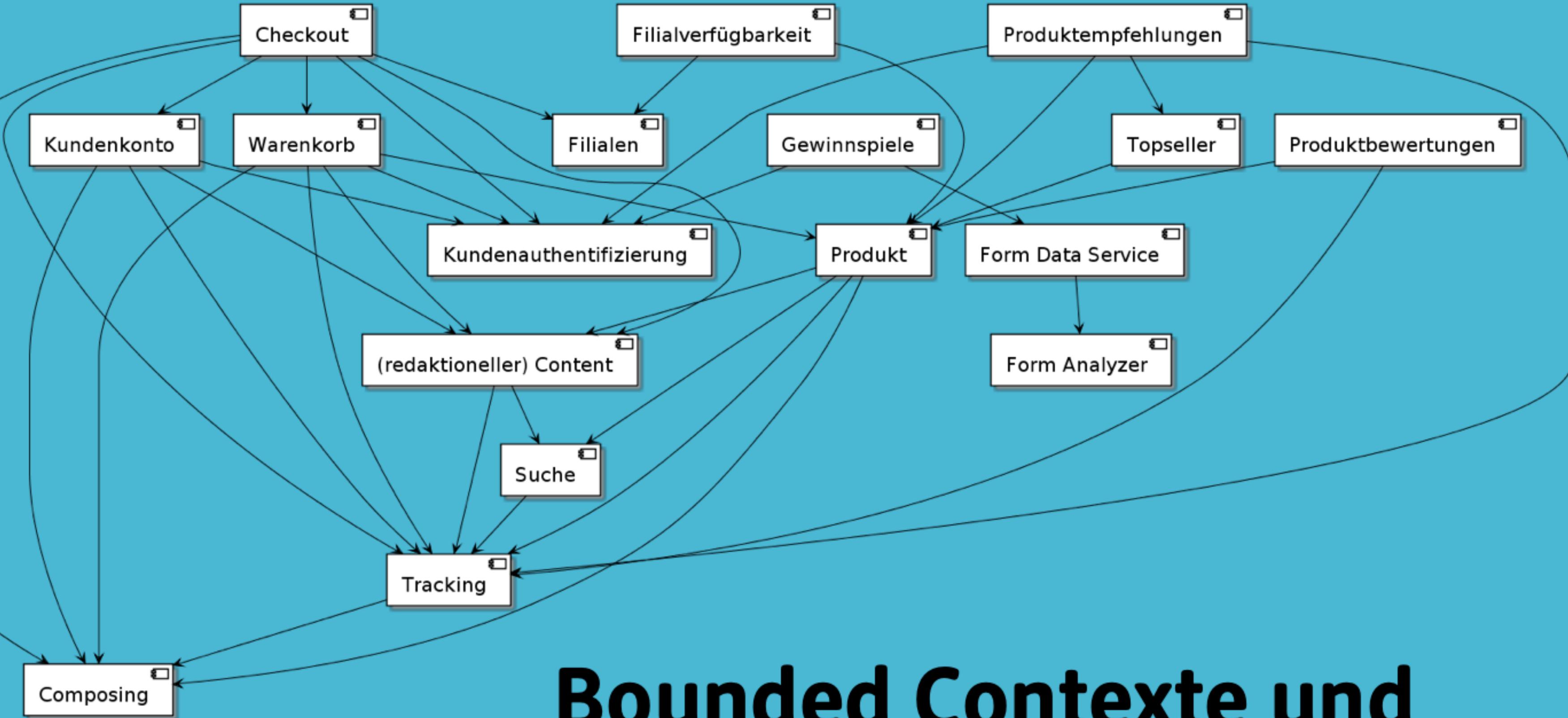
Produkte (623) Beratung (206)

**3**

Balea Deo  
22.12.2017  
Pflege & Duft  
[Seite öffnen](#)

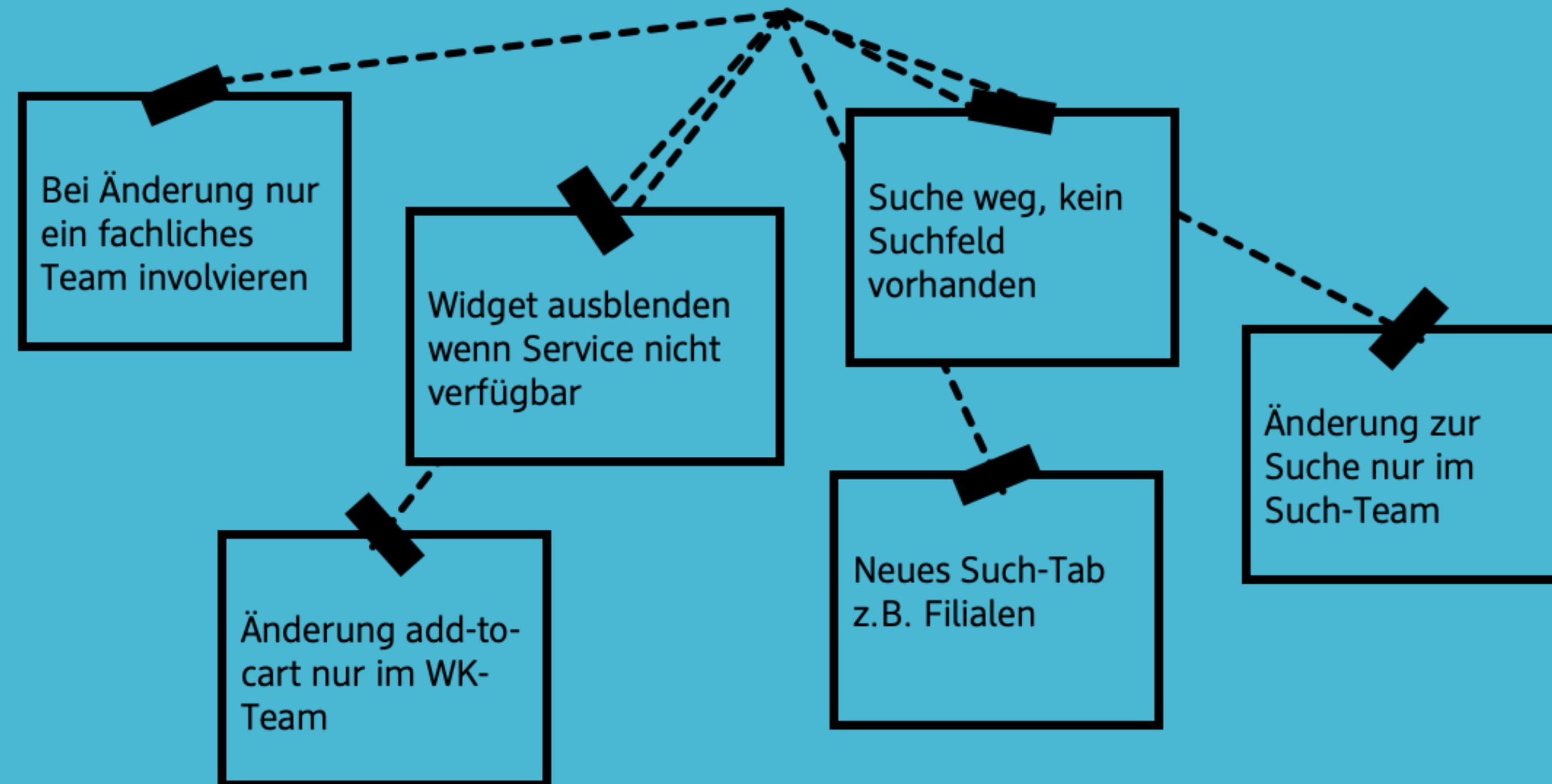
Über Balea  
11.01.2016  
Balea  
[Seite öffnen](#)

Balea Winter  
25.10.2018  
Limited Editions  
[Seite öffnen](#)



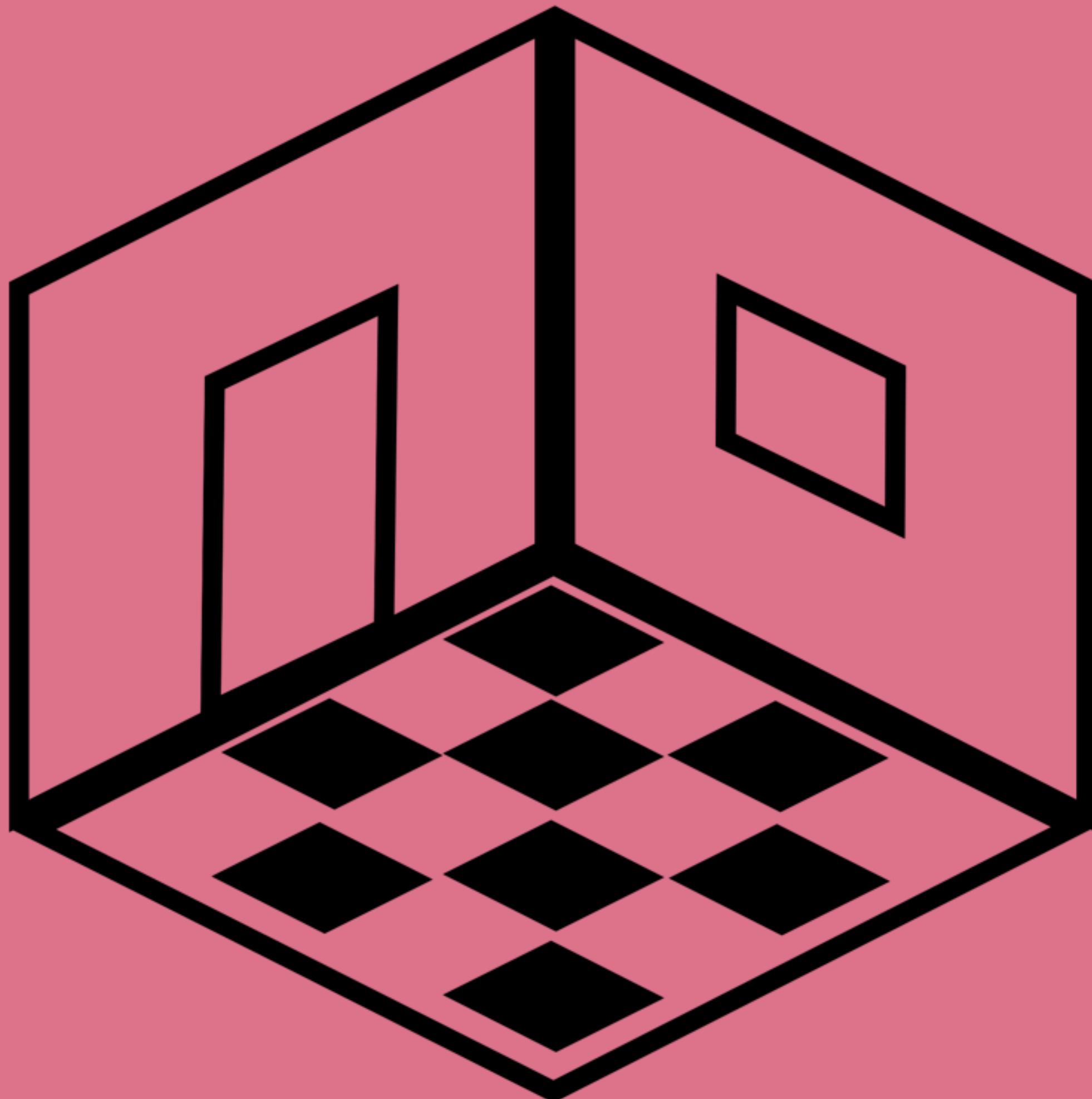
# Bounded Contexte und Abhängigkeiten bei dm.de

# Separations of Concerns



# ? ! DIE LÖSUNG

---



# Lösungs- Rahmen

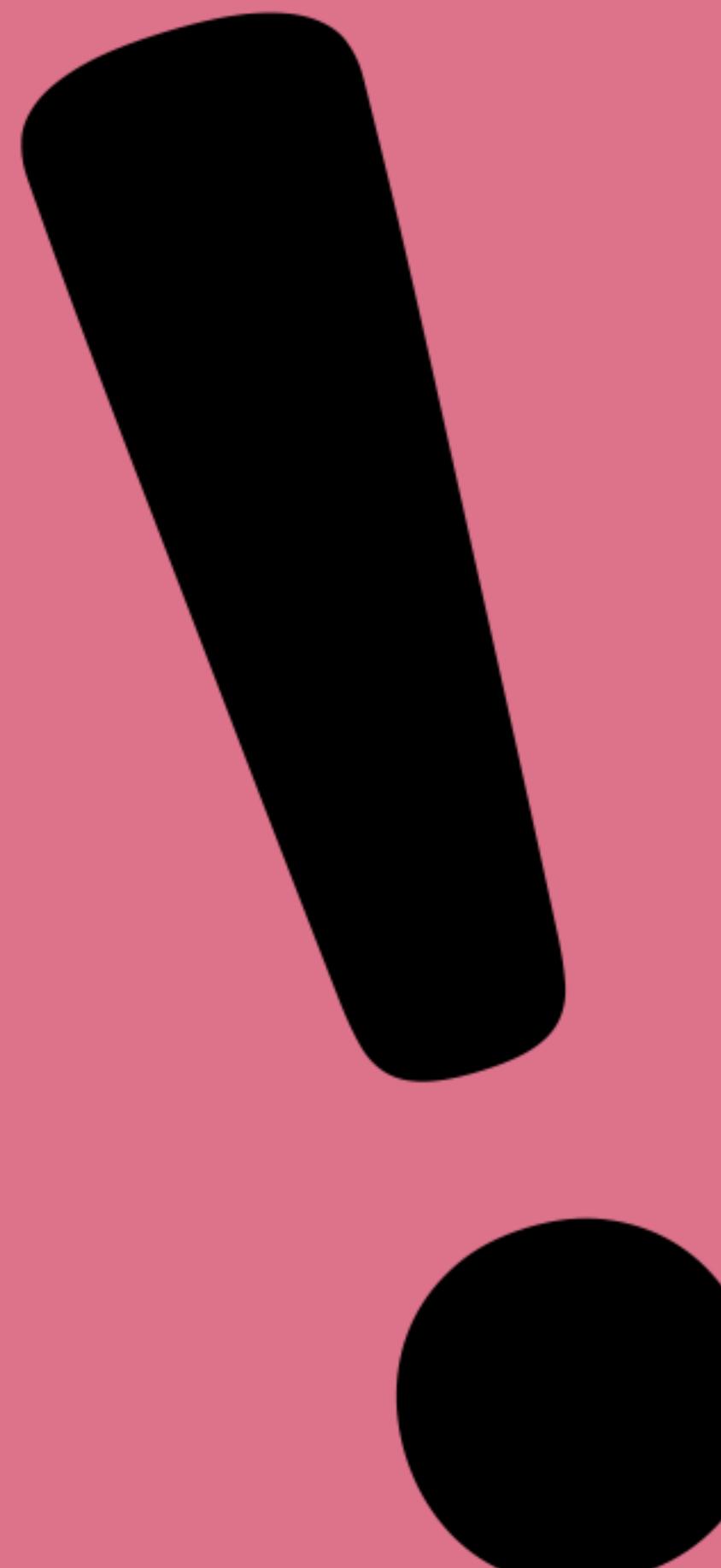
Überwiegend clientseitige  
Integration

- Nur **eine** Technologie -  React
- aus Performance-Gründen nicht x Frameworks in die Seite laden
  - Synergien (Know-How, UX-Komponenten)



**Auf den  
zweiten Blick...**

Bildquelle: <https://www.sehtestbilder.de>

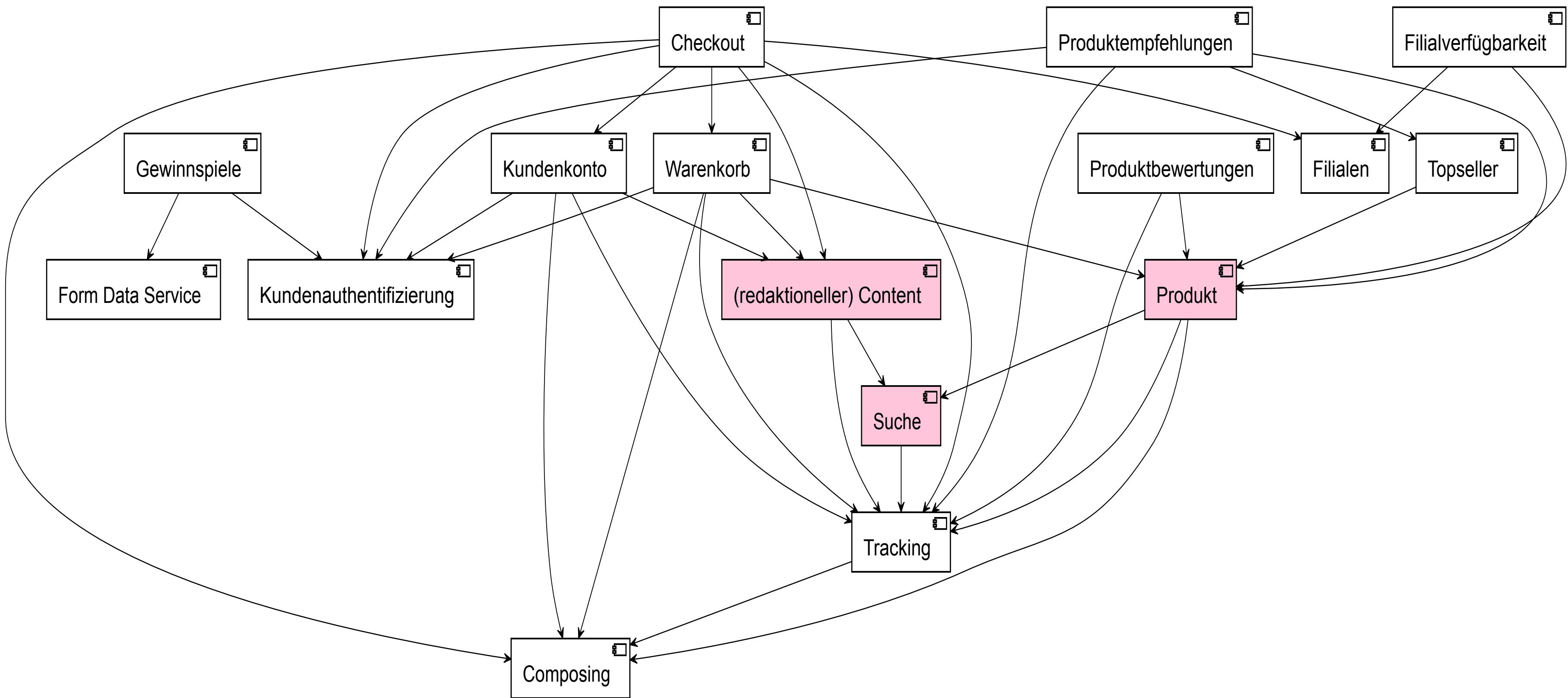


**< DEPENDENCY  
INVERSION />**

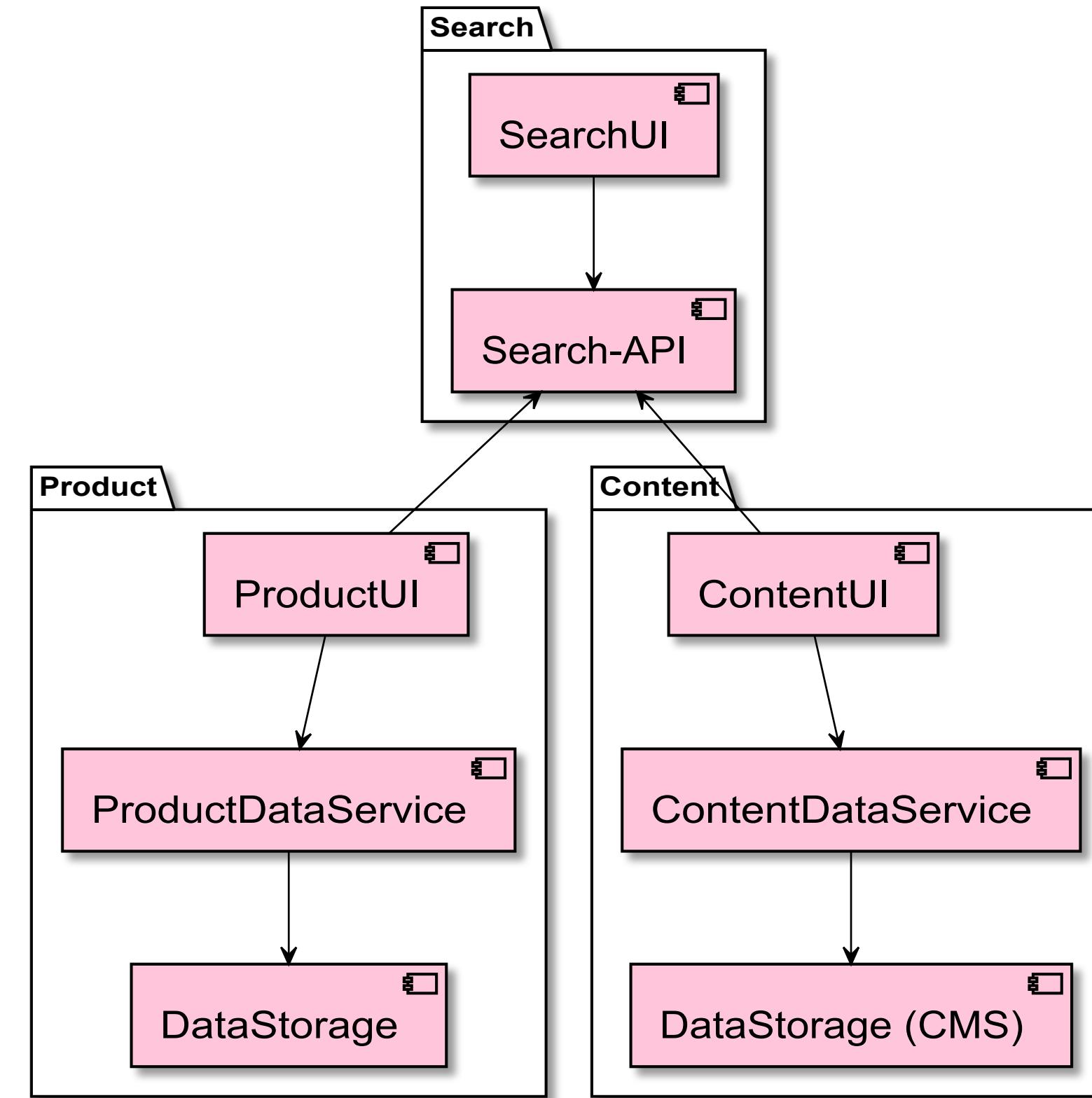
Allgemeine Module  
hängen nicht von  
speziellen Modulen  
ab.

Spezielle Module  
hängen von  
allgemeinen  
Modulen ab.

# Dependency Inversion am Beispiel der Suche auf dm.de



# Dependency Inversion - nur eine Abhängigkeitsrichtung



# Demo Suche

https://www.dm.de/search/468652.html?type=product&q=balea

balea

Kostenloser Versand ab 49 €

Kostenlose Rückgabe auch im dm-Markt

PAYBACK: Punkte sammeln & sparen

## Suche nach „balea“

Produkte (613) Beratung (221)

Sortieren Filtern

MARKE von dm MARKE von dm MARKE von dm MARKE von dm

 Balea FUSS HORNHAUT ENTFERNER SOCKEN Feel Well  
3,95 €

Balea Urea Fußcreme 1,25 €

Balea Fuß Bimsschwamm 0,95 €

Balea Duschöl 250ml 1,85 €

We setzten technisch notwendige Cookies und Webanalyse-Technologien auf Grundlage unserer berechtigten Interessen ein. Wenn Sie uns hier darüber hinaus Ihr Einverständnis geben, nutzen wir bestimmte Marketingcookies, um Ihnen personalisierte Services und Angebote anzubieten. Ausführliche Informationen finden Sie in unserer [Datenschutzerklärung](#).

http://localhost:8080/?query=balea&searchType=product

## Suche nach "balea"

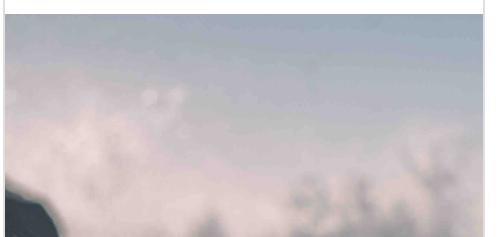
Produkte (6) Beratung (3)

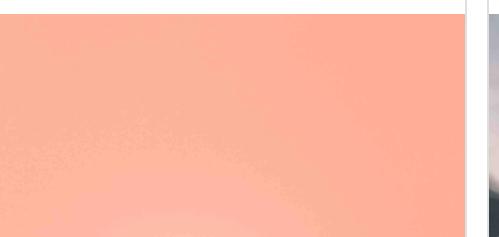
Suche nach "balea": 6 counts

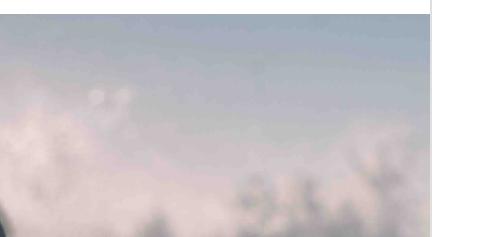
balea product 1 3,95 €  
  
Lorem ipsum dolor sit amet

balea product 2 1,99 €  
  
Lorem ipsum dolor sit amet

balea product 3 8,65 €  
  
Lorem ipsum dolor sit amet

balea product 4 2,95 €  
  
Lorem ipsum dolor sit amet

balea product 5 8,65 €  
  
Lorem ipsum dolor sit amet

balea product 6 2,95 €  
  
Lorem ipsum dolor sit amet

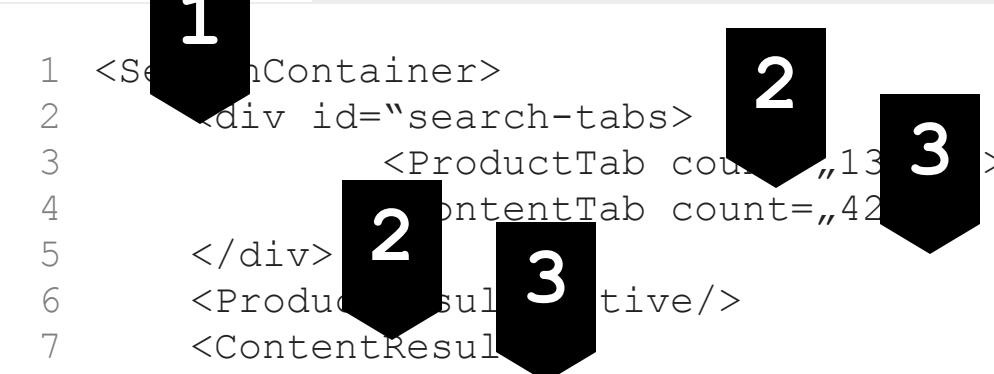
# Composition vs. Dependency Inversion

- 1 Domain Suche
- 2 Domain Produkt
- 3 Domain Content

red yellow green code ~ comparison

composition is x

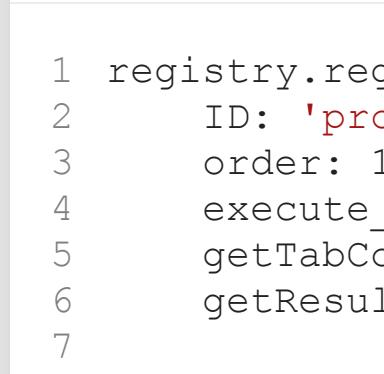
```
1 <SearchContainer>
2   <div id="search-tabs">
3     <ProductTab count="13">
4       <ContentTab count="42" />
5     </div> 2
6   <ProductResult active/>
7   <ContentResult />
8 </SearchContainer>
9
10 // --- everything in one repository ---
```



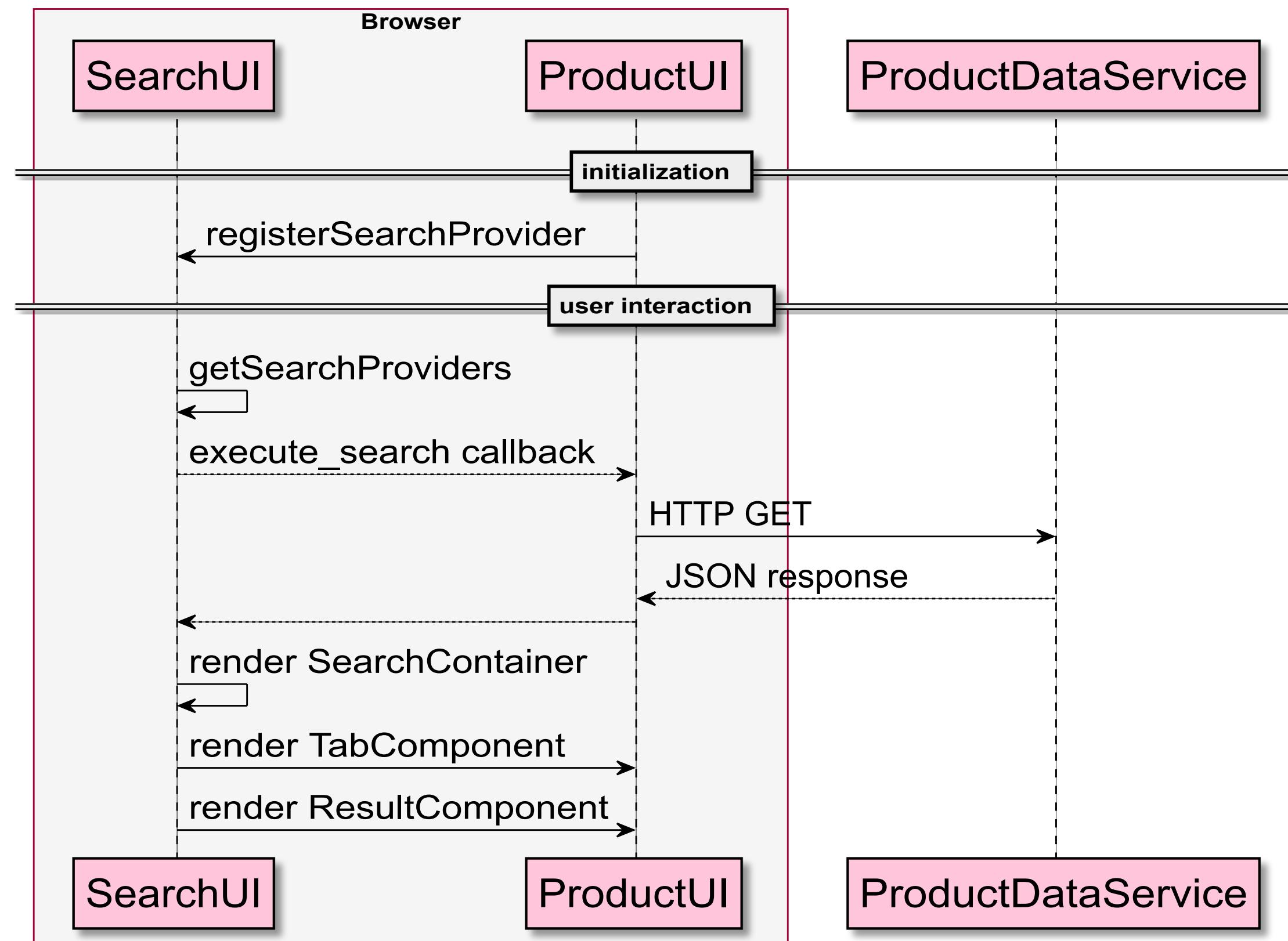
red yellow green code ~ comparison

dependencyInversion.js x

```
1 registry.registerSearchProvider({
2   ID: 'product',
3   order: 1,
4   execute_search: query => executeProductSearch(query),
5   getTabComponent: data => <ProductTab data={data} />,
6   getResultComponent: (query, data) => (
7     <ProductResult query={query} data={data} />
8   ),
9 });
10
11 // ----- ↑ Product ↑ -----
12 // --- loosely coupled micro-frontends ---
13 // ----- ↓ Search ↓ -----
14
15 const searchProviders = registry.getSearchProviders()
16 <SearchContainer>
17   <div id="search-tabs">
18     {searchProviders.map(provider => getTabFor(provider)) }
19   </div>
20   {activeProvider.getResultComponent(query, data)}
21 </SearchContainer>
```



# Suche mit einem Provider für Produktsuche



# Suche mit einem Provider für Produktsuche

31x14

http://localhost:8080/?query=balea&searchType=product

## Suche nach "balea"

Produkte (6) Beratung (3)

Suche nach "balea": 6 counts

balea product 1  
3,95 €



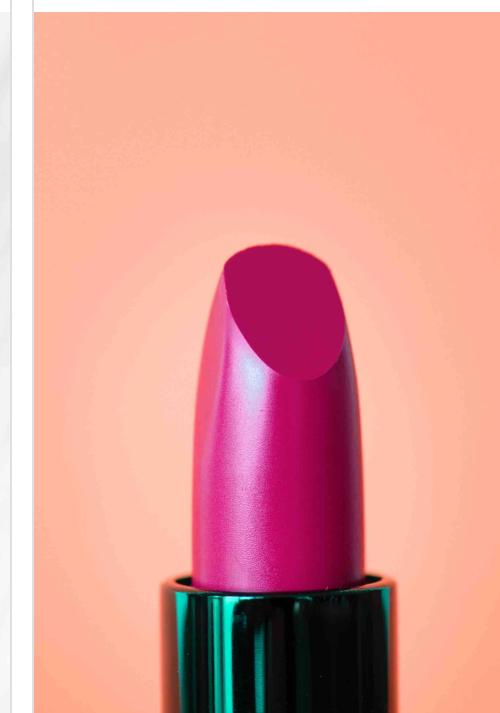
Lorem ipsum dolor sit amet

balea product 2  
1,99 €



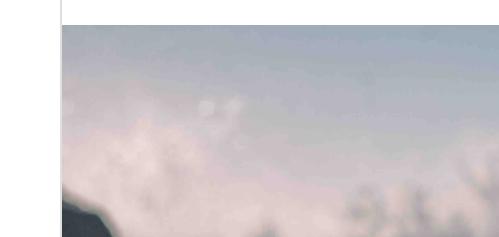
Lorem ipsum dolor sit amet

balea product 3  
8,65 €



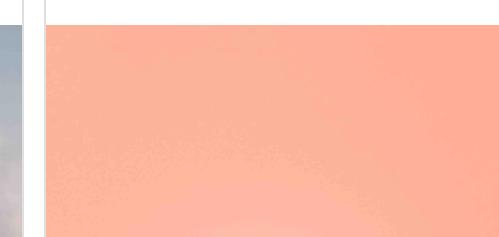
Lorem ipsum dolor sit amet

balea product 4  
2,95 €



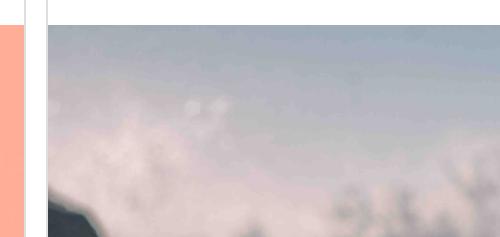
Lorem ipsum dolor sit amet

balea product 5  
8,65 €



Lorem ipsum dolor sit amet

balea product 6  
2,95 €



Lorem ipsum dolor sit amet

# Dependency Inversion - Search-API

code ~ sources

search-api/src/api/registry.js x

```
1 import byOrder from './util/sort';
2 import isEmpty from './util/isEmpty';
3
4 const searchProviders = {};
5
6 export const registerSearchProvider = provider => {
7   searchProviders[provider.ID] = { ...provider };
8 }
9
10 export const getSearchProviders = () => {
11   if (isEmpty(searchProviders)) {
12     throw new Error('No SearchProvider registered!');
13   }
14   return Object.keys(searchProviders)
15     .map(key => searchProviders[key])
16     .sort(byOrder);
17 }
18
19 export const removeSearchProvider = ID => {
20   delete searchProviders[ID];
21 }
```

# Dependency Inversion - Produkt

code ~ sources

product/client/src/ProductSearchInitializer.jsx x

```
1 import React from 'react';
2 import { registerSearchProvider, removeSearchProvider } from 'search-api';
3 import { executeProductCount, executeProductSearch } from './search';
4 import ProductSearchTab from './ProductSearchTab';
5 import ProductSearchResult from './ProductSearchResult';
6
7 export const SEARCH_PROVIDER_ID = 'product';
8 const ORDER = 1;
9
10 export const initialize = () => {
11   registerSearchProvider({
12     ID: SEARCH_PROVIDER_ID,
13     order: ORDER,
14     execute_search: queryData => executeProductSearch(queryData),
15     execute_count: queryData => executeProductCount(queryData),
16     getTabComponent: data => <ProductSearchTab data={data} />,
17     getResultComponent: (queryData, data, fetchData) => (
18       <ProductSearchResult queryData={queryData} data={data} fetchData={fetchData} />
19     ),
20   });
21 };
22
23 // as soon we have health checks, we can remove search provider in case of errors
24 // search provider will disappear in search tabs
25 export const shutdown = () => {
26   removeSearchProvider(SEARCH_PROVIDER_ID);
27 };
```

# Dependency Inversion - Suche

```
1 import React, { useEffect } from 'react';
2 import qs from 'qs';
3 import { getSearchProviders } from 'search-api';
4 import SearchResultHeader from './SearchResultHeader';
5 import SearchResultBody from './SearchResultBody';
6 import { doLoadCount, doLoadData } from './state/actions';
7 import isEmpty from '../util/isEmpty';
8 import { SearchInput } from './SearchInput';
9 import Container from 'react-bootstrap/Container';
10 import Row from 'react-bootstrap/Row';
11 import Col from 'react-bootstrap/Col';
12 import Navbar from 'react-bootstrap/Navbar';
13 import SearchFallback from './SearchFallback';
14 import search from './state/reducers';
15 import useThunkReducer from '../util/useThunkReducer';
16
17 const readQueryDataFromUrl = () => {
18   const queryString = window.location.search;
19   return queryString ? qs.parse(queryString.substring(1, queryString.length)) : null;
20 };
21
22 const handlePushHistory = queryData => {
23   const queryString = `?${qs.stringify(queryData, {
24     encode: false,
25     indices: false,
26   })}`;
27
28   window.history.pushState({ ...queryData }, null, queryString);
29 };
30
31 const getActiveSearchProvider = searchType => {
32   const searchProviders = getSearchProviders();
33
34   const activeSearchProviderFromSearchType = searchProviders.filter(
35     searchProvider => searchType && searchProvider.ID === searchType.toLowerCase()
```

http://localhost:8080

# Dependency Inversion - Suche

code ~ sources

search/client/src/components/SearchContainer.jsx x search/client/src/components/SearchResultHeader.jsx search/client/src/components/Se...

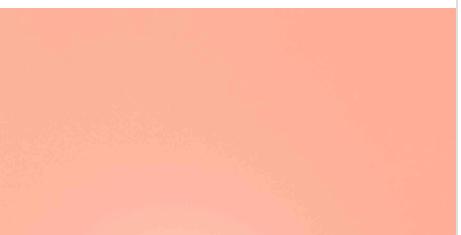
```
1 import React, { useEffect } from 'react';
2 import qs from 'qs';
3 import { getSearchProviders } from 'search-api';
4 import SearchResultHeader from './SearchResultHeader';
5 import SearchResultBody from './SearchResultBody';
6 import { doLoadCount, doLoadData } from './state/actions';
7 import isEmpty from '../util/isEmpty';
8 import { SearchInput } from './SearchInput';
9 import Container from 'react-bootstrap/Container';
10 import Row from 'react-bootstrap/Row';
11 import Col from 'react-bootstrap/Col';
12 import Navbar from 'react-bootstrap/Navbar';
13 import SearchFallback from './SearchFallback';
14 import search from './state/reducers';
15 import useThunkReducer from '../util/useThunkReducer';
16
17 const readQueryDataFromUrl = () => {
18   const queryString = window.location.search;
19   return queryString ? qs.parse(queryString.substring(1, queryString.length)) : null;
20 };
21
22 const handlePushHistory = queryData => {
23   const queryString = `?${qs.stringify(queryData, {
24     encode: false,
25     indices: false,
26   })}`;
27
28   window.history.pushState({ ...queryData }, null, queryString);
29 };
30
31 const getActiveSearchProvider = searchType => {
32   const searchProviders = getSearchProviders();
33
34   const activeSearchProviderFromSearchType = searchProviders.filter(
35     searchProvider => searchType && searchProvider.ID === searchType.toLowerCase()
```

http://localhost:8080/?query=balea&searchType=product

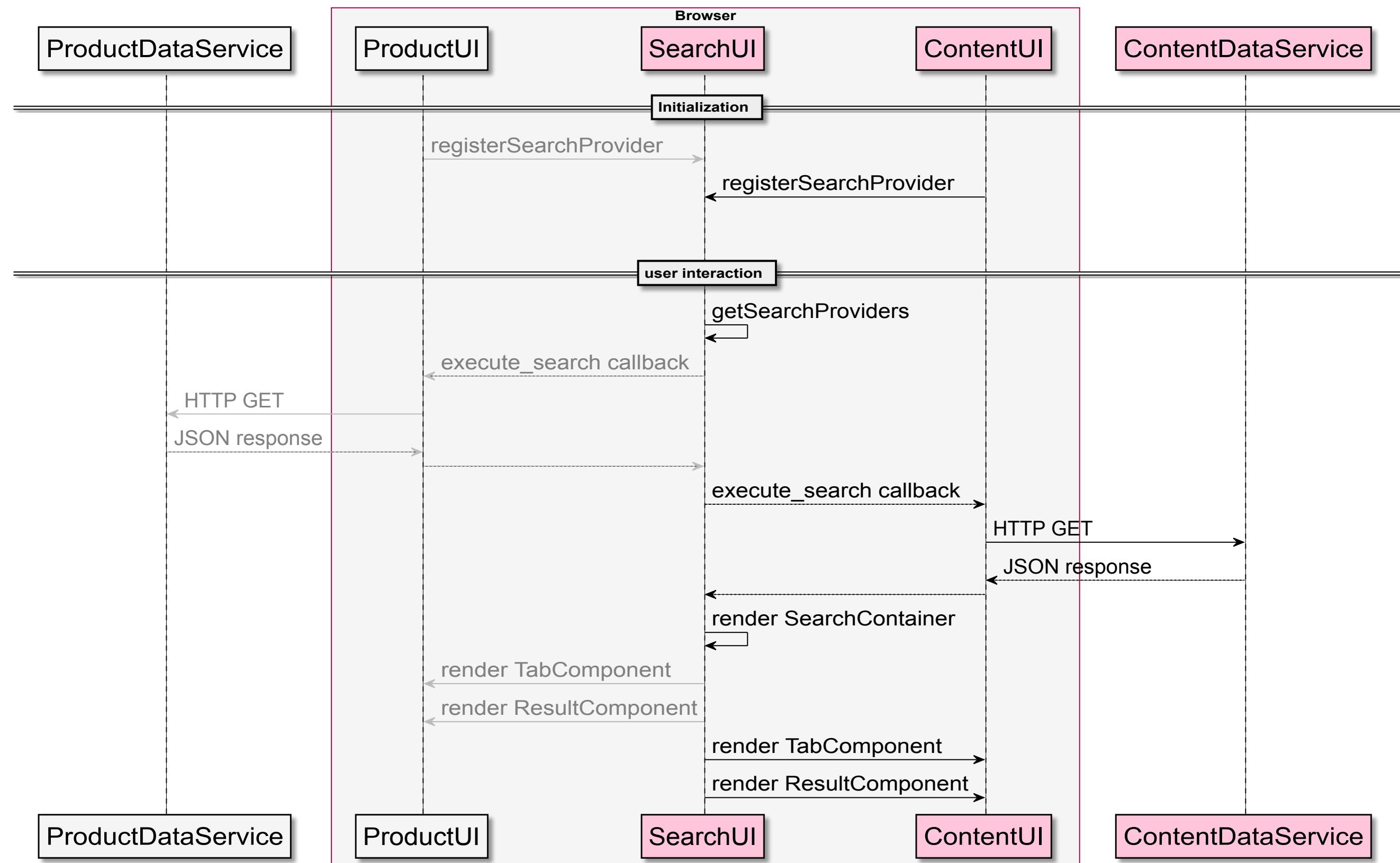
## Suche nach "balea"

Produkte (6) Beratung (3)

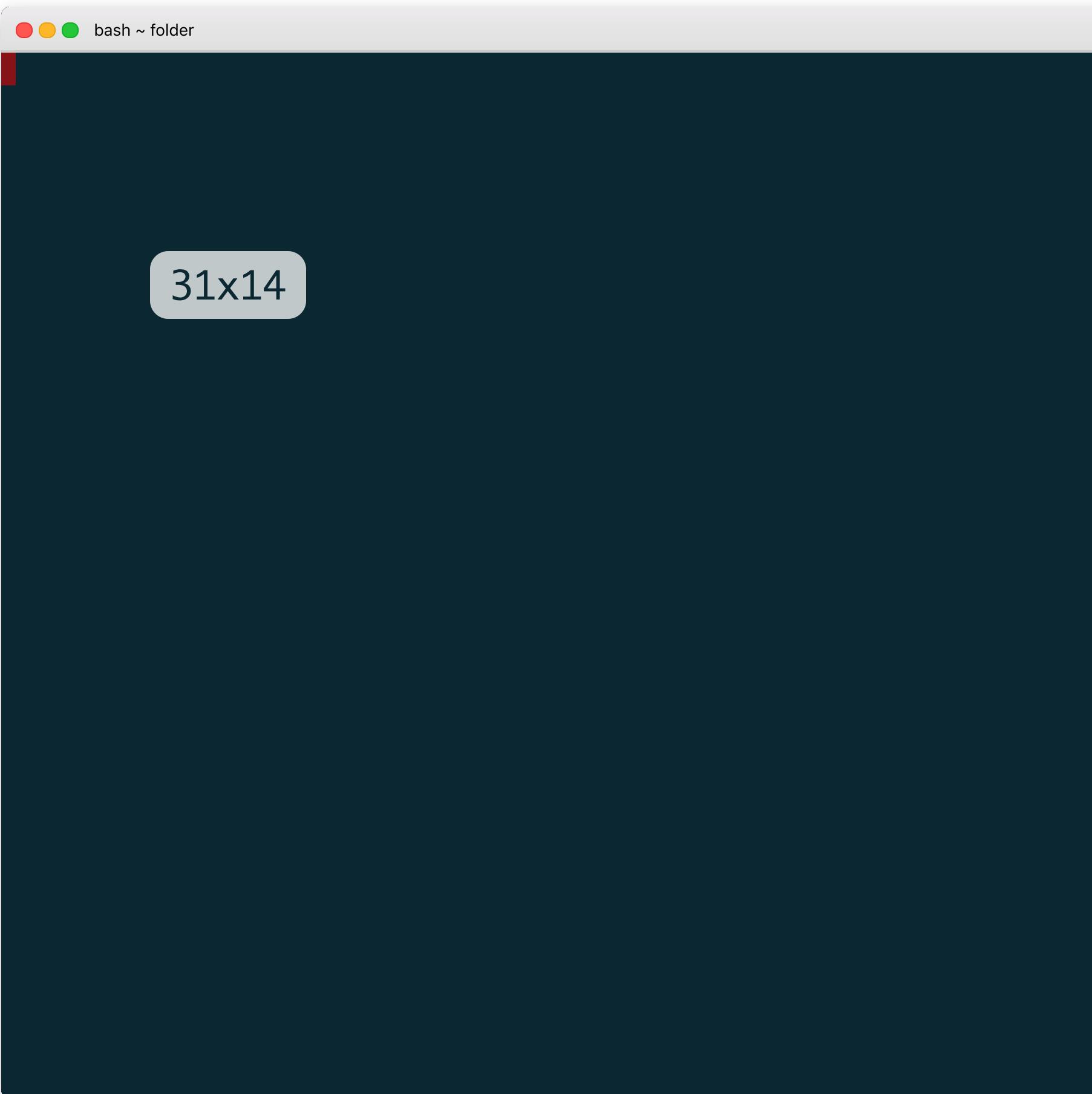
Suche nach "balea": 6 counts

<b>balea product 1</b> 3,95 €  Lorem ipsum dolor sit amet	<b>balea product 2</b> 1,99 €  Lorem ipsum dolor sit amet	<b>balea product 3</b> 8,65 €  Lorem ipsum dolor sit amet
<b>balea product 4</b> 2,95 € 	<b>balea product 5</b> 8,65 € 	<b>balea product 6</b> 2,95 € 

## ... und jetzt noch mit Provider für Contentsuche



.. und jetzt noch mit Provider für Contentsuche

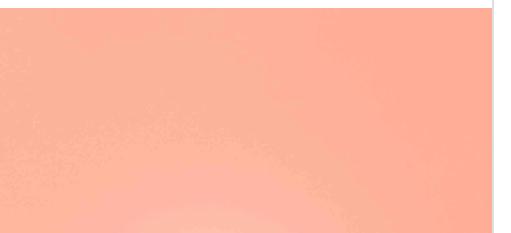


http://localhost:8080/?query=balea&searchType=product

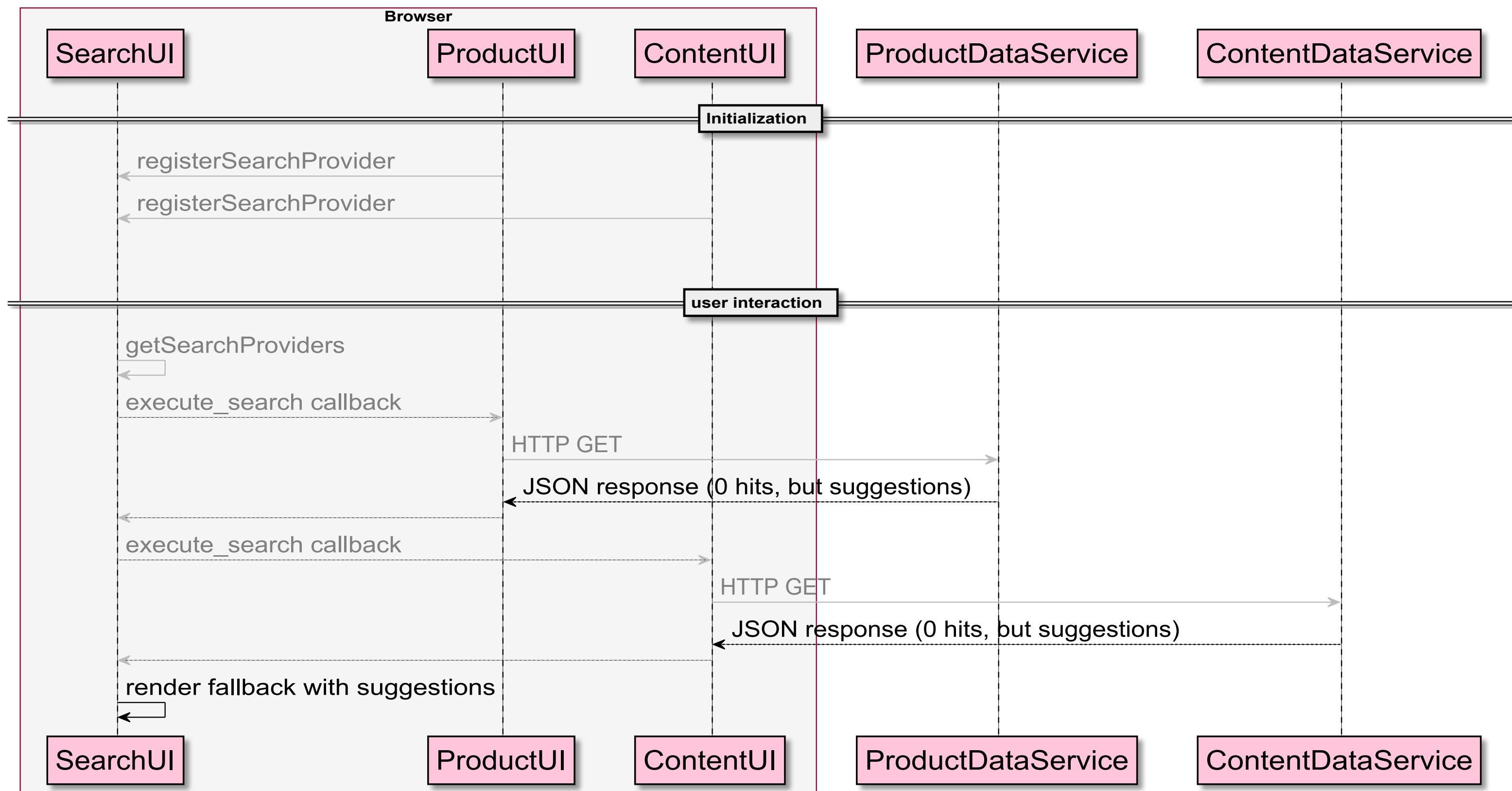
## Suche nach "balea"

Produkte (6) Beratung (3)

Suche nach "balea": 6 counts

<b>balea product 1</b> 3,95 €  Lorem ipsum dolor sit amet	<b>balea product 2</b> 1,99 €  Lorem ipsum dolor sit amet	<b>balea product 3</b> 8,65 €  Lorem ipsum dolor sit amet
<b>balea product 4</b> 2,95 € 	<b>balea product 5</b> 8,65 € 	<b>balea product 6</b> 2,95 € 

## ... 0-Treffer -> Fallback und Suchvorschläge



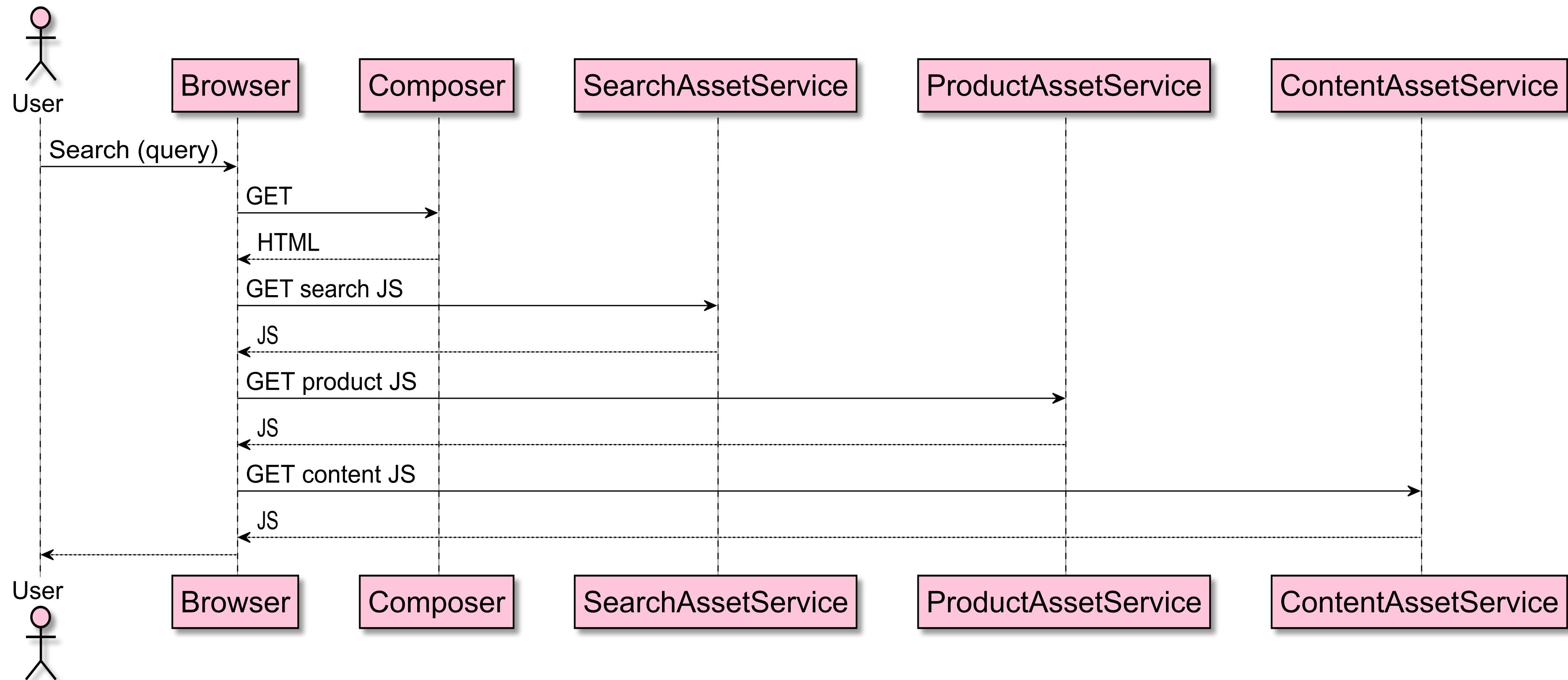
# Github Repo

---

<https://github.com/denise-schaefer/micro-frontends>

```
.
├── composer
│   └── server
├── content
│   ├── client
│   └── server
├── product
│   ├── client
│   └── server
├── search
│   ├── client
│   └── server
└── search-api
    ├── lib
    └── src
```

## HTML und JS laden





## **Composition**

Kein unabhängiges Deployment

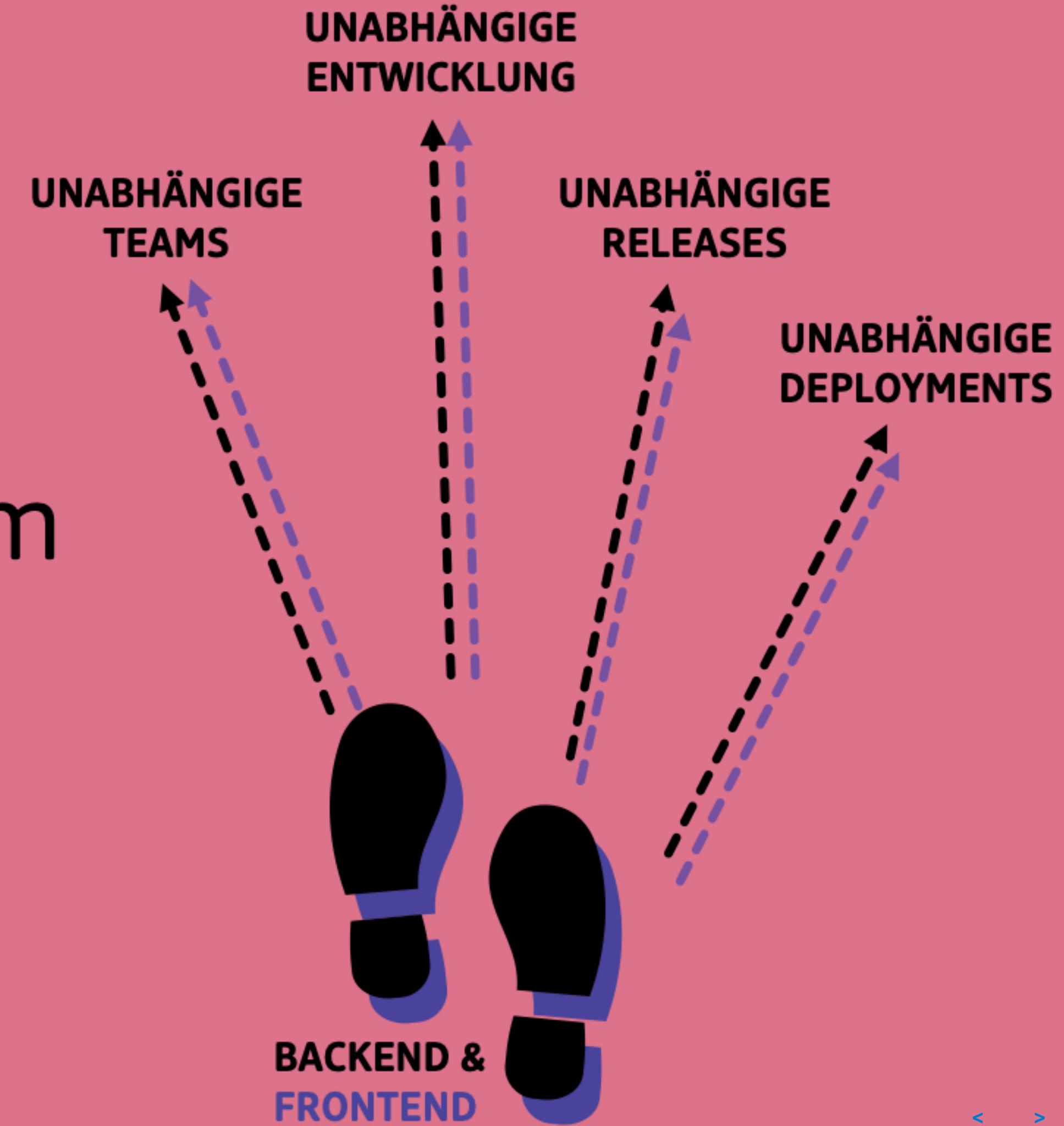


## **Dependency Inversion**

Unabhängiges Deployment

Runtime Composition

# Unabhängigkeit im Back- & Frontend





# Lessons Learned

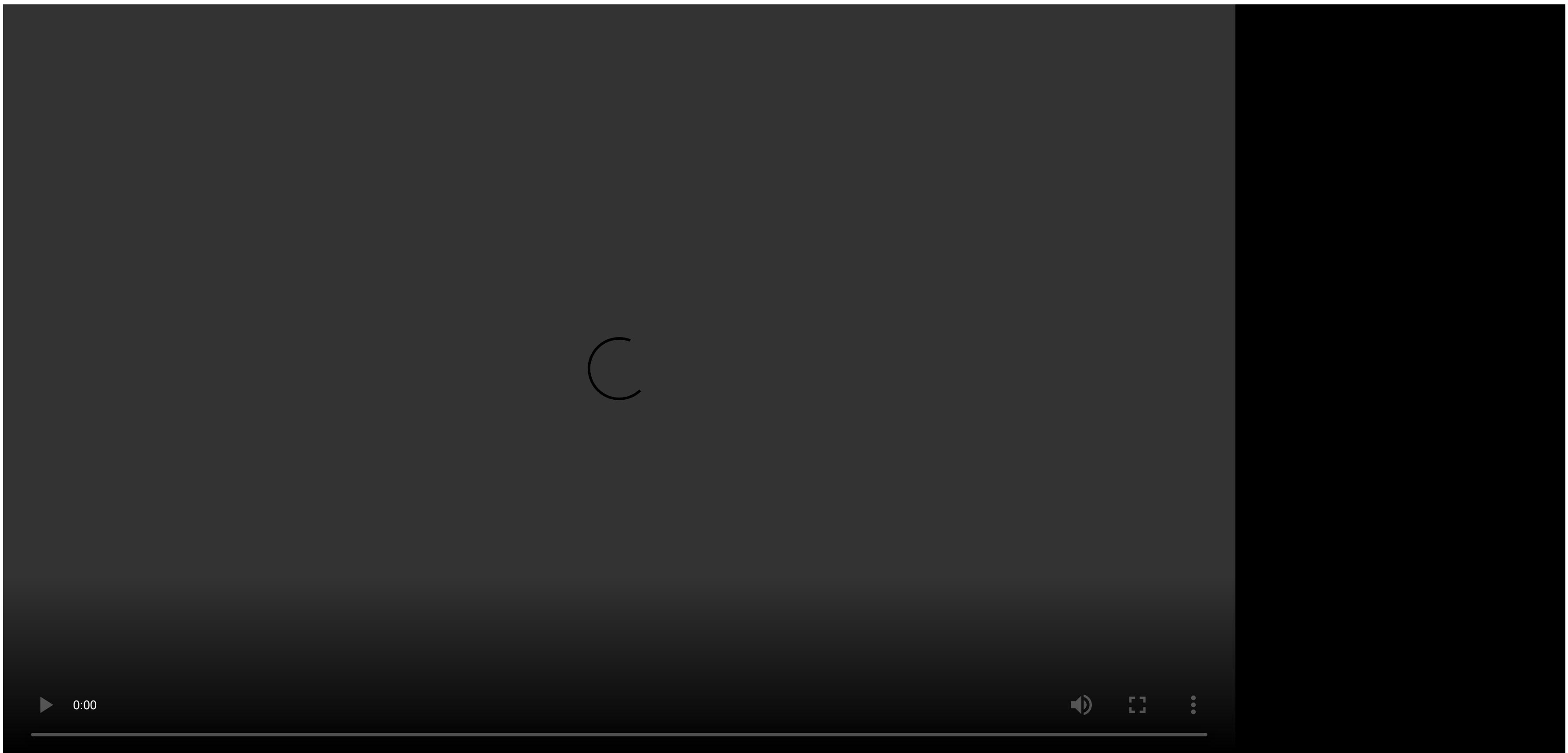
Vorteil umso größer, **je größer** das Projekt

Schnittstelle **technologiefrei** halten, z.B. kein Redux

**Umdenken** im Programmierparadigma fällt oft schwer

# Einfache Skalierung, auch für weitere Apps - SEINZ.

---



# Wie geht's weiter?

**Ablösung CMS** als Composer

**SSR** für ersten Seitenaufruf

**Frontend-seitiges Routing** für alle  
Uls von dm.de

DANKE!



[dmtech.de](http://dmtech.de)



[synyx.de](http://synyx.de)

