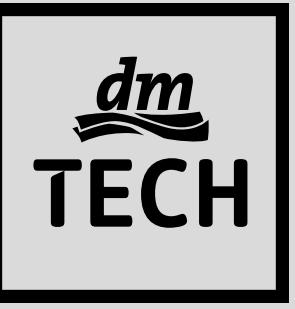
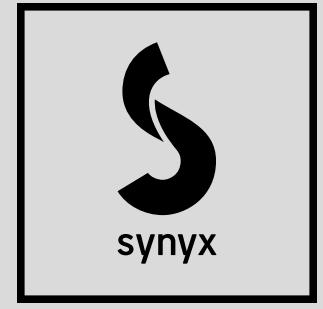


MICRO-FRONTENDS IN REACT



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

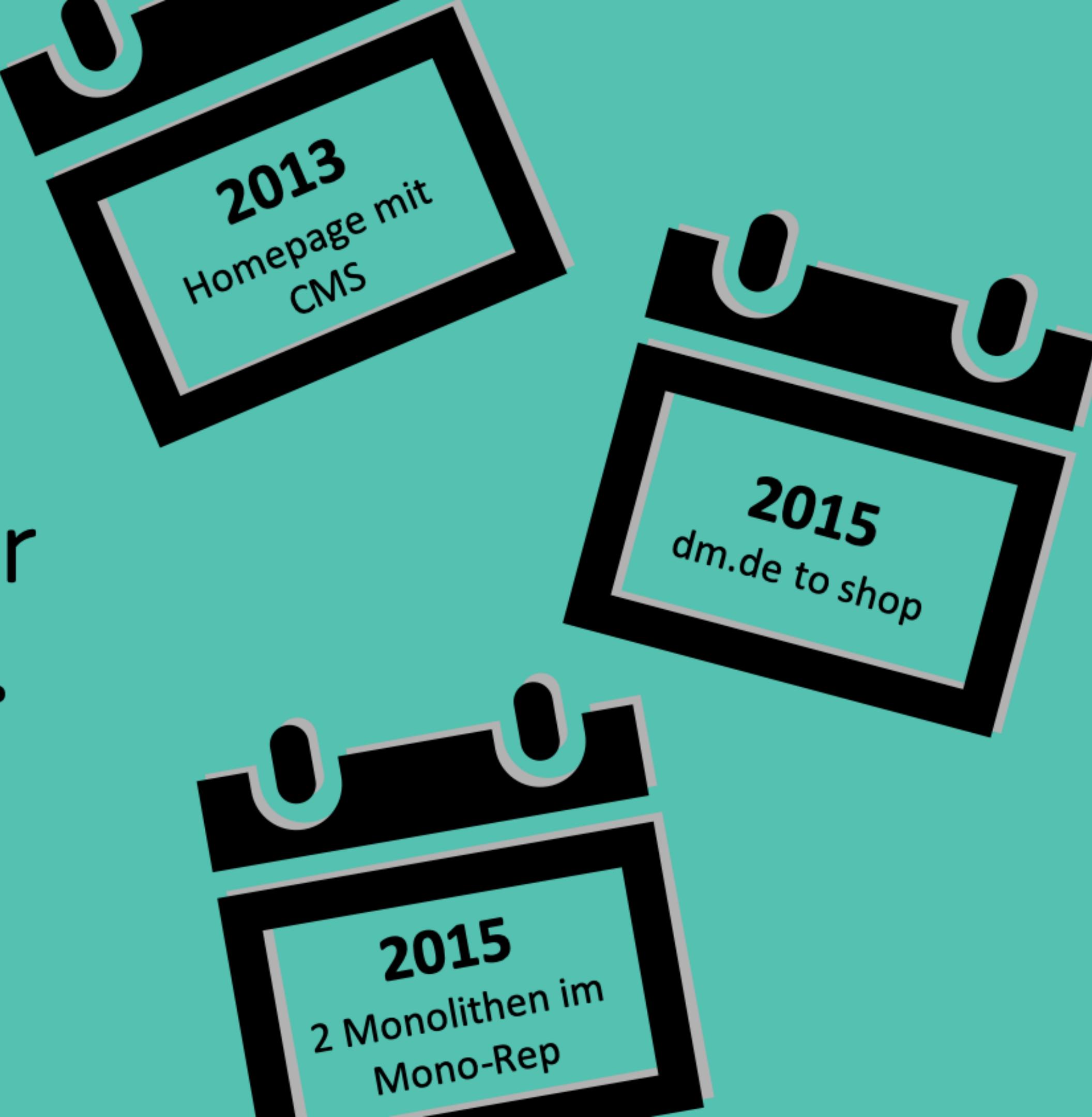


Benjamin Seber
[\(@_seebaer\)](https://twitter.com/_seebaer)



RÜCKBLENDE

Was bisher geschah...



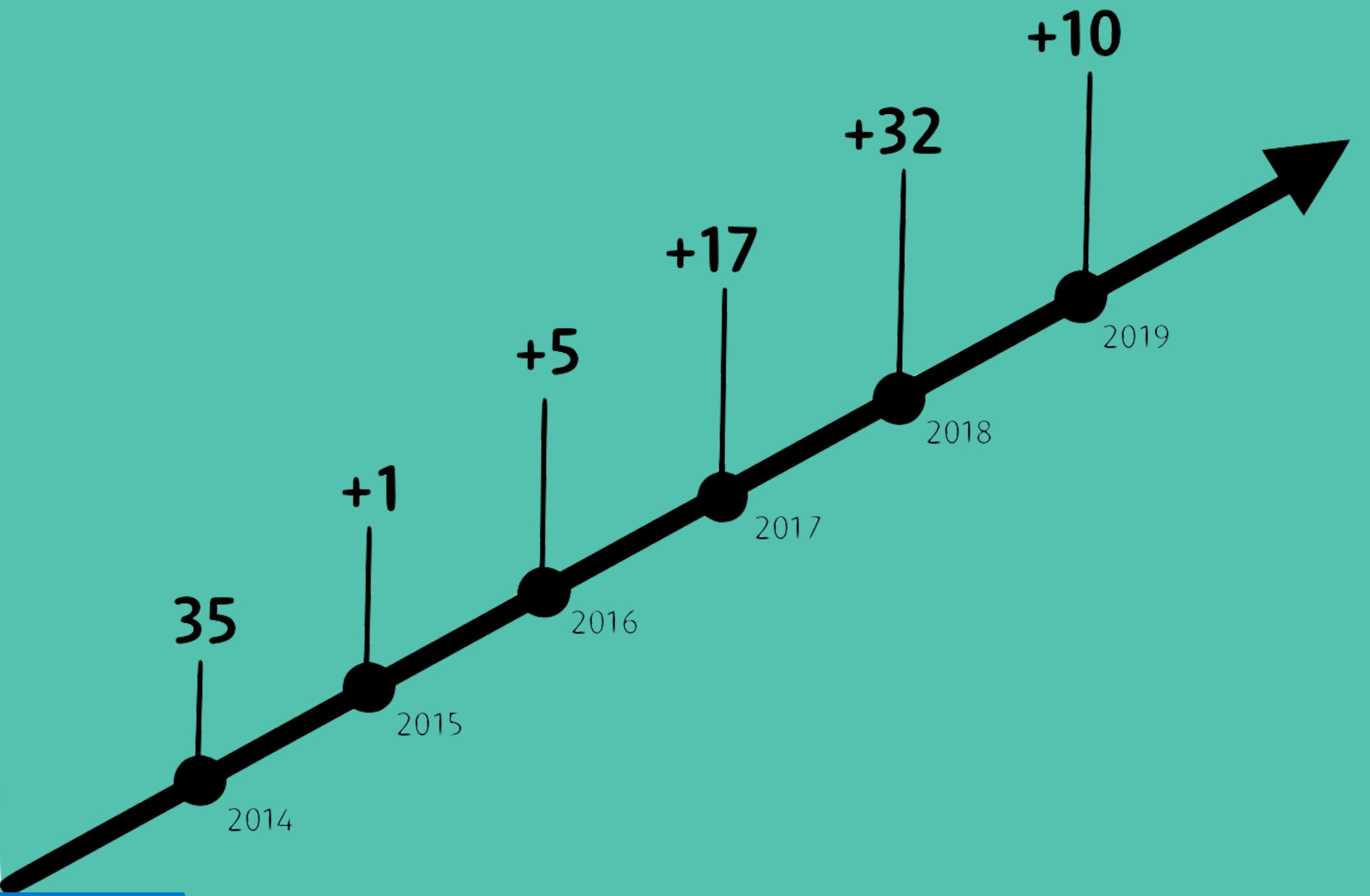
CoreMedia Git Historie

- 2013



A circular diagram with a black center and a teal outer ring, resembling a stylized eye or a gear. The text is contained within the black central area.

```
13 - 14:23 c098905fdb1c17fd8dce99
 05-13 - 06:37 7f1bddbe57f5282a9239a0baa
 13-05-13 - 06:36 0e0275dd95646c9fc1321bf9364
 2013-05-10 - 14:38 8964f525b9726a68428e596e55b011
 2013-05-10 - 14:24 074c37b8d5d5abfb364d92725a344f87
 May 2013-05-10 - 12:40 f66bc1c54c46d84f6665cd276cd8e2fb92
 1 May 2013-05-09 - 13:34 01a817ecf6f88d3c59aab69ac22f0a7a3f4
 2d May 2013-05-08 - 16:57 8d35cd896fba908835a8b5012d11966973e3
 2d May 2013-05-08 - 09:34 2778dccadd8b015c17fd27b476fa5ea037164
 Wed May 2013-05-08 - 08:26 44d132c640830dbdb0d4d94649ff0156f94106
 Tue May 2013-05-07 - 18:37 82ac7fc59309fccffd87379f0e2cdbacbb7d021
 * Mon May 2013-05-06 - 16:37 3b2dfa8f7c99c6b439f2b87fcaa11c885e518a
 * Mon May 2013-05-06 - 16:08 e3156eb80840c8577e759ab21f55455701918e9
 * Fri May 2013-05-03 - 17:19 e8a3eea664464e0fc09ebdb604d9e9d413dbb2cc
 * Fri May 2013-05-03 - 17:16 b3d7d0c38d4ded5c56ba983ea38c07094f032023
 * Fri May 2013-05-03 - 14:52 b8457c803b0e8430ab4838945867b16dd063bd01
 * Thu May 2013-05-02 - 17:53 4c190f4cae9346a634e6b61e118147f2d91176f
 * Thu May 2013-05-02 - 17:42 027f4f4a213b7b0e3b83dca239d5c637108b5ac
 * Thu May 2013-05-02 - 14:27 d0241edc44460795ef7b1d66751f3441503a6f8
 Mon Apr 2013-04-29 - 16:19 3215bc364646d79f36def6342a3eee3a6c0d521
 Mon Apr 2013-04-29 - 16:18 e58c0d746dd86130d1767fe14fc5a36ae9f44
 Mon Apr 2013-04-29 - 15:53 8d6bfe2415c32d9c338bad543535af6861221
 Mon Apr 2013-04-29 - 15:00 23079093b029198af87944df37d38ee7c7ec
 Apr 2013-04-29 - 14:57 dacaa810a76a1f237292a0443c0bb4e3dd5
 Apr 2013-04-29 - 13:05 56f83a9a9bddae49c33341bae038f239e
 Apr 2013-04-29 - 10:05 b55583fa3f00f98f3599f30745753b85
 2013-04-29 - 08:31 c18407604b50b262a3ac7f870ad2ff
 13-04-29 - 08:08 3985d98ecc7d781855674179008
 04-26 - 13:11 22c45649d19b2321fe21c47f1
 26 - 12:11 596d672a1d79392a36cb92
 26 - 11:16 b5aba1b2276b16bc
```



Anstieg der
Contributor

CoreMedia Git Historie

- 2016

Wir brauchen mehr Features!



Was war denn
Anfang 2016?

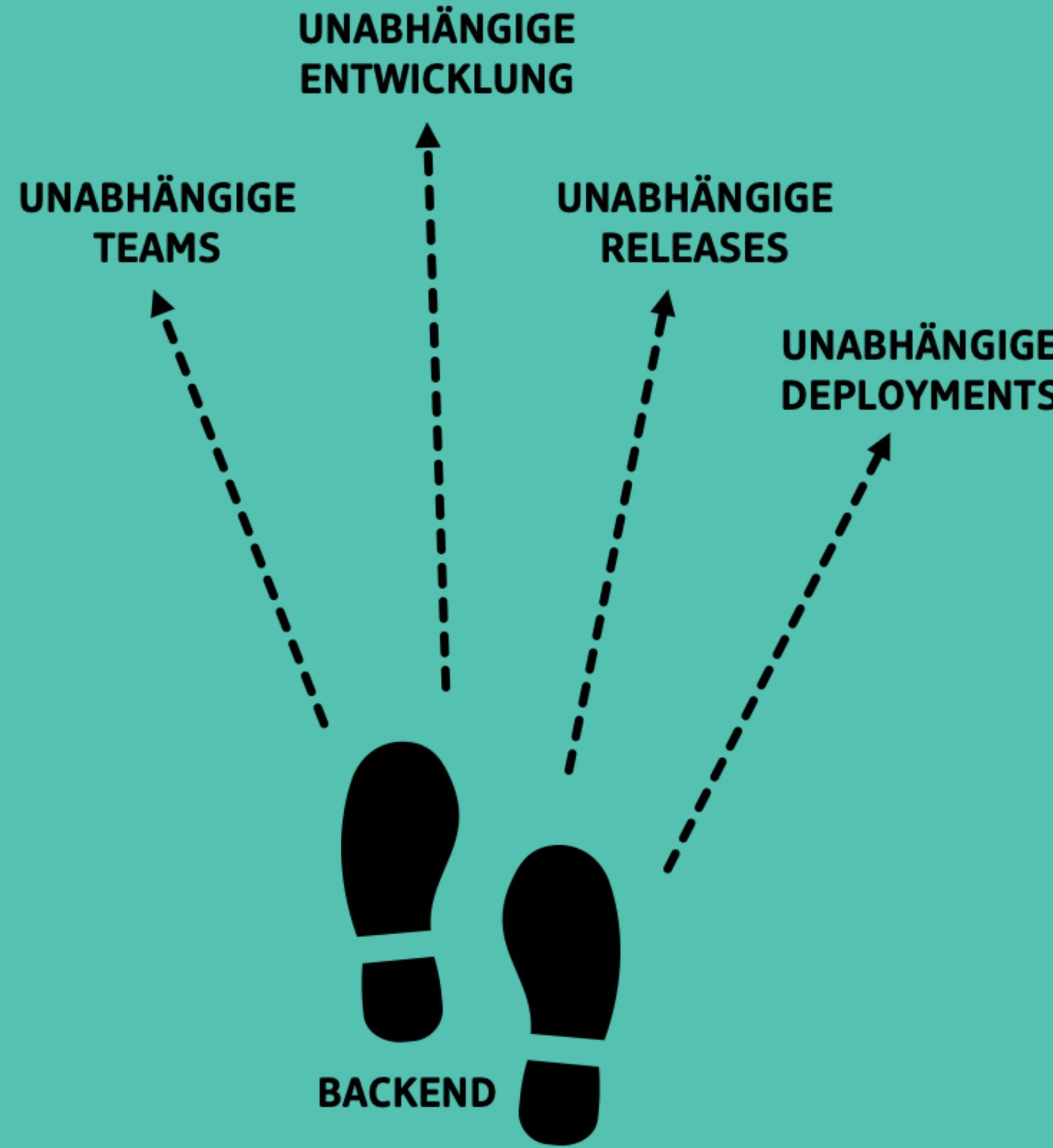
Einiges! Wo soll
ich anfangen?
Aaalso...



Micro-Services im Backend



Unabhängigkeit nur im Backend



Skalierung im Backend

BACKEND



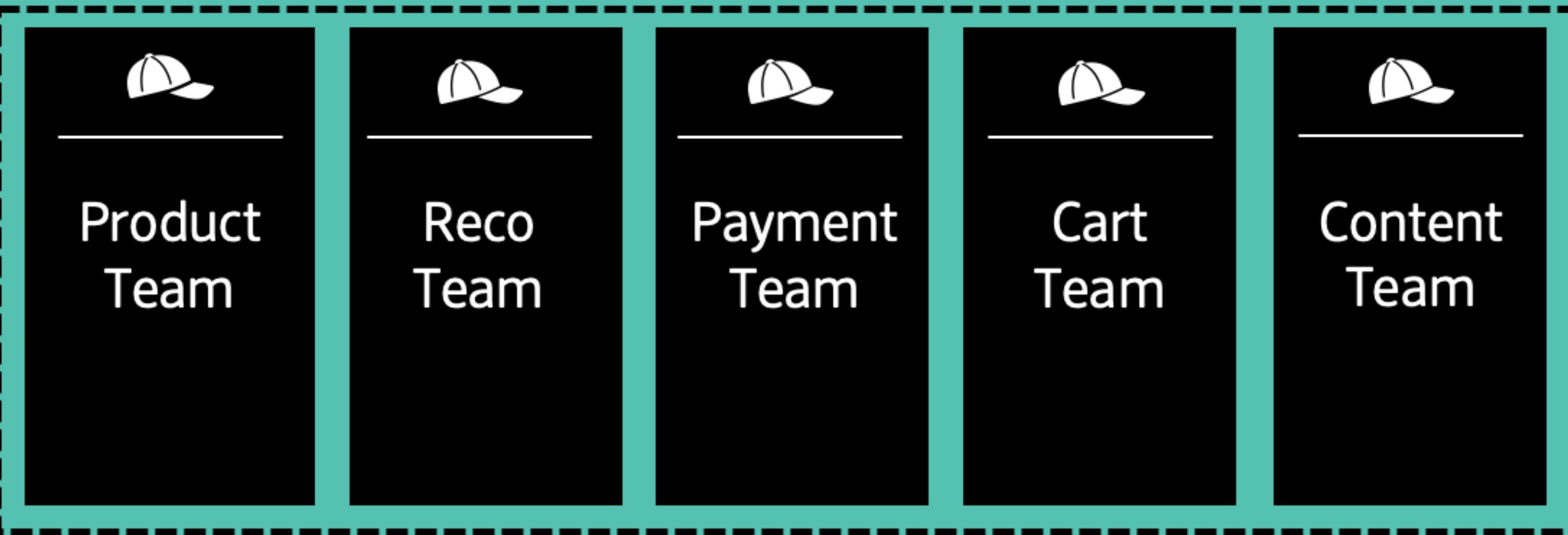
FRONTEND



Frontend-Team



Backend-Teams



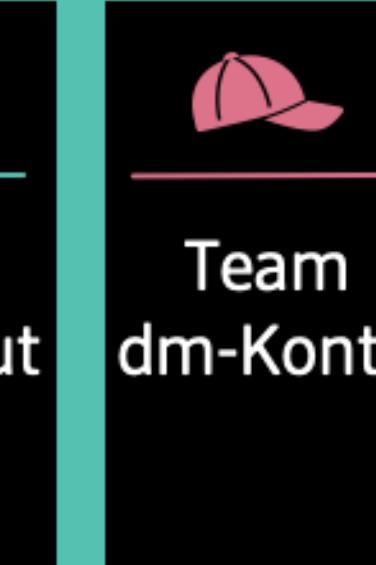
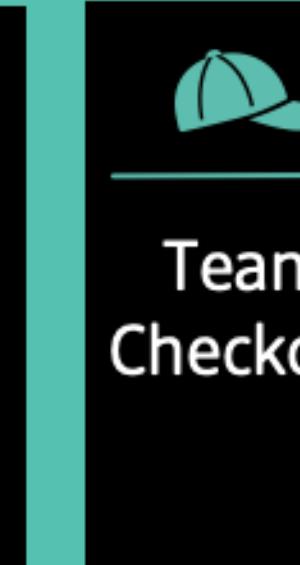
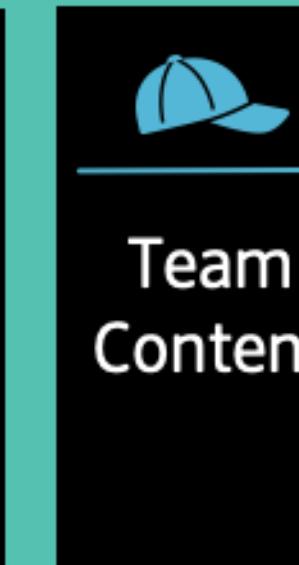
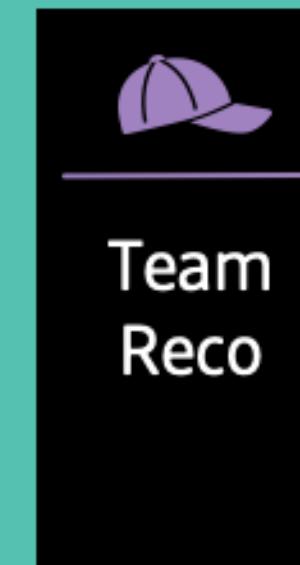
Auswirkung für den Product Owner





WANTED

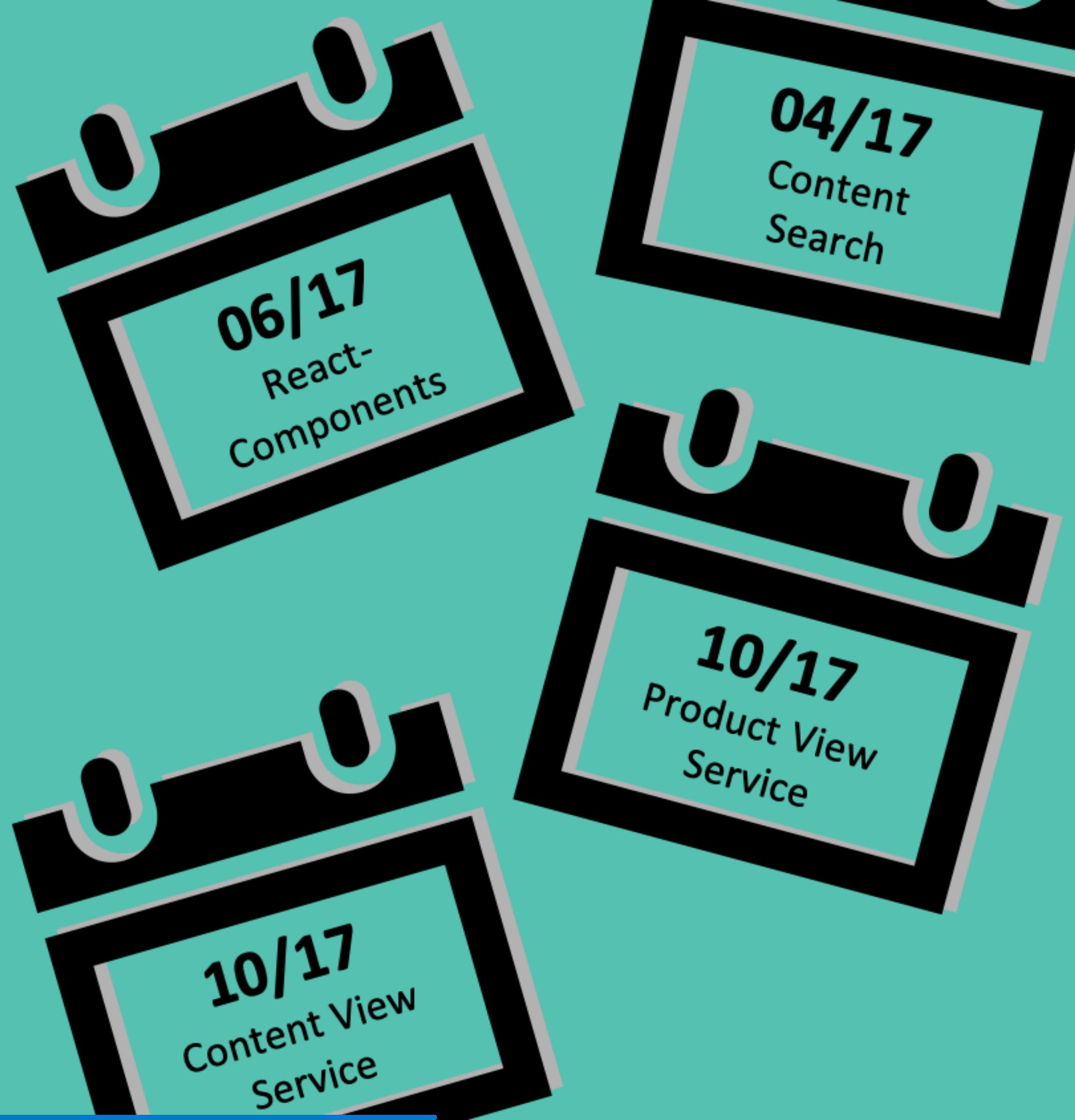
CROSS-FUNKTIONALE TEAMS

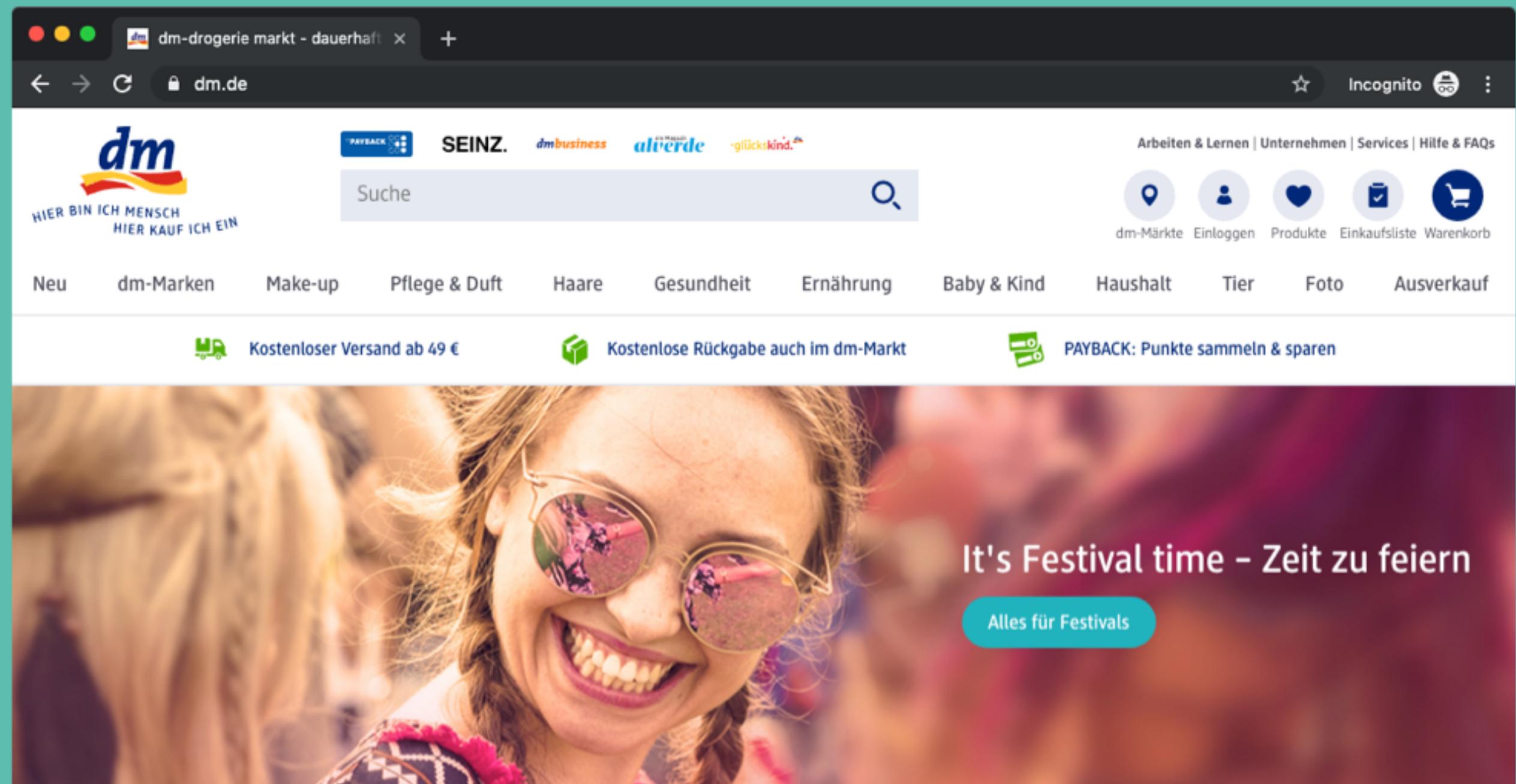


FRONT- & BACK-END



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

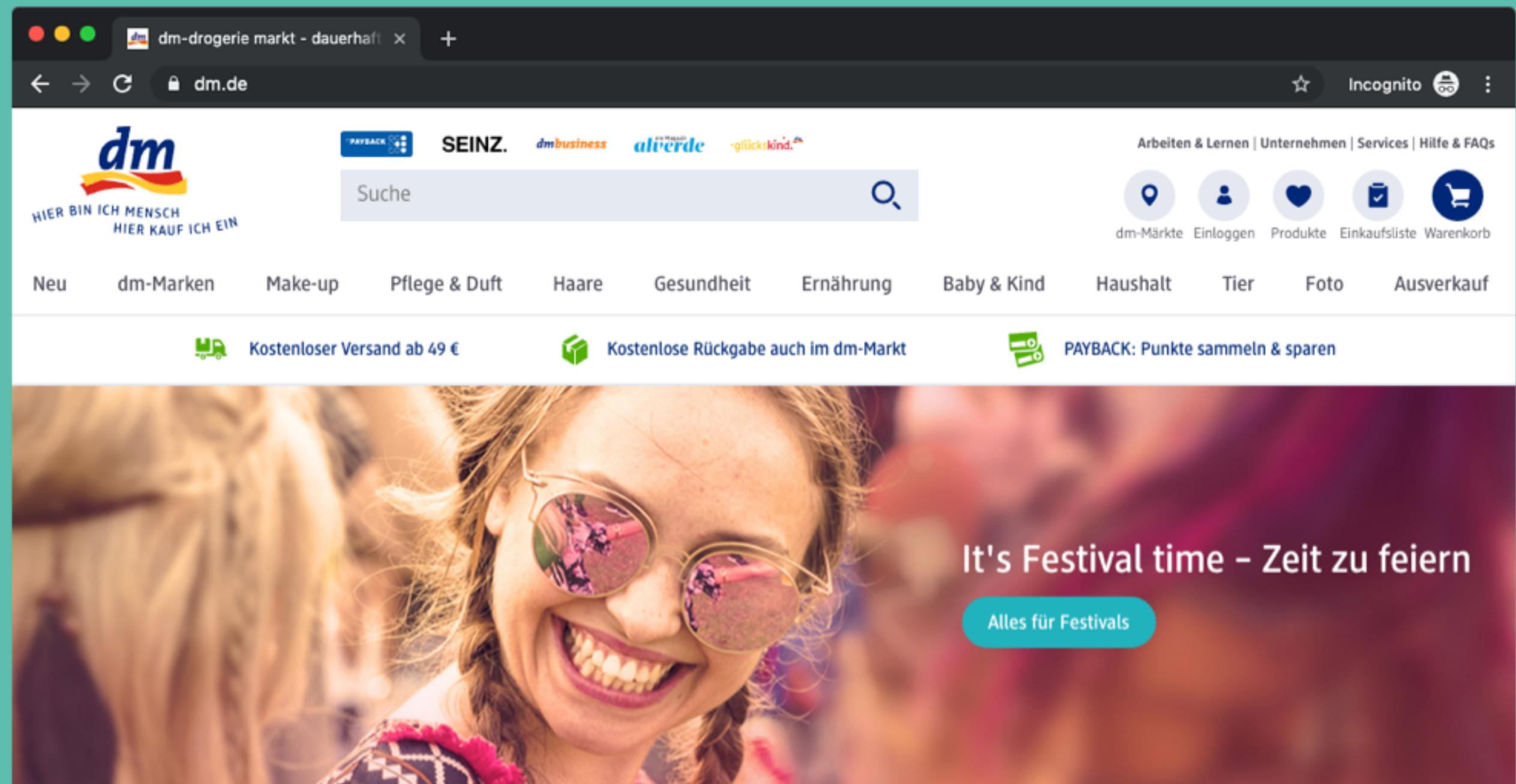
GitOverride: e(⌂ ⌂)đ

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



content-view-service



BABEL



ESLint

product-view-service



BABEL



ESLint

content-search-service

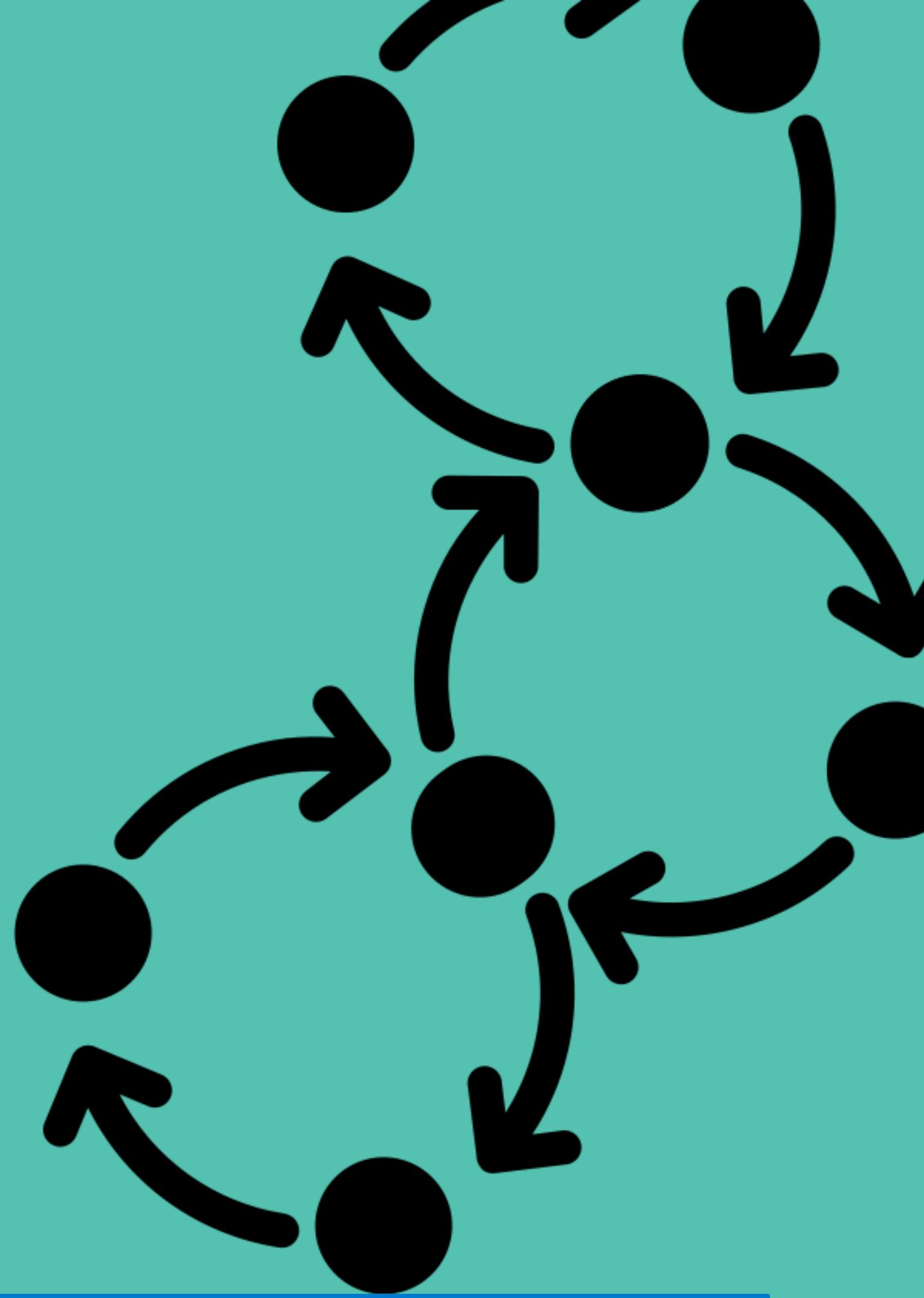


BABEL



ESLint

react-components



Aber erstes Zwischenergebnis:
Abhängigkeitszyklen
= verteilter Monolith

321 PUSH!



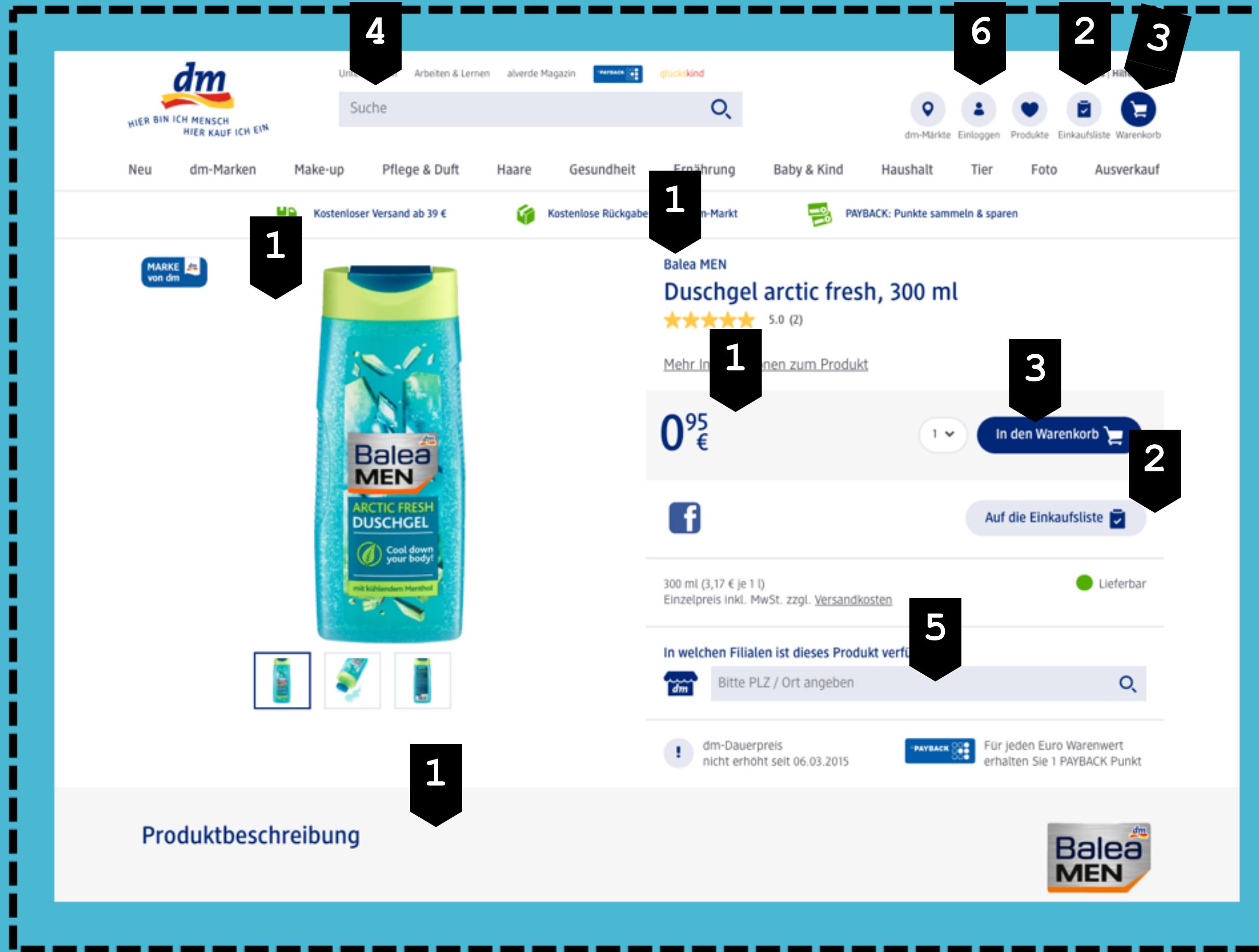
DAS RÄTSEL



**WIE TEILEN WIR
DAS FRONTEND AUF?**

Schauplatz

Detailseite



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

Schauplatz Suche

Domain Suche (Rahmen)

Domain Produkt-Suche

Domain Content-Suche

dm
HIER BIN ICH MENSCH
HIER KAUF' ICH EIN

SEINZ. dm-business alverde glückskind.™

Arbeiten & Lernen | Unternehmen | Services | Hilfe & FAQs

Balea 🔍

📍 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 an jedem Markt PAYBACK: Punkte sammeln & sparen

Alle Sortimente

Pflege & Duft (457)
Haare (162)
Baby & Kind (3)

Beliebte Filter

Anzahl 24

Sortieren nach Beliebtheit

Marke von dm 621 MARKE von dm

Vegan 379 MARKE von dm

Ohne Silikone 114 MARKE von dm

Für Männer 85 MARKE von dm

Neu 51 MARKE von dm

Medizinische Pflege 20 MARKE von dm

Marken

Suchen

Alle Marken dm-Marken

Balea COLORNIQUE 23

Balea Med 20

Balea MEN 84

Balea 490

2 Suchen nach „Balea“

3

Produkte (623) Beratung (206)

1  3,95 € 🛒 2 St (1,98 € je 1 St) ★★★★☆ (196)

2  1,25 € 🛒 100 ml (1,25 € je 100 ml) ★★★★★ (12)

3  1,85 € 🛒 250 ml (0,74 € je 100 ml) ★★★★☆ (10)

4  0,95 € 🛒 150 ml (0,63 € je 100 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

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  Markt  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

3

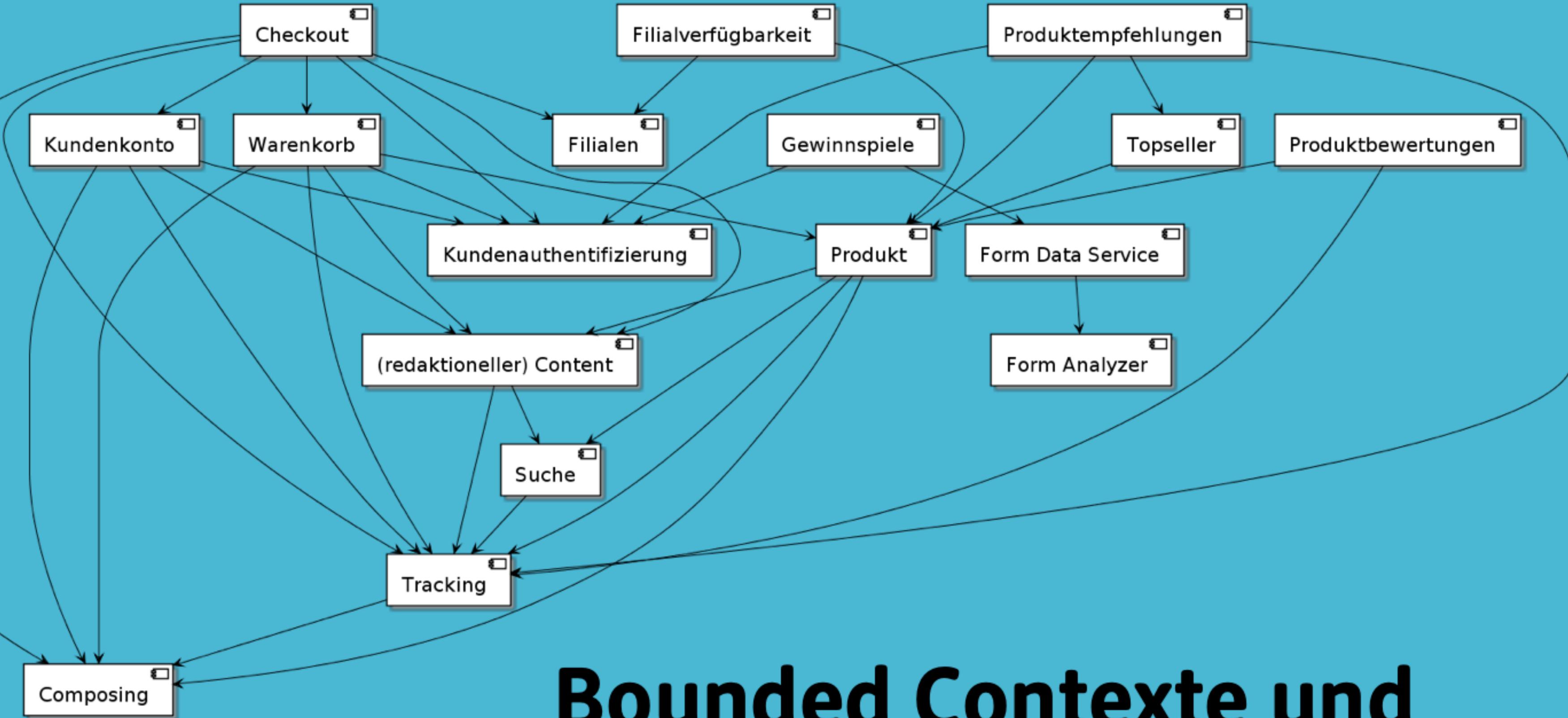
Suchantrag nach „Balea“

Produkte (623) Beratung (206)

**Balea Deo**
22.12.2017
Pflege & Duft
 Seite öffnen

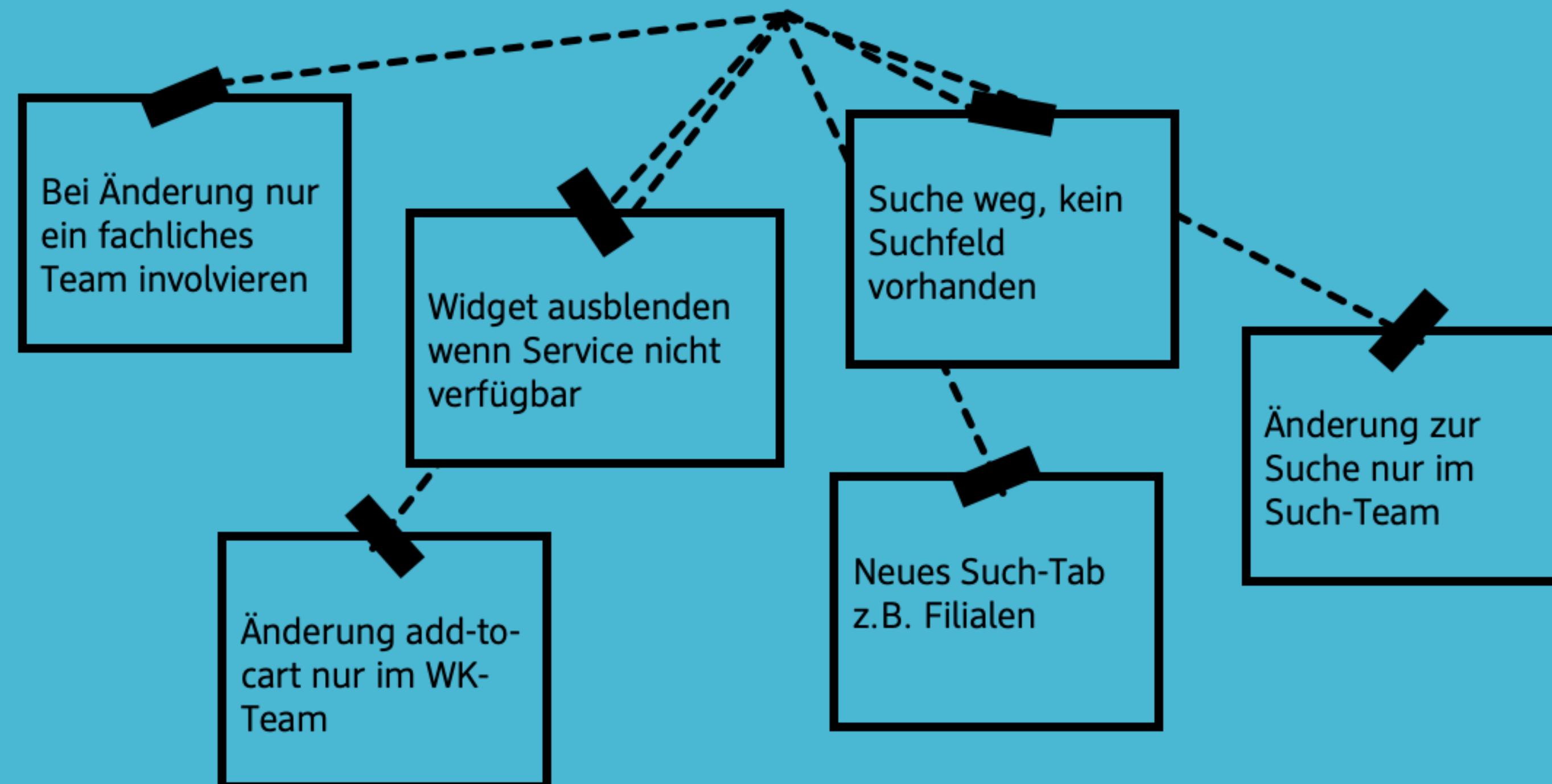
**Über Balea**
11.01.2016
Balea
 Seite öffnen

**Balea Winter**
25.10.2018
Limited Editions
 Seite öffnen

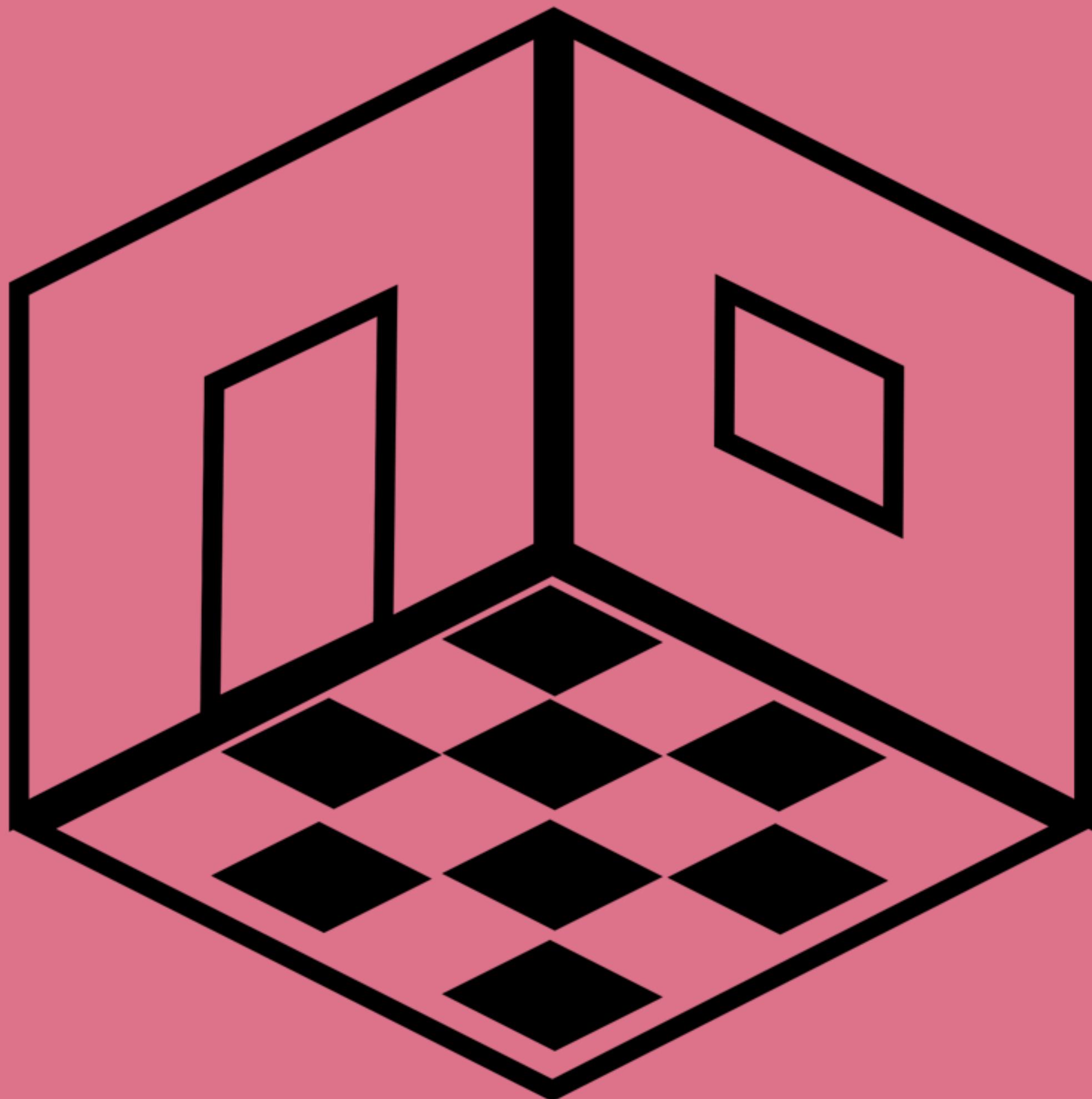


Bounded Contexte und Abhängigkeiten bei dm.de

Separations of Concerns



? ! DIE LÖSUNG



Lösungs- Rahmen

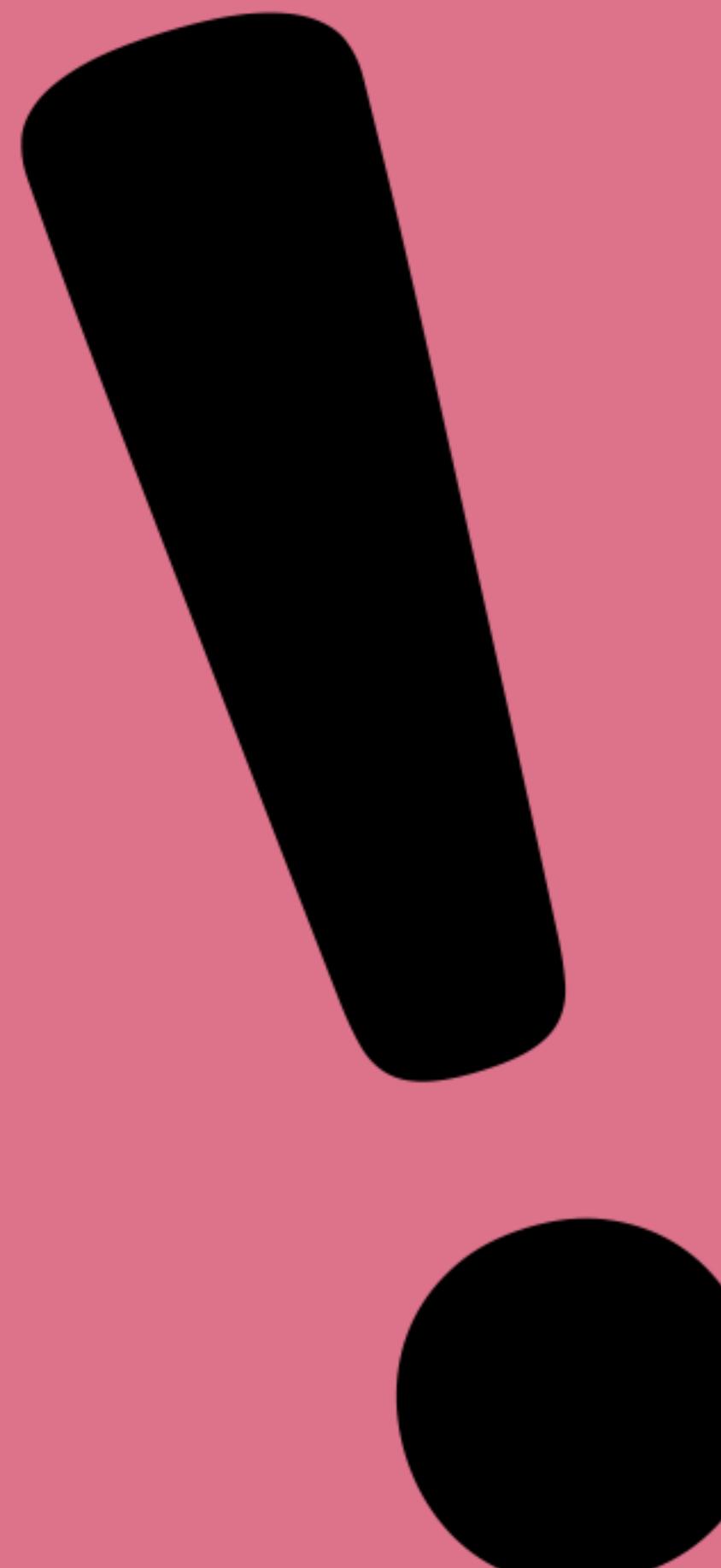
Überwiegend clientseitige
Integration

- 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>

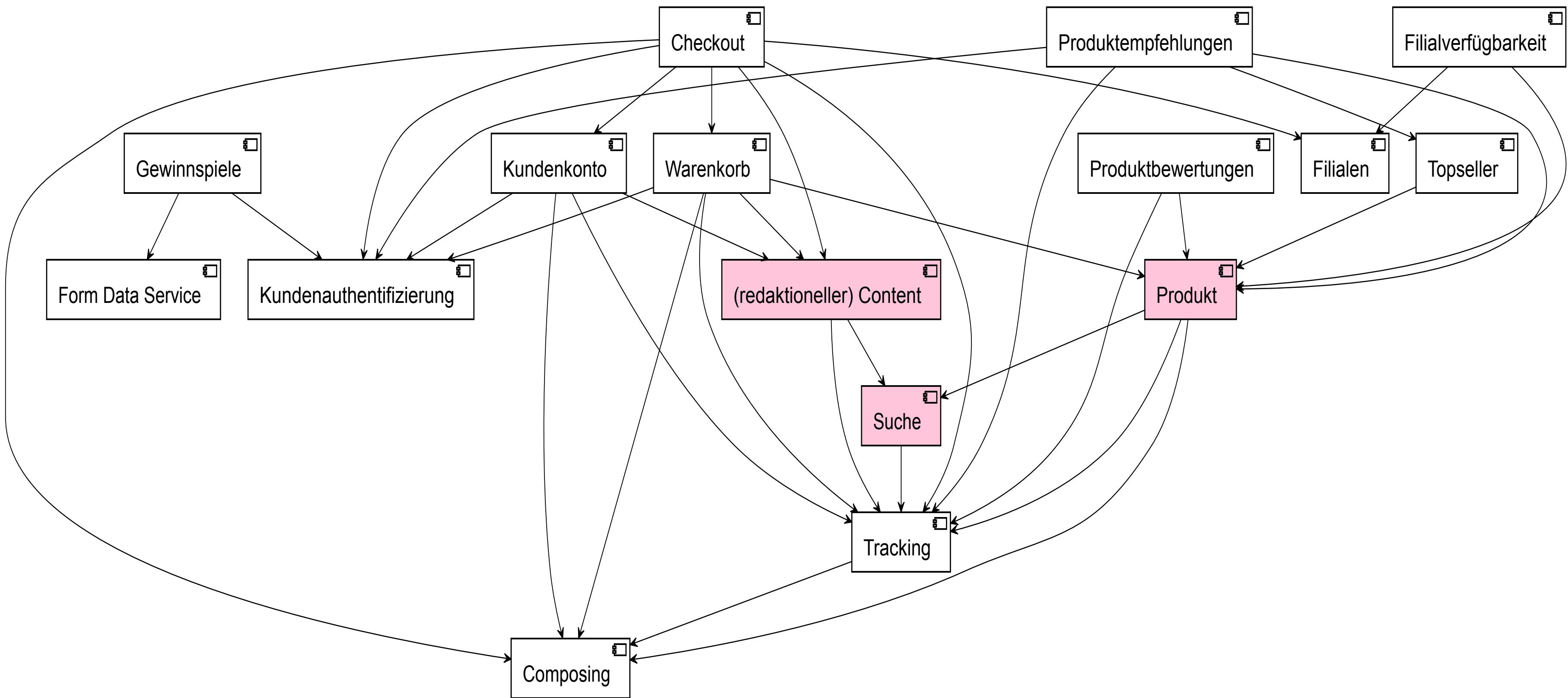


**< DEPENDENCY
INVERSION />**

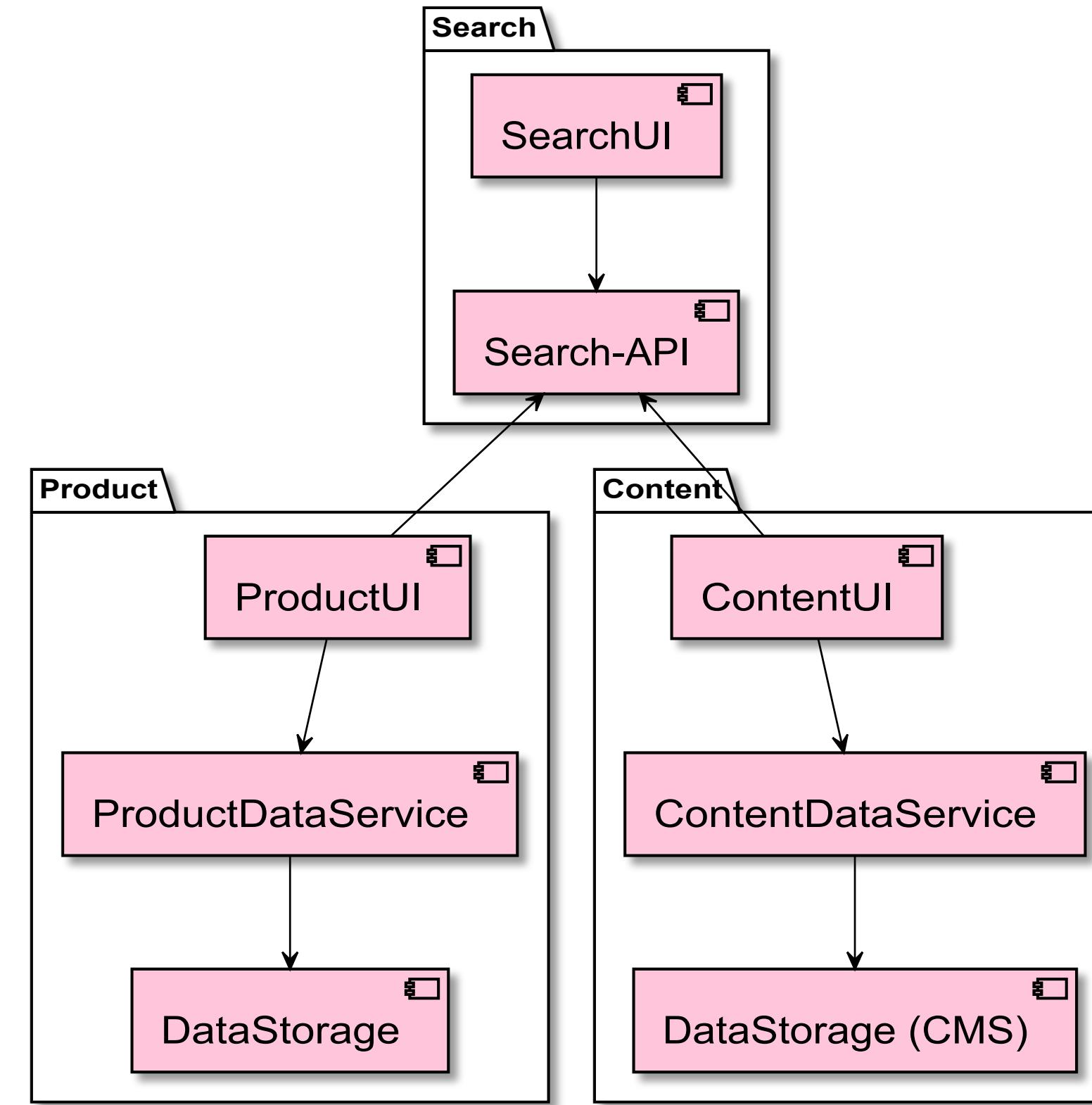
Allgemeine Module
hängen nicht von
speziellen Modulen
ab.

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

dm-Märkte Produkte Warenkorb Menü

Suche nach „balea“

Produkte (613) Beratung (221)

Sortieren Filtern

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



Balea Urea Fußcreme 3,95 €



Balea Fuß Bimsschwamm 1,25 €



Balea Duschöl 250ml 0,95 €



1,85 €

We setzte 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 €



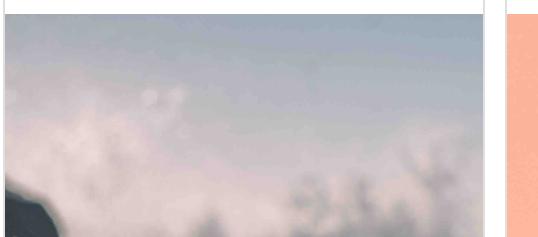
Lorem ipsum dolor sit amet

balea product 3 8,65 €



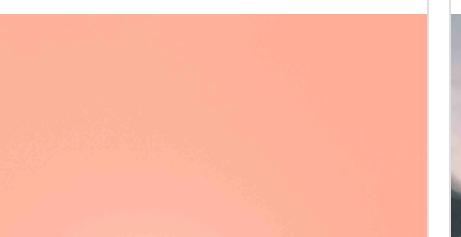
Lorem ipsum dolor sit amet

balea product 4 2,95 €



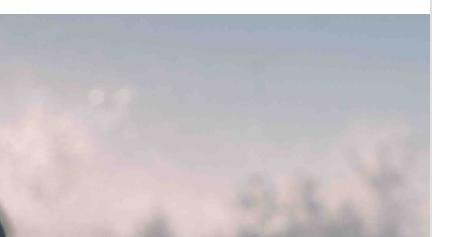
Lorem ipsum dolor sit amet

balea product 5 8,65 €



Lorem ipsum dolor sit amet

balea product 6 2,95 €



Lorem ipsum dolor sit amet

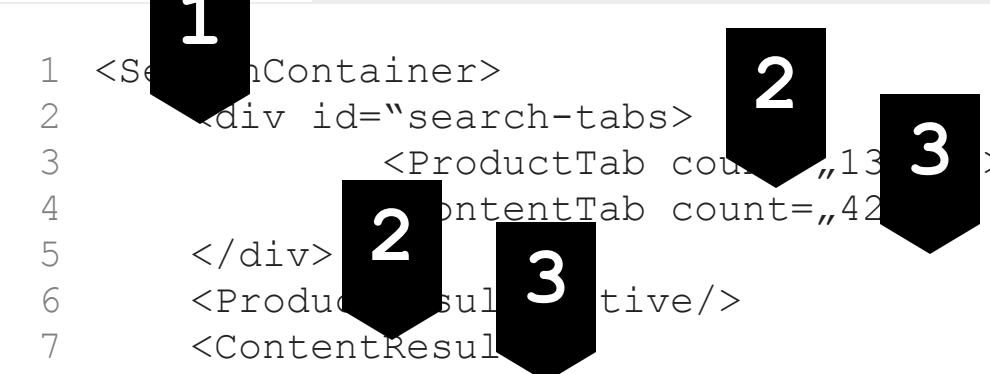
Composition vs. Dependency Inversion

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

red yellow green code ~ comparison

composition is x

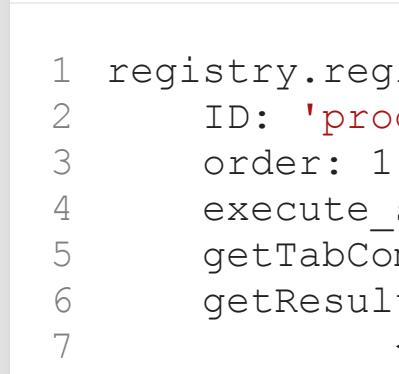
```
1 <SearchContainer>
2   <div id="search-tabs">
3     <ProductTab count="13">
4       <ContentTab count="42" />
5     </div> 2
6   <ProductResult active/>
7   <ContentResult />
8 </SearchContainer>
9
10 // --- everything in one repository ---
```



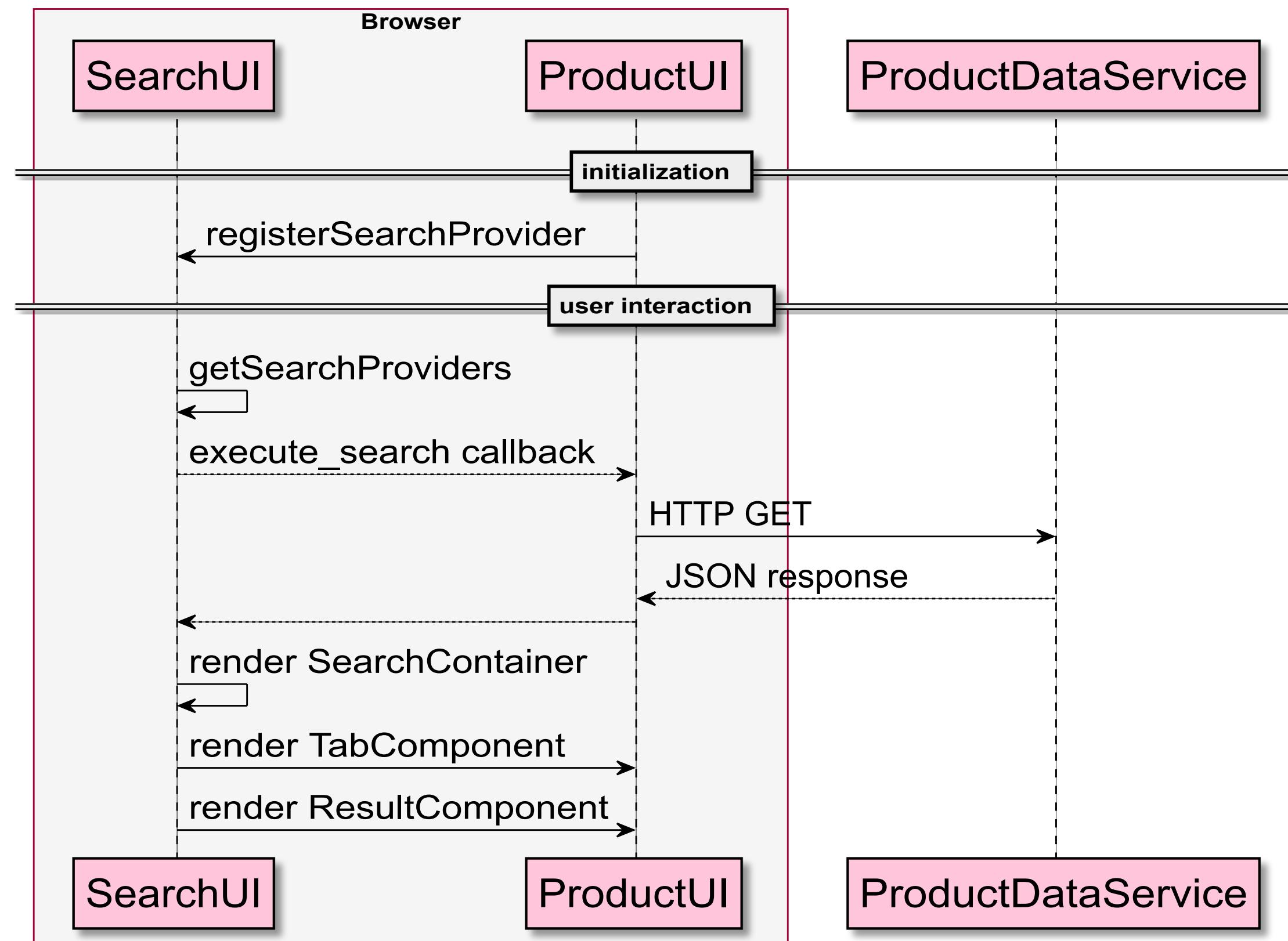
red yellow green code ~ comparison

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

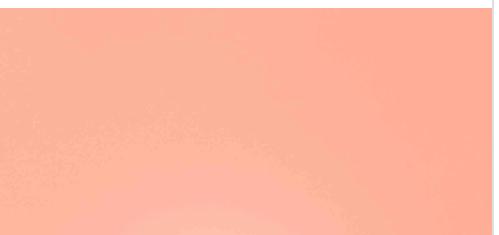
31x14

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 € 	balea product 5 8,65 € 	balea product 6 2,95 € 

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...

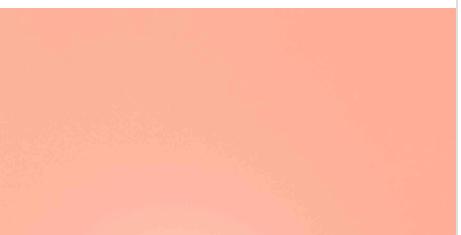
```
1 import React, { useEffect } from 'react';
2 import qs from 'qs';
3 import { getSearchProviders } from 'search-api';
4 import SearchResultHeader from './SearchResultHeader';
5 import SearchResultBody from './SearchResultBody';
6 import { doLoadCount, doLoadData } from './state/actions';
7 import 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

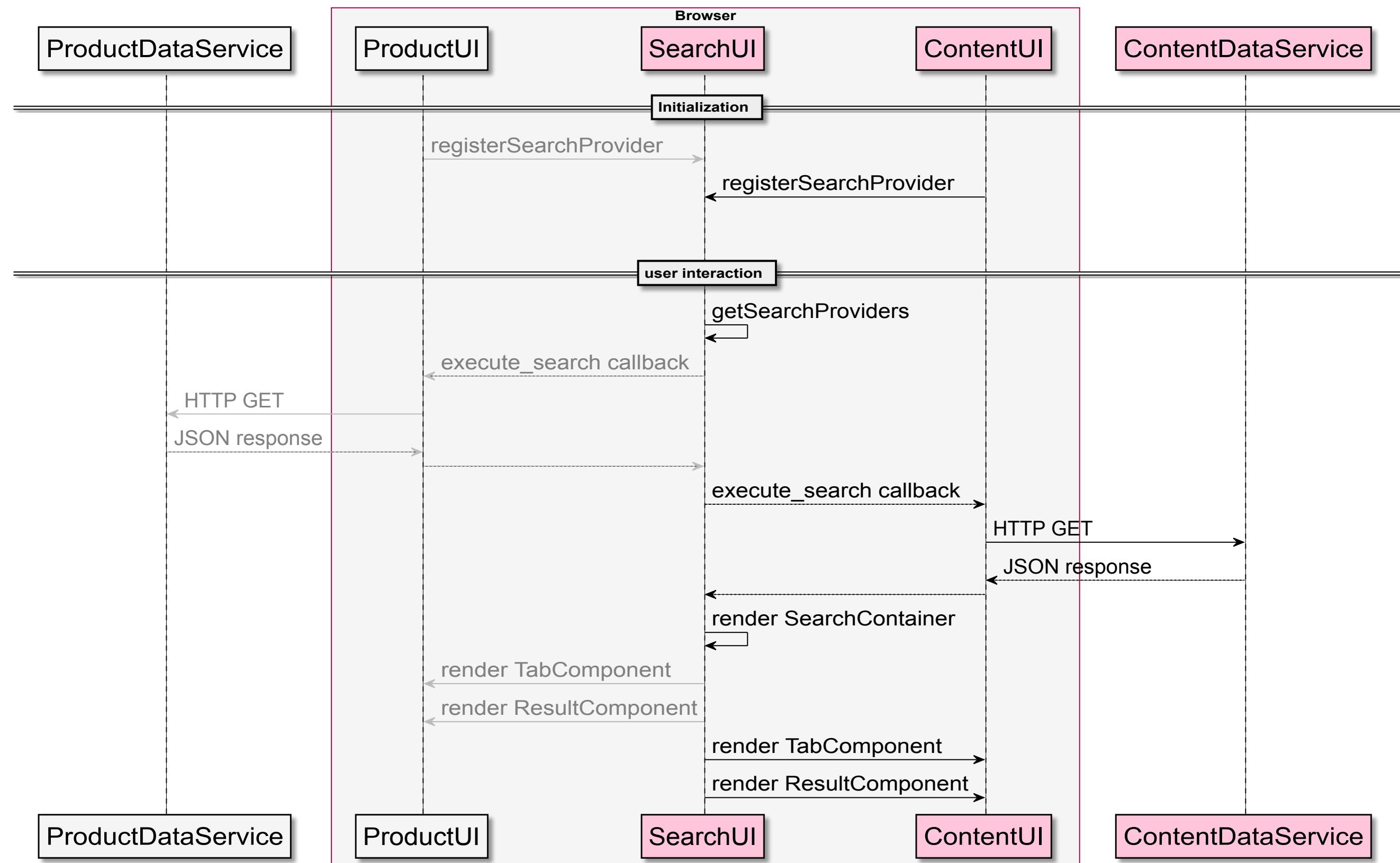
Suche nach "balea"

Produkte (6) Beratung (3)

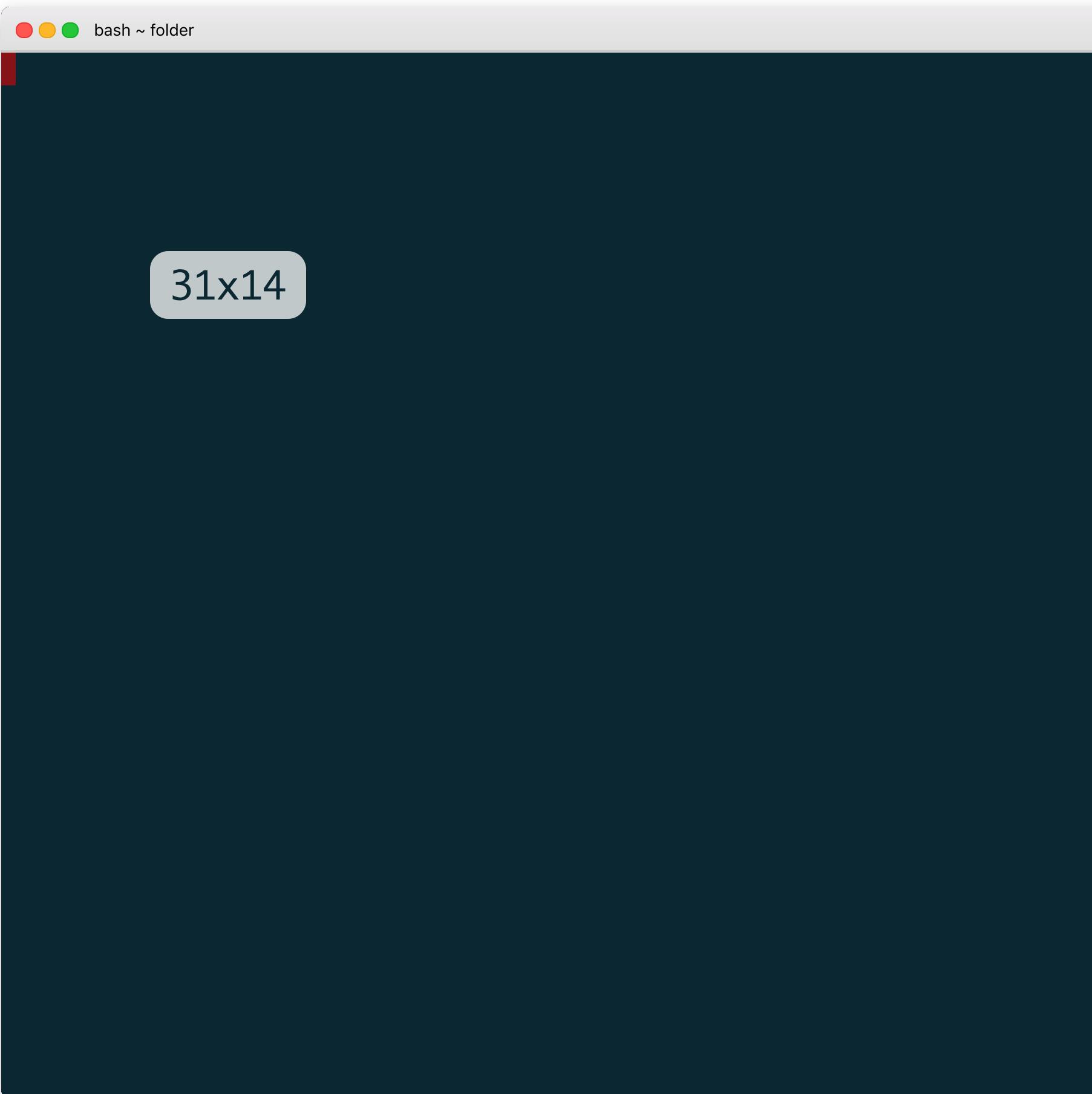
Suche nach "balea": 6 counts

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 € 	balea product 5 8,65 € 	balea product 6 2,95 € 

... und jetzt noch mit Provider für Contentsuche



.. und jetzt noch mit Provider für Contentsuche

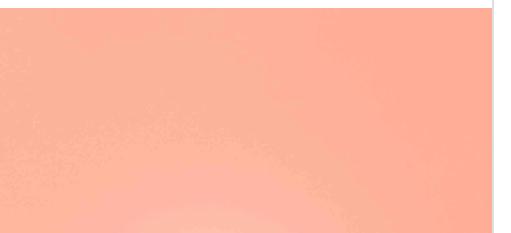


bash ~ folder http://localhost:8080/?query=balea&searchType=product

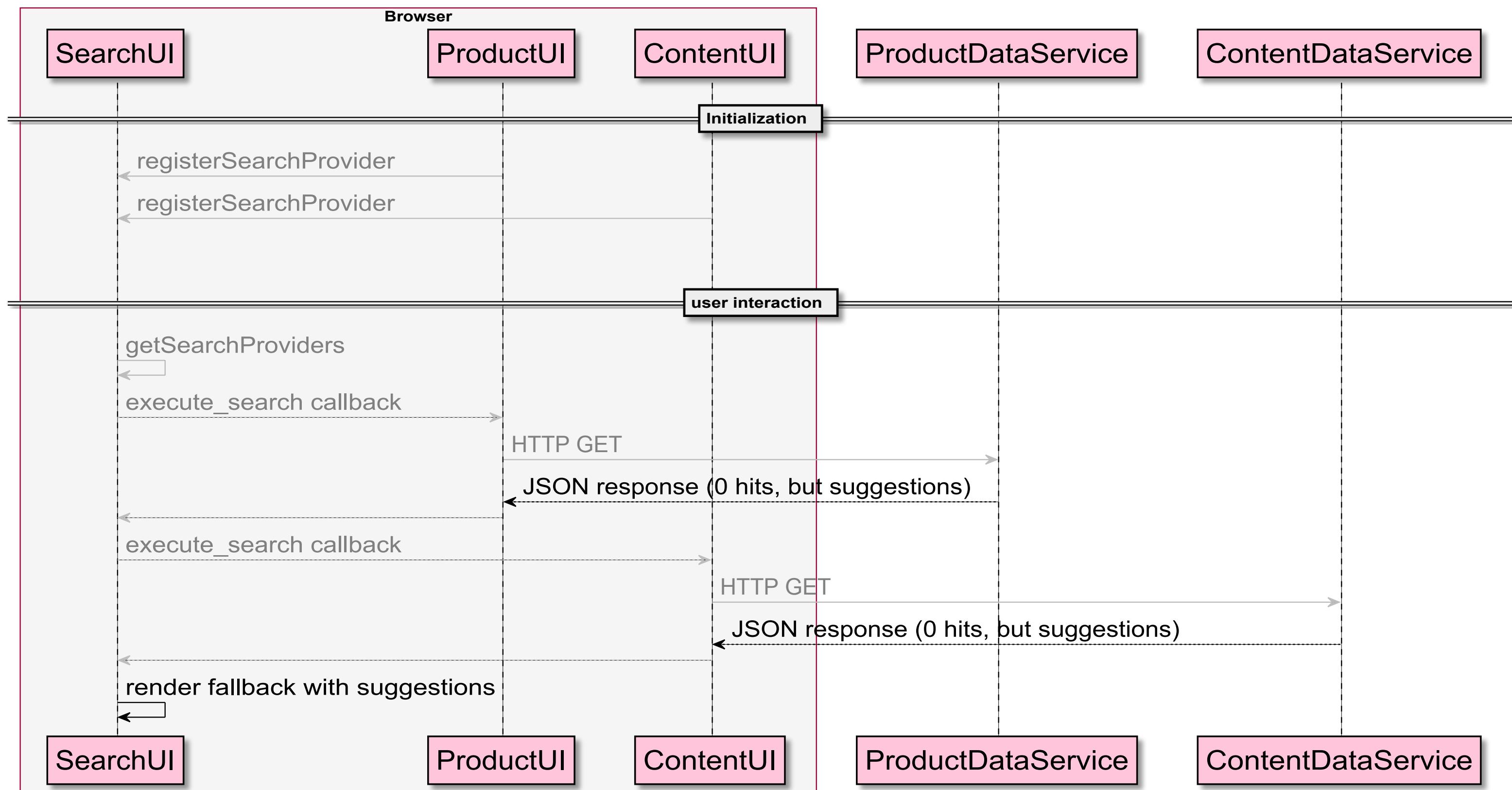
Suche nach "balea"

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 € 	balea product 5 8,65 € 	balea product 6 2,95 € 

... 0-Treffer -> Fallback und Suchvorschläge

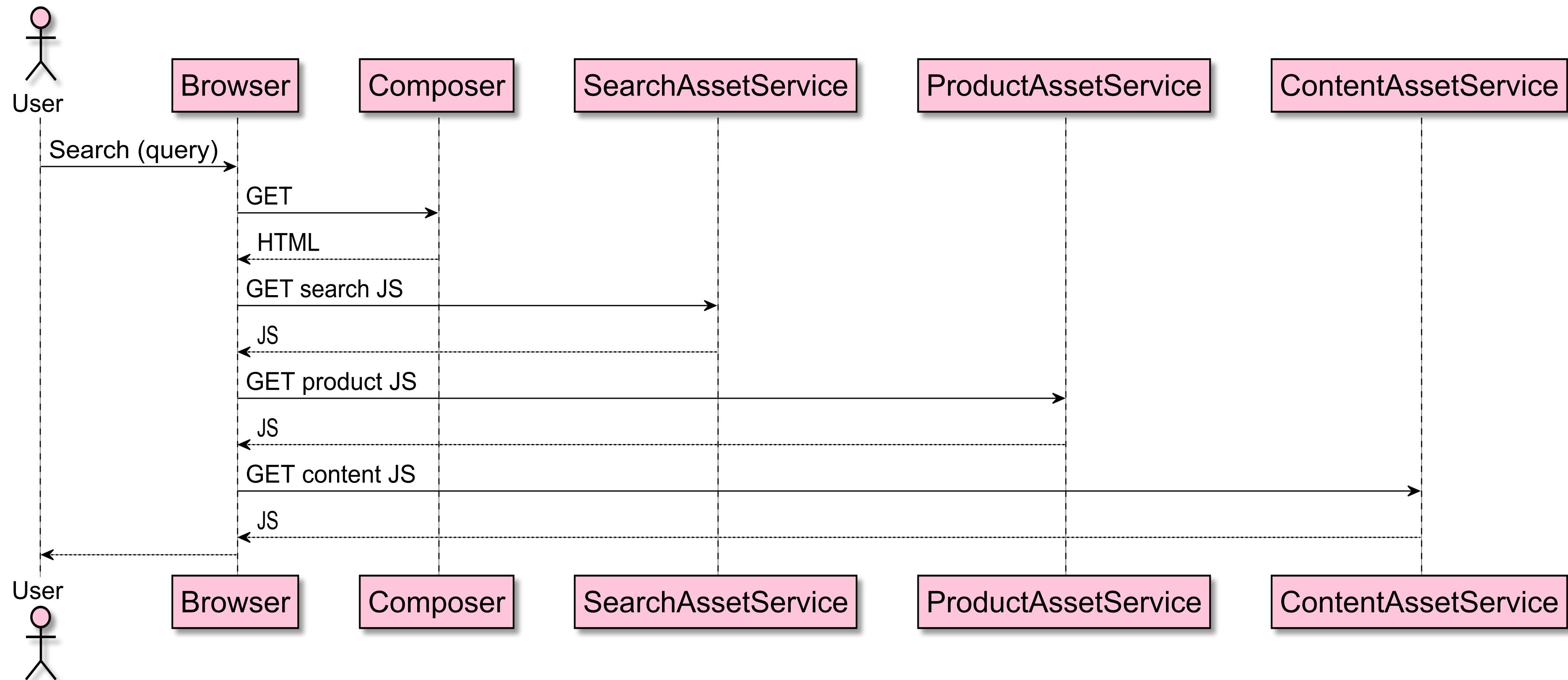


Github Repo

<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

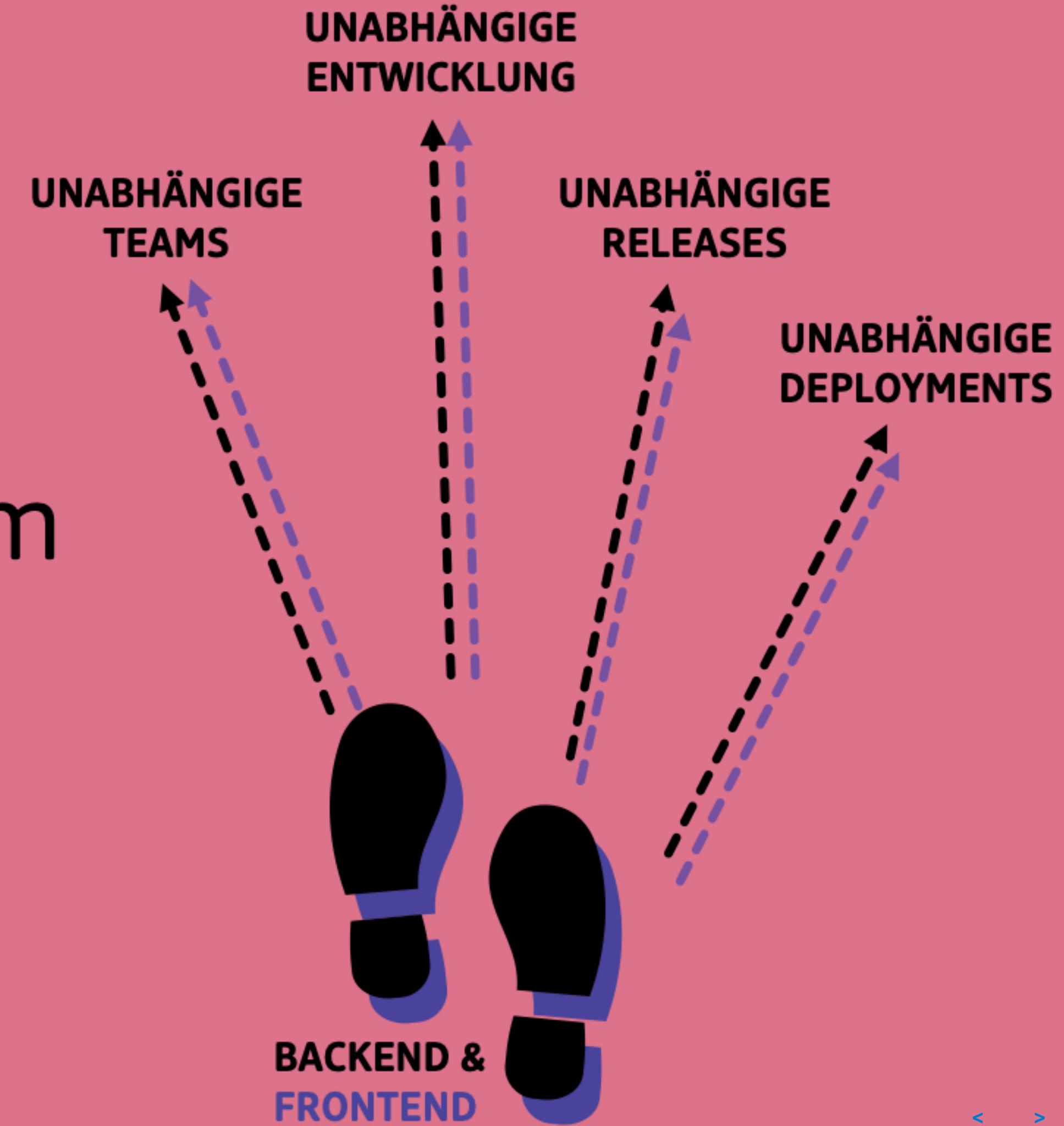


Dependency Inversion

Unabhängiges Deployment

Runtime Composition

Unabhängigkeit im Back- & Frontend





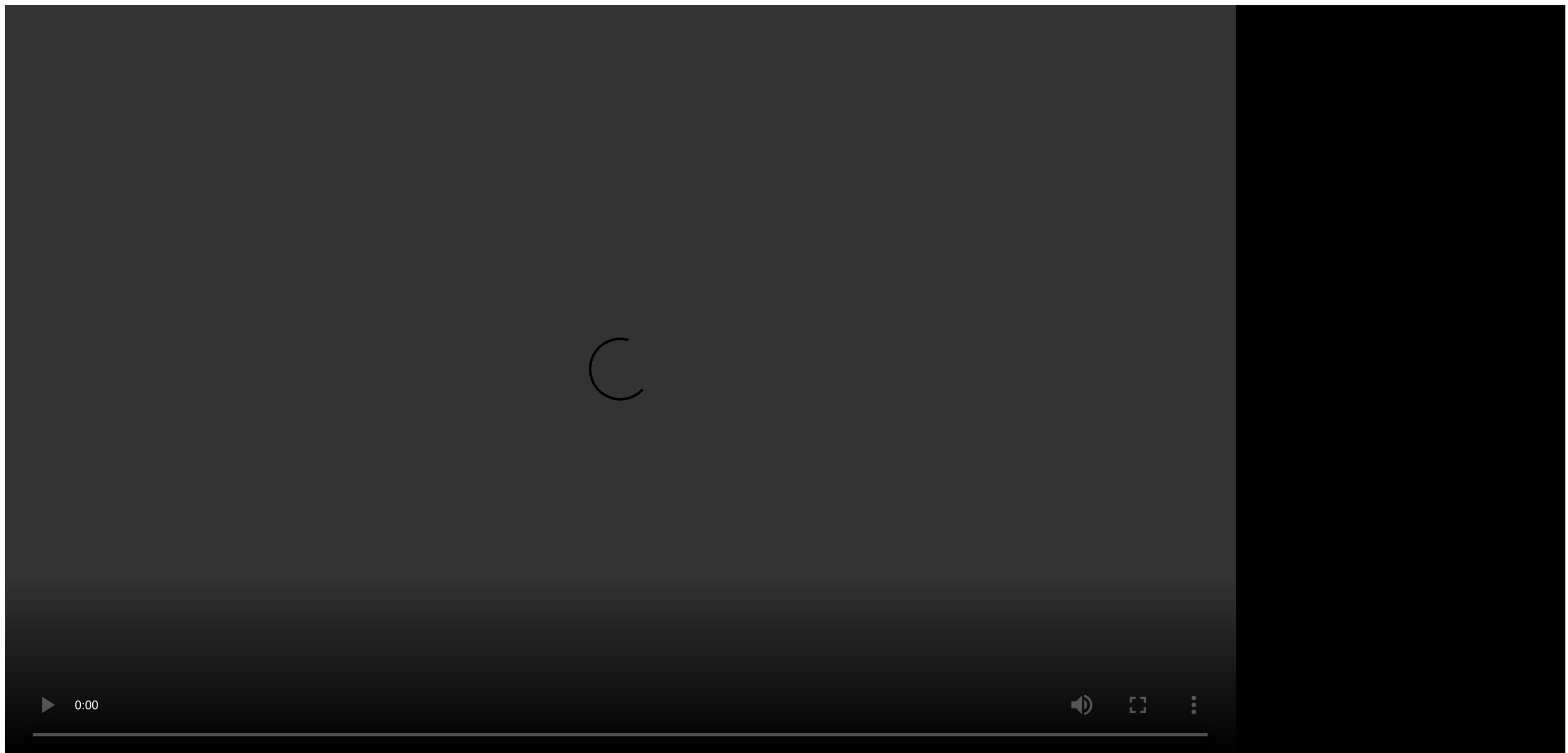
Lessons Learned

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



synyx.de

