A photograph of a brick building with a red-tiled roof. The building is partially covered in autumn foliage, with red and orange leaves visible on the left side. A yellow circular logo with a crown on top and the text 'KTH VETENSKAP OCH KONST' is visible on the left side of the building. The text 'Open Services, Interoperability, and Hypermedia' is overlaid in large white font across the center of the image.

Open Services, Interoperability, and Hypermedia

OSLC Fest 2018 in Stockholm

Mike Amundsen
@mamund



Mike Amundsen
@mamund

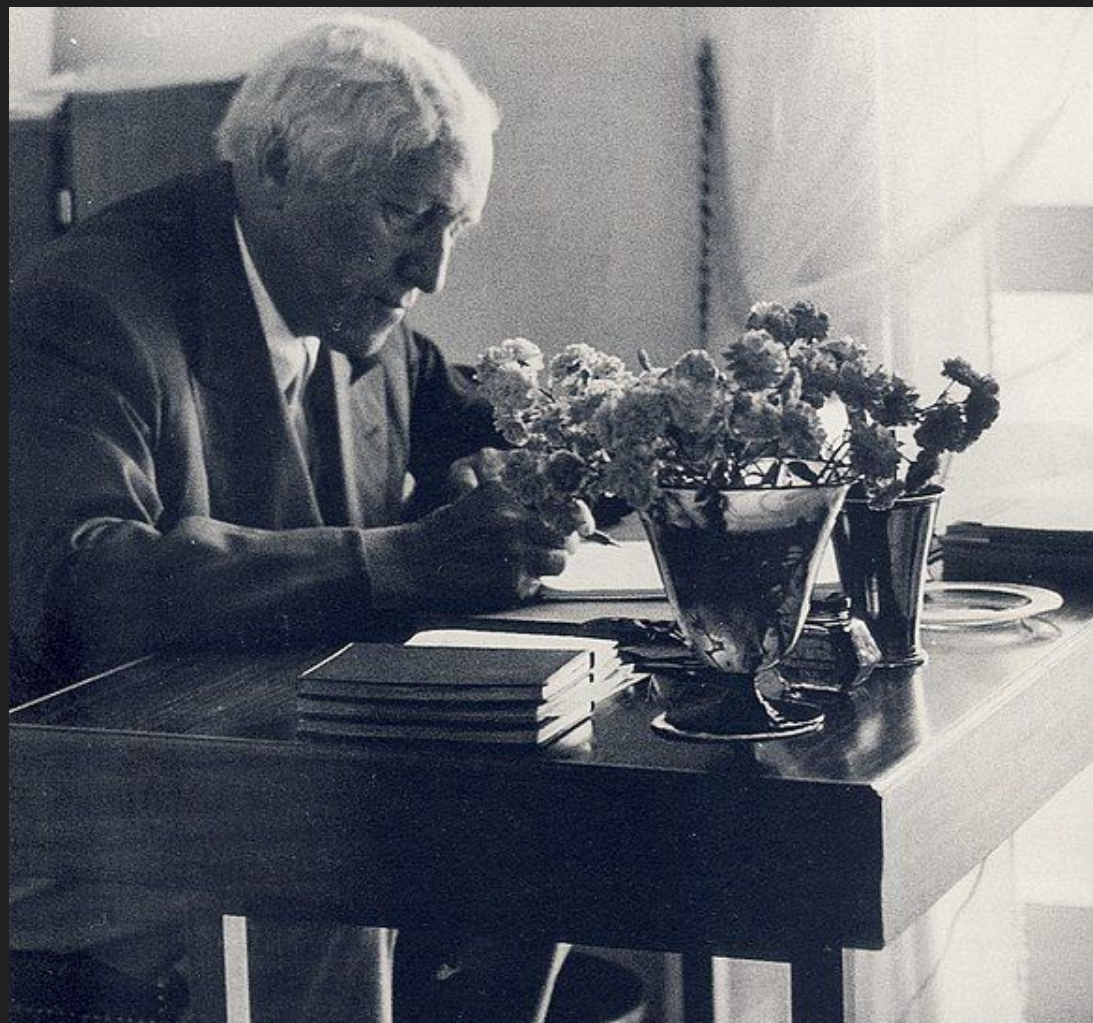
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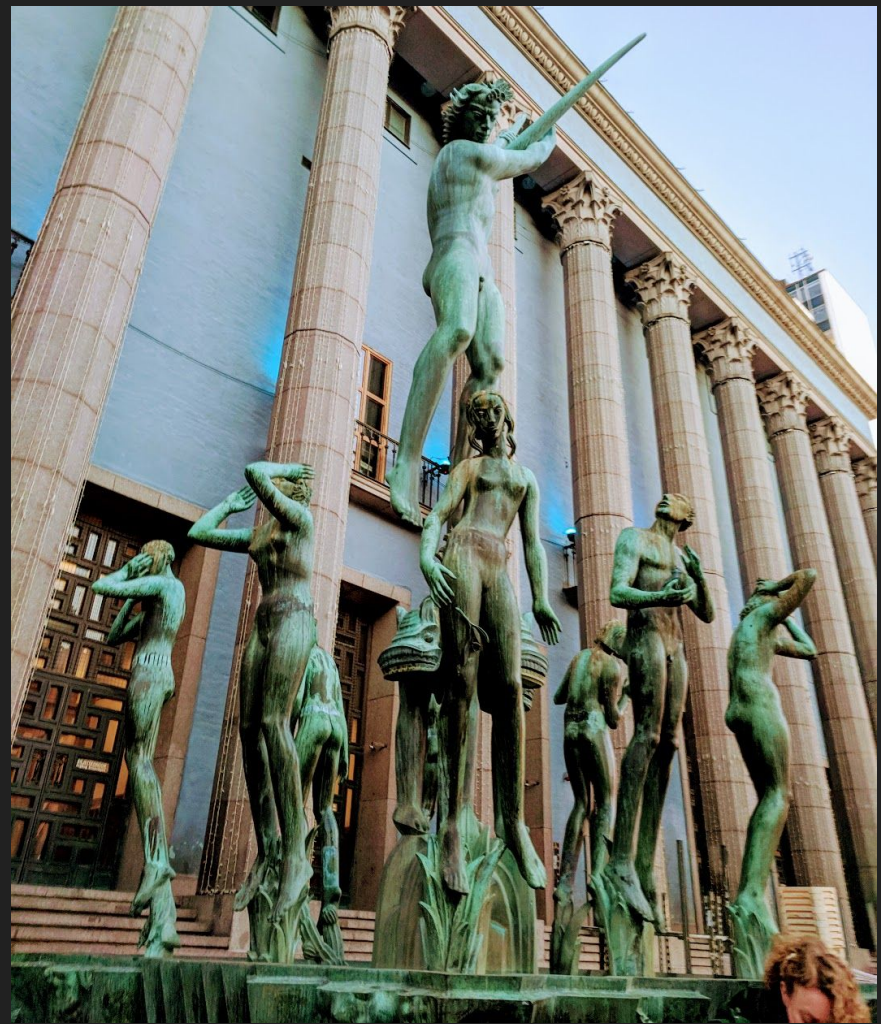
API STRATEGY

Microservices, APIs and Innovation: The Power of APIs

Explore the role APIs play in empowering teams and enabling organizations to innovate.







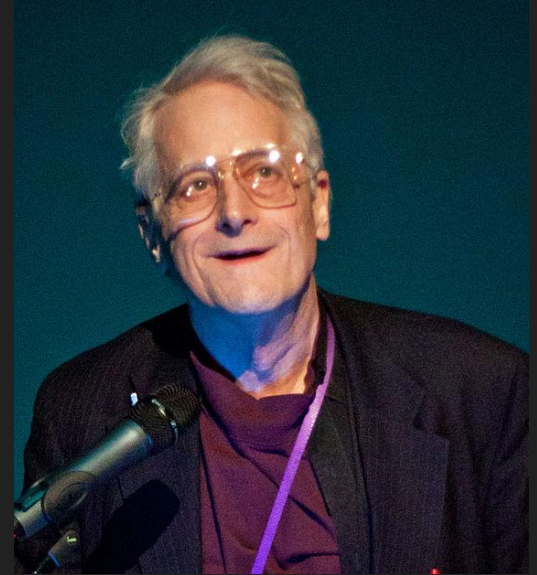


Av Boberger. Photo: Bengt Oberger - Eget arbete, CC BY-SA 3.0 <https://commons.wikimedia.org/w/index.php?curid=16763748>

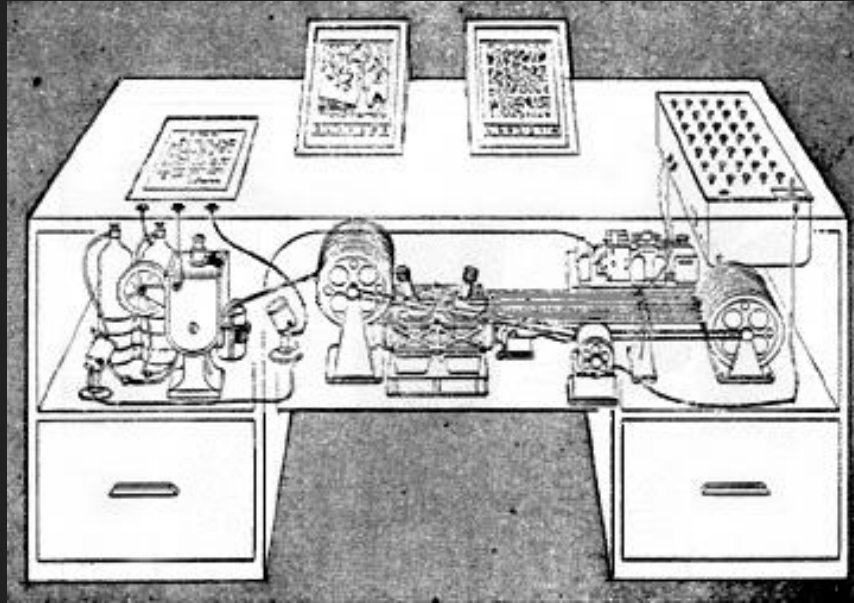
Hypermedia : Definitions

Ted Nelson's hyperlinks (1965)

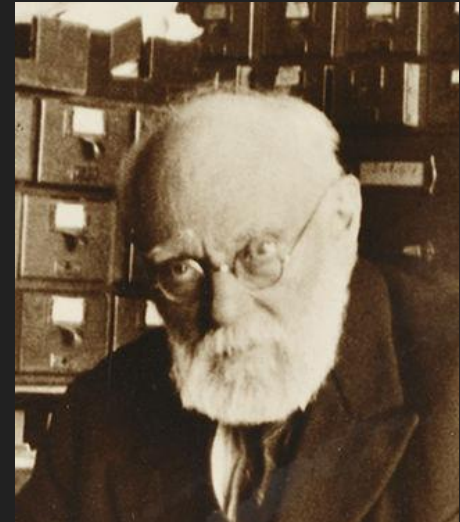
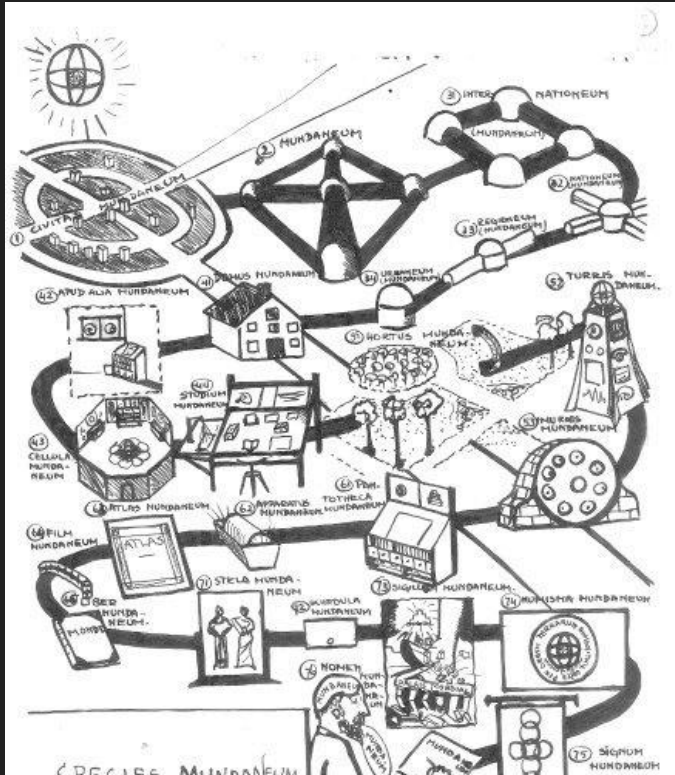
The words hypertext, hyperlink, and hypermedia were coined by Ted Nelson around 1965.



Vannevar Bush's Reader (1945)

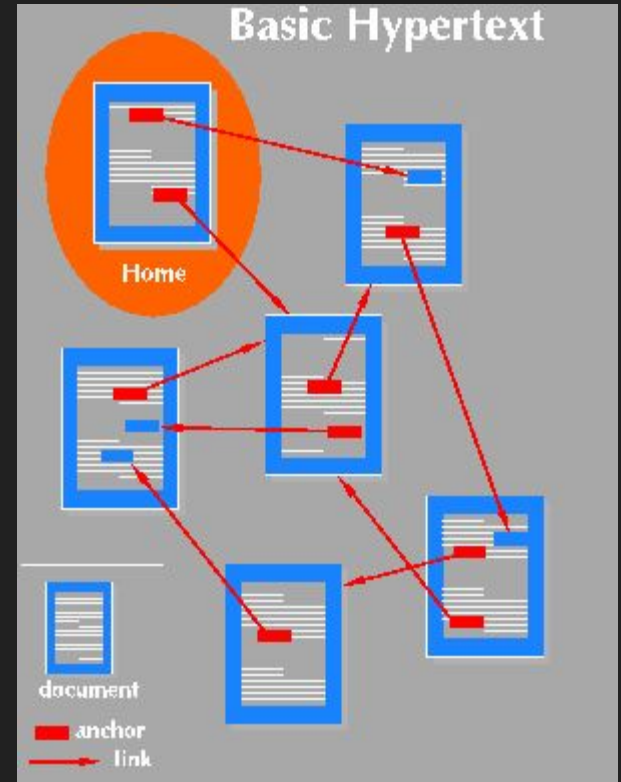


Paul Otlet's World Wide Network (1934)



What is Hypermedia?

Hypertext is text which is not constrained to be linear.



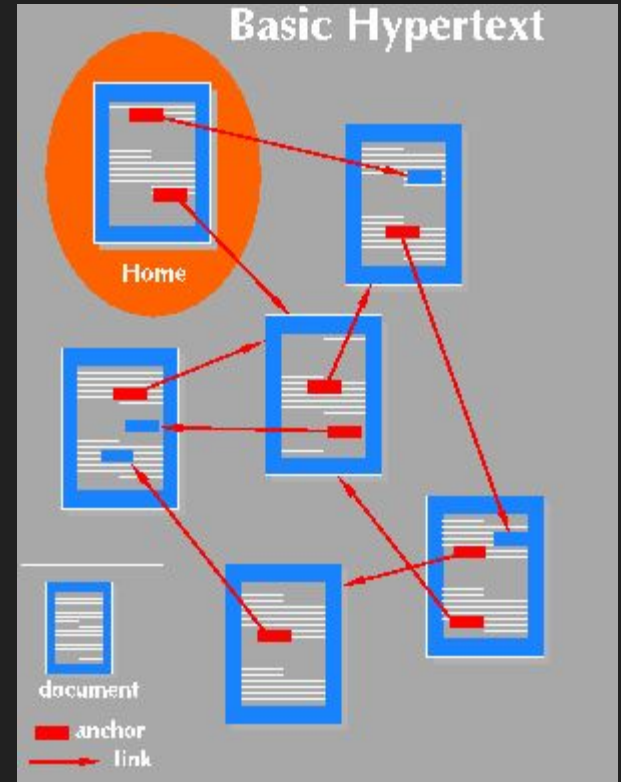
<https://www.w3.org/WhatIs.html>

What is Hypermedia?

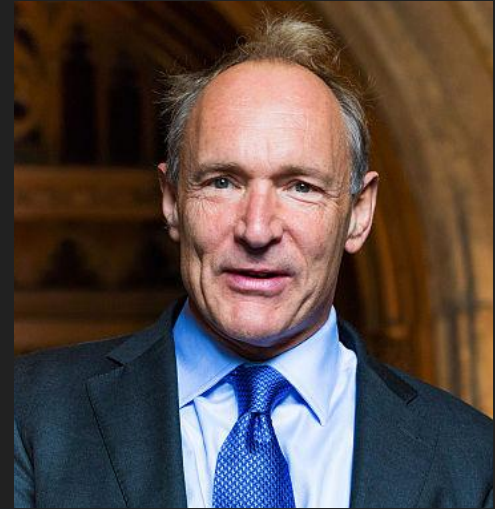
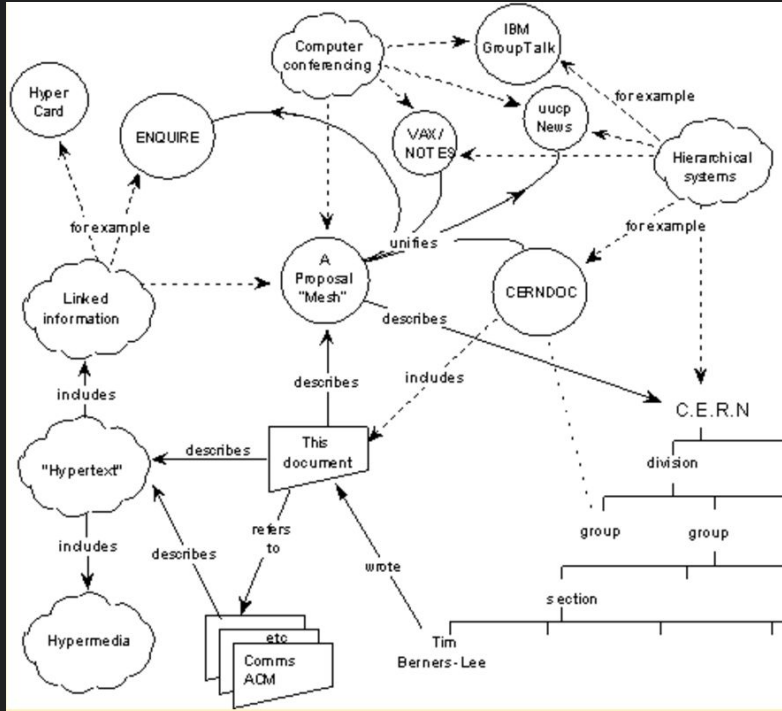
Hypertext is text which is not constrained to be linear.

Hypertext is text which contains links to other texts.

<https://www.w3.org/WhatIs.html>



Tim Berners-Lee WWW (1989)



***Hypermedia provides
"extreme late binding" at runtime.***

Hypermedia : Examples

NOT Hypermedia Examples

```
"http://www.example.org/search"
```

```
"http://www.example.org/images/logo"
```

```
"http://www.example.org/mv-keywords"
```

Hypermedia Examples

```
<a href="http://www.example.org/search" title="view search page">Search</a>
```

Hypermedia Examples

```
<a href="http://www.example.org/search" title="view search page">Search</a>
```

```

```


Hypermedia Examples

```
<a href="http://www.example.org/search" title="view search page">Search</a>
```

```

```

```
<form method="get">  
  <label>Search term:</label>  
  <input name="query" type="text" value="" />  
  <input type="submit" />  
</form>
```

Hypermedia Examples

```
<a href="http://www.example.org/search" title="view search page">Search</a>
```

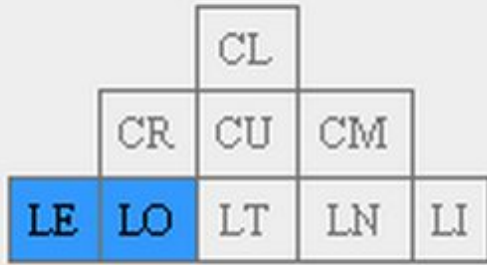
```

```

```
<form method="get">  
  <label>Search term:</label>  
  <input name="query" type="text" value="" />  
  <input type="submit" />  
</form>
```

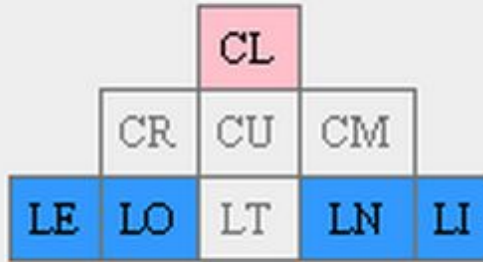
```
<form method="post" action="http://www.example.org/mv-keywords"/>  
  <label>Keywords:</label>  
  <input name="keywords" type="text" value="" />  
  <input type="submit" />  
</form>
```

Hypermedia Factors



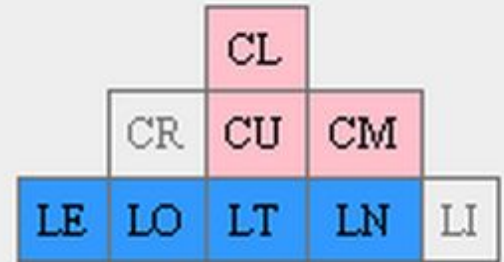
SVG

Hypermedia Factors



Atom

Hypermedia Factors



HTML

H-Factors and Hypermedia Types
<http://amundsen.com/hypermedia/>

 data.json

```
1  {
2    "task": [
3      {
4        "id": "137h96l7mpv",
5        "title": "LAX",
6        "completeFlag": "true",
7        "assignedUser": "bob",
8        "dateCreated": "2016-01-14T17:48:42.083Z",
9        "dateUpdated": "2016-01-27T22:03:02.850Z"
10     }
11   ]
12 }
```

links.json

```
1  {
2    "task": [
3      {
4        "url" : "http://api.examples.org/137h96l7mpv",
5        "id": "137h96l7mpv",
6        "title": "LAX",
7        "completeFlag": "true",
8        "assignedUser": "bob",
9        "dateCreated": "2016-01-14T17:48:42.083Z",
10       "dateUpdated": "2016-01-27T22:03:02.850Z"
11     }
12   ]
13 }
```

 actions-01.json

```
1  {
2    "task": [
3      {
4        "url" : "http://api.examples.org/137h96l7mpv",
5        "edit" : "http://api.examples.org/edit?id=137h96l7mpv",
6        "id": "137h96l7mpv",
7        "title": "LAX",
8        "completeFlag": "true",
9        "assignedUser": "bob",
10       "dateCreated": "2016-01-14T17:48:42.083Z",
11       "dateUpdated": "2016-01-27T22:03:02.850Z"
12     }
13   ]
14 }
```


 **actions-02.json**

```
1  {
2    "task": [
3      {
4        "url" : "http://api.examples.org/137h96l7mpv",
5        "edit" : "http://api.examples.org/edit?id=137h96l7mpv",
6        "approve" : "http://api.examples.org/approve?id=137h96l7mpv",
7        "id": "137h96l7mpv",
8        "title": "LAX",
9        "completeFlag": "true",
10       "assignedUser": "bob",
11       "dateCreated": "2016-01-14T17:48:42.083Z",
12       "dateUpdated": "2016-01-27T22:03:02.850Z"
13     }
14   ]
15 }
```

 actions-03.json

```
1  {
2    "task": [
3      {
4        "url" : "http://api.examples.org/137h9617mpv",
5        "action" : {
6          "name" : "approve",
7          "url": "http://api.examples.org/approve?id=137h9617mpv",
8          "method" : "put"
9        },
10       "id": "137h9617mpv",
11       "title": "LAX",
12       "completeFlag": "true",
13       "assignedUser": "bob",
14       "dateCreated": "2016-01-14T17:48:42.083Z",
15       "dateUpdated": "2016-01-27T22:03:02.850Z"
16     }
17   ]
18 }
```

 actions-04.json

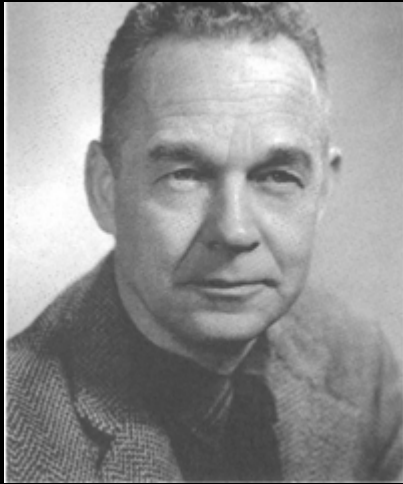
```
1  {
2    "task": [
3      {
4        "url" : "http://api.examples.org/137h96l7mpv",
5        "action" : {
6          "name" : "approve",
7          "url" : "http://api.examples.org/approve?id=137h96l7mpv",
8          "method" : "put",
9          "values" : [
10         {
11           "name" : "completeFlag",
12           "value" : "true",
13           "required" : "true",
14           "regex" : "^true|false$"
15         },
16         {
17           ...
18         }
19       ],
20     },
21     "id": "137h96l7mpv",
```


***Hypermedia adds
more information to the message***

Hypermedia : affordances

Affordances

"The affordances of the environment are what it offers ... what it provides or furnishes, either for good or ill.



James Gibson, 1977

James Gibson

Ecological Approach to Visual Perception, Gibson, 1979

Affordances

“The term affordance refers to the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used.”



Donald Norman, 1988

Donald Norman

The Design of Everyday Things, Donald Norman 1988, 2013

Affordances

“When I say Hypertext, I mean the simultaneous presentation of information and controls such that the information becomes the affordance through which the user obtains choices and selects actions.”



Roy Fielding, 2008

Roy Fielding

Architectural Styles and the Design of Network-based Software Architectures, Fielding, 2001

***Hypermedia affords
dis-coordinated change over time***

So...

The more

***you place in the message, the
less you need in the code.***

***The more
[info]
you place in the message, the
less you need in the code.***

***The more
[meaning|info]
you place in the message, the
less you need in the code.***

The more
[context|meaning|info]
you place in the message, the
less you need in the code.

The Best Software Architecture

"The best software architecture 'knows' what changes often and makes that easy."

- Paul Clements






Av Boberger. Photo: Bengt Oberger - Eget arbete, CC BY-SA 3.0 <https://commons.wikimedia.org/w/index.php?curid=16763748>



By ingen uppgift - Erik Näslund, "Carl Milles", Public Domain, <https://commons.wikimedia.org/w/index.php?curid=17279107>

A photograph of a brick building with a red-tiled roof. The building is partially covered in autumn foliage, with red and orange leaves visible on the left side. A yellow circular logo with a crown and the text 'KTH VETENSKAP OCH KONST' is visible on the left. The building has several windows, including a large arched window at the bottom right and a smaller octagonal window near the top right. The sky is blue with some clouds.

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