

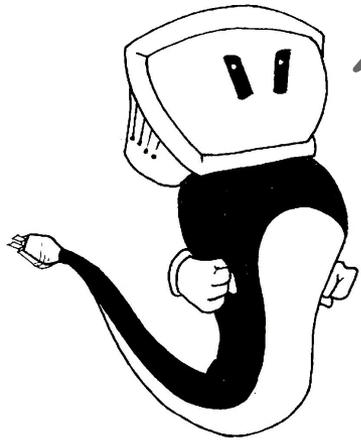
# Linking Data, Services and Human Know-How

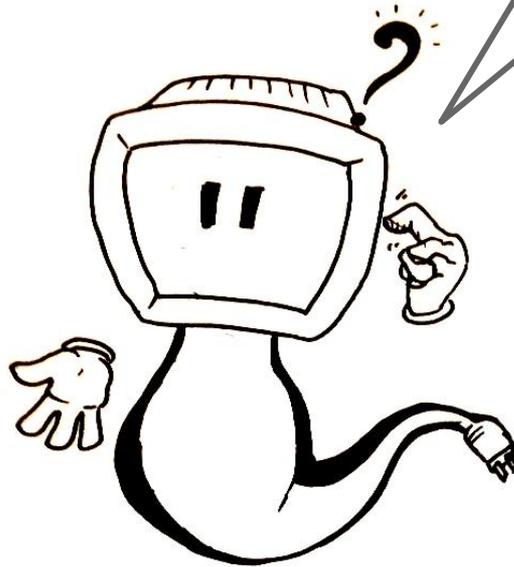
Paolo Pareti

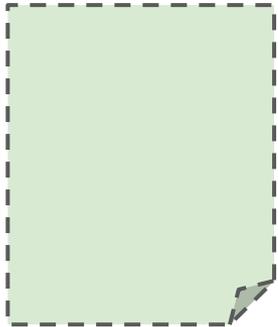


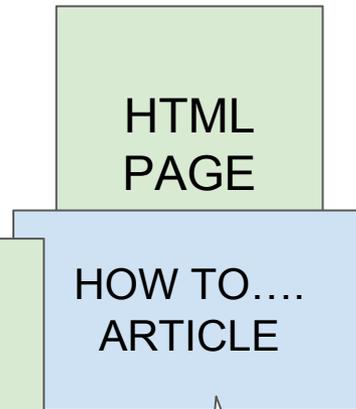
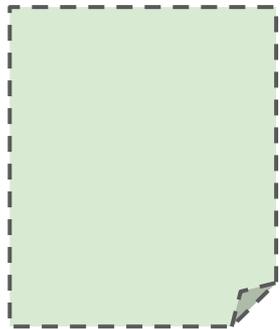
THE UNIVERSITY  
*of* EDINBURGH

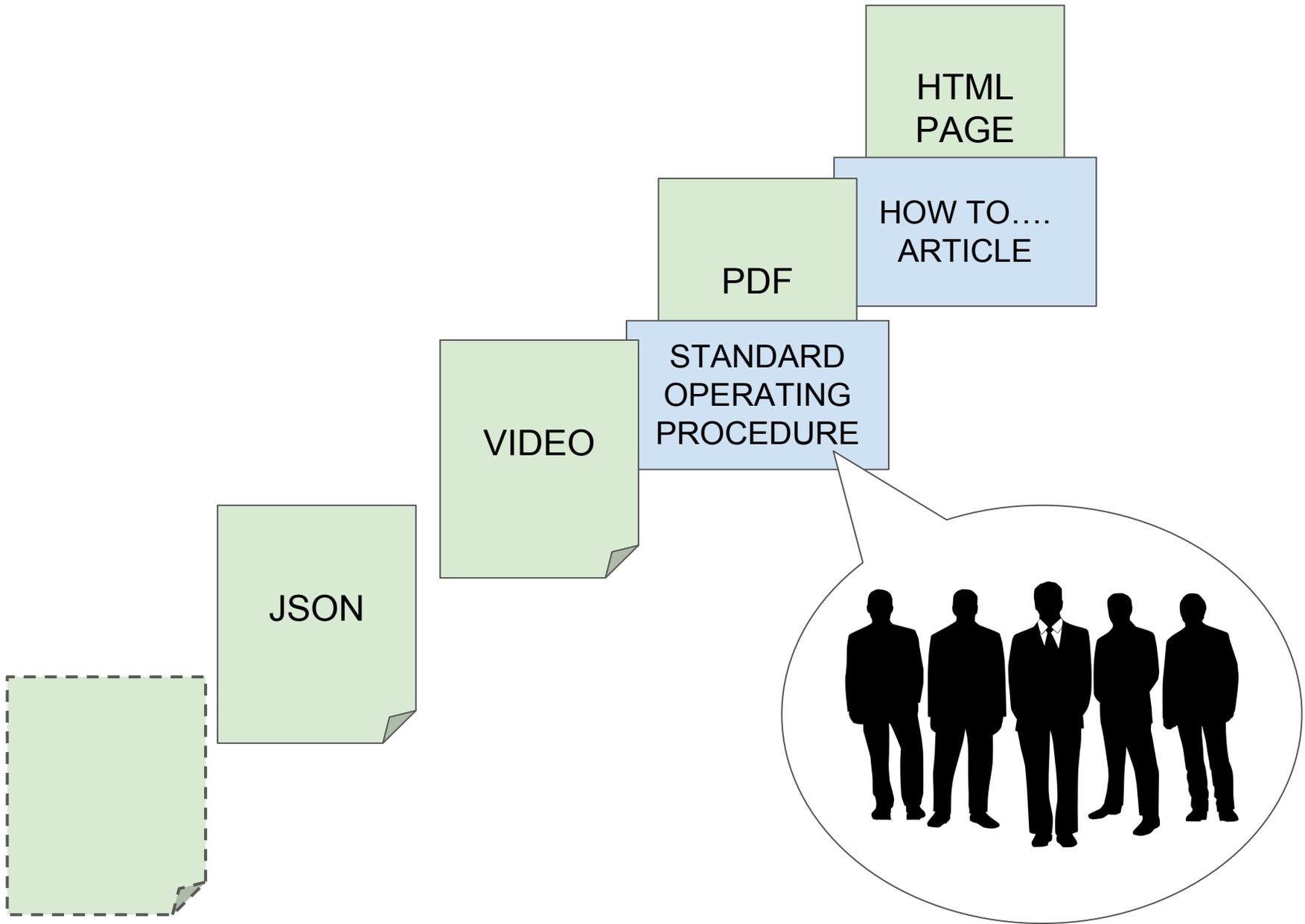
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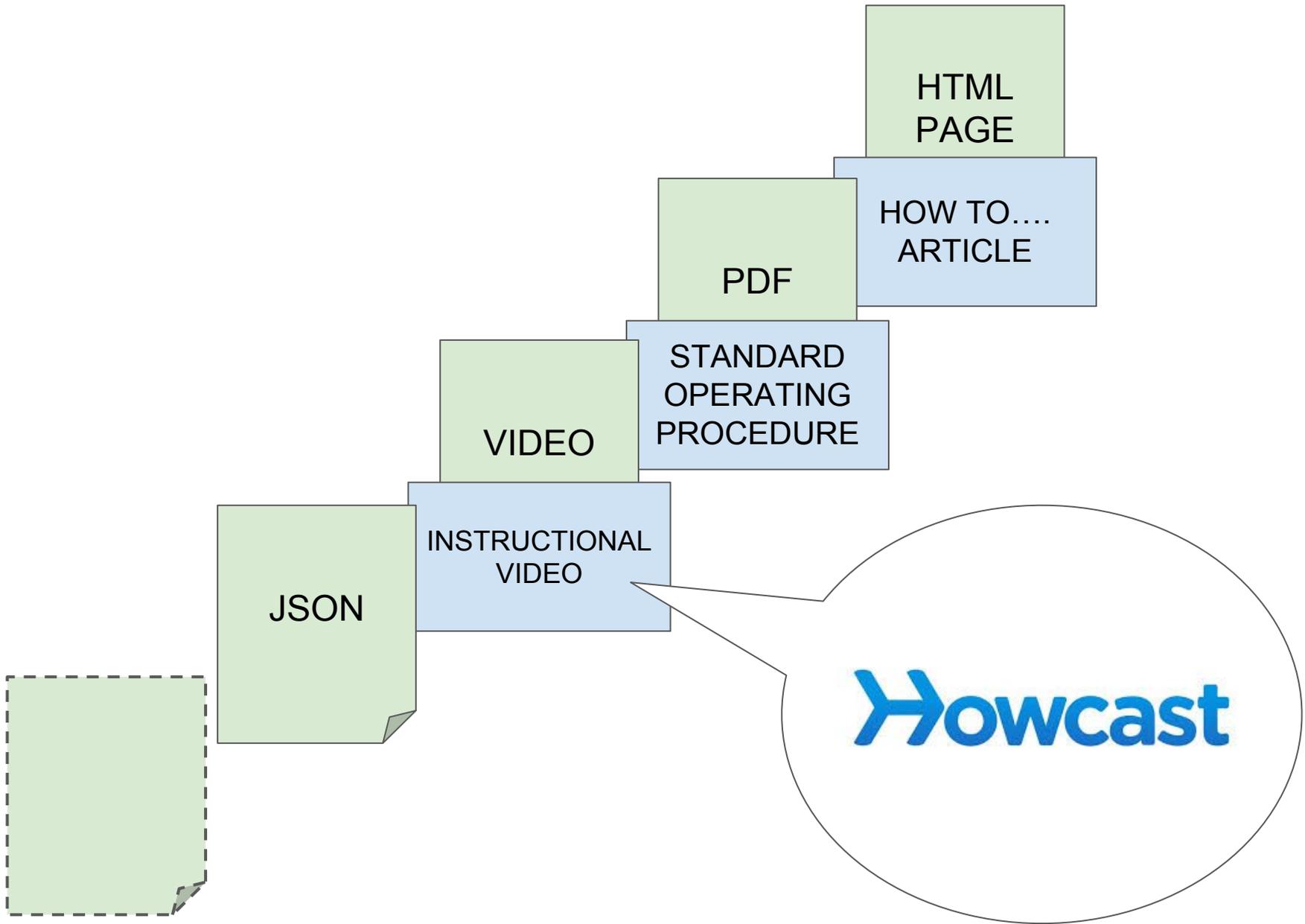


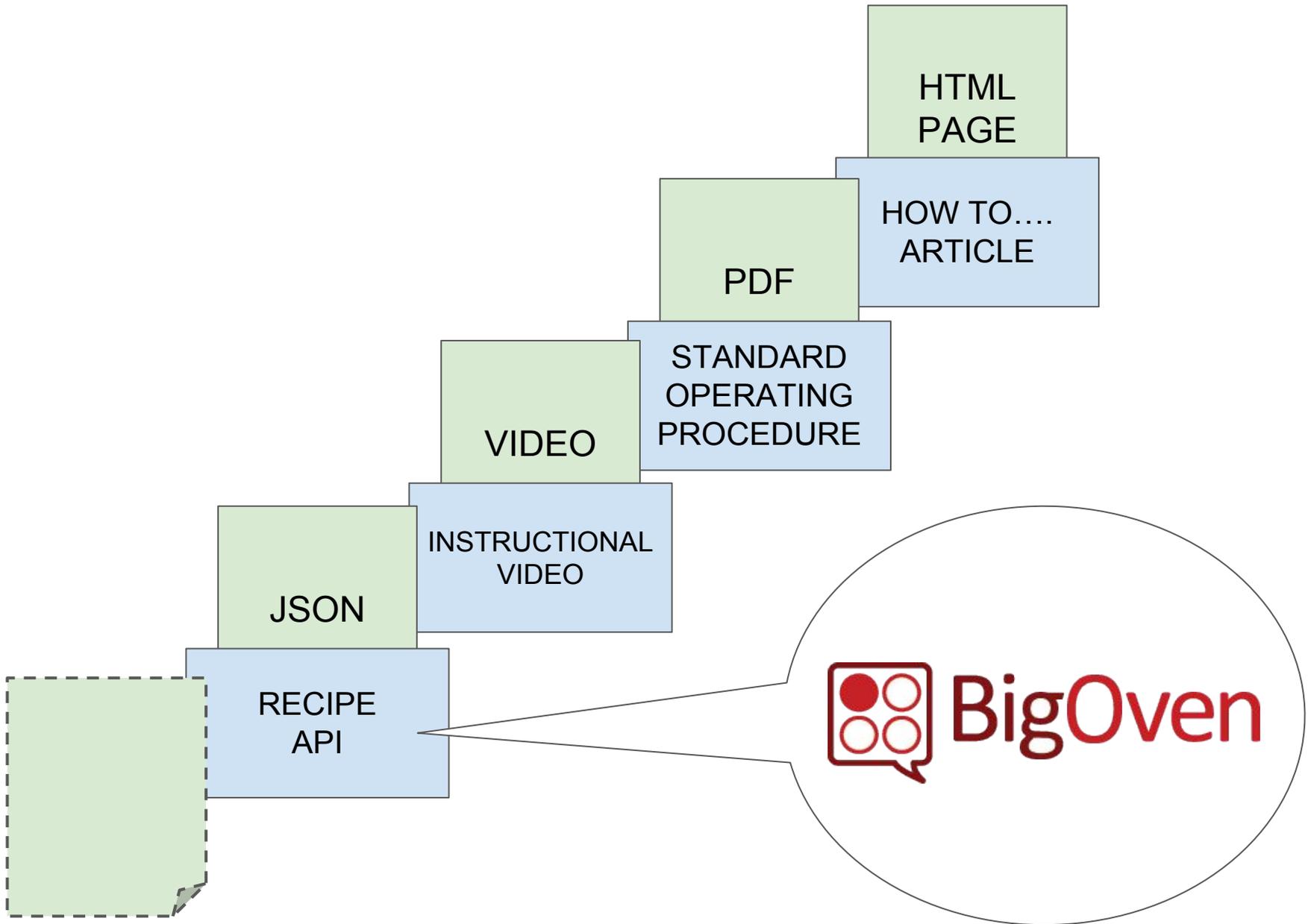


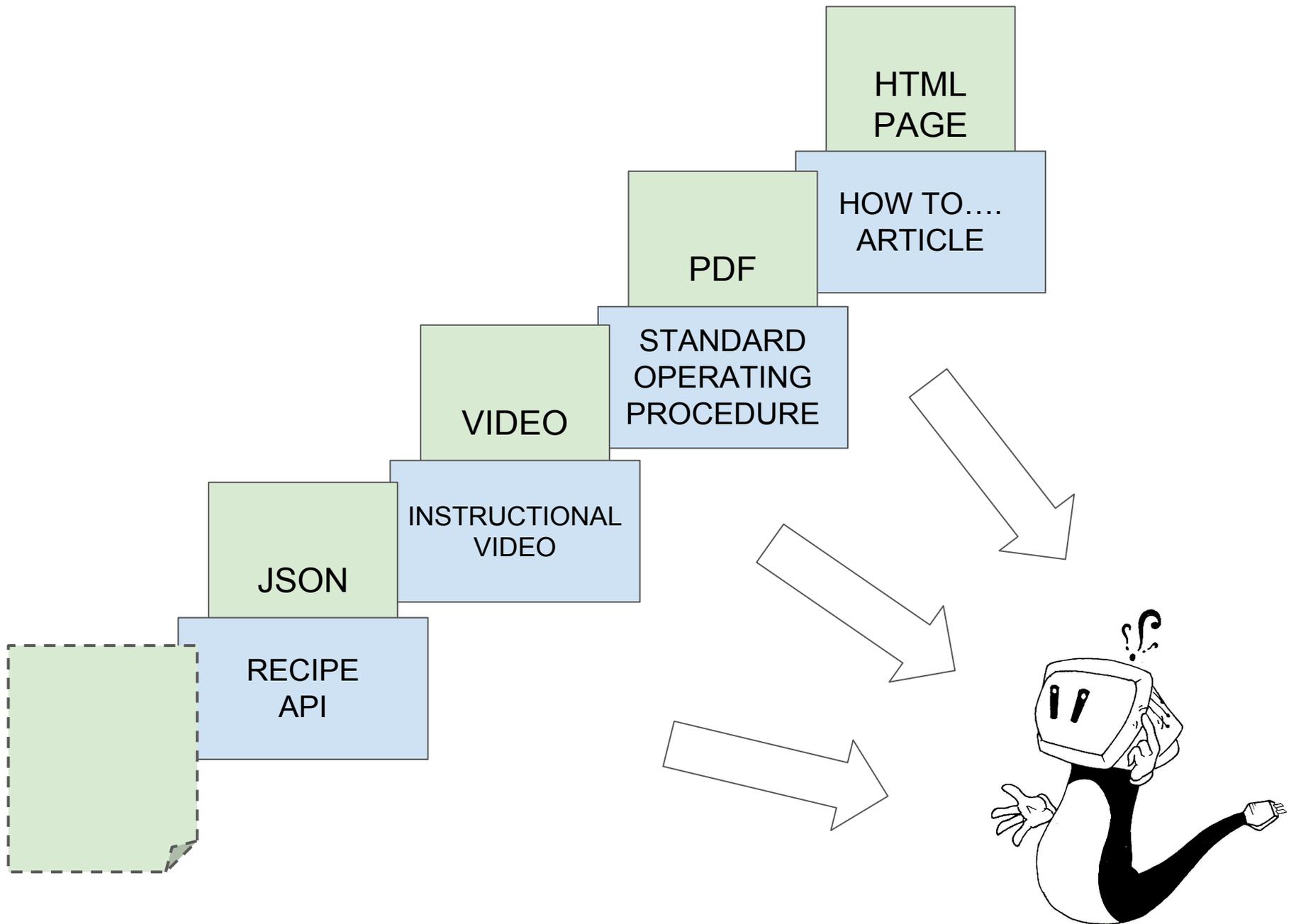












# How can we get the structured data?

- NLP + ML approaches
- Image processing
- Process mining from execution logs
- Semi-structured resources

# How can we get the structured data?

- NLP + ML approaches
- Image processing
- Process mining from execution logs
- **Semi-structured resources**

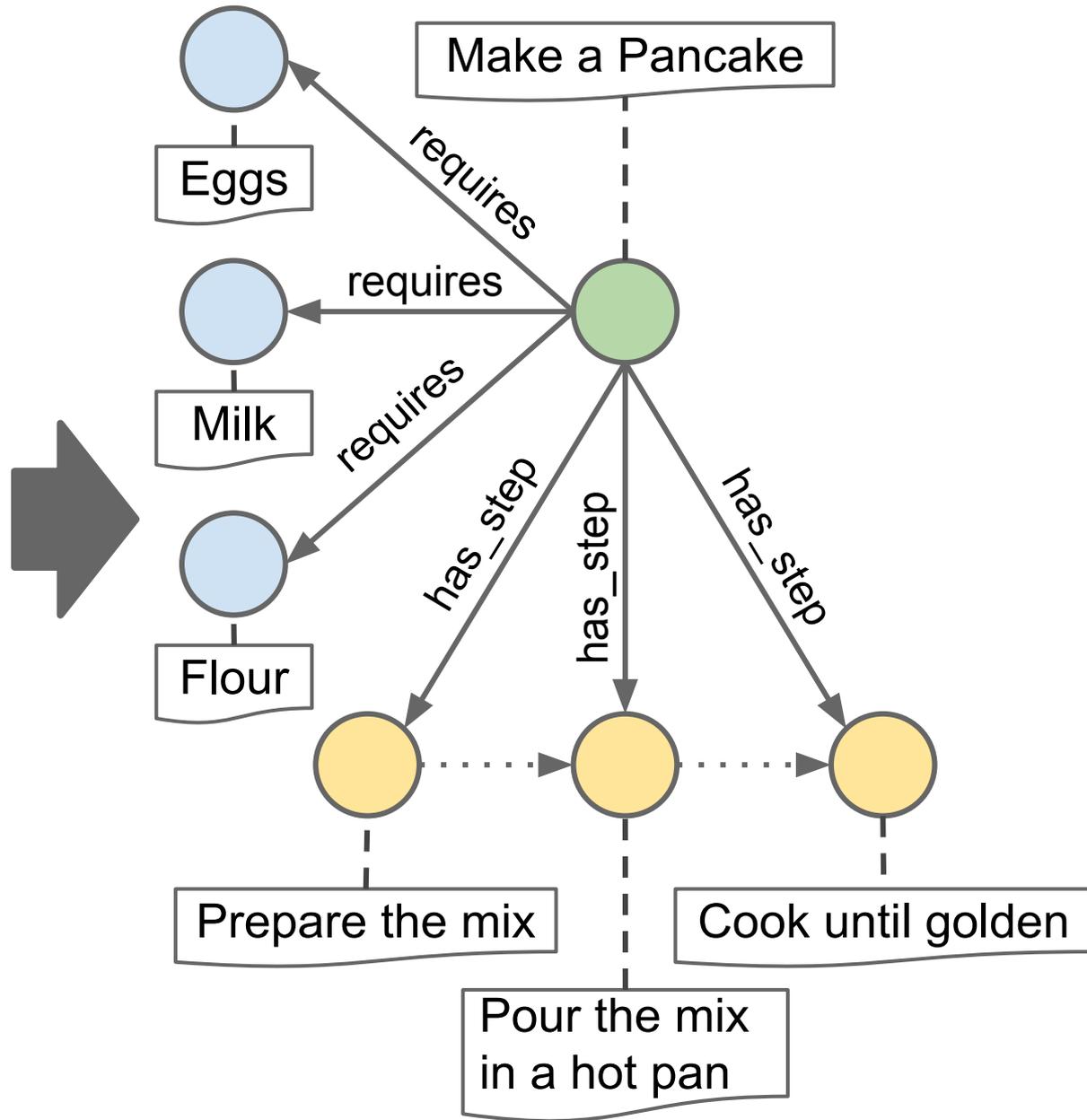
# How to Make a Pancake

## Steps:

1. Prepare the mix
2. Pour the mix in a hot pan
3. Cook until golden

## Requirements:

- Eggs
- Milk
- Flour



# Semi-structured resources

**wikiHow**  
The world's how to manual.

*Snapguide*

> 200.000  
procedures



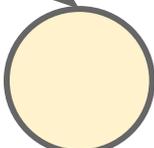
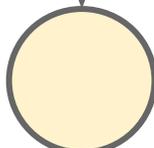
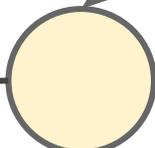
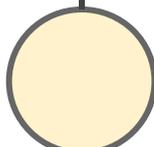
PROHOW  
Dataset

[http:// w3id.org/knowhow/dataset](http://w3id.org/knowhow/dataset)

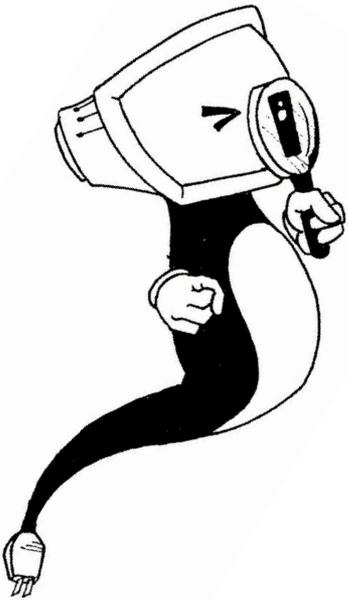


**What about the links?**

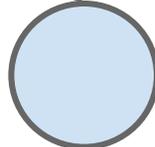
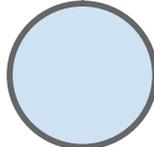
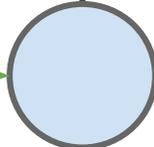
# How to Install an Operating System



create a partition

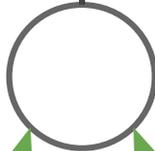


# How to Create a Partition



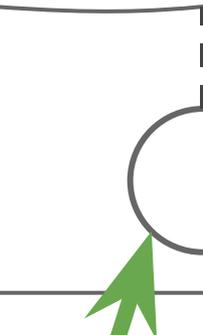
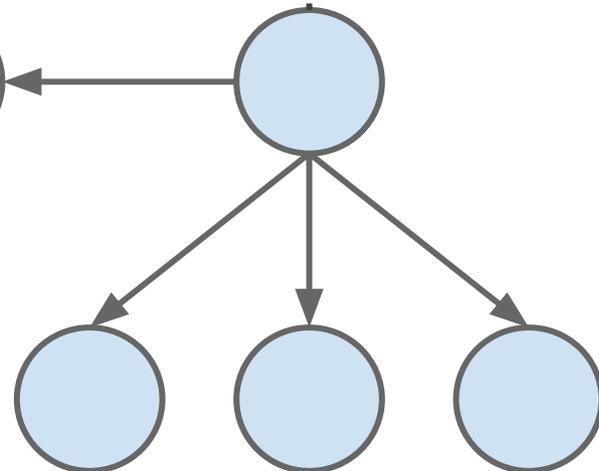
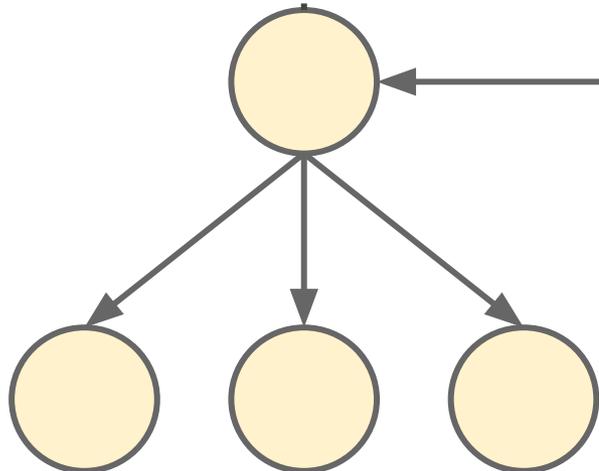
*DBpedia*

Guacamole



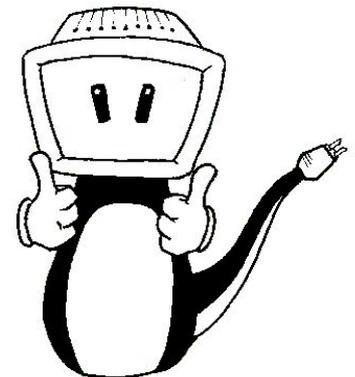
How to Make Guacamole

How to Serve Nachos



# Link Creation: our system Vs wikiHow community

- + 16% precision
- × 2 number of links
- × 2 coverage
  
- + *automatic*
- + *semantic links*

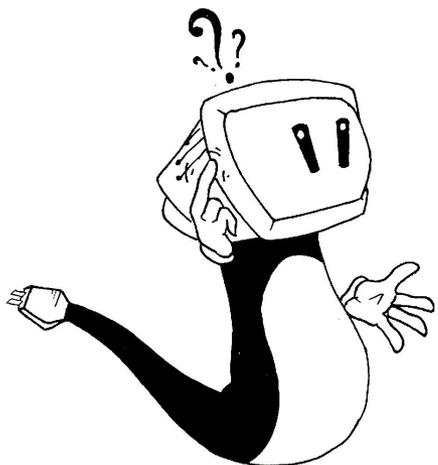
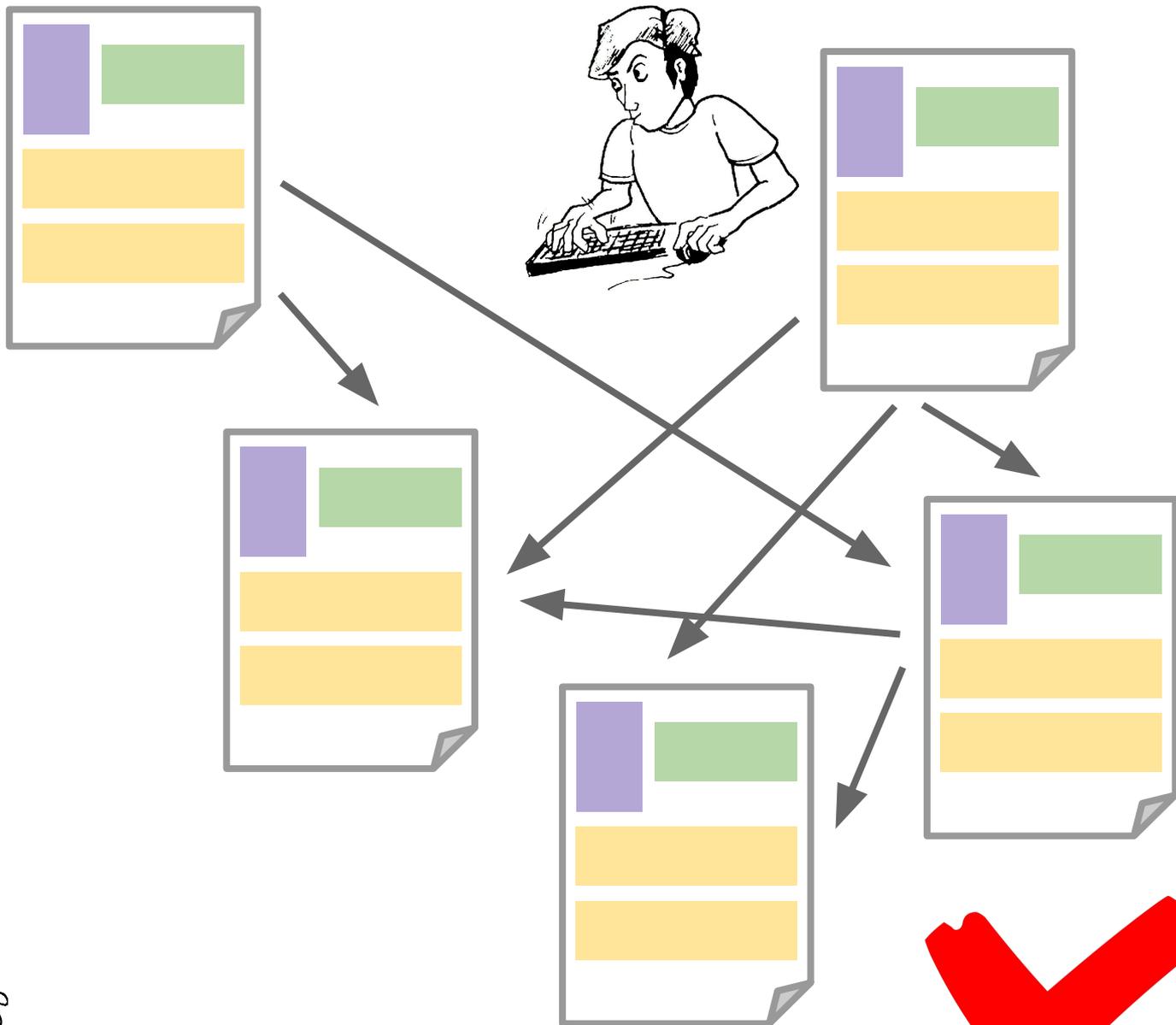


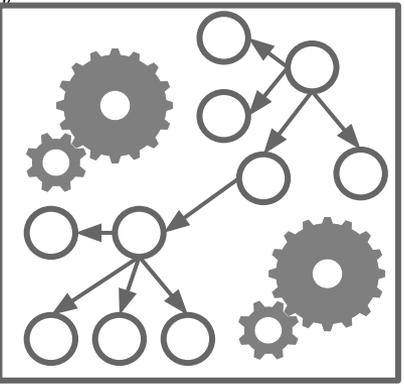
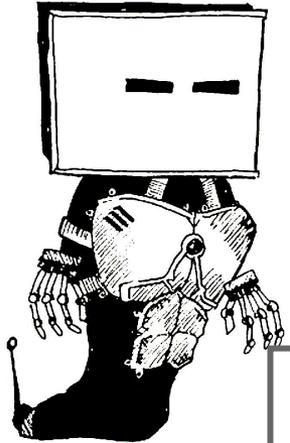
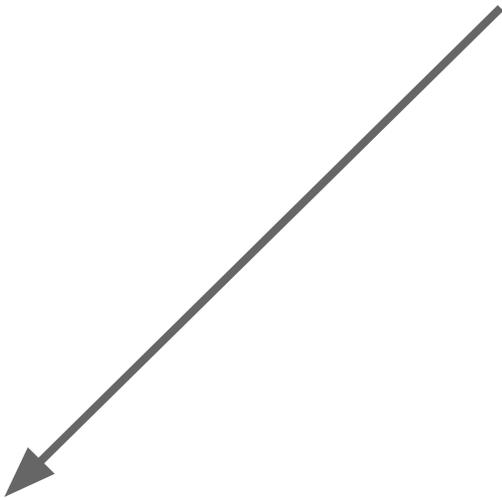
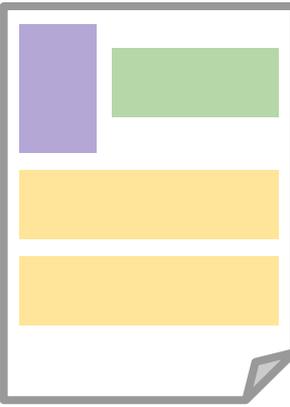
# Capturing the execution of tasks

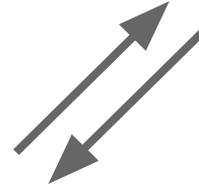
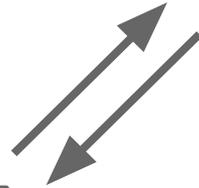
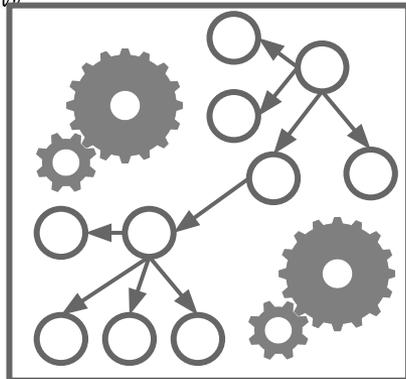
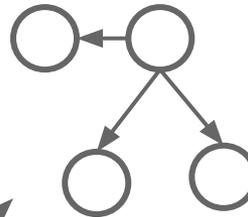
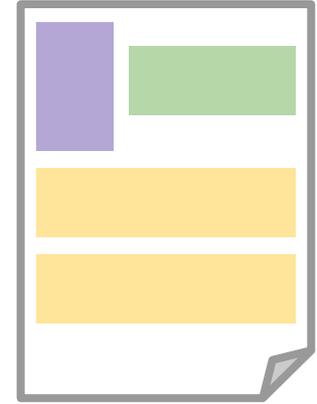
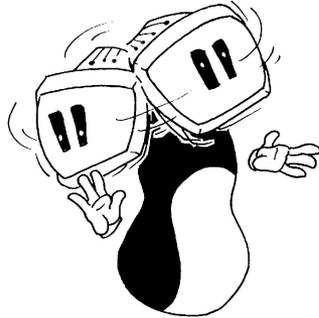
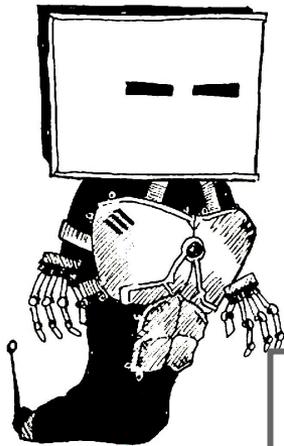


# Linked Data as point of contact for human-machine interactions

- Linked Data to represent both
  - know-how
  - executions
- In a format which is both
  - human understandable
  - machine understandable
- And that interleaves
  - human actions
  - machine actions







**Can the majority of (non-programmer) users create instructions (in some domain) which contain steps that are both human and machine understandable?**

# Experiment

<London: <https://en.wikipedia.org/wiki/London>>

<New York: [https://en.wikipedia.org/wiki/New\\_York\\_City](https://en.wikipedia.org/wiki/New_York_City)>

<Paris: <https://en.wikipedia.org/wiki/Paris>>

...

# Experiment

```
<London: https://en.wikipedia.org/wiki/London>  
<New York: https://en.wikipedia.  
org/wiki/New_York_City>  
<Paris: https://en.wikipedia.org/wiki/Paris>  
...
```



```
<li>London: https://www.london.gov.uk/</li>  
<li>New York: http://www1.nyc.gov/</li>  
<li>Paris: http://www.paris.fr/</li>  
...
```

*Step 1: Remove < and > from the string of text.*

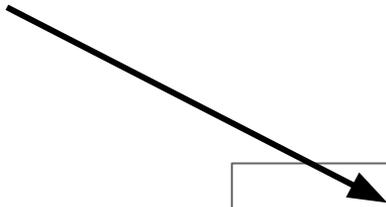
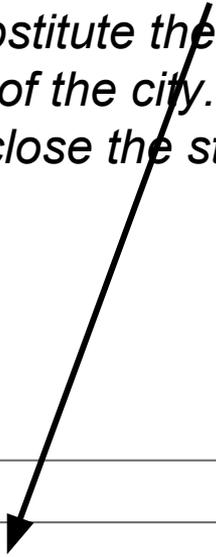
*Step 2: Substitute the wikipedia page of the city in the string of text with official homepage of the city.*

*Step 3: Enclose the string of text with <li> </li>.*

*Step 1: Remove < and > from the string of text.*

*Step 2: Substitute the wikipedia page of the city in the string of text with official homepage of the city.*

*Step 3: Enclose the string of text with <li> </li>.*



**Remove every occurrence of a particular character from the string of text**

**(Complete) (Partial) (Unrelated)**

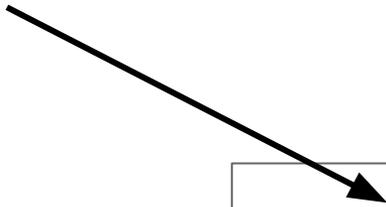
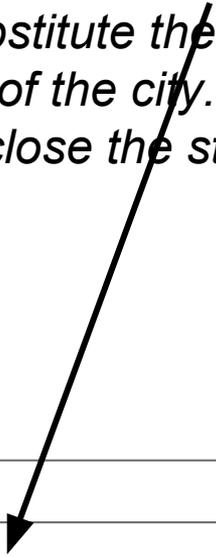
**Remove the last character in a string of text**

**(Complete) (Partial) (Unrelated)**

*Step 1: Remove < and > from the string of text.*

*Step 2: Substitute the wikipedia page of the city in the string of text with official homepage of the city.*

*Step 3: Enclose the string of text with <li> </li>.*



**Remove every occurrence of a particular character from the string of text**

**(Complete) (Partial) (Unrelated)**



**Remove the last character in a string of text**

**(Complete) (Partial) (Unrelated)**



*Step 1: Remove < and > from the string of text.*

*Step 2: Substitute the wikipedia page of the city in the string of text with official homepage of the city.*

*Step 3: Enclose the string of text with <li> </li>.*

**Remove the last character in a string of text**  
(Complete) (Partial) (Unrelated) ✓

**Remove every occurrence of a particular character from the string of text**  
(Complete) (Partial) ✓ (Unrelated)

**Which character?**

Step  
Step  
hor  
Step

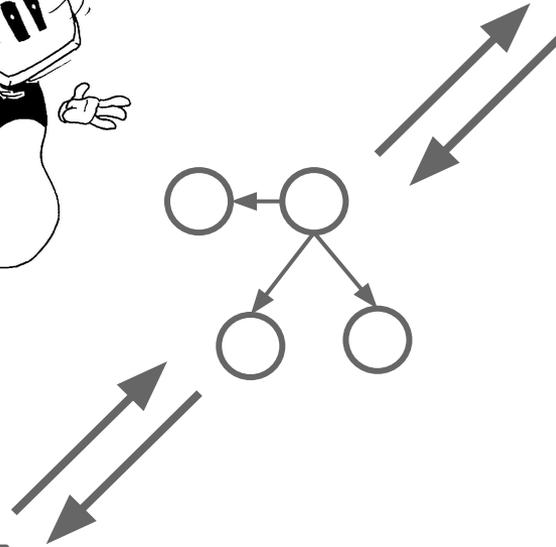
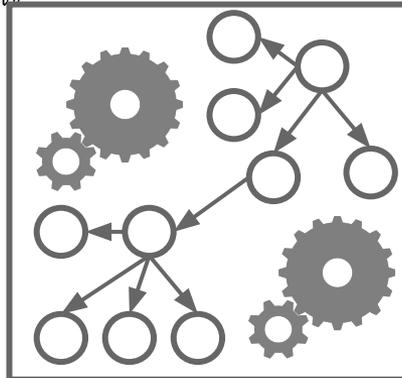
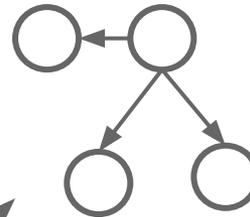
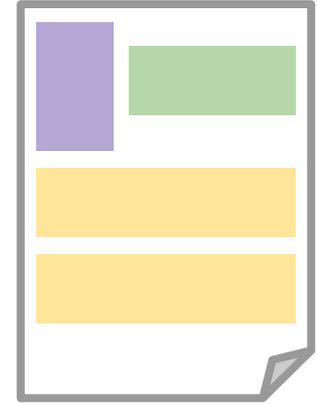
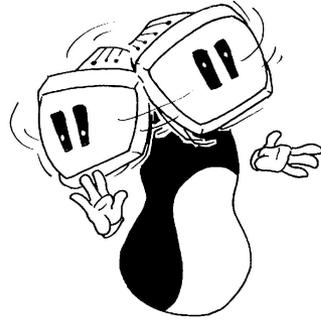
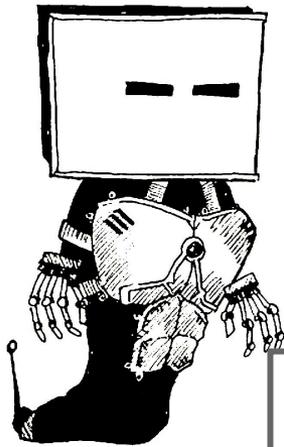
Crowdsourced links to functionalities:  
97% precision  
82% recall

cial

Remove the last character in a  
string of text  
(Complete) (Partial) (Unrelated) ✓

Remove every occurrence of a particular  
character from the string of text  
(Complete) ✓ (Partial) (Unrelated)

Which character?



# String Modification Task

Do it!

Automate it!

## Requirements

- The string of text to modify

## Steps

1. Remove `<` and `>` from the string of text.
  2. Substitute the wikipedia page of the city in the string of text with official homepage of the city.
  3. Enclose the string of text with `<li>` `</li>`.
-

# Activity: String Modification Task

## Requirements

- ~~The string of text to modify~~ DONE!

London: `https://en.wikipedia.org/wiki/London`

+

## - Steps:

1. ~~Remove < and > from the string of text.~~ DONE!

+

2. Substitute the wikipedia page of the city in the string of text with official homepage of the city.

DONE!

AUTOMATE!

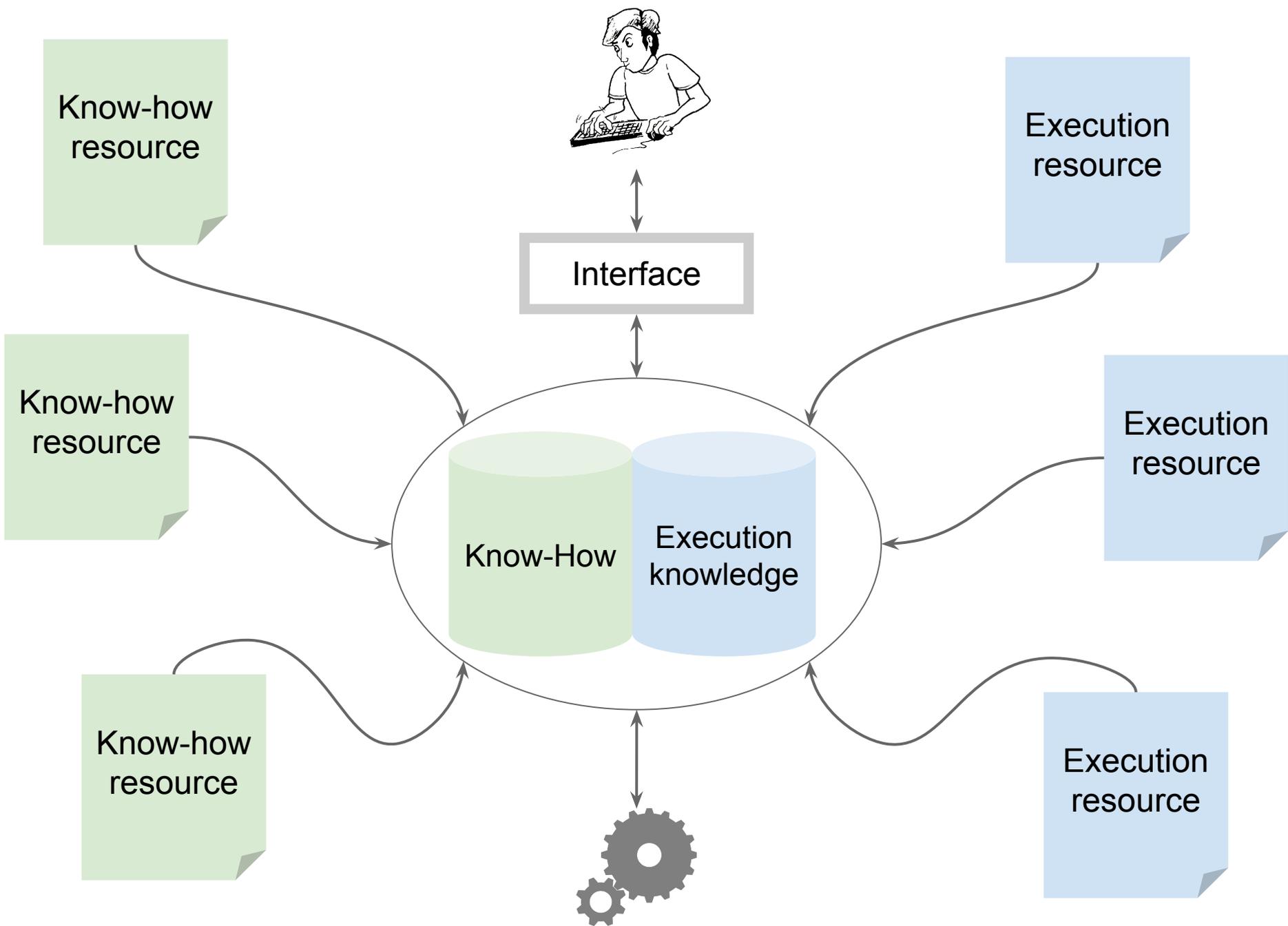
+

3. Enclose the string of text with `<li>` `</li>`.

DONE!

AUTOMATE!

+



**The end,**  
any questions?

