

# Short Introduction to the FAIR data principles



# What is FAIR data

**F**indable 

It should be possible for others to discover your data.

**A**ccessible 

It should be possible for humans and machines to gain access to your data.

**I**nteroperable 

It should be possible to combine and exchange data from different sources.

**R**eusable 

Data should be sufficiently documented to support their interpretation and reuse.

# The issue of non-findable data



Knowledge cannot be obtained from data that you cannot locate.

Duplicate experiments that some else has performed.






Searching for data results in a waste of time and effort.

Missed chance for interdisciplinary discoveries.

# Making data findable



**F1:** (Meta)data are assigned a globally unique and persistent identifier

By Part + Color (Element)	
 300524	 407024
 300521	 407021
 300523	 407023
 300501	 407001
 300526	 407026

# Making data findable



**F1:** (Meta)data are assigned a globally unique and persistent identifier

**F2:** Data are described with rich metadata

By Part + Color (Element)	By Part	By Color	By Category
 300524	 407024	 24. Bright Yellow (Yellow)	 Bricks
 300521	 407021	 21. Bright Red (Red)	 Plates
 300523	 407023	 23. Bright Blue (Blue)	 SNOT
 300501	 407001	 1. White	 Slope
 300526	 407026	 26. Black	 Technic
	 3005		
	 4070		

# The issue with non-accessible data



To use the data you find, you need to get your hands on it.

Detailed metadata cannot be obtained with restricted access.



Lack of clear access rules lead to long time to acquire the data.

Inability to reproduce and verify data.

# Accessibility





**A1:** (Meta)data are retrievable by their identifier using a standardized communication protocol

## What is a communication protocol?

A set of rules and standards that allow for exchange of data between two or more entities in a consistent and predictable manner.

For example: hypertext transfer protocol (HTTP).

The screenshot shows the Bricklink website interface. At the top, there's a navigation bar with the Bricklink logo, a search bar, and various utility icons like Market, Studio, Programs, Community, Sell, Log in / Register, and Cart. Below this is a secondary navigation bar with links like Catalog, View, Search, Price Guide, Color Guide, Inventories, Appears In, Relationships, Download, Add or Change, Logs, Credits, and Stores. The main content area displays the search results for 'Brick' in the 'Parts' category. It includes a search filter section with 'Find:' and 'in: Parts' dropdowns, and options for 'Sort by: Item Name' and 'Order: Up'. There are also navigation links for 'List', 'List with Images', 'Thumbnail Gallery', and 'Year Summary'. A pagination bar shows '[Previous] 1 [2][Next]' and '85 Items Found. Page 1 of 2 (Showing 50 Items Per Page)'. The main table has columns for 'Image', 'Item No.', and 'Description'. The first row shows a blue brick (Item No. 3005) with a red hand cursor icon pointing to it. The second row shows a green brick (Item No. 3005f2).

Image	Item No.	Description
	3005	Brick 1 x 1 Catalog: Parts: <a href="#">Brick</a>
	3005f2	Brick 1 x 1 Transparent with Frosted Horizontal Line Catalog: Parts: <a href="#">Brick</a>

# Accessibility



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The screenshot shows a web browser address bar with the URL <https://www.bricklink.com/v2/catalog/catalogitem.page?P=3005>. Below the address bar, the page content includes:

- Catalog:** [Parts](#): [Brick](#): 3005
- Brick 1 x 1**
- Item No: 3005 Alternate Item No: 30071, 35382
- [View Price Guide](#) [Buy](#)
- Select Color** dropdown menu with a blue brick selected.
- Item Info:** Years Released: 1954 - 2023, Weight: 0.44g, Stud Dim.: 1 x 1 x 1 in studs, Pack. Dim.: 0.8 x 0.8 x 1.15 cm.
- Item Consists Of:** N/A
- Item Appears In:** [4073 Sets](#), [49 Minifigures](#), [22 Parts](#), [25 Books](#), [23 Gear](#)
- My Store Inventory:** [Add to My Store Inventory](#), 183489 Lots For Sale
- My Wanted List:** [Add to My Wanted List](#), On 2735504 Wanted Lists
- My Collection:** [Add to My Collection](#), In 6590 Collections



# The issue with non-interoperable data



Data are stored formats that require specialized tools to use.

Impossible to compare data from different sources.



Different labels exist to describe the same quantities.

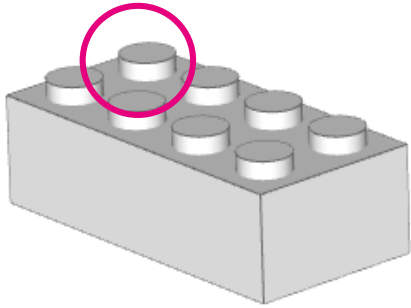
Data are structured differently by different researchers.

[Photo by Carlos Móner, Bricks on Display](#)

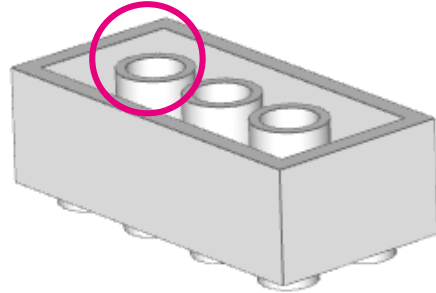
# Making data interoperable



**1:** (Meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation



- Protrusion
- Cylinder
- Post
- Stud

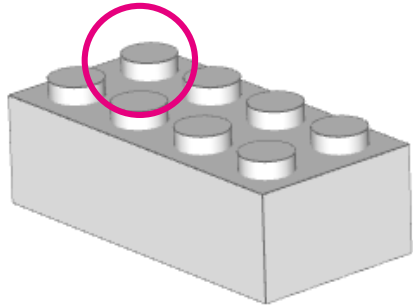


- Hole
- Hollow cylinder
- Tunnel
- Tube

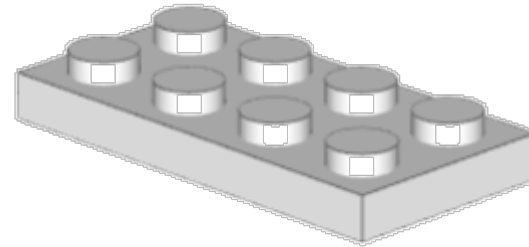
# Making data interoperable



**1:** (Meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation



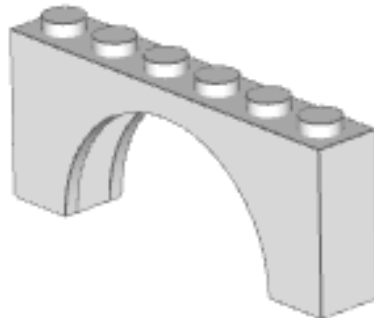
This is a **brick** with 8 studs



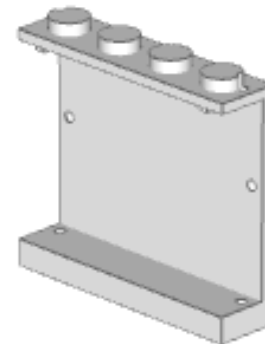
This is a **plate** with 8 studs



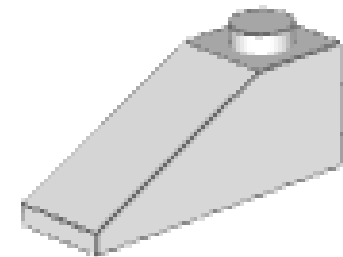
Tile



Arch



Panel



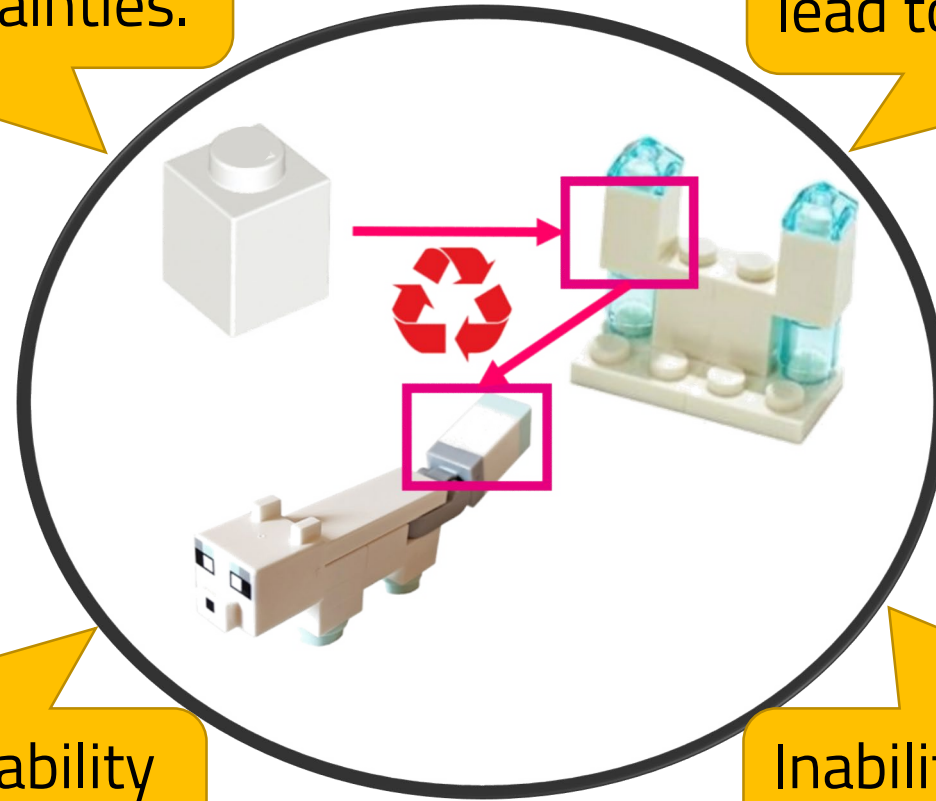
Slope

# Issues associated with data reusability



Absence of a clear license for data reuse leads to uncertainties.

The lack of digitized metadata lead to misinterpretation.



Inability to assess the suitability of data for the planned reuse.

Inability to define who should be credited, cited, or contacted.

# Making data reusable



**R1:** (meta)data are richly described with a plurality of accurate and relevant attributes

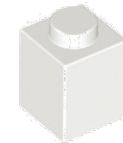
Both the metadata and data should be described in a manner that enables assessment of the resource in a certain study.

## Plurality

Make no assumption on who the user of your data may be

Be as generous as possible with the provided metadata

Metadata should support a variety of possible use cases for you data





# Learn more:

Full Tutorial on YouTube:



All Slides on Zenodo:

