



Christopher Pollin (Universität Graz, Institut Zentrum für Informationsmodellierung)

„Dashboardfizierung“ Historischer Rechnungsbücher

Ontologiebasierte Informationsvisualisierung für historische Daten

Virtuelles Digital Humanities Kolloquium der Berlin-Brandenburgischen Akademie der Wissenschaften ; (Berlin) : 2021.05.07

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“Dashboardfizierung” Historischer Rechnungsbücher

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historische Daten



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*Zentrum für Informationsmodellierung - Austrian
Centre for Digital Humanities*

07.05.2021



Motivation

*Ten years ago the research focus in semantic portal development **was on data harmonization, aggregation, search, and browsing [...]**. At the moment, the rise of Digital Humanities research has started **to shift the focus to providing the user with integrated tools for solving research problems in interactive ways [...]***

Hyvönen, Eero. (2019). Using the Semantic Web in digital humanities: Shift from data publishing to data-analysis and serendipitous knowledge discovery. *Semantic Web*. 11. 1-7. 10.3233/SW-190386.

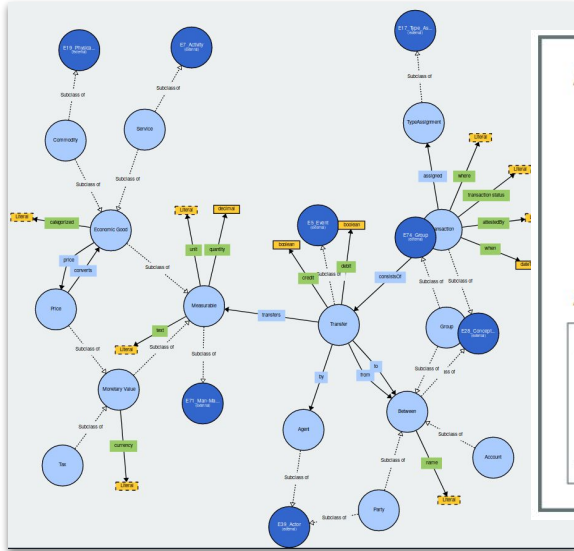
*[The Semantic Web] as an inherently application-driven field, this consolidation will have to happen across its sub-fields, resulting in application-oriented processes that are well-documented as to their goals and pros and cons, and which are **accompanied by easy-to-use and well-integrated tools supporting the whole process.***

Hitzler, P. (2021). A review of the semantic web field. *Communications of the ACM*, 64(2), 76-83.

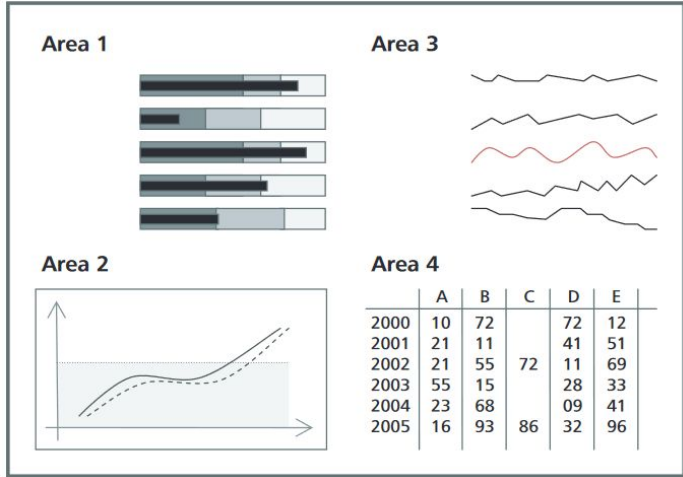
DEPCHA - Digital Edition Publishing Cooperative for Historical Accounts



Historische Daten



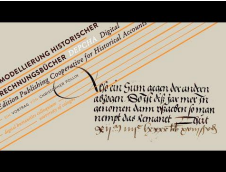
Bookkeeping Ontology



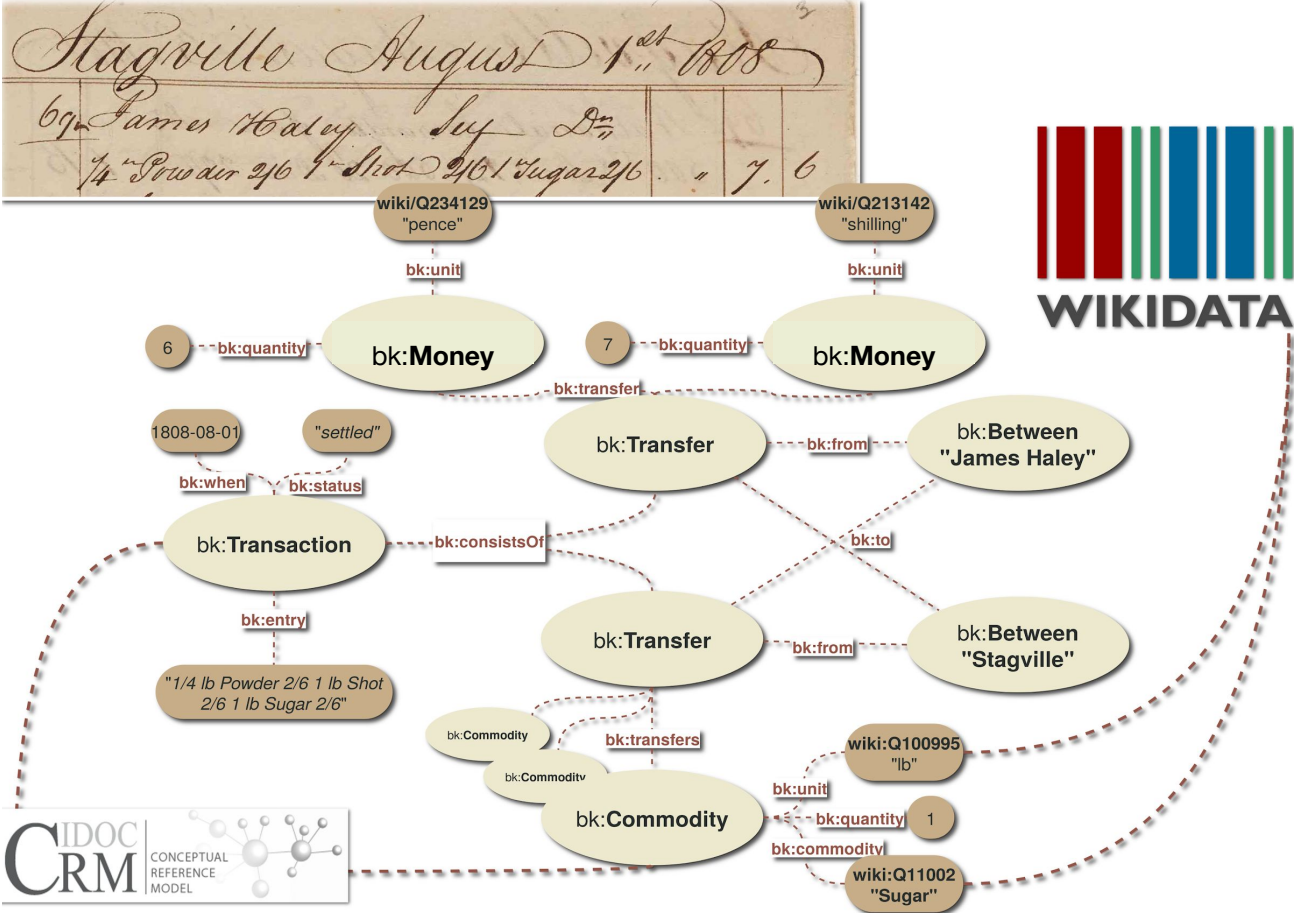
Dashboard

User Stories

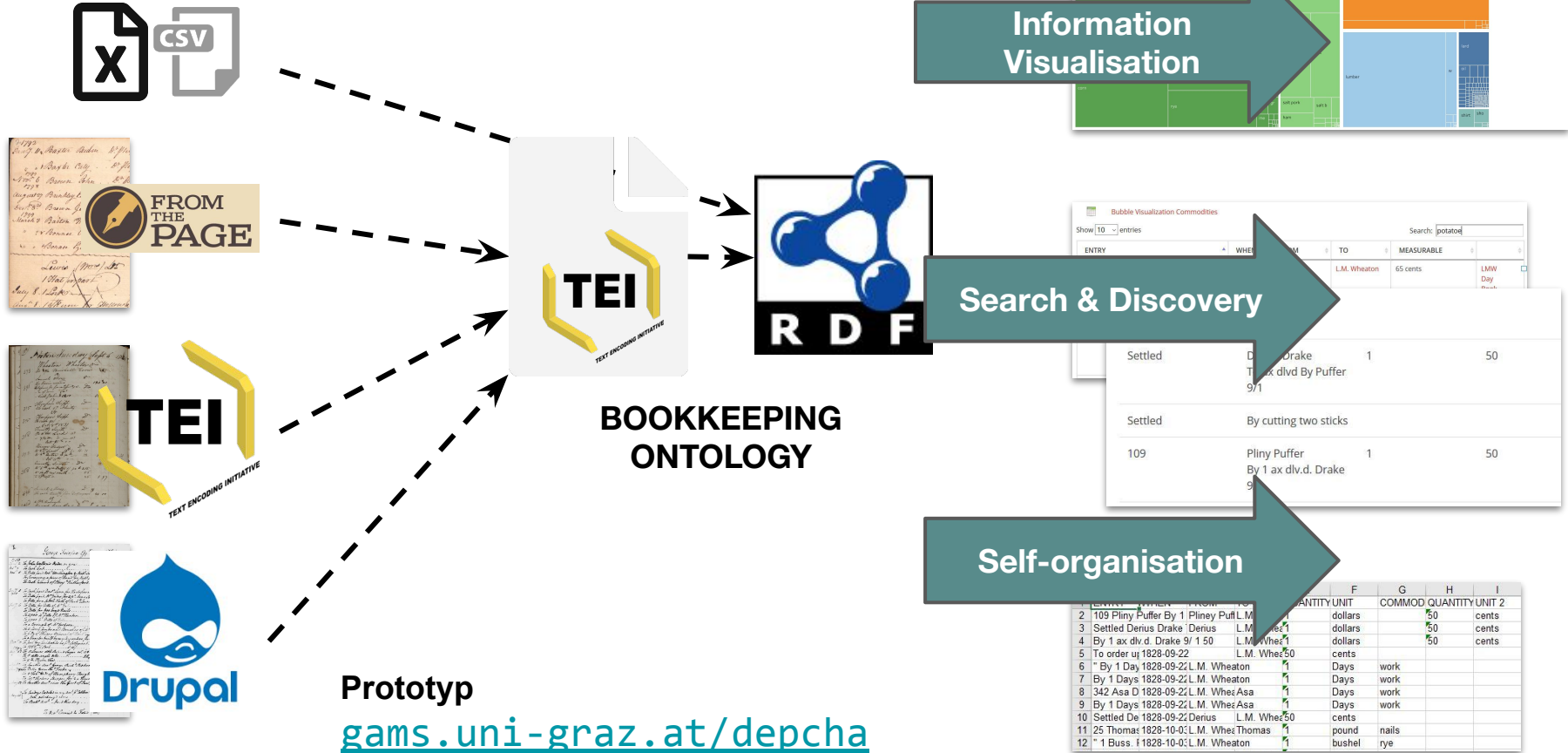
Ontology - InfoVis



Die Domäne: Transaktionen in historischen Rechnungsunterlagen



DEPCHA - Workflow



Bubble Visualization Commodities

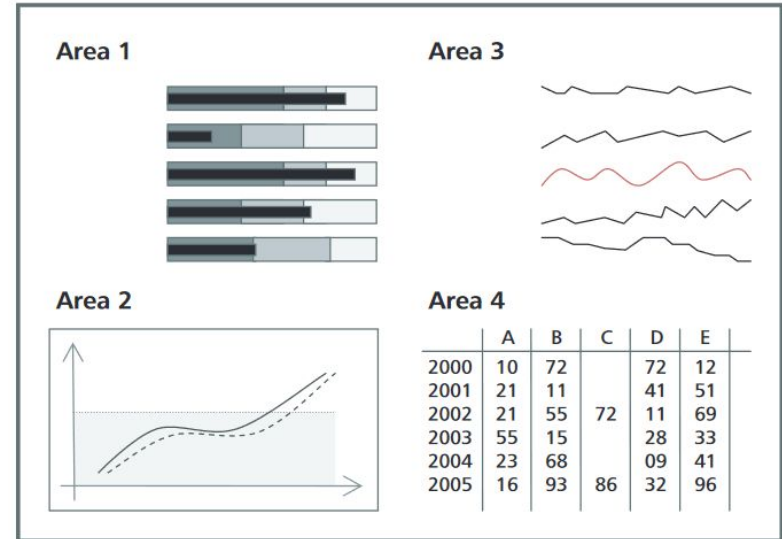
Show 10 entries

ENTRY	MEASURABLE	Search: [potato]
L.M. Wheaton	65 cents	
Settled Drake	1	
By cutting two sticks		
109 Pliny Puffer	1	
By 1 ax div.d. Drake		

	QUANTITY	UNIT	F	G	H	I
109 Pliny Puffer By 1 Pliny Puff L.M.	1	dollars		50		cents
Settled Derius Drake / Derius L.M. Whee	1	dollars		50		cents
By 1 ax div.d. Drake 9/ 1 50 L.M. Whee	1	dollars		50		cents
To order u; 1828-09-22 L.M. Whee	50	cents				
By 1 Day 1828-09-22 L.M. Wheaton	1	Days				work
By 1 Days 1828-09-22 L.M. Wheaton	1	Days				work
342 Asa D 1828-09-22 L.M. Whee Asa	1	Days				work
By 1 Days 1828-09-22 L.M. Whee Asa	1	Days				work
Settled De 1828-09-22 Derius L.M. Whee	50	cents				
25 Thomas 1828-10-03 L.M. Whee Thomas	1	pound				nails
1 Buss. f 1828-10-03 L.M. Wheaton	1	bushel				rye

Dashboard?

A “**faceted analytical display**” is a **set of interactive charts** (primarily graphs and tables) that simultaneously reside on a **single screen**, each of which presents a somewhat **different view of a common dataset**, and is used to **analyze that information**.

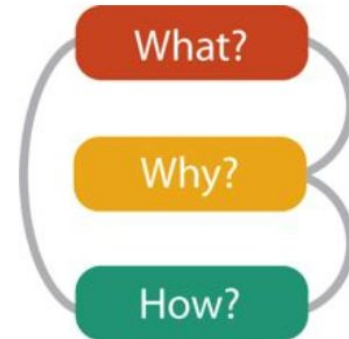


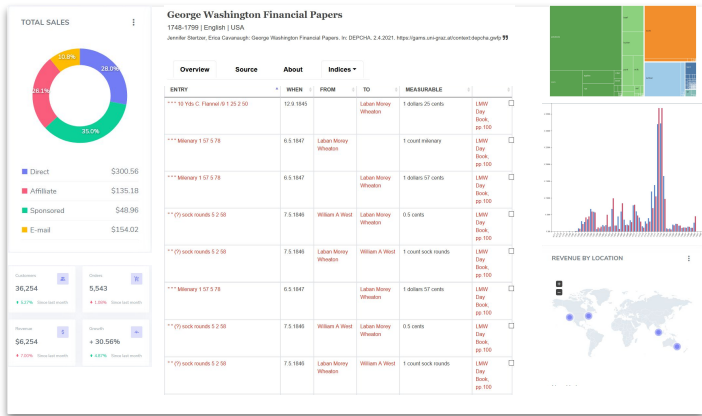
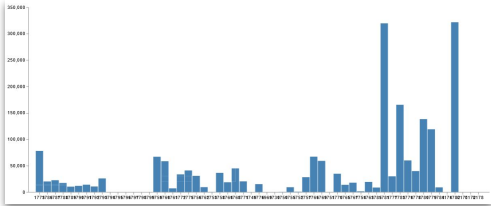
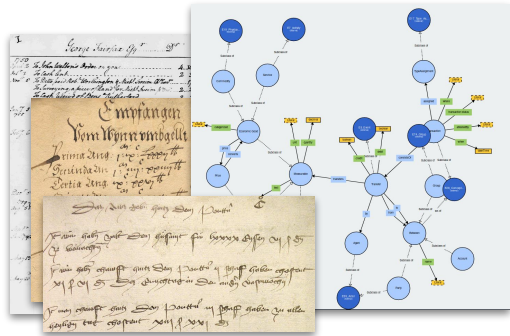
Informationsvisualisierung (InfoVis)

*Computer-based visualization systems provide **visual representations of datasets designed to help people carry out tasks more effectively.***

[...]

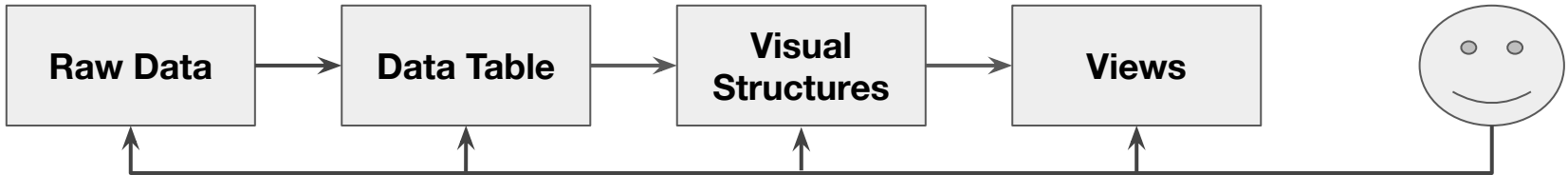
*Vis designers must take into account three very different kinds of resource **limitations: those of computers, of humans, and of displays.***





Data

Visual Form



Data Transformation

Visual Mappings

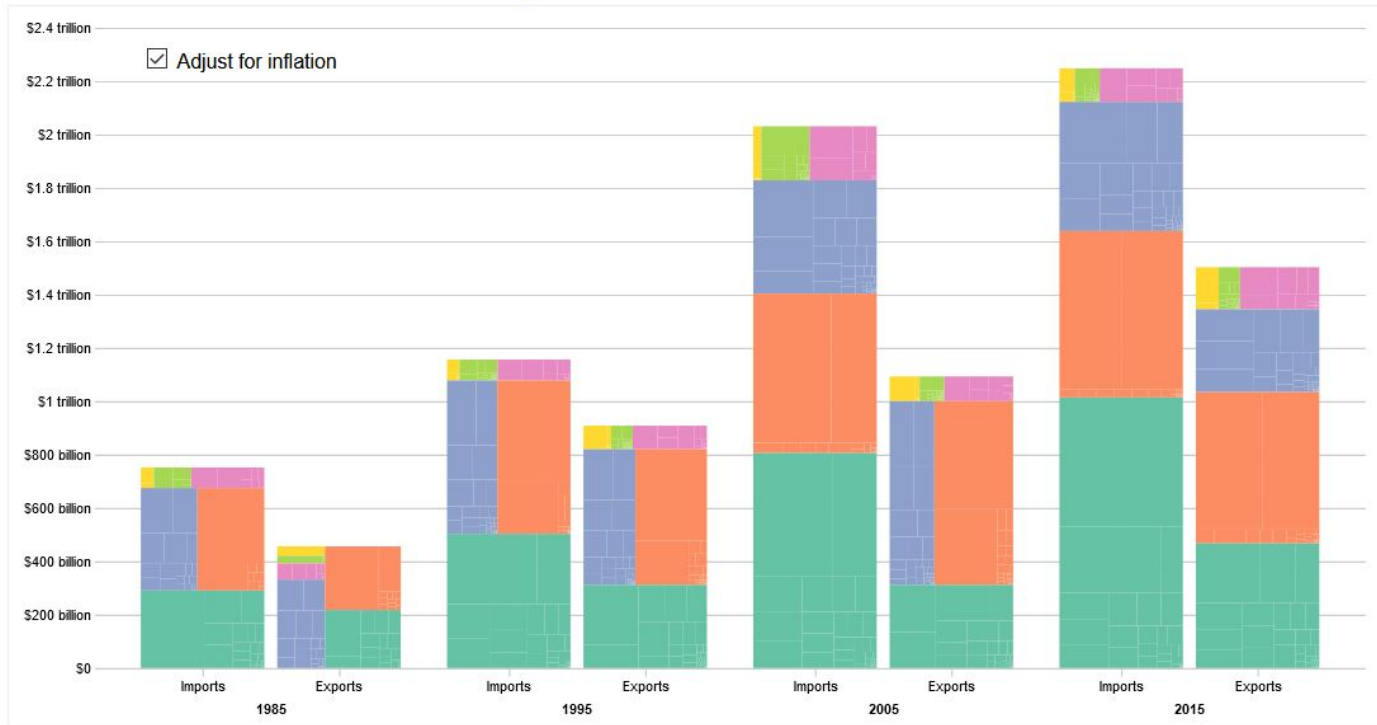
View Transformations

Task
Human Interaction

Referenzmodell der Informationsvisualisierung nach Card et al.

- Card et al. (1991): Readings in Information Visualization: Using Vision to Think. Morgan Kaufmann, 02 Feb 1999.
- Reiterer, H. / JETTER H. (2013): Informationsvisualisierung. In: Kuhlen et. al: Grundlagen der praktischen Information und Dokumentation : Handbuch zur Einführung in die Informationswissenschaft und - praxis. 6. Berlin, S. 192-206.

Zoomable Treemap Bar Chart



Zoomable Treemap Bar Chart

<https://bl.ocks.org/cmgiven/4541f6de7b6fbef482aaa43f3a71f8d4>

Wie kann “Wissen” innerhalb einer *Knowledge Base* genutzt werden, um (möglichst) generisch, aber user- bzw. domänenspezifische Informationsvisualisierungen für historische (geisteswissenschaftliche) Information zu implementieren?

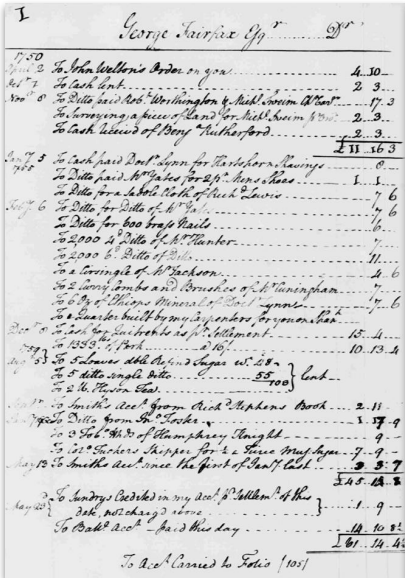
George Washington Financial Papers (1748-1799)

Geschäfts- und Haushaltsakten des US-Präsidenten George Washington

User Story

Transaktionen zu "Ferriages"

Book page	Date	Account Name (data)	Entry	£	Pounds	Shillings	Pence
Ledger A, 1750 - 1772: pg.2	January 1755	Washington, Augustine	To Ferriages at Poseys, sendg to Mr Chapmans forye			4	
Ledger A, 1750 - 1772: pg.12	1758	Alton, John, Posey, John	To Ferriage allowed Captn Posey in acct settled			2	
Ledger A, 1750 - 1772: PG-14	13 September 1755	Posey, John	By Ferriages, and looking after my Negroes	1	11		10 1/2
Ledger A, 1750 - 1772: pg.14	6 March 1760	Posey, John	By Sundrie Ferriages &ca to the date	8	3		7 1/2
Ledger A, 1750 - 1772: PG-34	17 March 1757	Cash	By Doctr Bond 4.6.8. Ferriages 2/6	4	9		2
Ledger A, 1750 - 1772: PG-34	17 March 1757	Cash	By Ferriages over So. River 2/6. Ditto Alexa. 2/6			5	
Ledger A, 1750 - 1772: PG-38	10 March 1758	Cash	By my Mothers Sue 3/9 Ferriage to Hobshole 8/9			12	6
Ledger A, 1750 - 1772: PG-38	29 March 1758	Cash	By Ferriages at Chamberlains 3/6 ye [the] Ferryn 3 1/2			6	7 1/2
Ledger A, 1750 - 1772: PG-40	October 1755		By Ferriage at Alexandria 10/. Dr Ross in cha: 2/6			12	6
Ledger A, 1750 - 1772: pg.55	14 April 1759	Cash	By Ferriage at Occoquan 1/3. Tavern at Do 5/4 1/2			6	7 1/2
Ledger A, 1750 - 1772: pg.56	16 June 1759	Cash	By Mrs Dandridge Servts 2/6. Ferriage Westpt—5			7	6
Ledger A, 1750 - 1772: pg.58	20 August 1759	Cash	By Ferriages 5/. By ditto 7/6 in Maryland			12	6
Ledger A, 1750 - 1772: pg.59	August 1760	Custis, Martha Parke ("Patsy")	✓ To paid Ferriages when She was Sick			9	



Epic

Als Historiker*in möchte ich Einnahmen/Ausgaben mit Bezug auf bestimmte Wirtschaftsobjekte analysieren.

User Story 1

Als Wirtschaftshistoriker*in möchte ich Kosten für den Transport (T) von Gütern und Personen im 18. Jahrhundert in den USA analysieren.

User Story 1.1

Ich möchte eine Aggregation aller Einnahmen, die durch T entstanden sind.

User Story 1.4

Ich möchte nach einzelnen Wirtschaftssubjekten und deren Beteiligung an T filtern

User Story 1.2

... eine Aggregation aller Ausgaben durch T

User Story 1.5

Ich möchte Kategorien von T und deren zeitliche Veränderung über Jahre untersuchen.

User Story 1.3

Ich möchte Einnahmen und Ausgaben für Teilbereiche im Bereich T aggregieren.

User Story 1.6

...

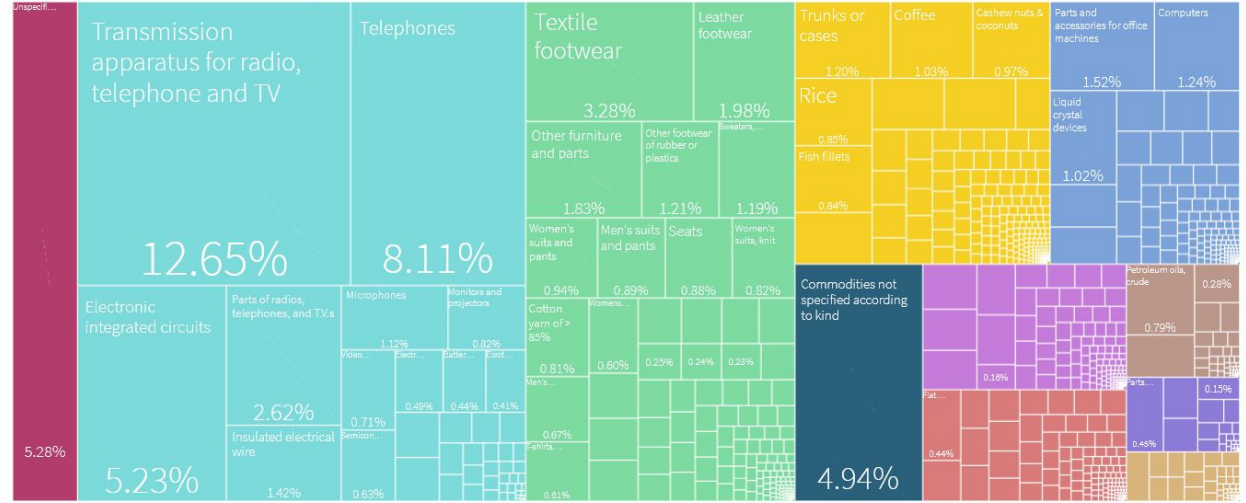
User Story 1.3

Ich möchte Einnahmen und Ausgaben für Teilbereiche im Bereich T aggregieren.

User Story 1.5

Ich möchte Kategorien von T und deren zeitlichen Veränderung über Jahre untersuchen.

What did Vietnam export in 2018?

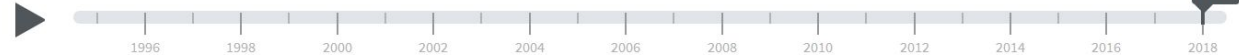


PRODUCT SECTORS

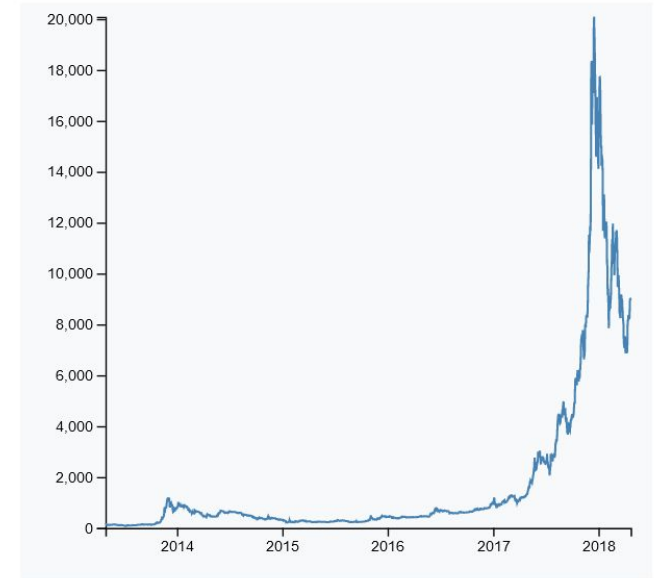
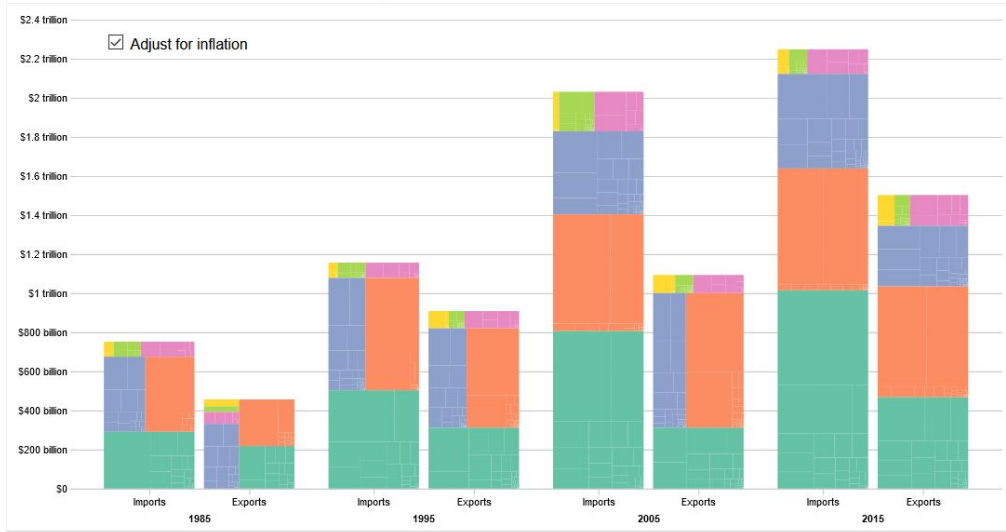


SEARCH IN VISUALIZATION

2018



Zoomable Treemap Bar Chart



User Story 1.x

Ich möchte Ausgaben nach bestimmten Unterkategorien über die Zeit hinweg vergleichen.

User Story 1.x

Ich möchte die Entwicklung der Einnahmen untersuchen.

DEPCHA - Digital Edition Publishing Cooperative for Historical Accounts

Alpha-Version

HOME

DATA SETS

INDICIES ▾

ONTOLOGY

DATABASKET

PROJECT ▾

Fulltextsearch



George Washington Financial Papers

1748-1799 | English | USA

Jennifer Stertz, Erica Cavanaugh: George Washington Financial Papers. In: DEPCHA. 2.4.2021. https://gams.uni-graz.at/context.depcha.gwfp

Overview

Source

About

Indices ▾



Overview - Group

Total 16844
Agents 343
Objects 245

Transactions

George Washington
Fairfax, George ...
...

Agents

Debit 550k
Credit 245k
Pounds | Shilling | Pence

Money & Main Currency

Data - Group

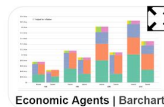
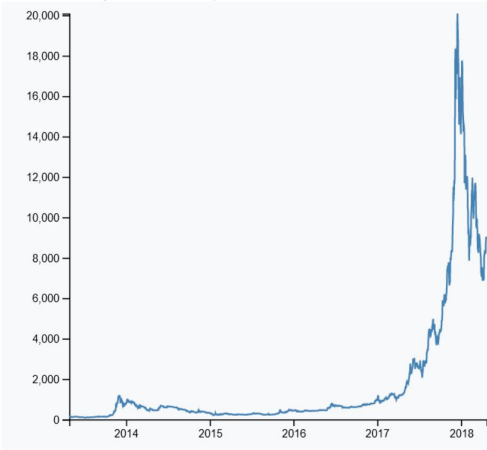
Show 10 entries

Search

ENTRY	WHEN	FROM	TO	MEASURABLE	
1754 Oct, Christopher To a Silver Mounted Hanger for your Son Nathaniel 2 3	--	Oct, Christopher		2 Pounds 3 Shillings	Ledger A, 1750-1772 pg.42
1756 April 1 Cash By cleaning my Pistols 3/9. Crak Saddlers account 21/6 1 5 3	1.4.1756	Cash		1 Pounds 5 Shillings 3 Pence	Ledger A, 1750-1772 pg.28
1756 April 1 Cash By Washing 7/ Barber 2/6. Expenses at Weatherbuns 25/10 1 15 4	1.4.1756	Cash		1 Pounds 15 Shillings 4 Pence	Ledger A, 1750-1772 pg.28
1756 April 1 Cash To Cash of the Publick 11 5	1.4.1756	Cash		11 Pounds 5 Shillings	Ledger A, 1750-1772 pg.28
1756 April 12 Cash Greens 3d 3/4 Bitters 7d 1/2 Greens 3d 3/4 Butter 7 1/2 1 10 5	12.4.1756	Cash		1 Shillings 10 5 Pence	Ledger A, 1750-1772 pg.28
1756 April 13 Cash Veal 2/6. Fowls 1/-. Washing 1/9. Butter 7d 1/2 5 10 5	13.4.1756	Cash		5 Shillings 10 5 Pence	Ledger A, 1750-1772 pg.28

InfoVis - Group

Income and expenses over time | Linechart



ProWD: Ein Werkzeug zum Erkennen von Datenlücken in Wikidata

transport (Q7590)
human-directed movement of things or people between locations

Filters
+ Add Filter or leave empty

PROFILE COMPARE DISCOVER

Search for Item...
Sort By: # of Properties (Highest)

Item	# of Properties	% of Properties	Property Check
1925 serum run to Nome	12	100%	—
foliyoo	12	100%	—
Cycling in Belarus	11	92%	—
Monte Serrat funicular	10	83%	—
transportation in Taiwan	7	58%	—
transport in Italy	7	58%	—

49 Items
45 Topic Properties

Topic Imbalance: 0.287 (Imbalanced)

Topic Property Frequency

Property	Count
country (P17)	28
topic's main category (P910)	21
image (P18)	20
located in the administrative territorial entity (P131)	17
facet of (P1269)	14

Topic Property Distribution

<https://prowd.id>

Ramadhana, N. H., Darari, F., Putra, P. O. H., Nutt, W., Razniewski, S., & Akbar, R. I. (2020). User-Centered Design for Knowledge Imbalance Analysis: A Case Study of ProWD. In *VOILA Workshop co-located with ISWC*.

Grafana

<https://grafana.com/>

Metabase

<https://www.metabase.com/>

Visual.is

<https://visual.is/>

metaphactory

<https://metaphacts.com/>

[Late Hokusai Project. ResearchSpace](#)

d3.js

<https://d3js.org/>

Plotly JavaScript

<https://plotly.com/javascript/>

....

Vega – A Visualization Grammar

<https://vega.github.io/vega/>

VISO – the Visualisation Ontology

<http://purl.org/viso>

RVL – an RDF(S)/OWL Visualisation Language

<http://purl.org/rvl>

Zusammenfassung und Plan...

- ❖ Datensätze und User Stories akquirieren → Weiterentwicklung des Modells
- ❖ Informationsvisualisierungen auf Basis der User Stories entwickeln
- ❖ Was braucht es noch im Frontend und Backend?
- ❖ Mapping: Wissensbasis → Informationsvisualisierungen
- ❖ Implementierung
- ❖ ... wie ist das dann eigentlich mit Unschärfe, Vagheit, Unvollständigkeit etc. !?
... und wie mit dem Anschein von Objektivität und Absolutheit, der durch ein Dashboard/Informationsvisualisierungen entsteht umgehen.

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https://www.researchgate.net/profile/Alberto-Sillitti/publication/286996830_Effective_dashboard_design/links/57c699e208aec24de0414df1/Effective-dashboard-design.pdf
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<http://ceur-ws.org/Vol-1695/paper4.pdf>
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nbn-resolving.de/urn:nbn:de:bsz:14-qucosa-229908.

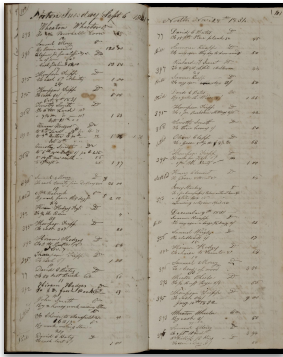
Literatur 2

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https://www.researchgate.net/publication/237419493_Ontology-Based_Information_Visualization_Toward_Semantic_Web_Applications
- Hoang, D. T. A., Nguyen, T. B., & Tjoa, A. M. (2012, October). Dashboard by-example: A hypergraph-based approach to on-demand data warehousing systems. In *2012 IEEE International Conference on Systems, Man, and Cybernetics (SMC)* (pp. 1853-1858). IEEE.
https://publik.tuwien.ac.at/files/PubDat_211630.pdf
- Gitanjali, J., Kuriakose, M., & Kuruba, R. (2014). Ontology and hyper graph based dashboards in data warehousing systems. *Asian Journal of Information Technology*, 13(8), 412-415.
<https://www.semanticscholar.org/paper/Ontology-and-Hyper-Graph-Based-Dashboards-in-Data-Gitanjali-Kuriakose/e67dbd2652e0edc3b2d71c0eb57adaafc8b0030b>
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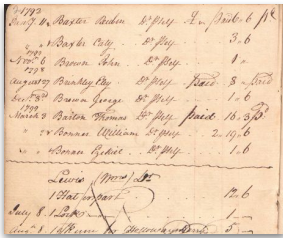
Materialien

Ontologie

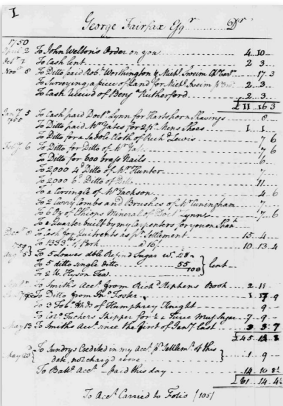
*An ontology is a **formal, explicit specification** of a **shared conceptualization** that is characterized by **high semantic expressiveness** required for **increased complexity**.*



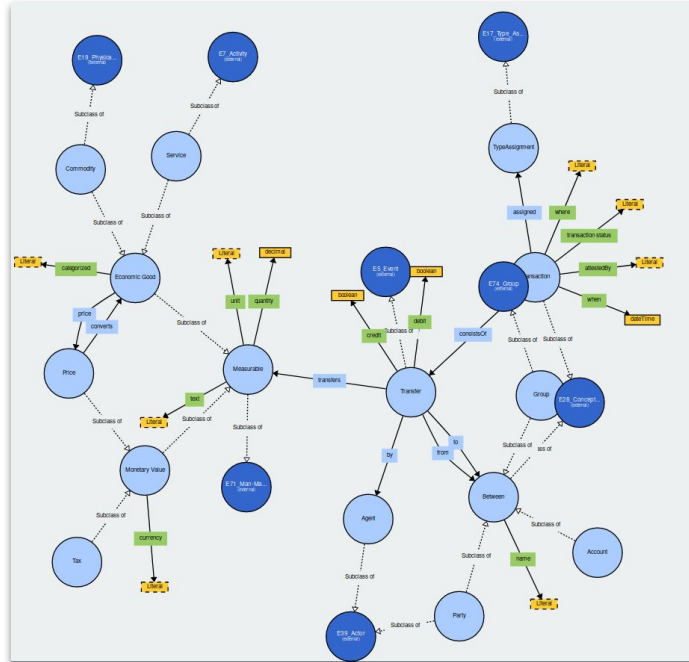
Wheaton Daybook
1828-1859
[Tomasek, Bauman]



Stagville Slave Ledger 1792-1799
[Brumfield, Agbe-Davies]



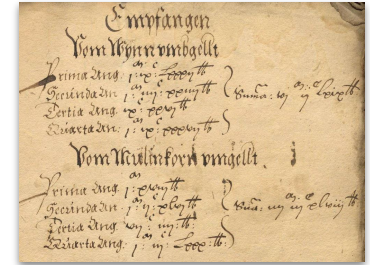
George Washington Financial Papers
1792-1799
[Stertzer]



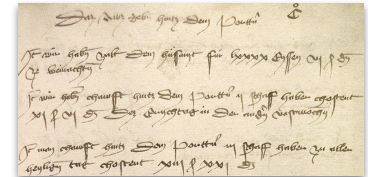
BOOKKEEPING ONTOLOGY

gams.uni-graz.at/o:depcha.bookkeeping
github.com/GVogeler/bookkeeping

[Georg Vogeler]



Jahresrechnungen der Stadt Basel
1535-1610

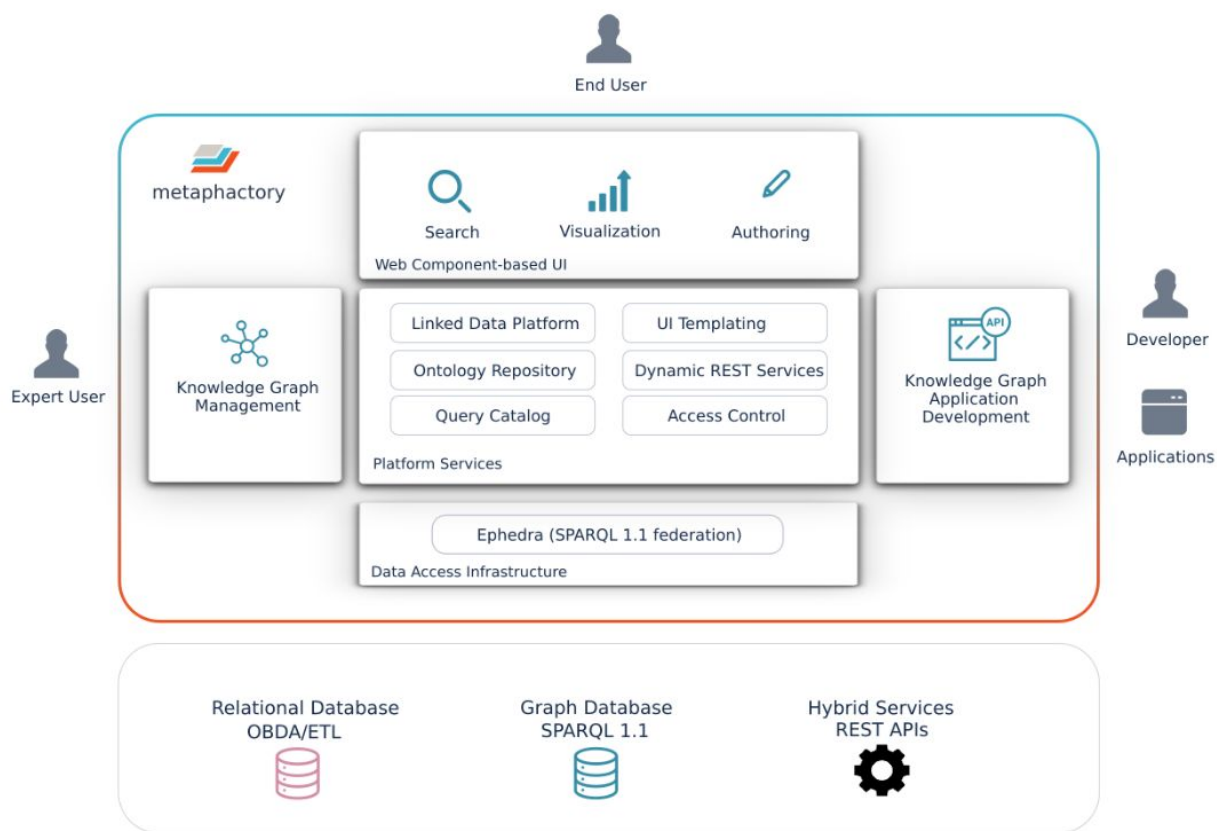


StadtA Regensburg, Cameraia 3

metaphactory

[...] a platform for building knowledge graph management applications.
[...] providing a rich and customizable user interface, and enabling rapid building of use case-specific applications.

Haase, P., Herzig, D. M., Kozlov, A., Nikolov, A., & Trane, J. (2019). metaphactory: A platform for knowledge graph management. *Semantic Web*, 10(6), 1109-1125.



Projekt Six Degrees of Francis Bacon

sozialen Netzwerken im frühneuzeitlichen Großbritannien, 1500-1700

Forschungsfragen:

- For instance, how can visualizations represent the uncertainty, vagueness, and debate that are central to humanities inquiry?
- How can designers use visualizations to coordinate quantitative measures and human judgements?
- What are principled ways of reducing the complexity of social relations to visual form?
- How can a web interface be part of an ongoing scholarly knowledge project?
- And how might qualitative categories such as identity and group belonging be presented alongside quantitative measures?

