

# Delegates' Summit:

## – Best Practice and Definitions –

### Concepts of Cognostic Addressing Structured and Non-structured Data

September 20, 2021

The Eleventh Symposium on  
Advanced Computation and Information in Natural and Applied Sciences (SACINAS)  
The International Conference on Numerical Analysis and Applied Mathematics (ICNAAM 2021)  
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## Abstract / Epitome

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This comprehensive summary contains the committee of participants and contributors, the contributions, statements, summit results (p. 18), and references for the Delegates' Summit on Best Practice and Definitions: Concepts of Cognition Addressing Structured and Non-structured Data, part of the Symposium on Advanced Computation and Information in Natural and Applied Sciences (SACINAS).

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# Delegates' Summit: Best Practice & Definitions of . . . Structured . . .

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Program: <http://icnaam.org>

# Recall: Last Years' Post-Summit Results

In 80 Words Around The World.

## Knowledge and Computing (Delegates and other contributors)

- “Knowledge is created from a subjective combination of different attainments as there are intuition, experience, information, education, decision, power of persuasion and so on, which are selected, compared and balanced against each other, which are transformed, interpreted, and used in reasoning, also to infer further knowledge. Therefore, not all the knowledge can be explicitly formalised. Knowledge and content are multi- and inter-disciplinary long-term targets and values. In practice, powerful and secure information technology can support knowledge-based works and values.”
- “Computing means methodologies, technological means, and devices applicable for universal automatic manipulation and processing of data and information. Computing is a practical tool and has well defined purposes and goals.”

**Citation:** Rückemann, C.-P., Skurowski, P., Staniszewski, M., Hülsmann, F., and Gersbeck-Schierholz, B. (2015): *Post-Summit Results, Delegates' Summit: Best Practice and Definitions of Knowledge and Computing; Sept. 23, 2015, The Fifth Symposium on Advanced Computation and Information in Natural and Applied Sciences (SACINAS), The 13th Internat. Conf. of Numerical Analysis and Applied Mathematics (ICNAAM), Sept. 23–29, 2015, Rhodes, Greece.*

URL: [http://scienceparagon.de/cpr/w/publ/2015/delegatessummit2015/rueckemann\\_icnaam2015\\_summit\\_summary.pdf](http://scienceparagon.de/cpr/w/publ/2015/delegatessummit2015/rueckemann_icnaam2015_summit_summary.pdf)

**Delegates and contributors:** Claus-Peter Rückemann, Friedrich Hülsmann, Birgit Gersbeck-Schierholz, Knowledge in Motion / Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF), Germany; Przemysław Skurowski, Michał Staniszewski, Silesian University of Technology, Gliwice, Poland; International EULISP post-graduate participants, ISSC, European Legal Informatics Study Programme, Leibniz Universität Hannover, Germany

# Recall: Last Years' Post-Summit Results

In 80 Words Around The World.

## Data-centric and Big Data (Delegates and other contributors)

- “The term data-centric refers to a focus, in which data is most relevant in context with a purpose. Data structuring, data shaping, and long-term aspects are important concerns. Data-centricity concentrates on data-based content and is beneficial for information and knowledge and for emphasizing their value. Technical implementations need to consider distributed data, non-distributed data, and data locality and enable advanced data handling and analysis. Implementations should support separating data from technical implementations as far as possible.”
- “The term Big Data refers to data of size and/or complexity at the upper limit of what is currently feasible to be handled with storage and computing installations. Big Data can be structured and unstructured. Data use with associated application scenarios can be categorised by volume, velocity, variability, vitality, veracity, value, etc. Driving forces in context with Big Data are advanced data analysis and insight. Disciplines have to define their ‘currency’ when advancing from Big Data to Value Data.”

**Citation:** Rückemann, C.-P., Kovacheva, Z., Schubert, L., Lishchuk, I., Gersbeck-Schierholz, B., and Hülsmann, F. (2016): *Post-Summit Results, Delegates' Summit: Best Practice and Definitions of Data-centric and Big Data – Science, Society, Law, Industry, and Engineering; Sept. 19, 2016, The Sixth Symposium on Advanced Computation and Information in Natural and Applied Sciences (SACINAS), The 14th Internat. Conf. of Numerical Analysis and Applied Mathematics (ICNAAM), Sept. 19–25, 2016, Rhodes, Greece.*  
 URL: [http://scienceparagon.de/cpr/z/publ/2016/delegatessummit2016/rueckemann\\_icnaam2016\\_summit\\_summary.pdf](http://scienceparagon.de/cpr/z/publ/2016/delegatessummit2016/rueckemann_icnaam2016_summit_summary.pdf)

**Delegates and contributors:** Claus-Peter Rückemann, Knowledge in Motion / Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF), Germany; Zlatinka Kovacheva, Middle East College, Department of Mathematics and Applied Sciences, Muscat, Oman; Lutz Schubert, University of Ulm, Germany; Iryna Lishchuk, Leibniz Universität Hannover, Institut für Rechtsinformatik, Germany; Birgit Gersbeck-Schierholz, Friedrich Hülsmann, Knowledge in Motion / Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF), Germany

# Recall: Last Years' Post-Summit Results

## Data Science Definition (Delegates and other contributors)

- “Qualified Data, especially for an enterprise, represents frozen knowledge or in other words frozen value. The abilities to understand and manage these data is what we call data science. Data results from action, hence, data science can be defined secondary to data. The essence of Data Science is to give qualified access to relevant data to owners and users. Hardware and software and their implementation represent the tertiary level of qualified and high level data.”

**Citation:** Rückemann, C.-P., Iakushkin, O. O., Gersbeck-Schierholz, B., Hülsmann, F., Schubert, L., and Lau, O. (2017): *Post-Summit Results, Delegates' Summit: Best Practice and Definitions of Data Sciences – Beyond Statistics; Sept. 25, 2017, The Seventh Symposium on Advanced Computation and Information in Natural and Applied Sciences (SACINAS), The 15th Internat. Conf. of Numerical Analysis and Applied Mathematics (ICNAAM), Sept. 25–30, 2017, Thessaloniki, Greece.*

URL: [http://scienceparagon.de/cpr/x/publ/2017/delegatessummit2017/rueckemann\\_icnaam2017\\_summit\\_summary.pdf](http://scienceparagon.de/cpr/x/publ/2017/delegatessummit2017/rueckemann_icnaam2017_summit_summary.pdf)

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# Recall: Last Years' Post-Summit Results

In 80 Words Around The World.

## Data Value Definition (Delegates and other contributors)

“Data value is the primary ranked value in scenarios comprised of data and computing context. In general, processing of data, is the cause for computing. In consequence, data, including algorithms and other factual, procedural, and further knowledge, have to be ranked primary on the scale of values whereas machinery for processing data, including computing, are providing means of secondary ranked value. In addition, further values, including economic values, can be associated with consecutive deployment of data and machinery.”

This is unaffected by varying views and attributions, including quality. Nevertheless, different views can scale values.

**Citation:** Rückemann, Claus-Peter; Pavani, Raffaella; Schubert, Lutz; Gersbeck-Schierholz, Birgit; Hülsmann, Friedrich; Lau, Olaf; and Hofmeister, Martin (2018): Post-Summit Results, Delegates' Summit: Best Practice and Definitions of Data Value; Sept. 13, 2018, The Eighth Symposium on Advanced Computation and Information in Natural and Applied Sciences (SACINAS), The 16th Internat. Conf. of Numerical Analysis and Applied Mathematics (ICNAAM), Sept. 13–18, 2018, Rhodos, Greece.

URL: [http://scienceparagon.de/cpr/z/publ/2018/delegatessummit2018/rueckemann\\_icnaam2018\\_summit\\_summary.pdf](http://scienceparagon.de/cpr/z/publ/2018/delegatessummit2018/rueckemann_icnaam2018_summit_summary.pdf),

URL: <https://doi.org/10.15488/3639> (DOI).

**Delegates and contributors:** Claus-Peter Rückemann, Knowledge in Motion / Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF), Germany; Raffaella Pavani, Department of Mathematics, Politecnico di Milano, Italy; Lutz Schubert, IOMI, University of Ulm, Germany; Birgit Gersbeck-Schierholz, Knowledge in Motion / Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF), Germany; Friedrich Hülsmann, Knowledge in Motion / Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF), Germany; Olaf Lau, Knowledge in Motion / Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF), Germany. Martin Hofmeister, Knowledge in Motion / Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF), Germany.

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# Recall: Last Years' Post-Summit Results

In 80 Words Around The World.

## Formalisation Definition (Delegates and other contributors)

**“Formalisation is the process of creating a defined set of rules, allowing a formal system to infer theorems from axioms. Formal systems may represent well-defined systems of abstract thought. Description and analysis of any detail of any more or less complex system and physical background essentially require a formalisation process. The process includes abstraction and reduction of knowledge, keeping the preconditioned importance of respective context. Consequently, formalisation should be created and context observed by educated experts within the respective discipline.”**

**All mathematical-machine based systems, e.g., computers, are formal systems. Ideologies should be kept outside of formalisation.**

**Citation:** Rückemann, Claus-Peter; Pavani, Raffaella; Gersbeck-Schierholz, Birgit; Tsitsipas, Athanasios; Schubert, Lutz; Hülsmann, Friedrich; Lau, Olaf; and Hofmeister, Martin (2019): *Post-Summit Results, Delegates' Summit: Best Practice and Definitions of Formalisation and Formalism*; Sept. 25, 2019, *The Ninth Symposium on Advanced Computation and Information in Natural and Applied Sciences (SACINAS), The 17th Internat. Conf. of Numerical Analysis and Appl. Math. (ICNAAM), Sept. 23–28, 2019, Rhodos, Greece.*  
 URL: [http://scienceparagon.de/cpr/z/publ/2019/delegatesummit2019/rueckemann\\_icnaam2019\\_summit\\_summary.pdf](http://scienceparagon.de/cpr/z/publ/2019/delegatesummit2019/rueckemann_icnaam2019_summit_summary.pdf),  
 URL: <https://doi.org/10.15488/5241> (DOI).

**Delegates and contributors:** Claus-Peter Rückemann, *Knowledge in Motion / Unabhäng. Deutsches Inst. für Multi-disziplin. Forschung (DIMF), Germany*; Raffaella Pavani, *Department of Mathematics, Politecnico di Milano, Italy*; Birgit Gersbeck-Schierholz, *Knowledge in Motion / Unabhäng. Deutsches Inst. für Multi-disziplin. Forschung (DIMF), Germany*; Athanasios Tsitsipas, *IOMI, University of Ulm, Germany*; Lutz Schubert, *IOMI, University of Ulm, Germany*; Friedrich Hülsmann, *Knowledge in Motion / Unabhäng. Deutsches Inst. für Multi-disziplin. Forschung (DIMF), Germany*; Olaf Lau, *Knowledge in Motion / Unabhäng. Deutsches Inst. für Multi-disziplin. Forschung (DIMF), Germany*. Martin Hofmeister, *Knowledge in Motion / Unabhäng. Deutsches Inst. für Multi-disziplin. Forschung (DIMF), Germany*.

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## Recall: Last Years' Post-Summit Results

## Complements of Knowledge and Corresponding Sample Implementations:

- |                                  |   |                                    |
|----------------------------------|---|------------------------------------|
| • <b>Factual Knowledge</b>       | ⇔ | <b>Numerical data, data ...</b>    |
| • <b>Conceptual Knowledge</b>    | ⇔ | <b>Classification ...</b>          |
| • <b>Procedural Knowledge</b>    | ⇔ | <b>Computing ...</b>               |
| • <b>Metacognitive Knowledge</b> | ⇔ | <b>Experience ...</b>              |
| • <b>Structural Knowledge</b>    | ⇔ | <b>Standard hybrid formats ...</b> |
| • ...                            |   |                                    |

(Sources/references: SACINAS Delegates' Summit, 2015–2021; Rückemann, Keynote on Structured Data Comprehension, MIM 2021 [1]; Knowledge Mapping, 2018 [2]; Aristotle, 350 B.C.E. / Platon's Phaidon, [3] [4] [5]; Anderson & Krathwohl, 2001 [6]); Rückemann, Coherent Knowledge Solutions From Prehistory to Future, Lawrence Livermore National Laboratories (LLNL), ML4I 2021 [7])

## Best Practice and Definitions: ... Structured ... (1/4)

In 80 Words Around The World.

**Case: Information science, natural sciences, prehistory, universal applications**

Source: Claus-Peter Rückemann, Friedrich Hülsmann, (KiM, DIMF)

- **Structure and cognostic addressing:**

Structure is an organisation of interrelated entities in a material or non-material object or system, on homogeneous intrinsic levels. Structure can mean features and facilities. Cognostic addressing applies to the wish to gain essential properties in science and scholarship in general, such as correlation, interrelation, and coherence and leads to a fundamental understanding.

...

Lower structure levels can only be addressed on higher formalisation levels, independent of structure is not available or not recognised. Substantial deficits of lower level structured data cannot be compensated by tools.

Cognostic addressing of structures and inherent structural knowledge should be created by educated, experienced experts within respective disciplines.

In future, we consequently propose the term '**nucleal cognstructure**', which is not meant to be final but as a general instrument in long-term development. Further future ultimate complementary aspects may even not be named yet.

## Best Practice and Definitions: . . . Structured . . . (2/4)

In 80 Words Around The World.

**Case: Mathematics, applied and theoretical**

Source: Raffaella Pavani, (Politecnico di Milano)

**• Structure and cognostic addressing:**

As a mathematician, I share the concept [[1]] that insufficient care for knowledge affects seriously scientific work. Indeed, 'bigger does not mean better'. Anybody working in applied Mathematics knows that. However, in theoretical Mathematics this does not hold. Consider, for example, the 344 proofs of Pythagorean Theorem and Euclidean and non-Euclidean Geometries. I think that in Mathematics cognostics and knowledge are linked in an unpredictable way.

[[1]] Rückemann C.-P., Cognostics and Knowledge Used With Dynamical Processing, International Journal on Advances in Software, vol. 8, no. 3&4, pp. 361–376, 2015, [8].

# Best Practice and Definitions: . . . Structured . . . (3/4)

In 80 Words Around The World.

## Case: Biology

Source: Birgit Gersbeck-Schierholz, (KiM, DIMF)

- **Structure and cnostic addressing:**

In the discipline of biology we have macro- and micro-structures.

Macro-structures are directly accessible.

We often use more abstracted models for micro-structures, which are less directly accessible.

The cnostic identification, addressing, and continuous refinement of structures are essential prerequisites of creating new insight.

## Best Practice and Definitions: . . . Structured . . . (4/4)

In 80 Words Around The World.

**Case: Informatical point of view of practical implementation**

Source: Zlatinka Kovacheva, Ina Naydenova, (BAS, Sofia)

- **Structure and cnostic addressing:**

Structured data is mostly quantitative, factual, well organized and modeled data (alphabetical, numeric data, currency or date) in pre-defined, tabular format, which is easy to search and analyze. Unstructured data is mostly qualitative, in variety of shapes and sizes, collected from media, audio, video, emails, sensor data, communications, websites, mobile data, scientific data, satellite imagery, surveillance imagery, etc., not structured via pre-defined data models, and cannot be processed and analyzed using conventional tools and methods.

# Best Practice and Definitions

In 80 Words Around The World.

## Statements on Concepts of Cognostic Addressing Structured and Non-structured Data

(Delegates and other contributors)

- **How should structure be defined?**
- **What is structured and non-structured?**
- **What are cognostic's contributions?**
- **Which Best Practice for cognostic addressing of structured and non-structured data can be summarised?**
- **Next Delegates' Summit Contexts:**  
**Best Practice and Definitions of Re-use and Re-usability.**  
**Best Practice and Definitions [topics]**  
**aware of "Science Under Direction".**

## Best Practice Bibliography

## Bibliography on Best Practice and Definitions (Delegates' Summits)



Rückemann, Claus-Peter; Pavani, Raffaella; Gersbeck-Schierholz, Birgit; Tsitsipas, Athanasios; Schubert, Lutz; Hülsmann, Friedrich; Lau, Olaf; and Hofmeister, Martin (2019) *Post-Summit Results, Delegates' Summit: Best Practice and Definitions of Formalisation and Formalism*; Sept. 25, 2019, *The Ninth Symposium on Advanced Computation and Information in Natural and Applied Sciences (SACINAS), The 17th Internat. Conf. of Numerical Analysis and Applied Mathematics (ICNAAM), Sept. 23–28, 2019, Rhodos, Greece.*

URL: [http://scienceparagon.de/cpr/x/publ/2019/delegatessummit2019/rueckemann\\_icnaam2019\\_summit\\_summary.pdf](http://scienceparagon.de/cpr/x/publ/2019/delegatessummit2019/rueckemann_icnaam2019_summit_summary.pdf),

URL: <https://doi.org/10.15488/5241> (DOI).



Rückemann, Claus-Peter; Pavani, Raffaella; Schubert, Lutz; Gersbeck-Schierholz, Birgit; Hülsmann, Friedrich; Lau, Olaf; and Hofmeister, Martin (2018): *Post-Summit Results, Delegates' Summit: Best Practice and Definitions of Data Value*; Sept. 13, 2018, *The Eighth Symposium on Advanced Computation and Information in Natural and Applied Sciences (SACINAS), The 16th Internat. Conf. of Numerical Analysis and Applied Mathematics (ICNAAM), Sept. 13–18, 2018, Rhodos, Greece.*

URL: [http://scienceparagon.de/cpr/x/publ/2018/delegatessummit2018/rueckemann\\_icnaam2018\\_summit\\_summary.pdf](http://scienceparagon.de/cpr/x/publ/2018/delegatessummit2018/rueckemann_icnaam2018_summit_summary.pdf),

URL: <https://doi.org/10.15488/3639> (DOI).



Rückemann, Claus-Peter; Iakushkin, Oleg O.; Gersbeck-Schierholz Birgit; Hülsmann, Friedrich; Schubert, Lutz; and Lau, Olaf (2017): *Post-Summit Results, Delegates' Summit: Best Practice and Definitions of Data Sciences – Beyond Statistics*; Sept. 25, 2017, *The Seventh Symposium on Advanced Computation and Information in Natural and Applied Sciences (SACINAS), The 15th Internat. Conf. of Numerical Analysis and Applied Mathematics (ICNAAM), Sept. 25–30, 2017, Thessaloniki, Greece.*





URL: [http://scienceparagon.de/cpr/x/publ/2017/delegatessummit2017/rueckemann\\_icnaam2017\\_summit\\_summary.pdf](http://scienceparagon.de/cpr/x/publ/2017/delegatessummit2017/rueckemann_icnaam2017_summit_summary.pdf),

URL: <https://www.tib.eu/en/search/id/datacite%3Adoi-10.15488%252F3411/Best-Practice-and-Definitions-of-Data-Sciences/>,

URL: <https://doi.org/10.15488/3411> (DOI).

## Best Practice Bibliography

## Bibliography on Best Practice and Definitions (Delegates' Summits)

-   Rückemann, Claus-Peter; Kovacheva, Zlatinka; Schubert, Lutz; Lishchuk, Iryna; Gersbeck-Schierholz, Birgit; and Hülsmann, Friedrich (2016): Post-Summit Results, Delegates' Summit: Best Practice and Definitions of Data-centric and Big Data – Science, Society, Law, Industry, and Engineering; Sept. 19, 2016, The Sixth Symposium on Advanced Computation and Information in Natural and Applied Sciences (SACINAS), The 14th Internat. Conf. of Numerical Analysis and Applied Mathematics (ICNAAM), Sept. 19–25, 2016, Rhodes, Greece.  
URL: [http://scienceparagon.de/cpr/x/publ/2016/delegatessummit2016/rueckemann\\_icnaam2016\\_summit\\_summary.pdf](http://scienceparagon.de/cpr/x/publ/2016/delegatessummit2016/rueckemann_icnaam2016_summit_summary.pdf),  
URL: <https://www.tib.eu/en/search/id/datacite%3Adoi-10.15488/252F3410/Best-Practice-and-Definitions-of-Data-centric-and/>,  
URL: <https://doi.org/10.15488/3410> (DOI).
-   Rückemann, Claus-Peter; Hülsmann, Friedrich; Gersbeck-Schierholz, Birgit; Skurowski, Przemyslaw; and Staniszewski, Michal (2015) Post-Summit Results, Delegates' Summit: Best Practice and Definitions of Knowledge and Computing; Sept. 23, 2015, The Fifth Symposium on Advanced Computation and Information in Natural and Applied Sciences (SACINAS), The 13th Internat. Conf. of Numerical Analysis and Applied Mathematics (ICNAAM), Sept. 23–29, 2015, Rhodes, Greece.  
URL: [http://scienceparagon.de/cpr/x/publ/2015/delegatessummit2015/rueckemann\\_icnaam2015\\_summit\\_summary.pdf](http://scienceparagon.de/cpr/x/publ/2015/delegatessummit2015/rueckemann_icnaam2015_summit_summary.pdf),  
URL: <https://www.tib.eu/en/search/id/datacite%3Adoi-10.15488/252F3409/Best-Practice-and-Definitions-of-Knowledge-and-Computing/>,  
URL: <https://doi.org/10.15488/3409> (DOI).

[9] [10] [11] [12] [13]



## Networking and Outlook

**Thank you for your attention!**

**Wish you an inspiring conference  
and a pleasant stay on Rhodes!**

**Looking forward to seeing you again next year for the  
Symposium on Advanced Computation and Information!**

## Post-Summit Results

### Structure and Cognostic Addressing Definition (Delegates and other contributors)

“Structure is an organisation of interrelated entities in a material or non-material object or system, on homogeneous intrinsic levels. Structure should be addressed by super- and sub-levels. Cognostic addressing applies to the wish to gain essential properties in science and scholarship in general, such as correlation, interrelation, and coherence and leads to a fundamental understanding. Cognostic identification, addressing, and continuous refinement of structures are essential prerequisites of creating new insight. In future, we consequently propose the term ‘nucleal cognostic structure’”.

Structure can mean features and facilities. Links between knowledge and cognostics are unpredictable, especially by artificial and automated means in general. Structure can be deployed by methods, e.g., matching predefinable models, patterns, and precision. In practical programming many practicians prefer to define structure and cognostic addressing by formal aspects only.

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# References

## Bibliography / References

**Reference section containing the cited references.**

- [1] C.-P. Rückemann, "Keynote Lecture: The Multi-disciplinary Case of Prehistorical Insight: Information Science at the Edge of Structured Data Comprehension," *The XI-th International Conference - Mathematics of Informational Modeling, Institute of Mathematics and Informatics, Bulgarian Academy of Sciences, July 1–2, 2021, Varna, Bulgaria*, URL: <http://math.bas.bg>, 2021.
- [2] —, "Methodology of Knowledge Mapping for Arbitrary Objects and Entities: Knowledge Mining and Spatial Representations – Objects in Multi-dimensional Context," in *Proceedings of The Tenth International Conference on Advanced Geographic Information Systems, Applications, and Services (GEOProcessing 2018), March 25 – 29, 2018, Rome, Italy*. XPS Press, 2018, pp. 40–45, ISSN: 2308-393X, ISBN-13: 978-1-61208-617-0.
- [3] Aristotle, *Nicomachean Ethics*, 2008, (Written 350 B.C.E.), Translated by W. D. Ross, Provided by The Internet Classics Archive, URL: <http://classics.mit.edu/Aristotle/nicomachaen.html> [accessed: 2018-01-01].
- [4] —, *Nicomachean Ethics, Volume 1*, 2009, Project Gutenberg, eBook, EBook-No.: 28626, Release Date: April 27, 2009, Digitised Version of the Original Publication, Produced by Sophia Canoni, Book provided by Iason Konstantinidis, Translator: Kyriakos Zambas, URL: <http://www.gutenberg.org/ebooks/12699> [accessed: 2018-01-01].
- [5] —, *The Ethics of Aristotle*, 2005, Project Gutenberg, eBook, EBook-No.: 8438, Rel. Date: Jul., 2005, Digit. Vers. of the Orig. Publ., Produced by Ted Garvin, David Widger, and the DP Team, Edition 10, URL: <http://www.gutenberg.org/ebooks/8438>.
- [6] L. W. Anderson and D. R. Krathwohl, Eds., *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. Allyn & Bacon, Boston, MA, USA, Pearson Education Group, 2001, ISBN-13: 978-0801319037.

- [7] C.-P. Rückemann, "Coherent Knowledge Solutions From Prehistory to Future – Towards Coherent Multi-disciplinary Knowledge Reference Implementation Blueprints for Industrial Learning: Insight from Consistent Coherent Conceptual Integration of Prehistory, Archaeology, Natural Sciences, and Humanities," *ML4I – Machine Learning for Industry Forum 2021; hosted by the High-Performance Computing Innovation Center (HPCIC) and Data Science Institute (DSI), at the Lawrence Livermore National Laboratory (LLNL), August 10–12, 2021, Livermore, California, U.S.A., (Invited Speech), URL: <http://www.llnl.gov>, 2021.*
- [8] —, "Cognostics and Knowledge Used With Dynamical Processing," *International Journal on Advances in Software*, vol. 8, no. 3&4, pp. 361–376, 2015, lavazza, L., (ed.) Università dell'Insubria - Varese, Italy, ISSN: 1942-2628, LCCN: 2008212462 (Library of Congress), URL: [http://www.iariajournals.org/software/soft\\_v8\\_n34\\_2015\\_paged.pdf](http://www.iariajournals.org/software/soft_v8_n34_2015_paged.pdf) (PDF), URL: <http://www.iariajournals.org/software/tocv8n34.html> (TOC) (HTML), URL: [http://www.thinkmind.org/index.php?view=article&articleid=soft\\_v8\\_n34\\_2015\\_6](http://www.thinkmind.org/index.php?view=article&articleid=soft_v8_n34_2015_6) (ThinkMind(TM) Digital Library), URL: <http://www.iariajournals.org/software/>.
- [9] C.-P. Rückemann, F. Hülsmann, B. Gersbeck-Schierholz, P. Skurowski, and M. Staniszewski, *Knowledge and Computing. Post-Summit Results, Delegates' Summit: Best Practice and Definitions of Knowledge and Computing, September 23, 2015, The Fifth Symposium on Advanced Computation and Information in Natural and Applied Sciences (SACINAS), The 13th International Conference of Numerical Analysis and Applied Mathematics (ICNAAM), September 23–29, 2015, Rhodes, Greece, 2015, Delegates and other contributors: Claus-Peter Rückemann, Westfälische Wilhelms-Universität Münster (WWU) / Leibniz Universität Hannover / North-German Supercomputing Alliance (HLRN), Germany; Friedrich Hülsmann, Knowledge in Motion, Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF), Germany; Birgit Gersbeck-Schierholz, Knowledge in Motion, Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF), Germany; Przemyslaw Skurowski, Institute of Informatics, Silesian University of Technology, Gliwice, Poland; Michal Staniszewski, Institute of Informatics, Silesian University of Technology,*

Gliwice, Poland; International EULISP post-graduate participants, ISSC, European Legal Informatics Study Programme, Leibniz Universität Hannover, Germany; DOI: 10.15488/3409, URL: [http://www.icnaam.org/sites/default/files/Preliminary\\_Program\\_of\\_ICNAAM\\_2015.pdf](http://www.icnaam.org/sites/default/files/Preliminary_Program_of_ICNAAM_2015.pdf), URL: [http://www.scienceparagon.de/cpr/x/publ/2015/delegatessummit2015/rueckemann\\_icnaam2015\\_summit\\_summary.pdf](http://www.scienceparagon.de/cpr/x/publ/2015/delegatessummit2015/rueckemann_icnaam2015_summit_summary.pdf), URL: <https://www.tib.eu/en/search/id/datacite%3Adoi~10.15488%252F3409/Best-Practice-and-Definitions-of-Knowledge-and-Computing/> (TIB.eu), URL: <https://doi.org/10.15488/3409> (DOI) .

- [10] C.-P. Rückemann, Z. Kovacheva, L. Schubert, I. Lishchuk, B. Gersbeck-Schierholz, and F. Hülsmann, *Best Practice and Definitions of Data-centric and Big Data – Science, Society, Law, Industry, and Engineering*. Post-Summit Results, Delegates' Summit: Best Practice and Definitions of Data-centric and Big Data – Science, Society, Law, Industry, and Engineering, September 19, 2016, The Sixth Symposium on Advanced Computation and Information in Natural and Applied Sciences (SACINAS), The 14th International Conference of Numerical Analysis and Applied Mathematics (ICNAAM), September 19–25, 2016, Rhodes, Greece, 2016, delegates and other contributors: Claus-Peter Rückemann, Westfälische Wilhelms-Universität Münster (WWU) / Leibniz Universität Hannover / North-German Supercomputing Alliance (HLRN), Germany; Zlatinka Kovacheva, Middle East College, Department of Mathematics and Applied Sciences, Muscat, Oman; Lutz Schubert, University of Ulm, Germany; Iryna Lishchuk, Leibniz Universität Hannover, Institut für Rechtsinformatik, Germany; Birgit Gersbeck-Schierholz, Knowledge in Motion / Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF), Germany; Friedrich Hülsmann, Knowledge in Motion / Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF), Germany; DOI: 10.15488/3410, URL: [http://www.icnaam.org/sites/default/files/Preliminary\\_Program\\_of\\_ICNAAM\\_2016.pdf](http://www.icnaam.org/sites/default/files/Preliminary_Program_of_ICNAAM_2016.pdf), URL: [http://history.icnaam.org/icnaam\\_2016/sites/default/files/Preliminary\\_Program\\_ICNAAM\\_2016\\_68th.pdf](http://history.icnaam.org/icnaam_2016/sites/default/files/Preliminary_Program_ICNAAM_2016_68th.pdf), URL: <http://www.scienceparagon.de/cpr/x/publ/>

2016/delegatessummit2016/rueckemann\_icnaam2016\_summit\_summary.pdf, URL: <https://www.tib.eu/en/search/id/datacite%3Adoi-10.15488%252F3410/Best-Practice-and-Definitions-of-Data-centric-and/> (TIB.eu), URL: <https://doi.org/10.15488/3410> (DOI).

- [11] C.-P. Rückemann, O. O. Iakushkin, B. Gersbeck-Schierholz, F. Hülsmann, L. Schubert, and O. Lau, *Best Practice and Definitions of Data Sciences – Beyond Statistics*. Post-Summit Results, Delegates' Summit: Best Practice and Definitions of Data Sciences – Beyond Statistics, September 25, 2017, The Seventh Symposium on Advanced Computation and Information in Natural and Applied Sciences (SACINAS), The 15th International Conference of Numerical Analysis and Applied Mathematics (ICNAAM), September 25–30, 2017, Thessaloniki, Greece, 2017, delegates and other contributors: Claus-Peter Rückemann, Westfälische Wilhelms-Universität Münster (WWU) / Knowledge in Motion, Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF) / Leibniz Universität Hannover / North-German Supercomputing Alliance (HLRN), Germany; Oleg O. Iakushkin, Department of Computer Modelling and Multiprocessor Systems at the Faculty of Applied Mathematics and Control Processes, Saint-Petersburg State University, Russia; Birgit Gersbeck-Schierholz, Knowledge in Motion, Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF), Germany; Friedrich Hülsmann, Knowledge in Motion, Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF), Germany; Lutz Schubert, IOMI, University of Ulm, Germany; Lau, Olaf, Knowledge in Motion, Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF), Germany; DOI: 10.15488/3411, URL: [http://icnaam.org/sites/default/files/Preliminary%20Program%20of%20ICNAAM%202017\\_ver\\_60.pdf](http://icnaam.org/sites/default/files/Preliminary%20Program%20of%20ICNAAM%202017_ver_60.pdf), URL: [http://www.scienceparagon.de/cpr/x/publ/2017/delegatessummit2017/rueckemann\\_icnaam2017\\_summit\\_summary.pdf](http://www.scienceparagon.de/cpr/x/publ/2017/delegatessummit2017/rueckemann_icnaam2017_summit_summary.pdf), URL: <https://www.tib.eu/en/search/id/datacite%3Adoi-10.15488%252F3411/Best-Practice-and-Definitions-of-Data-Sciences/> (TIB.eu), URL: <https://doi.org/10.15488/3411> (DOI).

- [12] C.-P. Rückemann, R. Pavani, L. Schubert, B. Gersbeck-Schierholz, F. Hülsmann, O. Lau, and M. Hofmeister, *Best Practice and Definitions of Data Value*. Post-Summit Results, Delegates' Summit: Best Practice and Definitions of Data Value, September 13, 2018, The Eighth Symposium on Advanced Computation and Information in Natural and Applied Sciences (SACINAS), The 16th International Conference of Numerical Analysis and Applied Mathematics (ICNAAM), September 13–18, 2018, Rhodes, Greece, 2018, delegates and other contributors: Claus-Peter Rückemann, Westfälische Wilhelms-Universität Münster (WWU) / Knowledge in Motion, Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF) / Leibniz Universität Hannover / North-German Supercomputing Alliance (HLRN), Germany; Raffaella Pavani, Department of Mathematics, Politecnico di Milano, Italy; Lutz Schubert, IOMI, University of Ulm, Germany; Birgit Gersbeck-Schierholz, Knowledge in Motion, Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF), Germany; Friedrich Hülsmann, Knowledge in Motion, Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF), Germany; Lau, Olaf, Knowledge in Motion, Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF), Germany; Hofmeister, Martin, Knowledge in Motion, Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF), Germany; DOI: 10.15488/3639, URL: [http://history.icnaam.org/icnaam\\_2018/icnaam.org/sites/default/files/Preliminary%20Program%20of%20ICNAAM%202018\\_Web\\_version\\_70.pdf](http://history.icnaam.org/icnaam_2018/icnaam.org/sites/default/files/Preliminary%20Program%20of%20ICNAAM%202018_Web_version_70.pdf), URL: [http://icnaam.org/sites/default/files/Preliminary%20Program%20of%20ICNAAM%202018\\_ver\\_70.pdf](http://icnaam.org/sites/default/files/Preliminary%20Program%20of%20ICNAAM%202018_ver_70.pdf), URL: [http://www.scienceparagon.de/cpr/x/publ/2018/delegatessummit2018/rueckemann\\_icnaam2018\\_summit\\_summary.pdf](http://www.scienceparagon.de/cpr/x/publ/2018/delegatessummit2018/rueckemann_icnaam2018_summit_summary.pdf), URL: <https://www.tib.eu/en/search/id/datacite%3Adoi~10.15488%252F3639/Best-Practice-and-Definitions-of-Data-Value/> (TIB.eu), URL: <https://doi.org/10.15488/3639> (DOI).
- [13] C.-P. Rückemann, R. Pavani, B. Gersbeck-Schierholz, A. Tsitsipas, L. Schubert, F. Hülsmann, O. Lau, and M. Hofmeister, *Best Practice and Definitions of Formalisation and Formalism*. Post-Summit Results, Delegates' Summit: Best Practice and Definitions of



Formalisation and Formalism, September 25, 2019, The Ninth Symposium on Advanced Computation and Information in Natural and Applied Sciences (SACINAS), The 17th International Conference of Numerical Analysis and Applied Mathematics (ICNAAM), September 23–28, 2019, Rhodes, Greece, 2019, delegates and other contributors: Claus-Peter Rückemann, Westfälische Wilhelms-Universität Münster (WWU) / Knowledge in Motion, Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF) / Leibniz Universität Hannover / North-German Supercomputing Alliance (HLRN), Germany; Raffaella Pavani, Department of Mathematics, Politecnico di Milano, Italy; Birgit Gersbeck-Schierholz, Knowledge in Motion, Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF), Germany; Athanasios Tsitsipas, IOMI, University of Ulm, Germany; Lutz Schubert, IOMI, University of Ulm, Germany; Friedrich Hülsmann, Knowledge in Motion, Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF), Germany; Lau, Olaf, Knowledge in Motion, Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF), Germany; Hofmeister, Martin, Knowledge in Motion, Unabhängiges Deutsches Institut für Multi-disziplinäre Forschung (DIMF), Germany; DOI: 10.15488/5241, URL: [http://www.scienceparagon.de/cpr/x/publ/2019/delegatessummit2019/rueckemann\\_icnaam2019\\_summit\\_summary.pdf](http://www.scienceparagon.de/cpr/x/publ/2019/delegatessummit2019/rueckemann_icnaam2019_summit_summary.pdf), URL: <https://doi.org/10.15488/5241> (DOI).