

A State-of-The-Art Overview and Future Research Avenues for Self-Service Business Intelligence and Analytics

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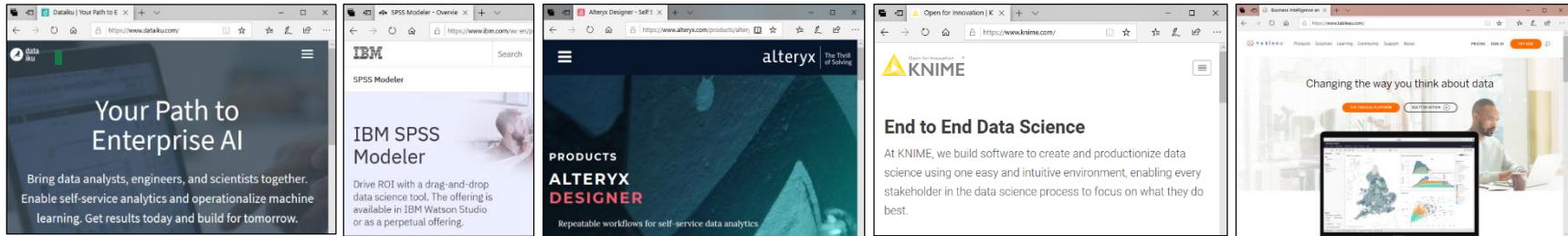
INSTITUTE OF INFORMATION SYSTEMS AND MARKETING (IISM)
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...encourages users to prepare, analyze and consume data on their own, with nominal IT support (based on Gartner IT Glossary, 2019; Lennerholt et al., 2018)

“empower casual users to perform analytics” and “power users can accomplish their task [...] more easily and quickly than before”. (Alpar & Schulz 2016)

➡ Addresses the challenge to support different user roles with diverse levels of expertise for various analytical demands ranging from (1) information usage, (2) over information creation, (3) towards information resource creation (Alpar & Schulz 2016).

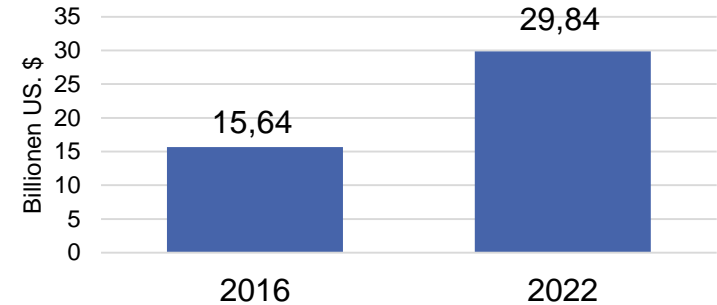


Motivation

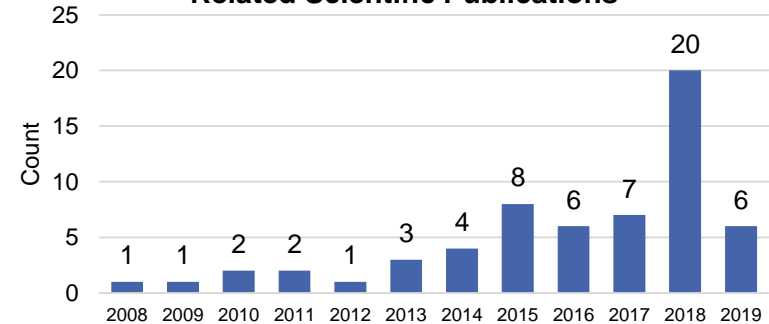
- Adoption of SSBIA is challenging due to technical or organizational boundaries (Logi 2017)
- Vast number of studies requires structuration
- Lack of a systematic approach to illustrate the state-of-the-art along the various characteristics of SSBIA
- Although some scholars sketched out SSBIA challenges (e.g., Lennerholt et al., 2018) future reserach needs more guidance to be well-directed

What are the potential avenues in SSBIA for future research?

Size of the Global BIA Market (BARC, 2019)



Number of SSBIA Related Scientific Publications



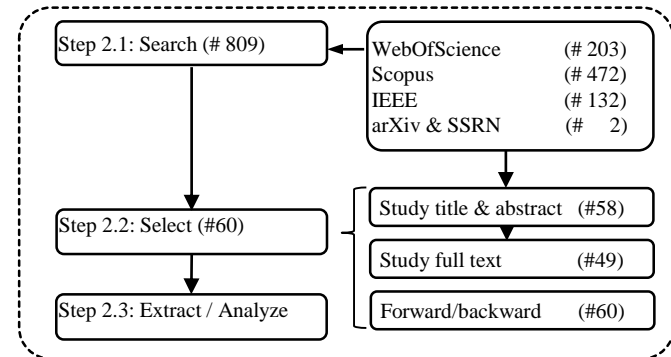
Systematic Literature Review

Following Webster and Watson (2002), Kitchenham and Charters (2007)

Search String

- 1 *“Self*Service” AND (*
- 2 *“Business Intelligence” OR “Analytic*”*
- 3 *OR “Information System*” OR “Decision Support System*”*
- 4 *OR “Machine Learning” OR*
- 5 *“Data” AND (“Understanding” OR “Cleaning” OR
“Preparation” OR “Integration” OR “Wrangling” OR
“Modeling” OR “Mining” OR
“Discovery” OR “Exploration” OR “Visualization”)*

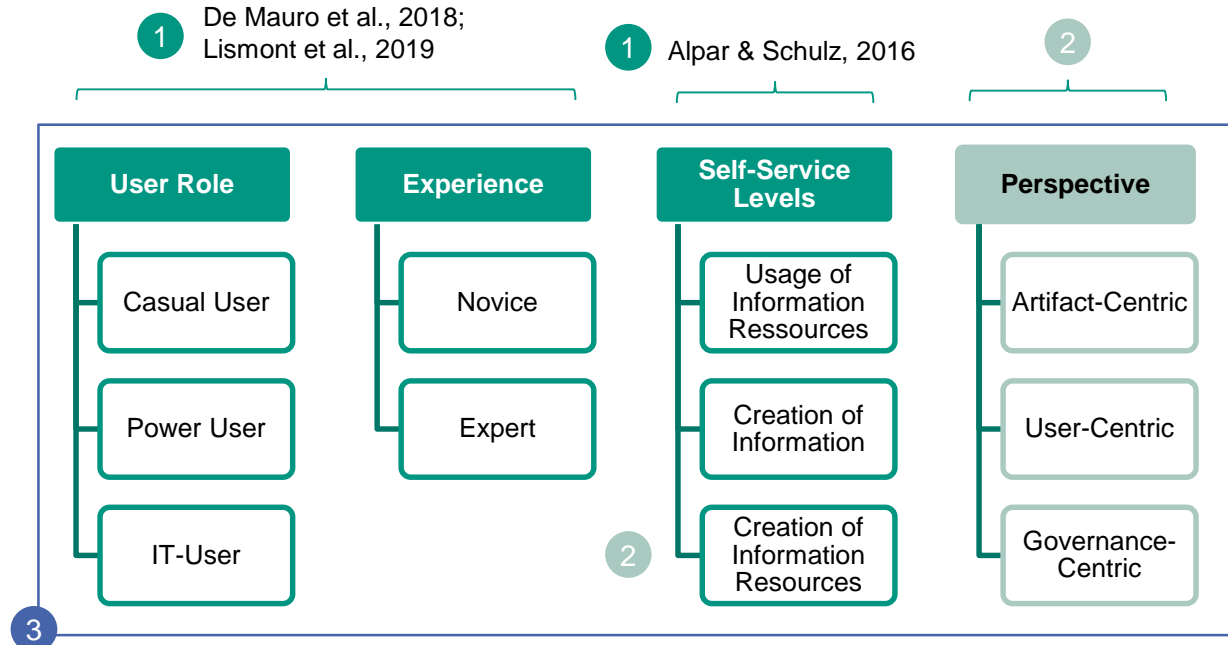
Hit Statistics



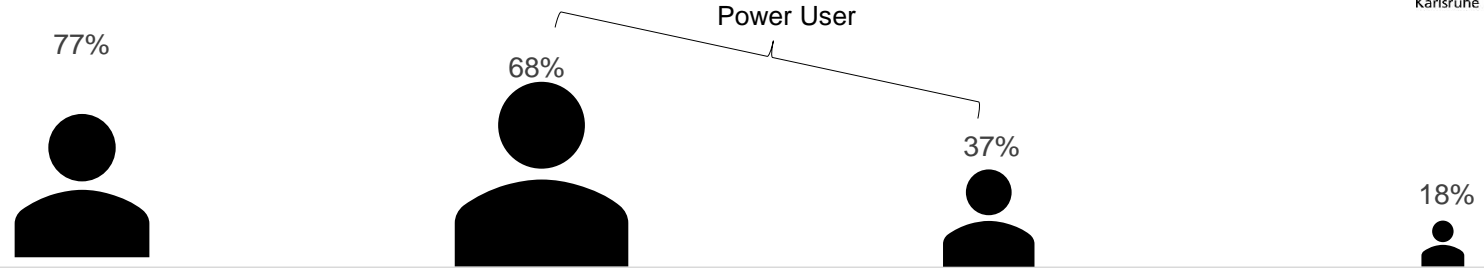
Conceptual Framework

Classification Process

- 1 Derived deductively from existing literature
- 2 Cross-validate existing codes or *create new ones*
- 3 Assign codes independently by two researchers and resolve conflicts



User Roles



Casual User

Business User & Domain Experts

Solely **consume data** (monitoring of dashboards, preparing reports)

Scars analytical but **extensive business or engineering knowledge** (Spahn et al., 2008)

Naturally develop a data-driven mindset over time supported by a ontology to learn BIA-related knowledge (Englmeier & Román, 2014)

Data Analyst

Responsible for transforming data into **actionable insights for casual users** (Eckerson, 2012)

Distinguished by **data production** (clean and aggregate data, De Mauro et al., 2018) and **data consumption** tasks (analyze ML outputs; Dinsmore, 2016)

Unlike DS, often bound to a **department** (Eckerson, 2012)

Data Scientist

Less business and domain knowledge (Eckerson, 2012)

Structured, unstructured, internal and external data (Abelló et al., 2013)

Applying advanced analytics (identifying patterns, applying context and intelligence; De Mauro et al., 2018)

IT User

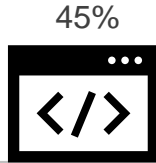
Engineers & Developers

Providing necessary data **infrastructure** (e.g. data streams via pipelines), **thus act as enabler** (De Mauro et al., 2018, Zehnder & Riemer, 2018)

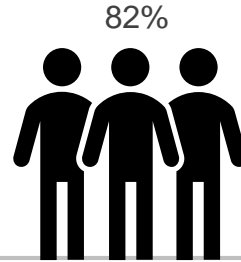
Mgt. and governance of data (Bilalli et al., 2016)

Implementation of data-intensive systems (Eckerson, 2012)

Perspectives



Artefact-centric View



User-centric View



Governance-centric

Continuous interaction without any mediation or intervention (Abelló et al. 2013),

I.e. Fusion Cubes or

Semantic **query designer** tool (Spahn et al. 2008)

Leverage ML by a domain-specific language (Zehnder and Riemer 2018)

Aim to make casual user **more knowledgeable** (Imhoff & White, 2011)

Implementation of information levels (data consumptions tasks, data production tasks, user profiles, availability; Alpar & Schulz, 2016)

Multi-tool, multi-user platform to **create synergies between casual and power user** (Convertino & Echenique)

Data Lakes (typically not fully IT-curated) become an important direct source for SSBI (Llave, 2018; Vo et. al., 2018),

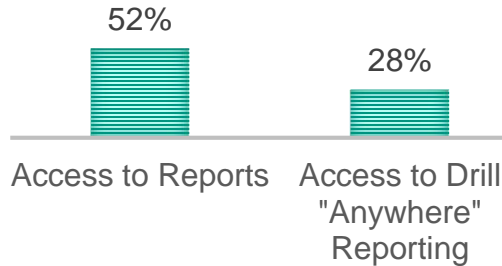
Data quality needs to be sufficient for the analytical task (Stodder, 2015).

Crowd-sourced annotation systems may rate the value of reports and data sources (Imhoff & White, 2011).

Too strict governance leads to **shadow IT infrastructure** built up by business departments (Stodder, 2015).

Self-Service Levels

(1) Usage of Information Resources

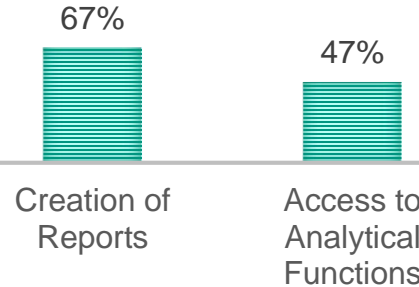


Access to reports requires the lowest level of **self-reliance** and **system support** from casual users (Alpar & Schulz, 2016).

Sharing and collaboration are important system features (Marjanovic, 2015)

Technical solutions to **drill-down and roll-up anywhere functionalities** (Chouder et al., 2017).

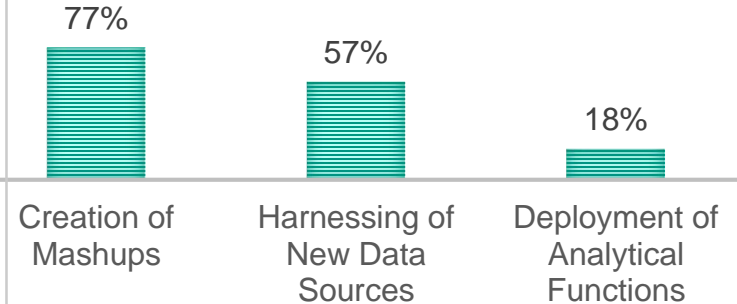
(2) Creation of Information



Data access and availability are a key concern for information creation (Berthold et al., 2017).

Because power users are scarce in the market, casual users should be enabled through SSBIA to fit models (Dinsmore, 2016). **Model management warehouses** could ensure reuse of pre-trained models (Chard et al., 2019).

(3) Creation of Information Resources



Creation of Mashups refers to **various data preparation tasks**. SSBIA should give users the autonomy to explore and integrate new data in structured and unstructured formats (Bani-Hani et al., 2018).

Learned statistical models can only create value if they are integrated into business processes. For e.g., more **technical roles** may deploy analytical functions to **enable casual users to leverage ML** (Zehnder and Riemer, 2018).

Future Research Avenues

- 1 Understand the Trade-Off between Top-Down and Bottom-Up SSBI Capabilities
- 2 Define a Method for Implementing SSBI within Organizations
- 3 Investigate Success Factors for Data Management and Data Governance
- 4 Support Casual Users' Self-Reliance within the Analytical Investigation Process
- 5 Develop Effective Multi Sensory User Interfaces for Immersive Collaboration Environments

Vielen Dank für Ihre Aufmerksamkeit!

Many thanks for your attention!