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ERCIS

Smarter Work?

Promises and Perils of Algorithmic Management in the Workplace Using Digital Traces.

@johuellm

COMPETENCE CENTER SMARTER WORK


“R2-D2, You Know Better Than To Trust A Strange Computer”

Managing People

What People Hate About Being Managed by Algorithms, According to a Study of Uber Drivers

by Mareike Möhlmann and Ola Henfridsson

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Make Algorithms Enhance Your Productivity—Not A 'Surveillance State'

Christos Makridis Former Contributor ⓘ

Markets

I am a professor & policy adviser, writing about behavioral economics.

"R2-D2, You Know Better Than To Trust A Strange Computer"

Agenda

1 **Introduction**
The Controversy of Algorithmic Management

2 **Results**
Towards meaningful Recommendations

3 **Discussion**
Between Appropriateness and Validity

4 **Outlook**
Bringing Algorithms into Practice

Definition

Algorithmic
- deterministic decision rules
- **probabilistic models**
  (multivariate statistical models, e.g., machine learning, “AI”)

Digital Traces
- logs of routine IT use

Algorithmic Management Using Digital Traces

Management
- inform, support, augment, or automate **decisions**
- related to **people**
- in the **workplace**

Sources: Lee et al., 2015; Möhlmann & Zalmansson, 2017; Crowston & Bolici, 2020; **Hüllmann, 2021.**

Motivation

Why Research Algorithmic Management Using Digital Traces?

Promises

- Optimise productivity
- Improve hiring and staffing
- Objective performance evaluation
- …
- Social phenomena predictable?

Perils

- Bias and discrimination
- Privacy violations
- Opacity
- …
- Social phenomena not predictable?

Sources: Berente et al., 2019; Lee, 2018; Lazer et al., 2009; Pentland, 2015. Gal et al., 2020; Narayanan, 2019.

Research Questions

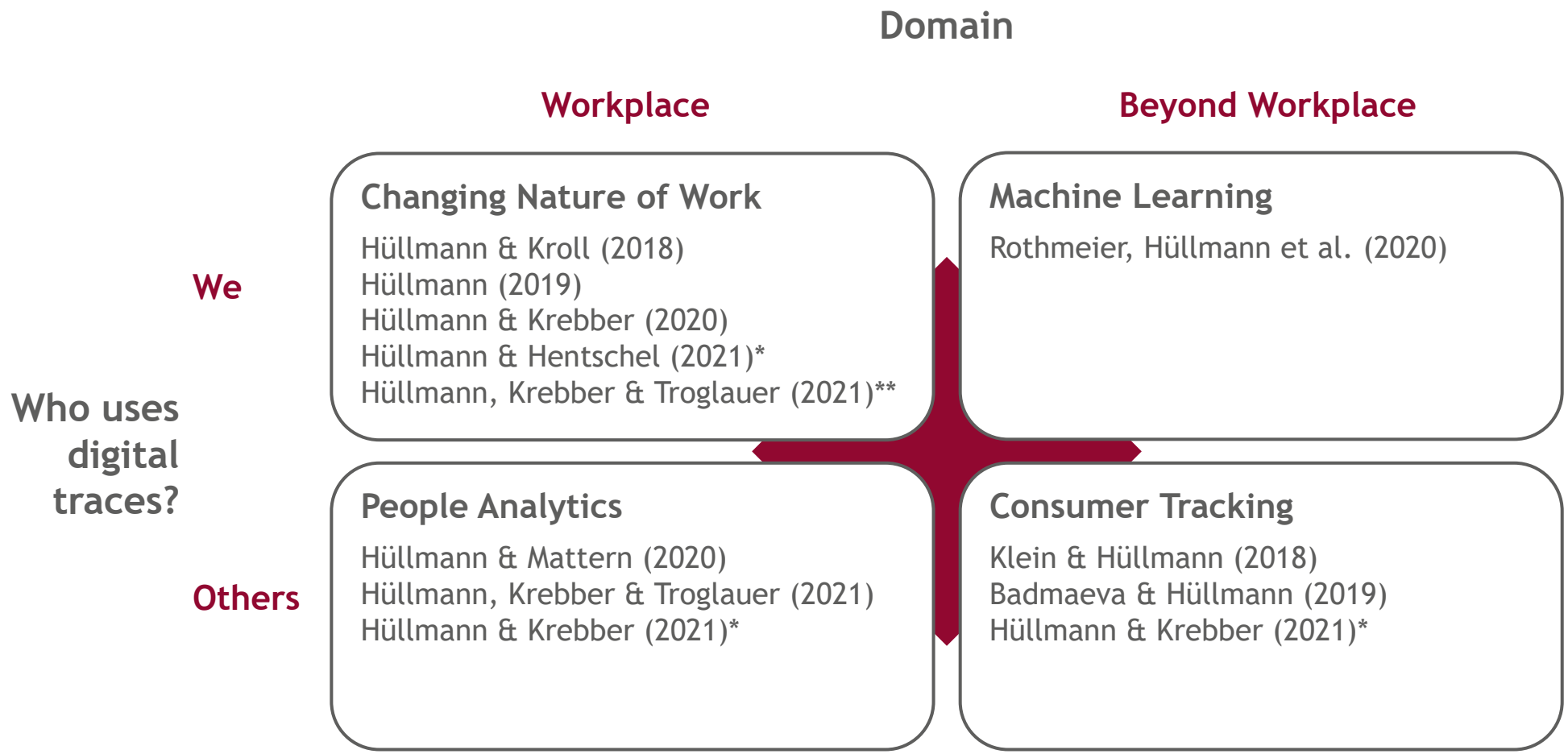
When is it **appropriate** to use algorithmic management based on digital traces in the workplace?

- Uncover the extent of algorithmic management in practice

How do we ensure **valid** inferences and proper mechanisms for digital traces analysis?

- Develop proper procedures for academia and practice
- Empirically examine selected case studies

Paper Overview

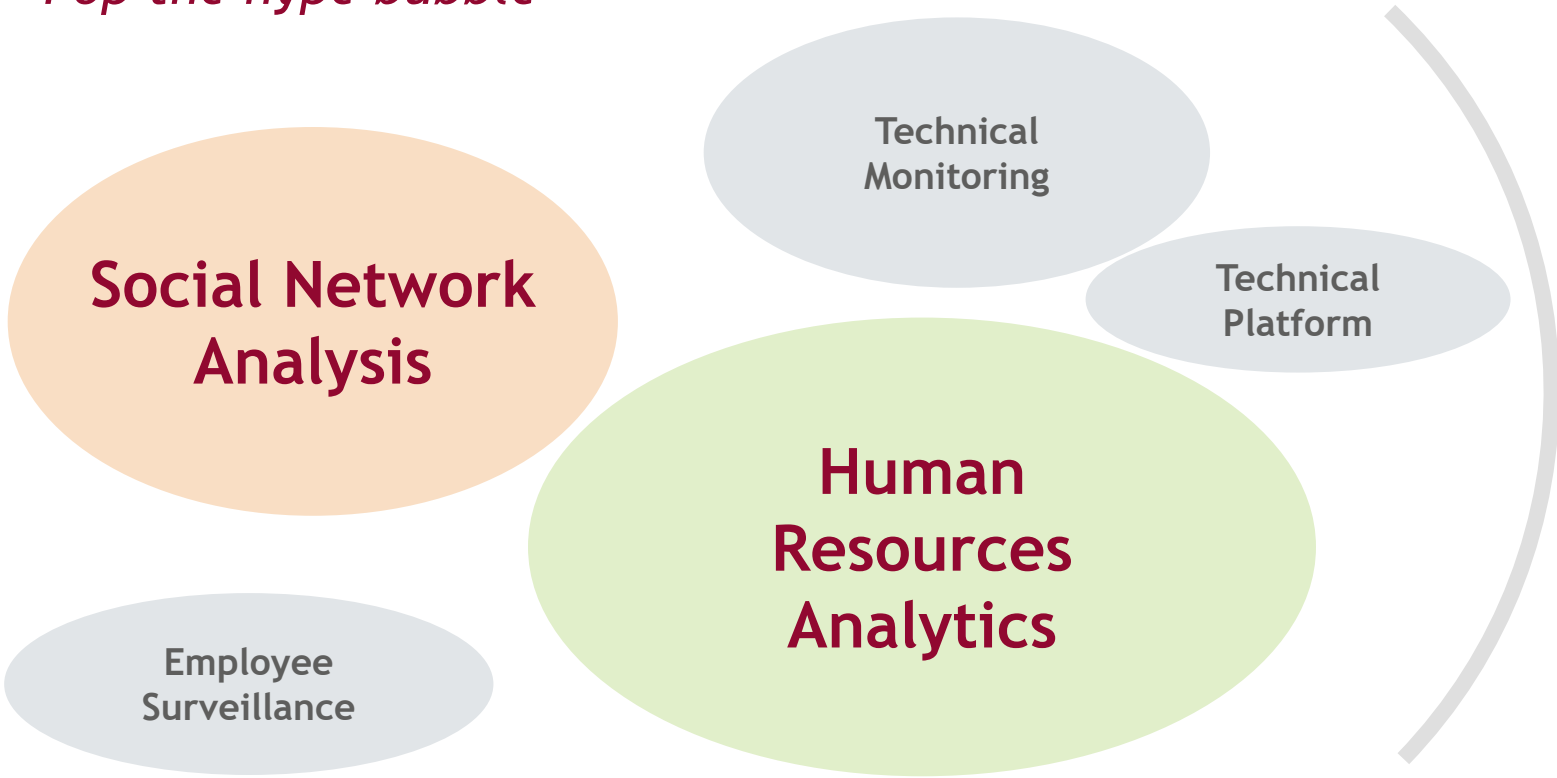


* preprint; ** submitted.

People Analytics

Algorithmic Management by the HR function.

"Pop the hype bubble"



Ambiguous
(different people mean different things when using this term)

No empirical backing
(no evidence or warrants for claimed effects)

Opaque
(mechanisms, privacy, transparency, accountability, ethics, etc.)

Sources: **Hüllmann & Mattern, 2020; Hüllmann et al., 2021a, 2021b.**

Digital Traces

Excerpt from Taxonomy.

Characteristic	Instance	
Nature of Data	Historical, longitudinal logs of routine technology use	
Relationality	Monadic	Dyadic
Generation	Passive	Active
Size*	Big Data	Little Data
Structure	Structured	Structured with media attached
…	…	…

*Data Granularity

Breadth: "number of measurable properties"
Depth: "level of aggregation within each property"

Sources: **Hüllmann, 2019; Hüllmann, 2021**; Berente et al., 2018; Hedman et al., 2013.

Predicting Onboarding

Using only meta data:

– Mixed results

– Importance of construct validity

Do we need context and triangulation with qualitative insights …

… or do we need more data?

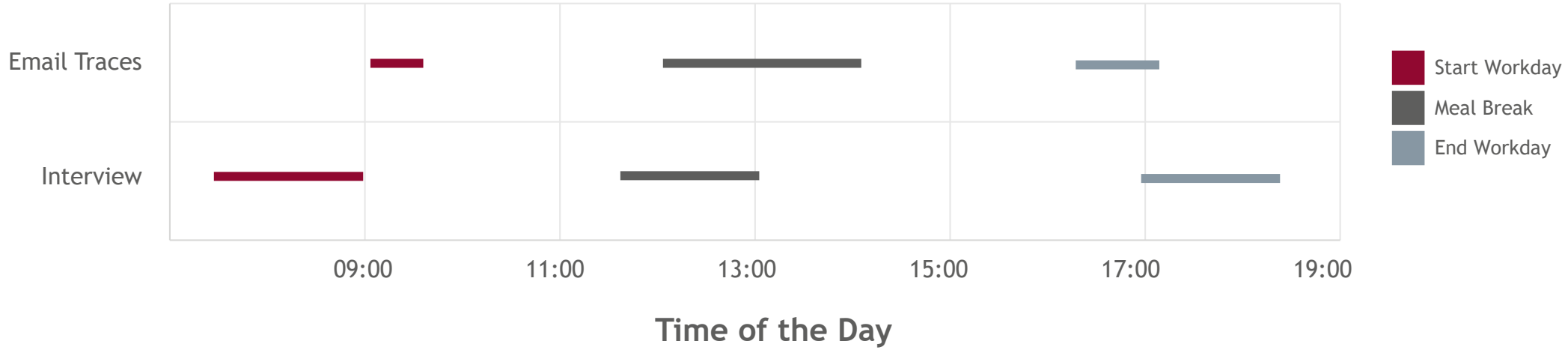
Sources: **Hüllmann et al., 2021; Hüllmann & Kroll, 2018**.

Triangulating Temporal Rhythms

Quantitative analysis of **email traces**, and semi-structured interviews:

- Decent accuracy for stable and long-term patterns
- Inconclusive for dynamic and micro patterns

→ More data needed!



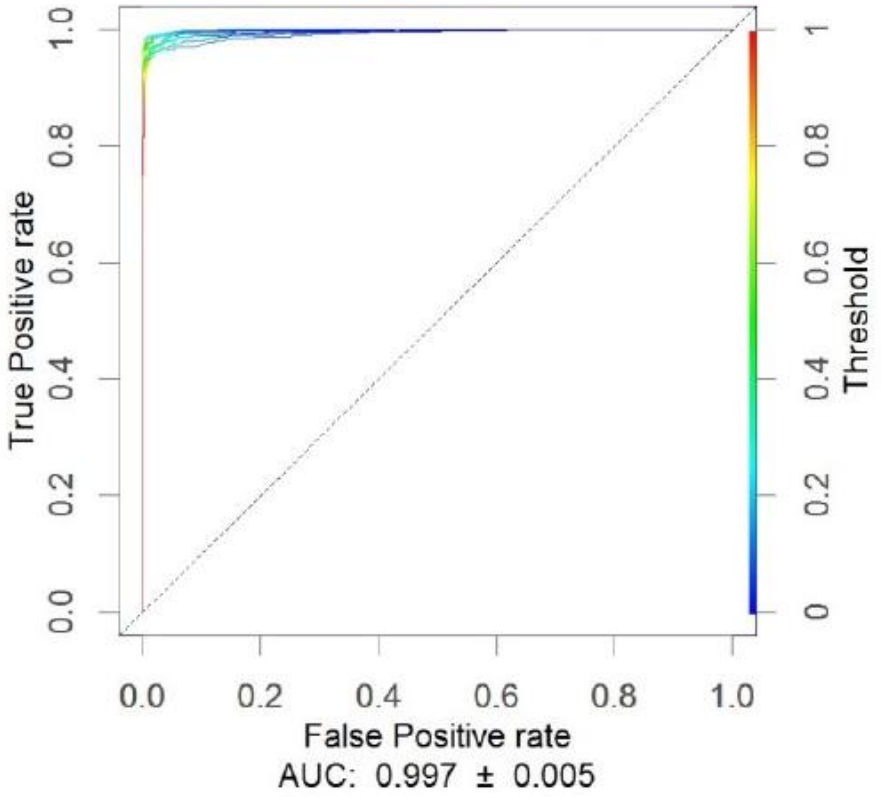
Sources: **Hüllmann & Krebber, 2020**; Howison et al., 2011.

Churn Prediction

97% accuracy in churn prediction (14 days interval).

Churn prediction is interesting for organisations.

However, games have rigid rules and finite set of clearly defined actions.



Sources: **Rothmeier, Hüllmann et al., 2020**.

Digital Traces as a Method

How to Ensure Valid Digital Traces Analysis?

Recommendations:

- **Ensure construct validity with digital traces**
- **Triangulation**
- **Data in breadth and depth**

Remaining questions:

- How to reduce privacy concerns?
- How to scale triangulation?
- What jobs, tasks, scenarios are suitable?

01 Education
advise & teach on digital traces analysis

02 Methods
research on digital traces & instrument validation

03 Theory
untapped potential for processual insights

Algorithmic Management

Transparency and Disclosure of Mechanisms is Required.

Research:

Expose Algorithmic Management

Customers:

Be cautious with changes based on algorithms.

Governments:

Increase transparency and accountability.

Vendors:

Show that the interventions work.

Algorithm Registries

Appropriateness

Certifications

Appropriateness & Validity

Explainable AI

Appropriateness & Validity

Responsible AI

Validity

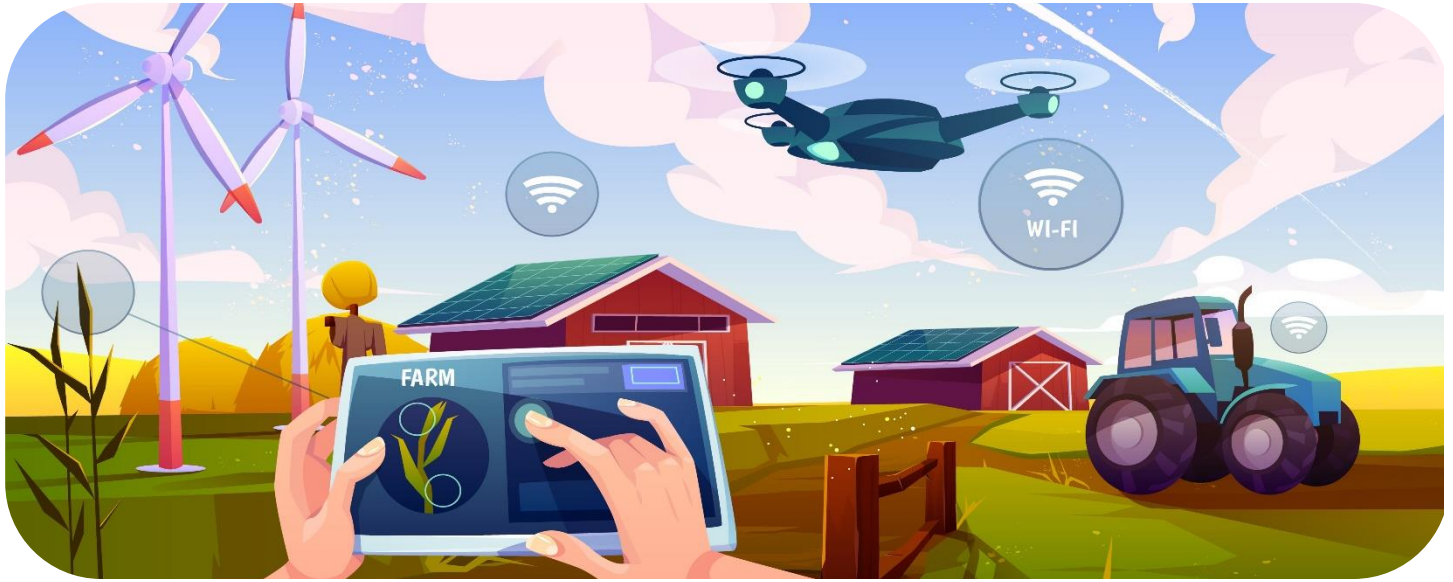
Quo Vadis?

Algorithmic Management using Digital Traces in Practice.

How does human-algorithm co-work transform work at small and medium enterprises (SME) of primary and secondary economic sectors?

For example, farming:

- Resource deprived SME
- Regional importance
- High tech industry
- Struggling farmers



Sources: Gal et al., 2020; Waardenburg et al., 2018

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Backup

Future Research

Human, & AI co-work in Farming

- How are the **role** of the farmer and his **tasks changing**?
- Is there a **loss of identity** for the farmer towards his/her job?
- When does the farmer **trust** the algorithm or ignore the recommendations?
- What **competencies** does the farmer need? Is there a competence overload?
- How does the **collaboration** between **farmer** and **“algorithmic system”** take shape?
- How do farmers engage in **sensemaking** for complex systems? Can farmers **assess validity** and **plausibility**?

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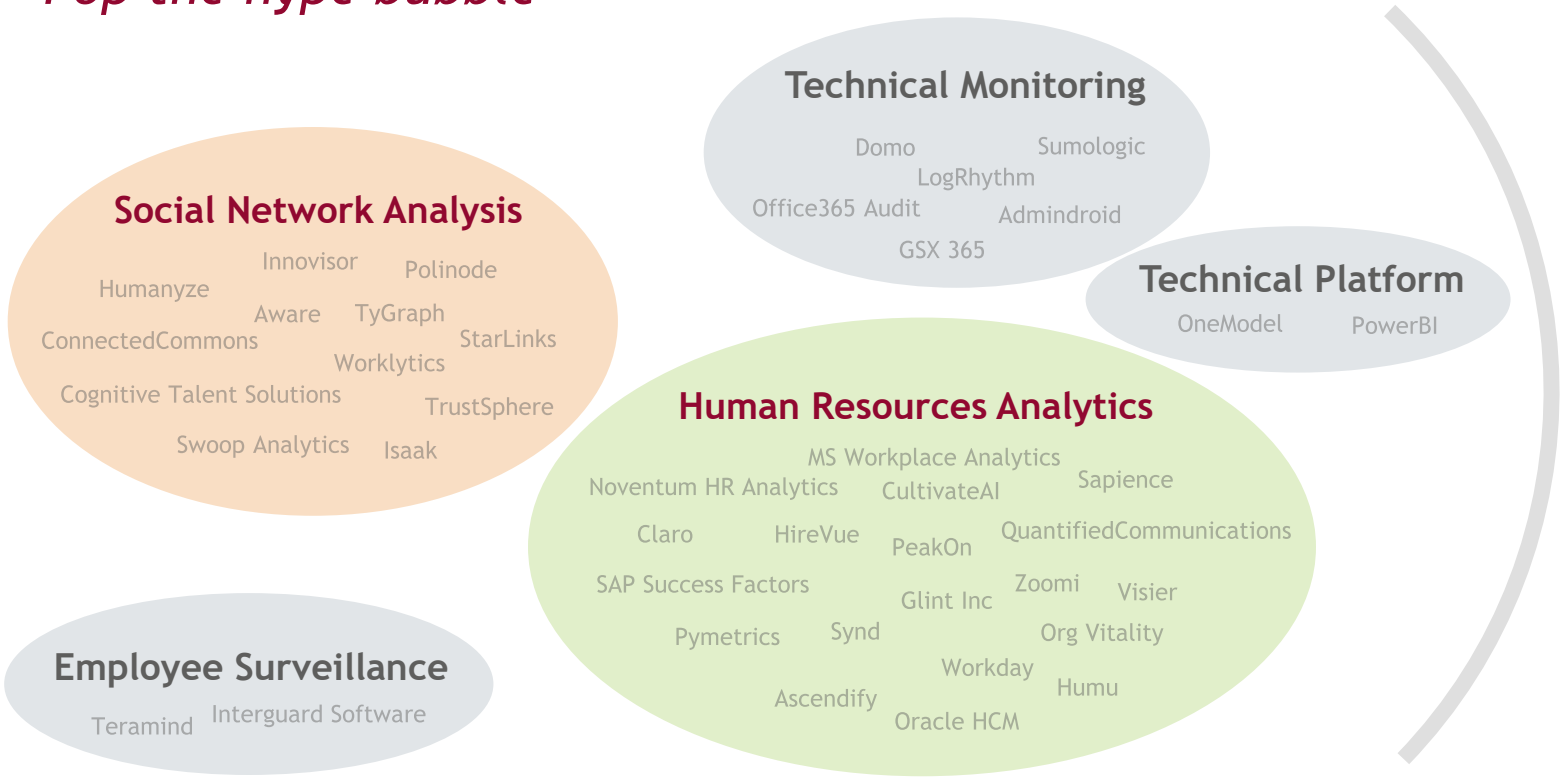

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Included papers

Paper	Outlet	Type	ACS	VHB	WKWI	Points
1. Construction of Meaning	ICIS 2019 Workshop	Conference	100%	n/a	n/a	0,50
2. Social Onboarding	ACIS 2018	Conference	80%	n/a	C	0,80
3. Temporal Rhythms	AMCIS 2020	Conference	85%	D	B	0,85
4. Three Issues	Bled 2020	Conference	100%	n/a	C	1,00
5. IT Artifact	WI 2021	Conference	65%	C	A	0,65
6. Price Discrimination	WI 2019	Conference	60%	C	A	0,60
7. Data Capitalism	WD 2018	Journal	30%	n/a	n/a	0,30
8. Churn Prediction	IEEE TX on Games 2020	Journal	40%	B	A	1,00
9. Media Collections**	CSCW 2021	Conference	TBD	C	B	0,00
10. Informal Drivers*	n/a	Journal	TBD	n/a	n/a	0,00
11. Status Quo People Analytics*	n/a	Journal	TBD	n/a	n/a	0,00
12. Data Economy*	n/a	Book Chapter	TBD	n/a	n/a	0,00
Sum:						5,70

* preprint; ** submitted.

References

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- Berente, N., Gu, B., Recker, J., and Santhanam, R. 2019. “Call for Papers MISQ Special Issue on Managing AI,” MIS Quarterly, pp. 1–5.
- Crowston, K., and Bolici, F. 2020. “Impacts of the Use of Machine Learning on Work Design,” in Proceedings of the 8th International Conference on Human-Agent Interaction, New York, New York, USA: ACM, November 10, pp. 163–170.
- Gal, U., Jensen, T. B., and Stein, M.-K. 2020. “Breaking the Vicious Cycle of Algorithmic Management: A Virtue Ethics Approach to People Analytics,” Information and Organization (30:2).
- Hedman, J., Srinivasan, N., and Lindgren, R. 2013. “Digital Traces of Information Systems: Sociomateriality Made Researchable,” in Proceedings of the Thirty Fourth International Conference on Information Systems (ICIS), pp. 1–17.
- Howison, J., Wiggins, A., and Crowston, K. 2011. “Validity Issues in the Use of Social Network Analysis for the Study of Online Communities,” Journal of the Association for Information Systems (12:12), pp. 767–797.
- Hüllmann, J. A., & Kroll, T. (2018). The Impact of User Behaviours on the Socialisation Process in Enterprise Social Networks. In Proceedings of the 29th Australasian Conference on Information Systems (ACIS), Sydney, Australia.
- Hüllmann, J. A. 2019. “The Construction of Meaning through Digital Traces,” in Proceedings of the Pre-ICIS 2019, International Workshop on The Changing Nature of Work, München.
- Hüllmann, J. A., and Hentschel, J. 2021. “Beyond the Formal: Drivers of Informal Communication in Enterprise Social Networks,” In Preparation.
- Hüllmann, J. A., and Krebber, S. 2020. “Identifying Temporal Rhythms Using Email Traces,” in Proceedings of the America’s Conference of Information Systems (AMCIS), Salt Lake City, Utah, USA.
- Hüllmann, J. A., and Krebber, S. 2021a. “Status Quo of People Analytics in Academia and Practice: Exhaustive Review and Morphological Box,” In Preparation, pp. 1–42.
- Hüllmann, J. A., and Krebber, S. 2021b. “The Data Economy: An Introduction,” In Preparation.
- Hüllmann, J. A., Krebber, S., and Troglauer, P. 2021a. “The IT Artifact in People Analytics: Reviewing Tools to Understand a Nascent,” in Proceedings of the 16th International Conference on Wirtschaftsinformatik (WI), Duisburg-Essen, Germany.
- Hüllmann, J. A., Krebber, S., and Troglauer, P. 2021b. “Exploring Media Collections of Distributed Workers Using Digital Traces,” in In Preparation.
- Hüllmann, J. A., and Kroll, T. 2018. “The Impact of User Behaviours on the Socialisation Process in Enterprise Social Networks,” in Proceedings of the Australasian Conference on Information Systems (ACIS), Sydney, Australia.
- Hüllmann, J. A., and Mattern, J. 2020. “Three Issues with the State of People and Workplace Analytics,” in Proceedings of the 33rd Bled EConference, Bled, Slovenia.

References

Page (2/2).

- Lazer, D., Pentland, A., Adamic, L., Aral, S., Barabasi, A.-L., Brewer, D., Christakis, N., Contractor, N., Fowler, J., Gutmann, M., Jebara, T., King, G., Macy, M., Roy, D., and Van Alstyne, M. 2009. “SOCIAL SCIENCE: Computational Social Science,” Science (323:5915), pp. 721–723.
- Lee, M. K. 2018. “Understanding Perception of Algorithmic Decisions: Fairness, Trust, and Emotion in Response to Algorithmic Management,” Big Data & Society (5:1), pp. 1–16.
- Lee, M. K., Kusbit, D., Metsky, E., and Dabbish, L. 2015. “Working with Machines: The Impact of Algorithmic and Data-Driven Management on Human Workers,” in Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems - CHI ’15, New York, New York, USA: ACM Press, pp. 1603–1612.
- Möhlmann, M., and Zalmanson, L. 2017. “Hands on the Wheel: Navigating Algorithmic Management and Uber Drivers Autonomy,” in Proceedings of the International Conference on Information Systems (ICIS).
- Narayanan, A. 2019. “How to Recognize AI Snake Oil. Presentation,” Princeton Lectures, pp. 1–21.
- Pentland, A. 2015. Social Physics, (1st ed.), New York, New York, USA: Penguin Books.
- Rothmeier, K., Pflanzl, N., Hüllmann, J. A., and Preuss, M. 2020. “Prediction of Player Churn and Disengagement Based on User Activity Data of a Freemium Online Strategy Game,” IEEE Transactions on Games (E.A.), pp. 1–11.
- Waardenburg, L., Anastasia, S., and Huysman, M. 2018. “Predictive Policing: How Algorithms Inscribe the Understanding of Crime in Police Work,” in Academy of Management Global Proceedings.