Human-AI-Interaction in Different Professional Domains

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Advancing Mental Health Care with AI-Enabled Precision Psychiatry Tools: A Patent Review

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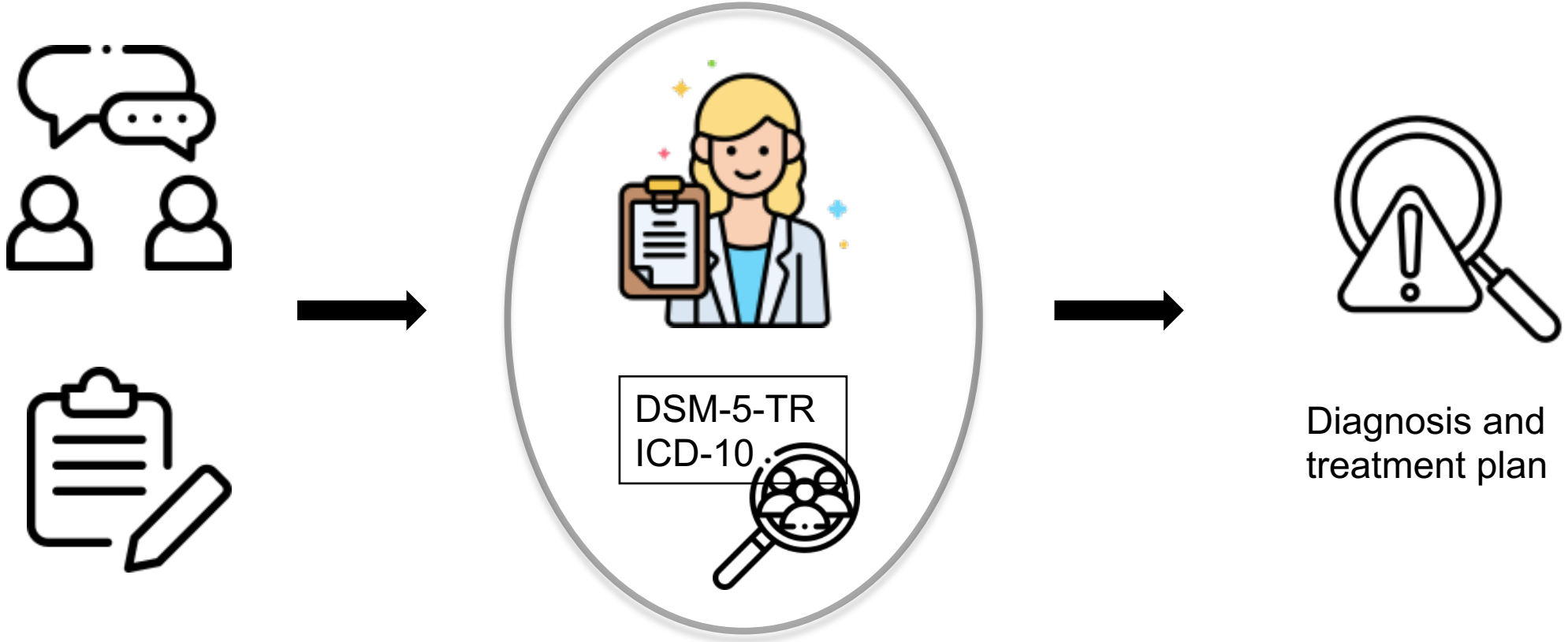
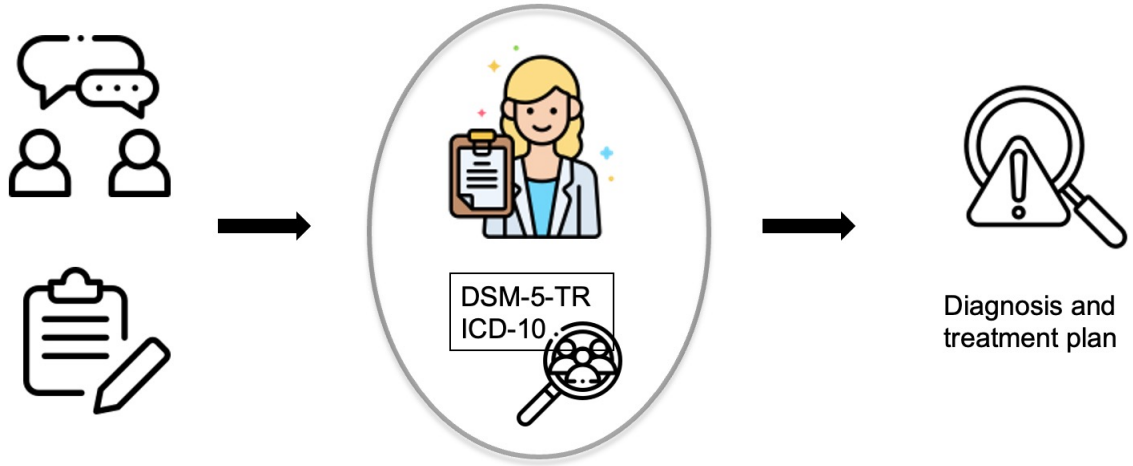
Clinical decision-making in mental healthcare: The conventional approach



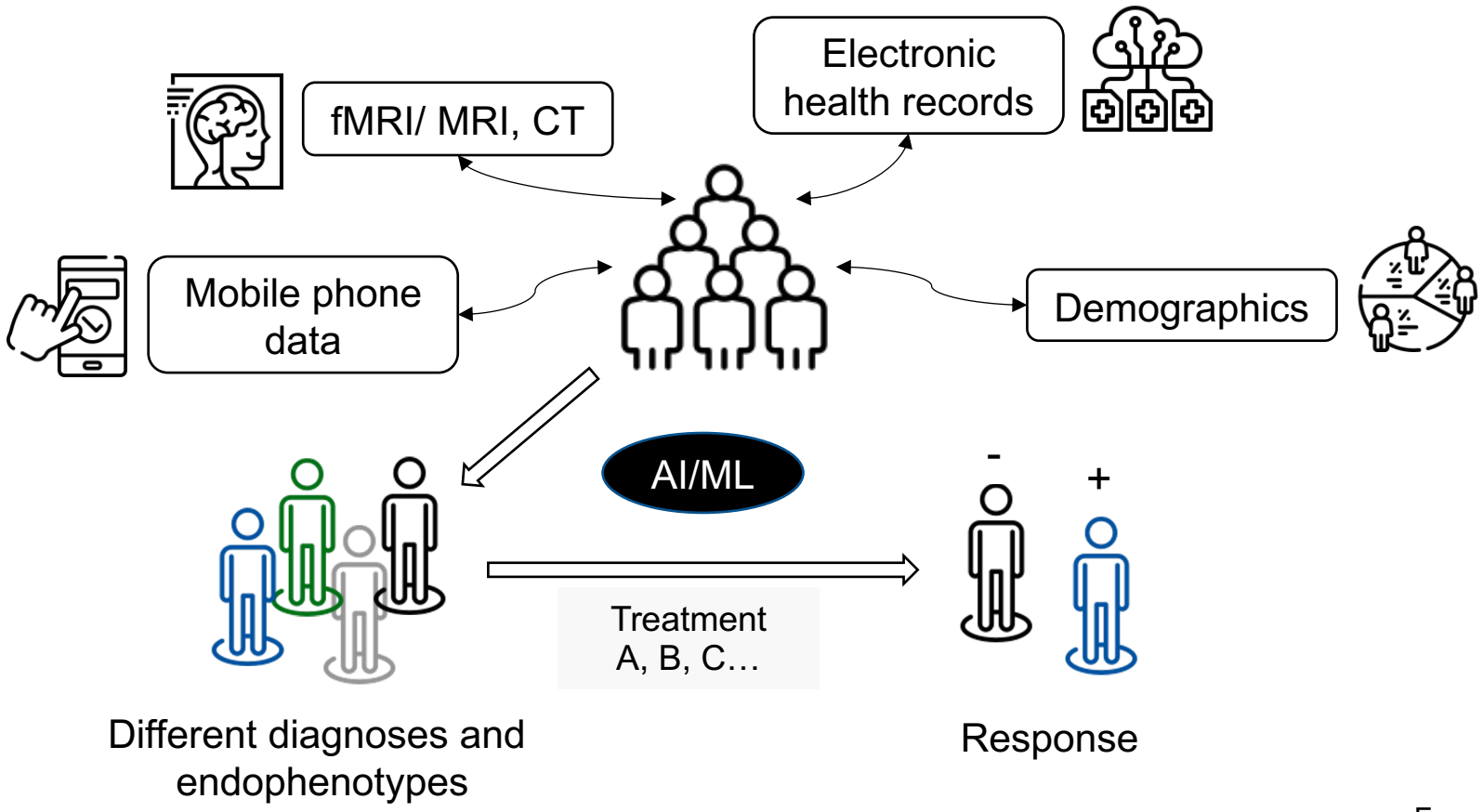
Clinical decision-making in mental healthcare: The conventional approach



- Disease course, symptom intensity, and treatment responses can vary heavily
- Burden of deriving ”correct recommendations” on individual psychotherapist/ psychiatrist

Kendler, 2016; Newson et al., 2020

Clinical decision-making in mental healthcare: AI-enabled precision psychiatry



More precise..

- diagnoses,
- prognoses,
- treatment recommendations

Fernandes et al., 2017

Advancing Mental Health Care with AI-Enabled Precision Psychiatry Tools: A Patent Review

- Despite the potential of AI-enabled precision psychiatry, **the use of AI in mental healthcare is still at its infancy** (Benjamens et al., 2020)

"The global precision psychiatry market is anticipated to observe impressive growth during the forecast period, 2023-2027. The major factors include **rise in incidences of mental health** and **technological advancements**, which are bolstering the market growth, globally"
(Research and Markets, Nov 2022)

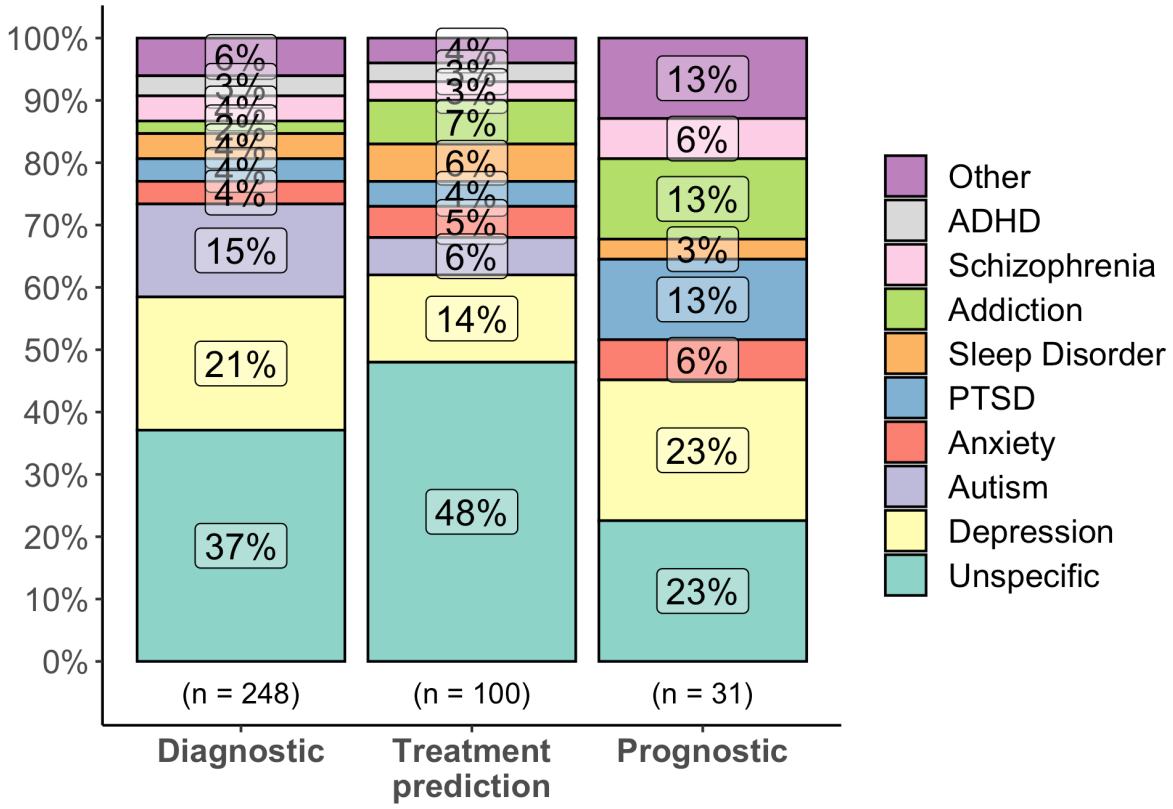
Advancing Mental Health Care with AI-Enabled Precision Psychiatry Tools: A Patent Review

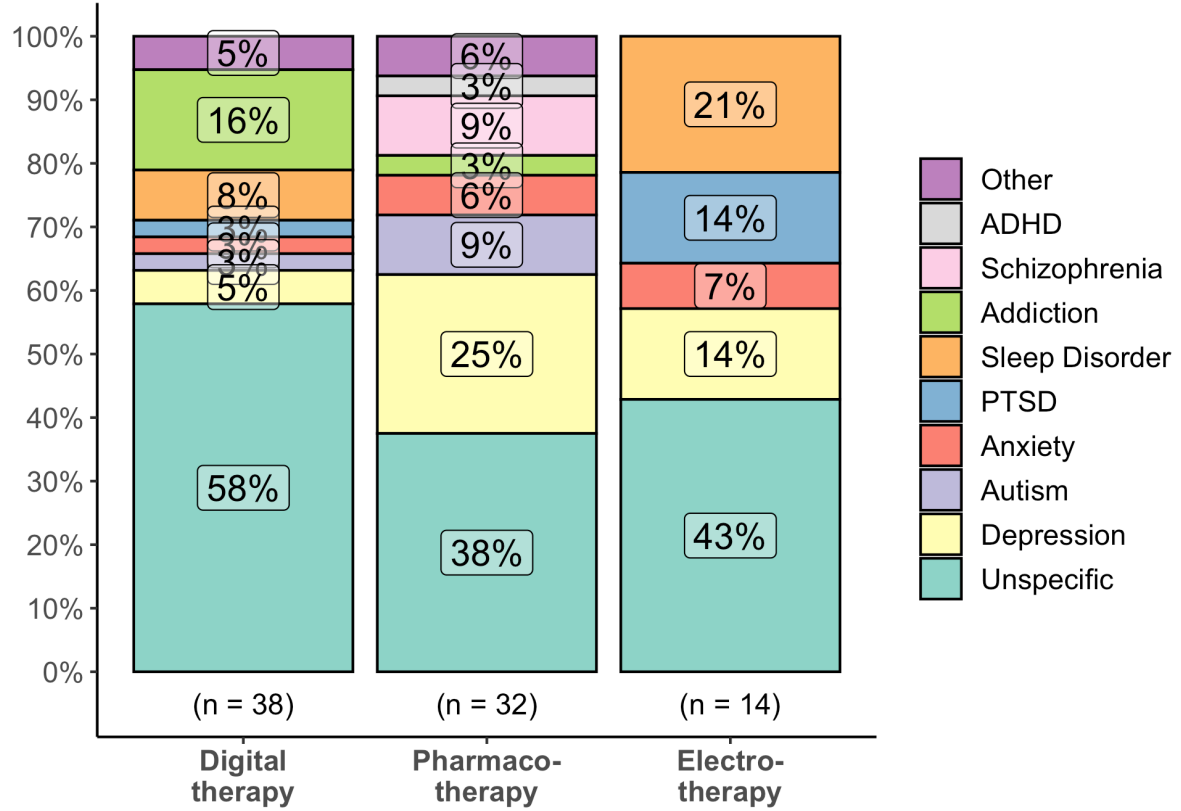
Derwent Innovation Patent Database

Diagnostic, treatment prediction, prognostic AI-enabled mental health tools

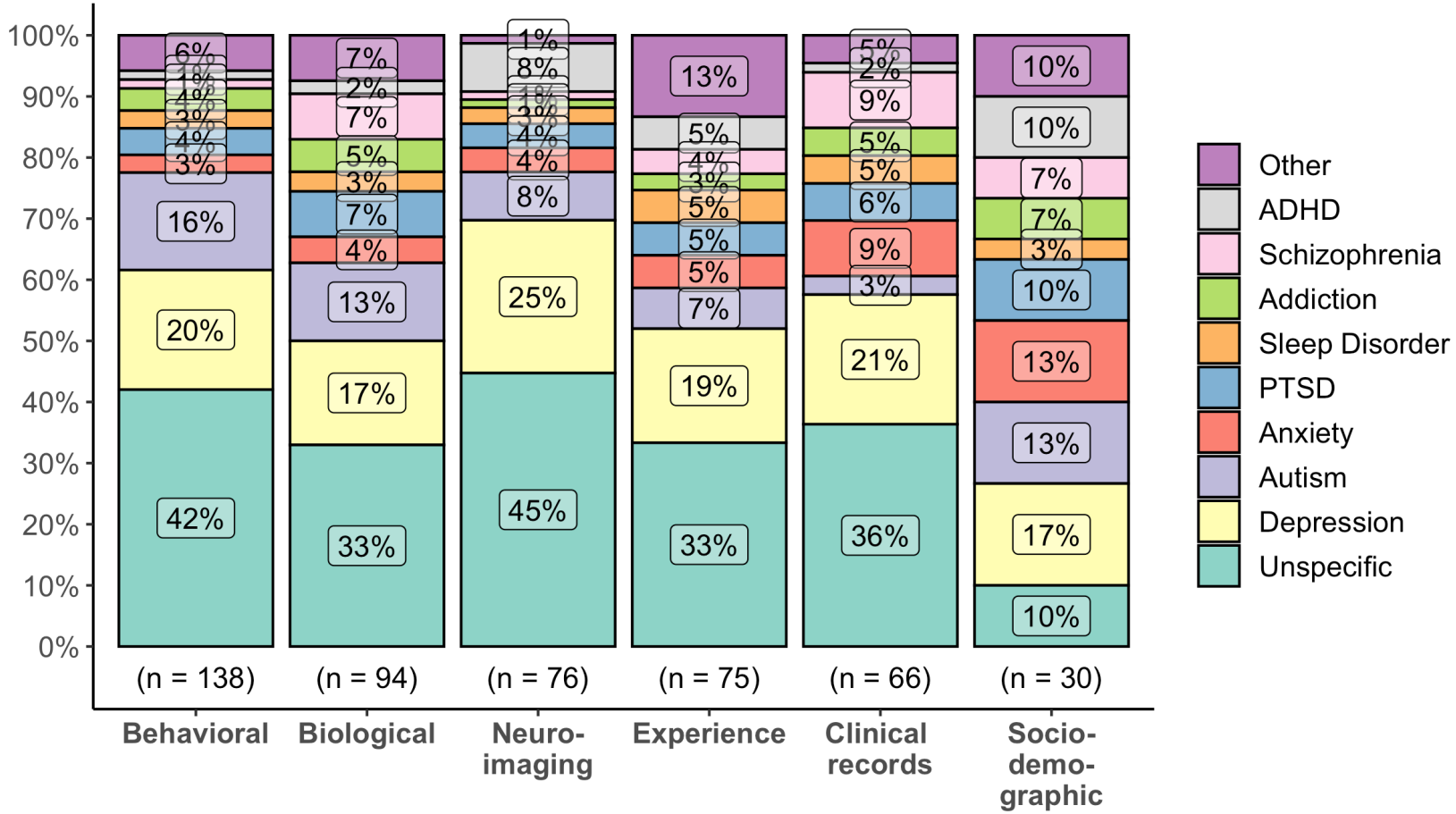
284 patents

Descriptive patent information: Prediction models and treatment approaches



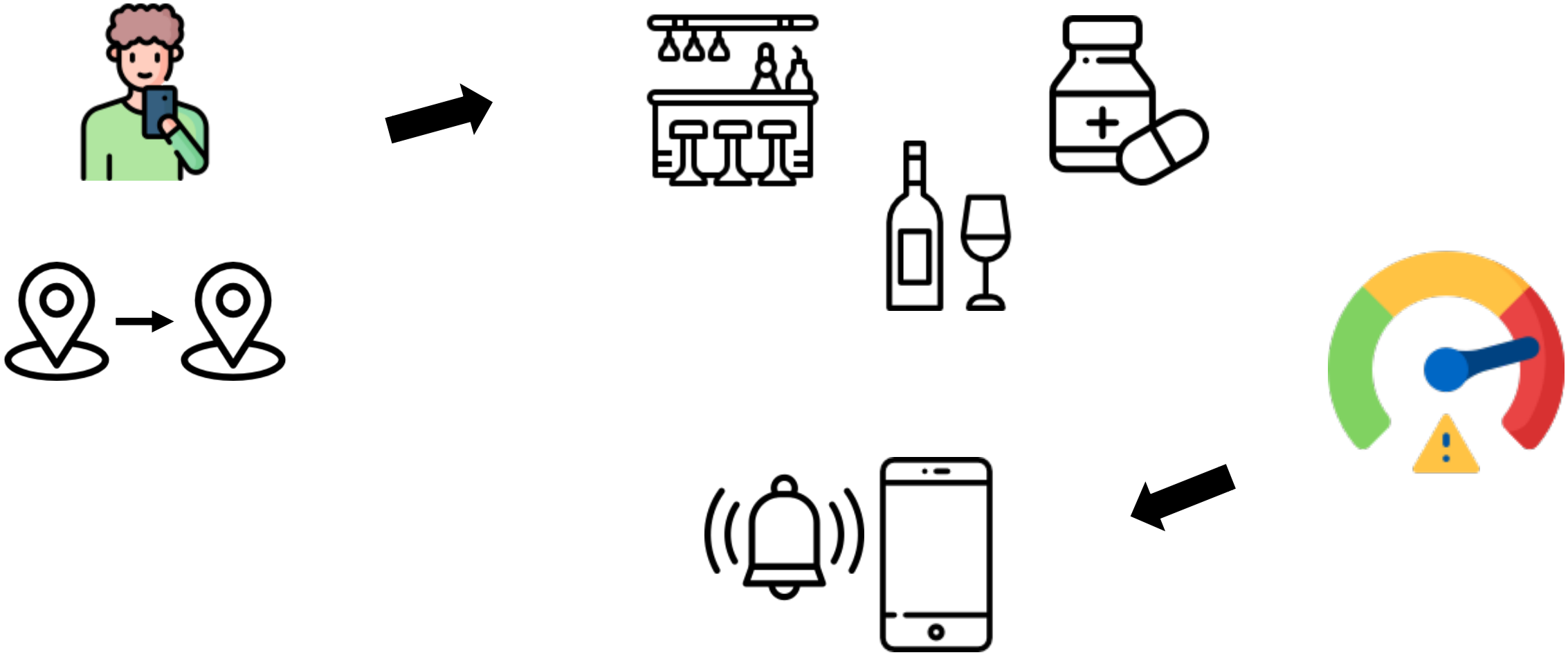


Descriptive patent information: Data sources

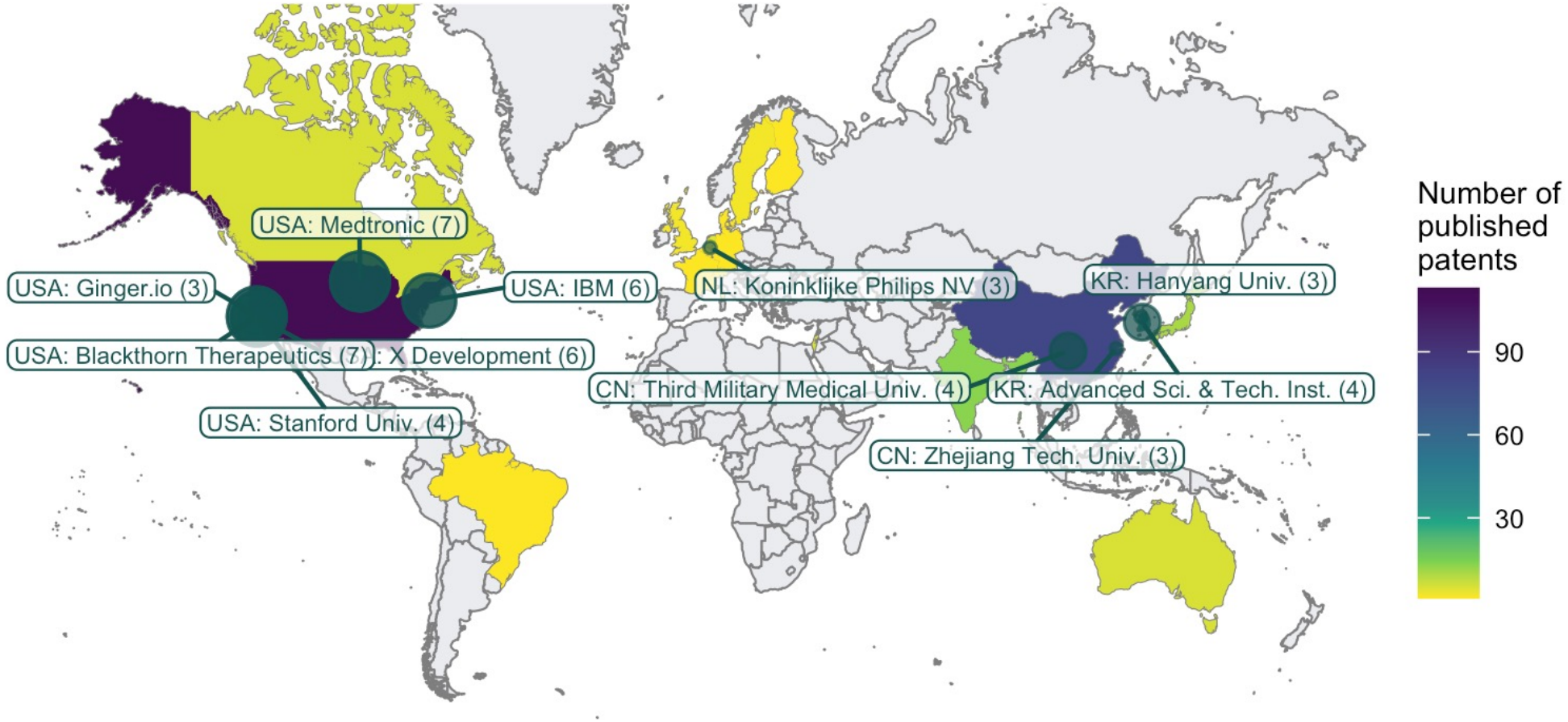


An example – the most impactful patent 2019

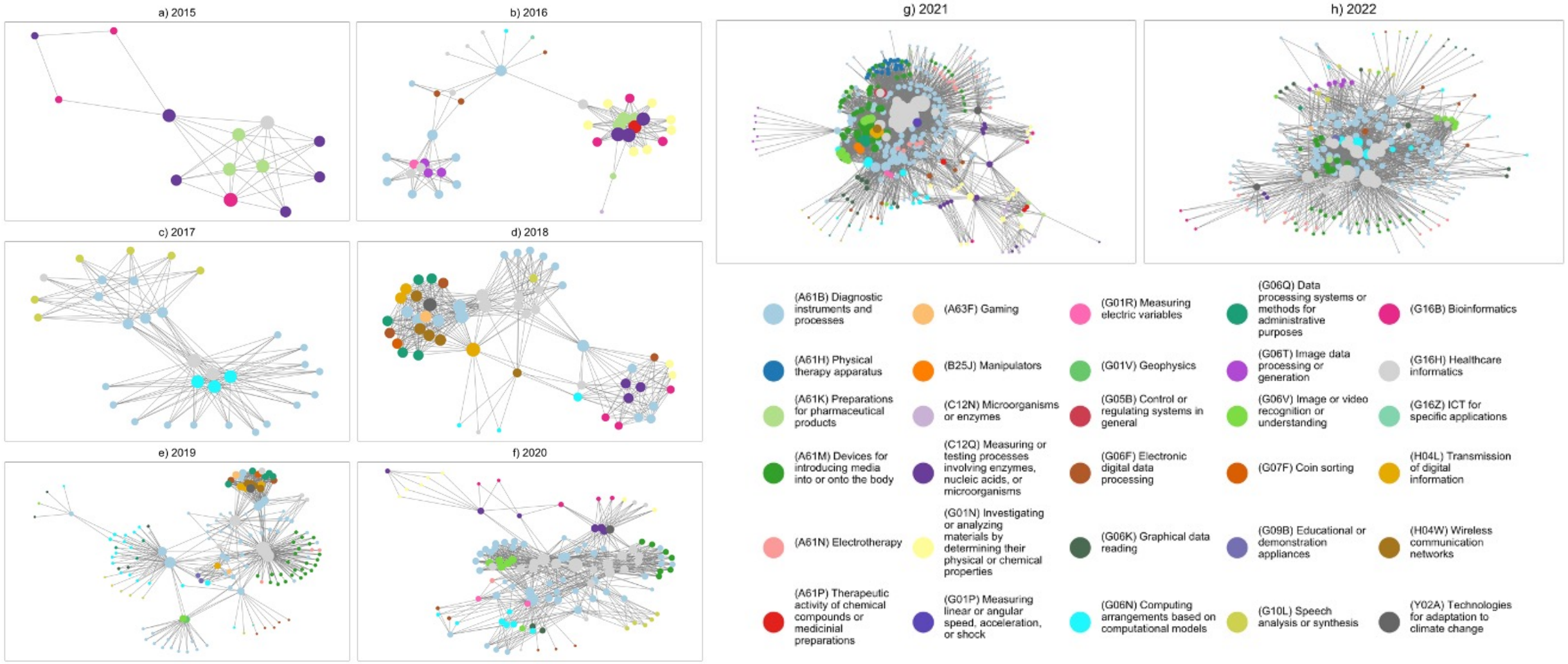
"Systems and methods of using wireless location, context, and/or one or more communication networks for monitoring for, preempting, and/or mitigating pre-identified behavior" (Williams et al., 2019)



Regional distribution of patents



CPC analysis – technology convergence



Impactful patents

2015

- Predicting treatment responses to antidepressant treatment with corticotropin-releasing hormone (CRH) receptor antagonists

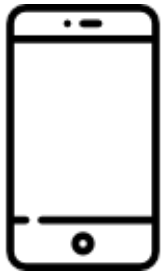
2016

- Adjustment of neuromodulation therapy relative to prioir therapy and treatment response

2017

- Monitoring bipolar disorder using speech analysis via mobile phone data

2018



- Using mobile phone data to generate medical status profile and treatment recommendations

Impactful patents

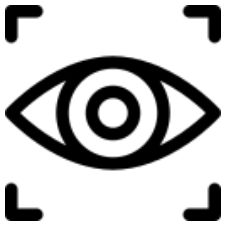
2019

- Using multiple data streams to preempt behavior associated with addiction

2020

- Predictive framework for depression treatment based on questionnaire data

2021



- Evaluation of mental health condition using eye movement data

2022

- Using EEG to predict the occurrence of mental health conditions

Take-home message and future research

- Practitioners and training institutions should be aware of the tools that will likely enter the market in the coming years
- Emphasize the potential of Human-AI-interaction in mental healthcare (AI not as a substitute but as support)
- Potential of AI-enabled precision psychiatry tools to contribute to diagnostic processes that move beyond ICD-10 and DSM-V criteria
- Technology convergence trends highlight the need to integrate expertise from multiple domains to spur novel developments in AI-enabled precision psychiatry

- Research-practice-gap analysis?
- Training interventions?
- Disseminating results to relevant stakeholders?

THANK YOU!

Reach out at…

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References

Benjamens, S., Dhunnoo, P., & Meskó, B. (2020). The state of artificial intelligence-based FDA-approved medical devices and algorithms: An online database. *Npj Digital Medicine*, *3*(1), 1–8. https://doi.org/10.1038/s41746-020-00324-0

Fernandes, B. S., Williams, L. M., Steiner, J., Leboyer, M., Carvalho, A. F., & Berk, M. (2017). The new field of "precision psychiatry." *BMC Medicine*, *15*(1), 80. https://doi.org/10.1186/s12916-017-0849-x

Kendler, K. S. (2016). The nature of psychiatric disorders. *World Psychiatry*, *15*(1), 5–12. https://doi.org/10.1002/wps.20292

Newson, J. J., Hunter, D., & Thiagarajan, T. C. (2020). The heterogeneity of mental health assessment. *Frontiers in Psychiatry*, *11*.

Research and Markets, Inc. (2022). *Precision Psychiatry Market—Global Industry Size, Share, Trends, Opportunity, and Forecast, 2017-2027*. TechSci Research. https://www.researchandmarkets.com/reports/5689413/precision-psychiatry-market-global-industry