Survival Analysis in the Era of Generative AI

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Sven Klijn

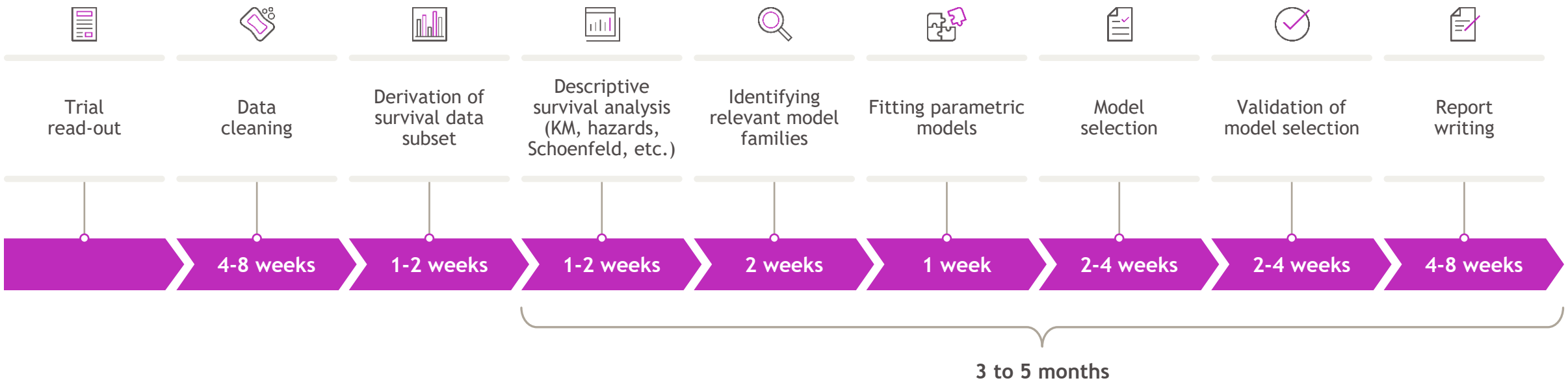
"The choice of extrapolation method often substantially impacts estimates of survival and cost effectiveness, representing a key area of discourse and uncertainty in technology appraisals (TAs)"[1]

"Alternative survival models were utilized to explore uncertainty in most appraisals (93%) […]
When scenario analyses were conducted to evaluate the impact of different extrapolation methods, the ICER varied considerably from the base-case value, ranging from -127% to 2,136%"[2]

The importance of survival analysis

1. Latimer et al. (2024). An Evaluation of an Algorithm for the Selection of Flexible Survival Models for Cancer Immunotherapies: Pass or Fail? DOI: 10.1007/s40273-024-01429-0
2. Zannat et al. (2023). Case for Clear Communication and Justification of Survival Extrapolation Methodology: A Review of NICE Submissions in Oncology. DOI: 10.1016/j.jval.2023.09.953

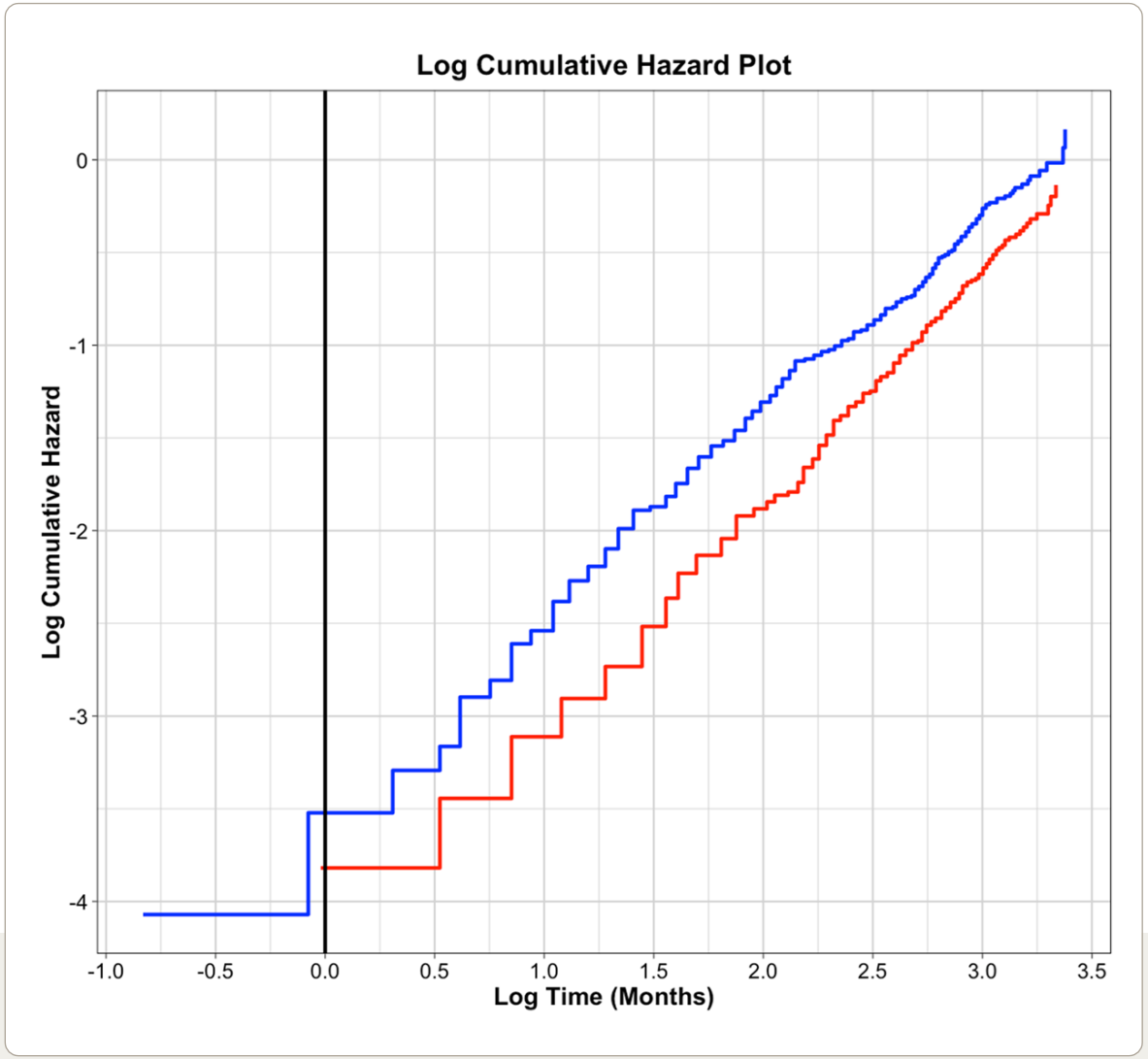
The process of survival analysis is lengthy



Survival analysis

is to some extent debatable

Does the proportional hazards assumption hold?



Objective

Leverage Generative AI to support experts in survival analysis, making the process faster and more robust without replacing human judgment

Project overview

2 years ago	1 year ago	Now
		
LLM multi-modal capabilities were insufficient	Multi-modal capabilities sufficiently improved for accurate recognition	Multi-modal reasoning and data integration

Combination of GenAI and survival analysis best practices

- **The current approach is grounded in four key papers:**
  - NICE DSU TSD 14 & 21
  - Palmer (2023): Guide to selecting flexible survival models[1]
  - Latimer (2024): Mixture and non-mixture cure modeling[2]
- **Considers both the survival data under evaluation and external data**
- **Allows for human control via a feedback loop**

1. Palmer et al. (2023). A Guide to Selecting Flexible Survival Models to Inform Economic Evaluations of Cancer Immunotherapies. DOI: 10.1016/j.jval.2022.07.009
2. Latimer et al. (2024). Mixture and Non-mixture Cure Models for Health Technology Assessment: What You Need to Know. DOI: 10.1007/s40273-024-01406-7

Panel

Sven Klijn
Director,
Bristol Myers Squibb

Will Rawlinson
Principal AI Scientist,
Estima Scientific

Nick Latimer
Professor,
University of Sheffield
and Petauri Evidence

Siguroli Teitsson
Director,
Bristol Myers Squibb

Session structure

Technical perspective

- Architecture and methodology
- Role of the human expert

Evaluation

- Initial results
- Results with feedback loop
- Results v2

Contextualization

- Relevance of efficiency
- Foundations of responsible automation
- Future directions