

STRengthening Analytical Thinking for Observational Studies: the STRATOS initiative

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<http://stratos-initiative.org/>



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The STRATOS initiative

Current situation in statistical methodology

- Statistical methodology has seen substantial development
- Resampling and Bayesian methods allow investigations that were impossible two decades ago
- Computer facilities can be viewed as the cornerstone
- Possible to compare complex model building strategies using simulation studies
- Wealth of new statistical software packages allows a rapid implementation and verification of new statistical ideas

Current situation in practical analyses

- Unfortunately, many sensible improvements are ignored, such as the use of spline functions in regression analyses

Reasons why improved strategies are ignored

- Overwhelming concern with **theoretical aspects**
- Very **limited guidance** on key issues that are **vital in practice**, discourages analysts from utilizing more sophisticated and possibly more appropriate methods in their analyses

How should medical science change ?

- Many more gains are possible if the waste and inefficiency in the ways that biomedical research is chosen, **designed**, done, **analysed**, regulated, managed, **disseminated**, and **reported** can be addressed." *The Lancet Research, Macleod et al., 2014*

Better use of statistical methods

- At least two tasks are essential:
 1. **Experts** in specific methodological areas have to work towards **developing guidance**
 2. An ever-increasing need for **continuing education** at all stages of the career
- For busy applied researchers it is often difficult to follow methodological progress even in their principal application area
 - Reasons are diverse
 - Consequence is that analyses are often deficient
- **Knowledge** gained through research on statistical methodology needs to be **transferred** to the broader community
- Many **analysts** would be **grateful for** an overview on the current **state of the art** and for **practical guidance**

Aims of the STRATOS Initiative

- **Provide evidence supported guidance** for highly relevant issues in the design and analysis of observational studies
- For the **start** we will concentrate on **state-of-the-art** guidance and the necessary evidence
- As the **statistical knowledge** of the analyst **varies** substantially, guidance has to keep this background in mind. **Guidance** has to be provided **at several levels** (Low statistical knowledge, Experienced statistician, Expert in a specific area)

The overarching long-term aim is to improve key parts of design and statistical analyses of observational studies in practice

Organisational Structure

- STRATOS is led by an **Executive Committee** and a **Steering Group**.
- There are nine **Topic Groups** and eleven cross-cutting **Panels**.

Topic groups

Topic Group		Chairs
1	Missing data	James Carpenter, Kate Lee
2	Selection of variables and functional forms in multivariable analysis	Georg Heinze, Aris Perperoglou, Willi Sauerbrei
3	Initial data analysis	Marianne Huebner, Saskia le Cessie, Werner Vach
4	Measurement error and misclassification	Laurence Freedman, Victor Kipnis
5	Study design	Mitchell Gail, Suzanne Cadarette
6	Evaluating diagnostic tests and prediction models	Gary Collins, Carl Moons, Ewout Steyerberg
7	Causal inference	Els Goetghebeur, Ingeborg Waernbaum
8	Survival analysis	Michal Abrahamowicz, Per Kragh Andersen, Terry Therneau
9	High-dimensional data	Lisa McShane, Joerg Rahnenfuehrer

Cross-cutting panels

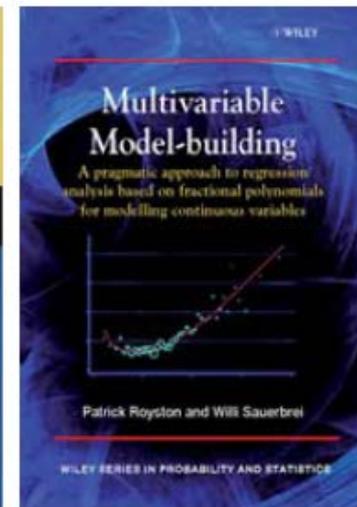
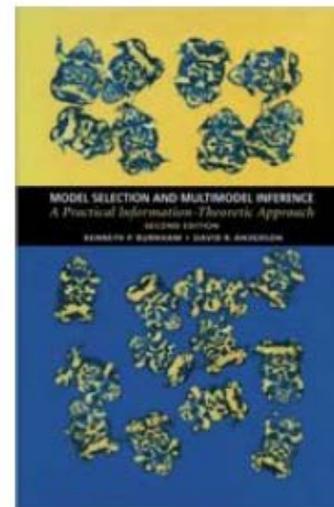
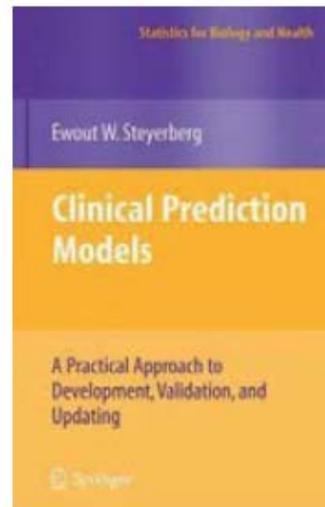
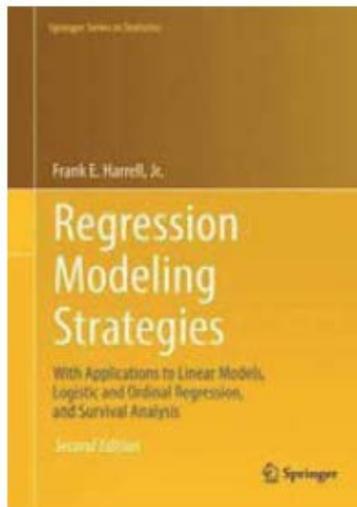
Panel		Chairs and Co-Chairs	
MP	Membership	Chairs:	James Carpenter, Willi Sauerbrei
PP	Publications	Chairs:	Bianca De Stavola, Stephen Walter
		Co-Chairs:	Mitchell Gail, Petra Macaskill
GP	Glossary	Chairs:	Simon Day, Marianne Huebner, Jim Slattery
WP	Website	Chairs:	Joerg Rahnenfuehrer, Willi Sauerbrei
RP	Literature Review	Chairs:	Gary Collins, Carl Moons
BP	Bibliography	Chairs:	to be determined
SP	Simulation Studies	Chairs:	Michal Abrahamowicz, Anne-Laure Boulesteix
DP	Data Sets	Chairs:	Saskia Le Cessie, Aris Perperoglou
TP	Knowledge Translation	Chair:	Suzanne Cadarette
		Co-Chair:	Catherine Quantin
CP	Contact Organisations	Chairs:	Willi Sauerbrei
VP	Visualisation	Chairs:	Mark Baillie

Difficulties to get agreement on existing methods

TG2 – Variable and function selection – different opinions



Variable selection



(Harrell, 2001; Steyerberg, 2009; Burnham & Anderson, 2002, Royston & Sauerbrei, 2008)

- Emphasis on different aims
- Different philosophies
- Joint work (except B&A) in STRATOS!

More new methods needed?

“[...]It becomes **more and more difficult to get an overview of existing methods**, not to mention the overview of their respective performances in different settings.

[...] Moreover, it is **well known that studies comparing a suggested new method to existing methods may be (strongly) biased in favor of the new method.**

LETTER TO THE EDITOR

Biometrical Journal →

On the necessity and design of studies comparing statistical methods

Boulesteix et al for the Simulation Panel of the STRATOS initiative, 2018

Guidance for whom?

Needed by many stakeholders!!

**analysts with different levels of knowledge,
teachers, reviewers, journalists,**

Researchers

First in a Series of Papers for the Biometric Bulletin

**STRATOS initiative – Guidance for designing and
analyzing observational studies**

STRATOS
I N I T I A T I V E

Willi Sauerbrei¹, Marianne Huebner², Gary S. Collins³, Katherine Lee⁴, Laurence Freedman⁵, Mitchell Gail⁶, Els Goetghebeur⁷, Joerg Rahnenfuehrer⁸ and Michal Abrahamowicz⁹ on behalf of the STRATOS initiative.

➡ Short papers from all Topic Groups have appeared
(TG6 to appear in December issue)

Consumers

Guidance for designing and analysing observational studies:

The STRENGTHENING Analytical Thinking for
Observational Studies (STRATOS) initiative



**Willi Sauerbrei¹, Gary S. Collins²,
Marianne Huebner³, Stephen D. Walter⁴,
Suzanne M. Cadarette⁵, and
Michal Abrahamowicz⁶ on behalf of the
STRATOS initiative**

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More Information

- Copies of a STRATOS Poster were deposited at the EUPHA desk; it is also available on the STRATOS website:

<http://www.stratos-initiative.org/>

- Thank you for your attention!