

Programming strategically for PK/PD data

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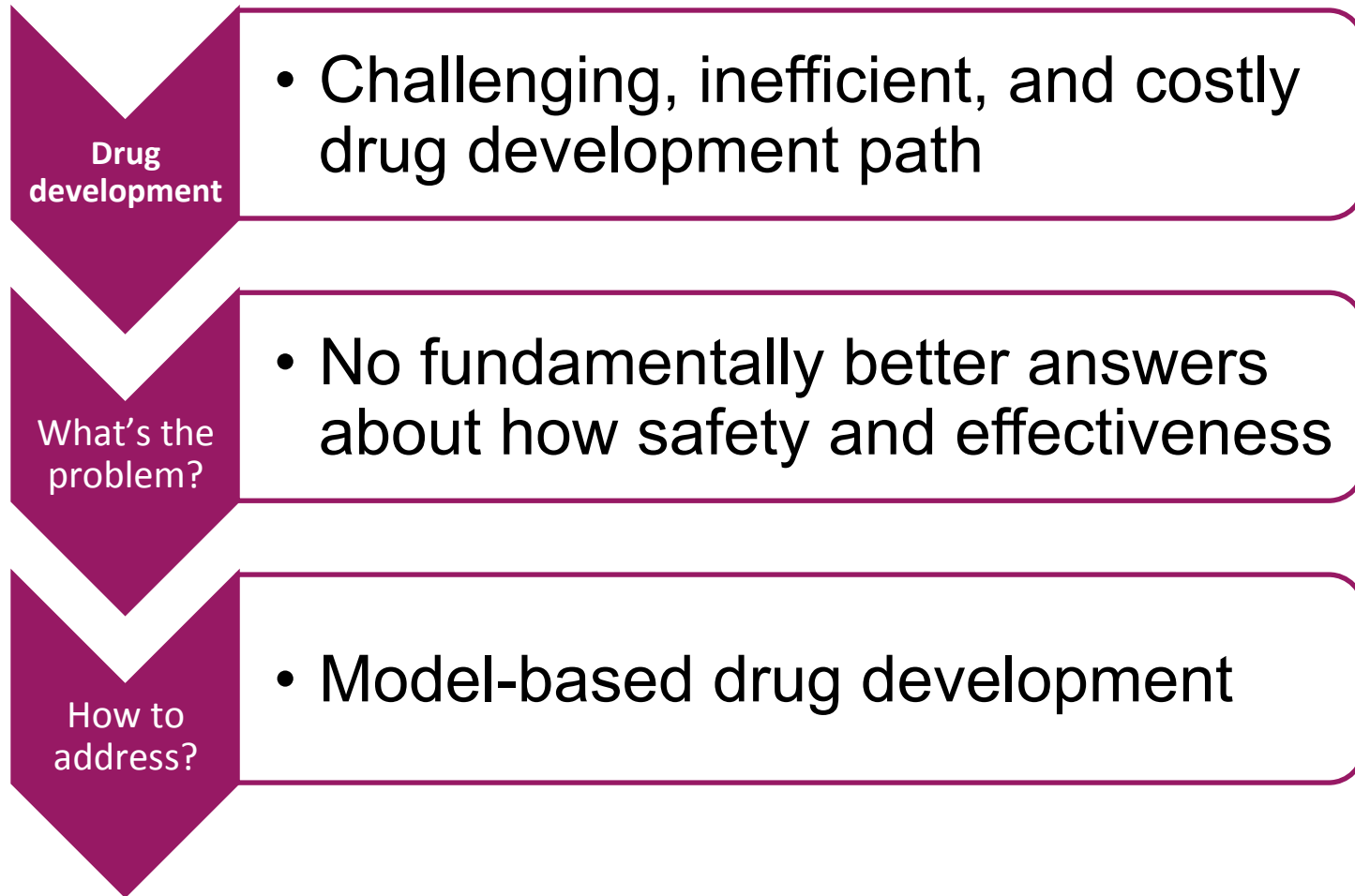


Agenda

- ❖ **Introduction**
- ❖ **What is PK/PD modeling and simulation**
- ❖ **Why programmers involve**
- ❖ **The process and strategy**
- ❖ **Best practices/tips for programming**
- ❖ **Conclusion and discussion**
- ❖ **References and recommended readings**
- ❖ **Acknowledgement**



Introduction

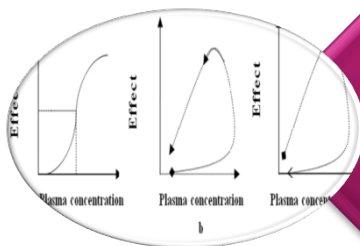


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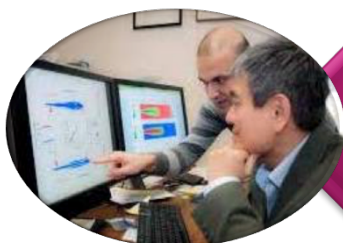
What is PK/PD modeling and simulation

$$y_i = \beta_0 + \sum_{j=1}^p \beta_j x_{ij} + e_i$$

A mathematical description of the relationship between pharmacokinetics (PK) and pharmacodynamics (PD)



Complete time course of desired and/or undesired effects in response to a dose regimen in consideration of underlying physiological processes



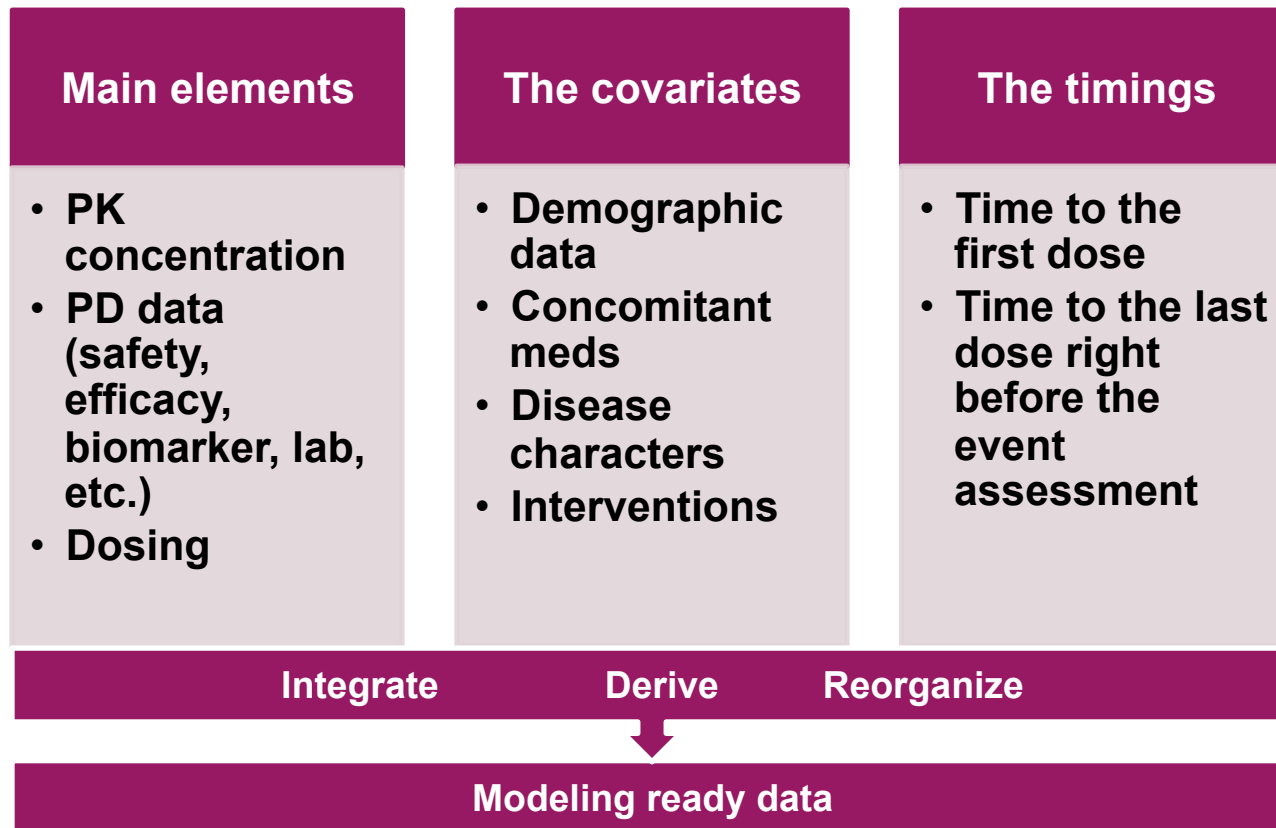
Conducted by pharmacometricians
Data driven
Exploratory approach
NONMEM



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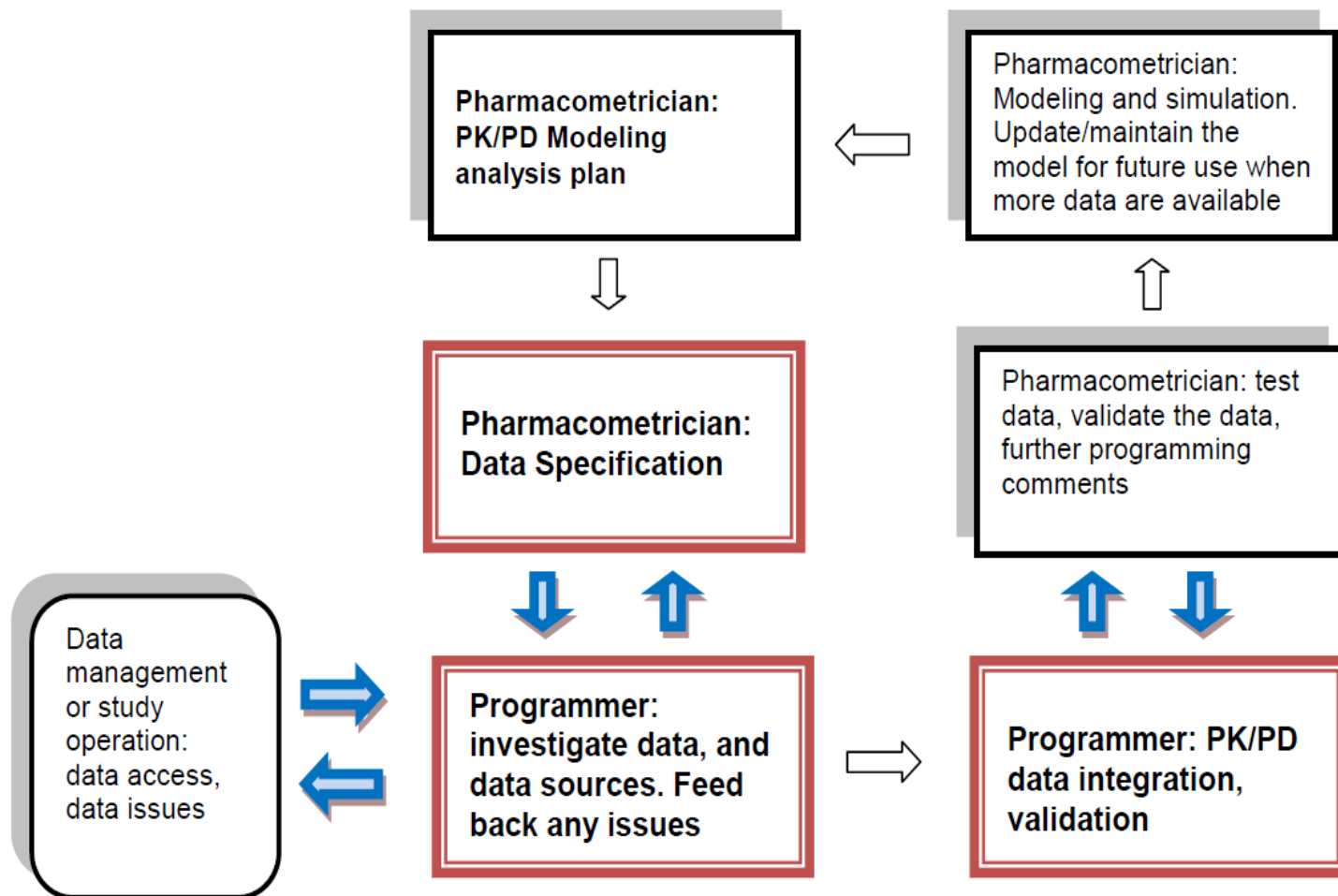
Why programming?

Data categories required for PK/PD modeling



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The process and strategy



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The process and strategy

➤ Request Data specification

Data integration

- Studies
- Data sets/variables
- Variables to be derived
- Principles/definitions on integration

Data handling

- Missing values
- Extreme values
- Values with character signs(<, >, LOQ)

Data format

- Vertical vs. horizontal
- SAS data vs. excel



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The process and strategy

- ✓ Don't be hurry on programming

Review the data specification

Investigate the data

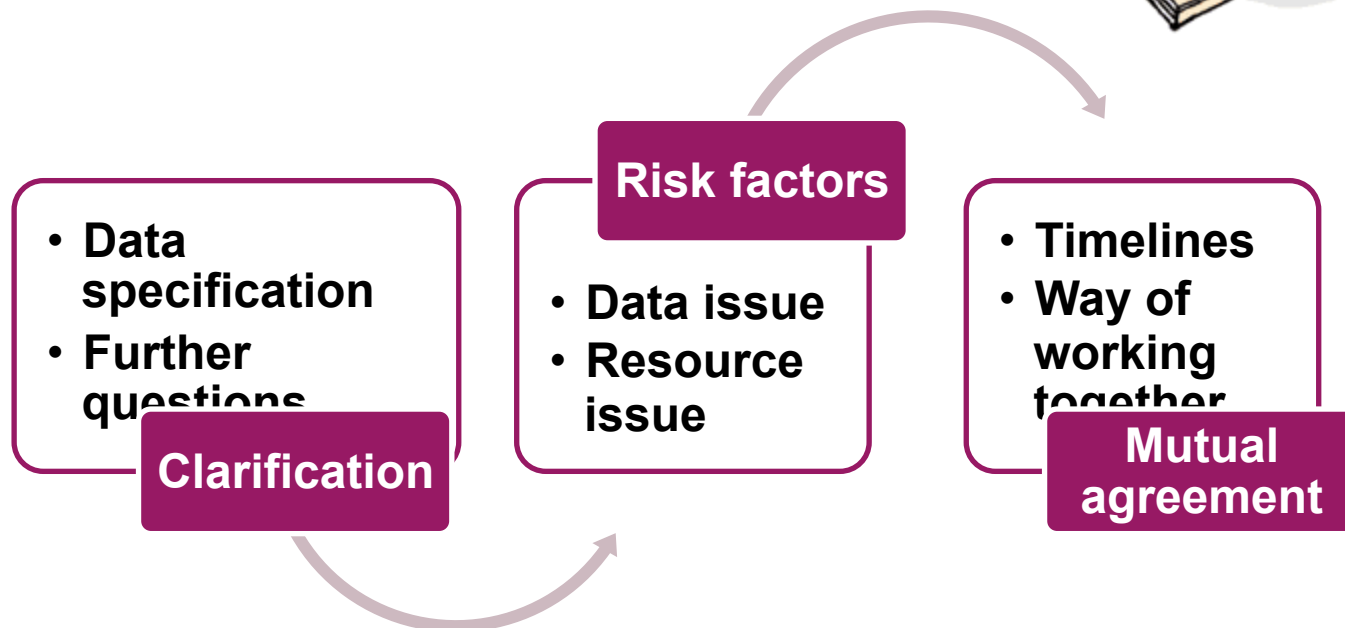
List questions/concerns



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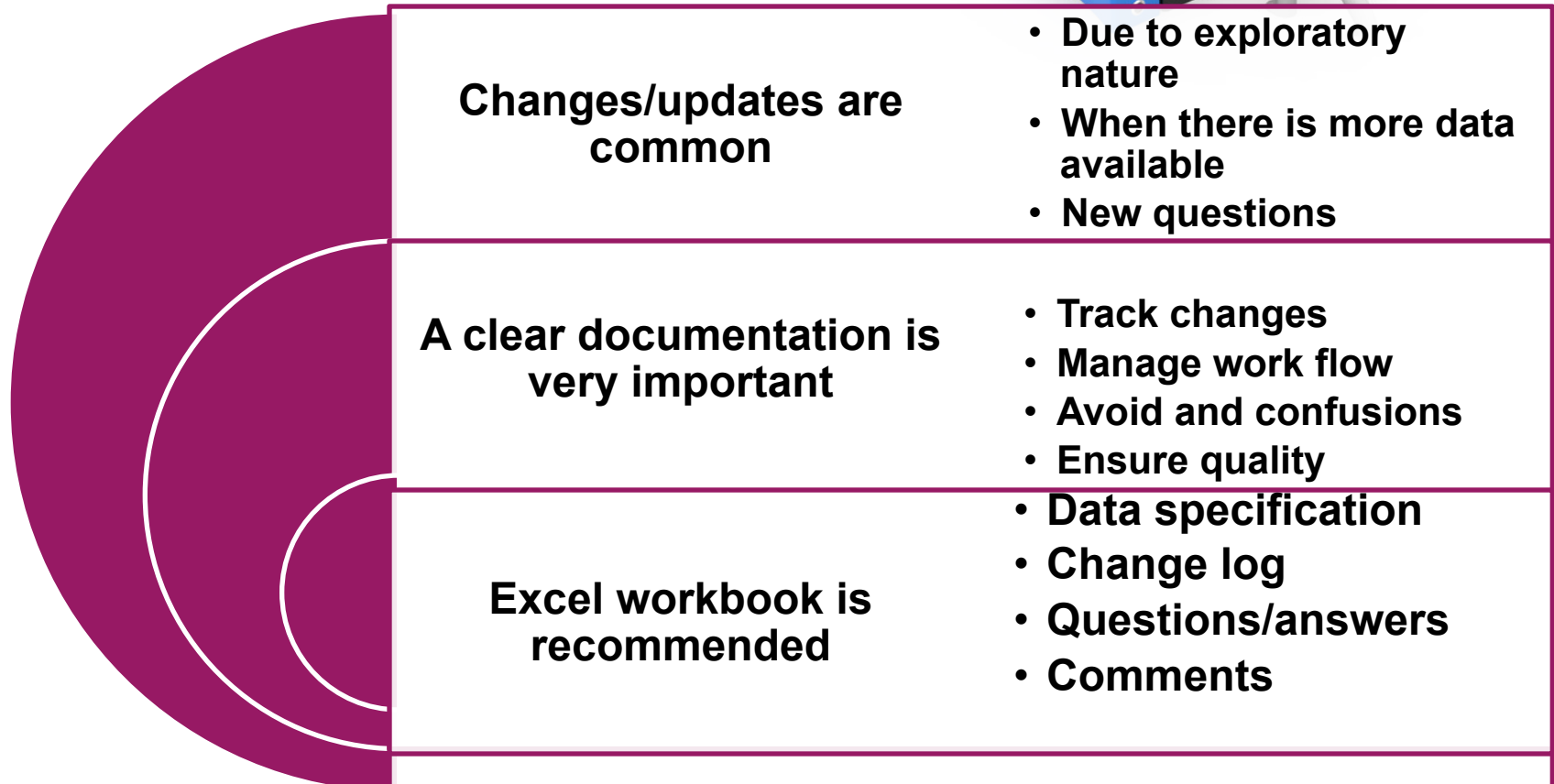
The process and strategy

✓ **Communication is the key to success**



The process and strategy

✓ Well organized documentation is critical



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Best practices/programming tips



Comments to direct the logic flow within programs

Flags to indicate the source data/variables

Develop simple macro for routine steps



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Conclusion and discussion

- Programming for PK/PD data is complex and challenging
- It is essential to understand the exploratory nature of PK/PD modeling and simulation
- Communication is the key for success
- Think strategically. Work collaboratively. Act proactively

Looking for the future:

- AZ QCP Specialized programmers on PK/PD data
- NONMEM data standardization
- Infrastructures: tools for visualization, data automation



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Questions



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Recommended readings

- 1. Pharmacometrics: the science of quantitative pharmacology.**
Edited by Ene I. Ette and Paul J. Williams (2013). Published by John Wiley and Sons.
- 2. Challenge and opportunity on the critical path to new medical products.** FDA. 2004
- 3. NONMEM PK/PD dataset programming: make it simpler.**
Theorem. In PHUSE wiki: http://www.phusewiki.org/docs/Bangalore%202014%20SDE%20Presentations/NONMEM_Presentation.pdf
- 4. Growing needs in drug industry for NONMEM programmers using SAS®.** Sharmeen Reza. Pharmsug 2015



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3. **Dheeraj Gop and Gomathi P (2012). *Pharmacokinetics/pharmacodynamic (PK/PD) modeling: an nvestigational tool for drug development. International journal of pharmacy and pharmaceutical sciences. Vol. 4 Suppl 3: 30-37***
4. **Iris Rajman (2008). *Pk/PD modeling and simulations: utility in drug development. Drug discovery today. Vol. 13 No. 7/8: 341-346***
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11. **Raymond Miller, et al (2005). *How modeling and simulation enhanced decision making in new drug development. Journal of pharmacokinetics and pharmacodynamics. Vol. 32. No. 2: 185-197***



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