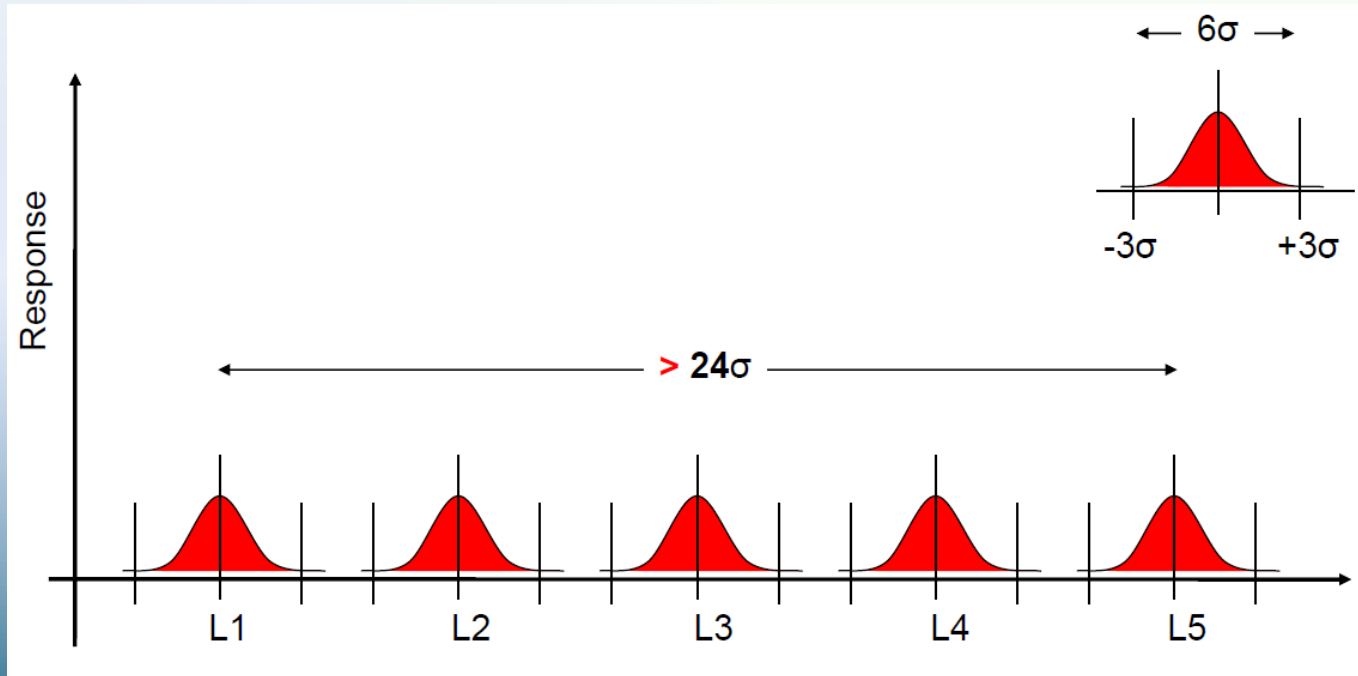
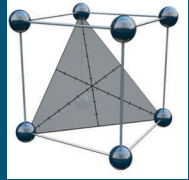
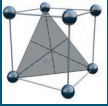


# FUSION QBD<sup>®</sup> - CREATING A DESIGN

How to Define Suitable Study Factor Levels and Ranges.

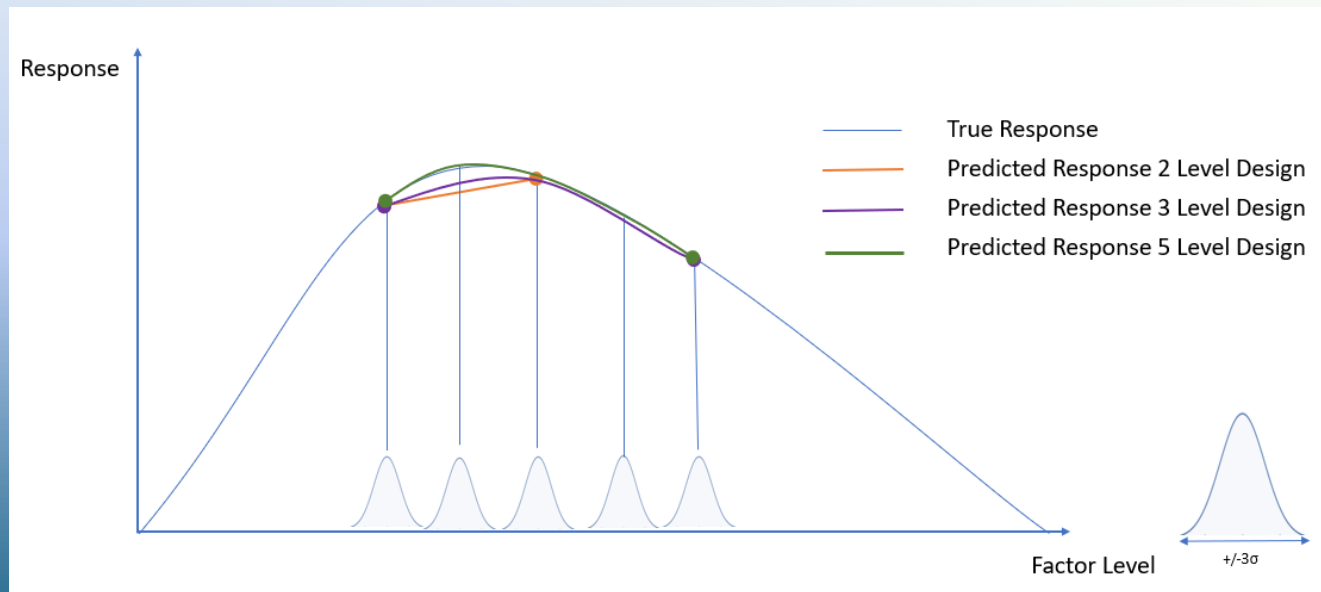




# How to Define Suitable Study Factor Levels and Ranges.

## Number of Levels:

- At least 3 levels for a numerical design
- Between two target level settings curvature effects can't be identified
- Not more than 5 target levels
- Always consider the duration and effort that is related with too extensive experiment approaches



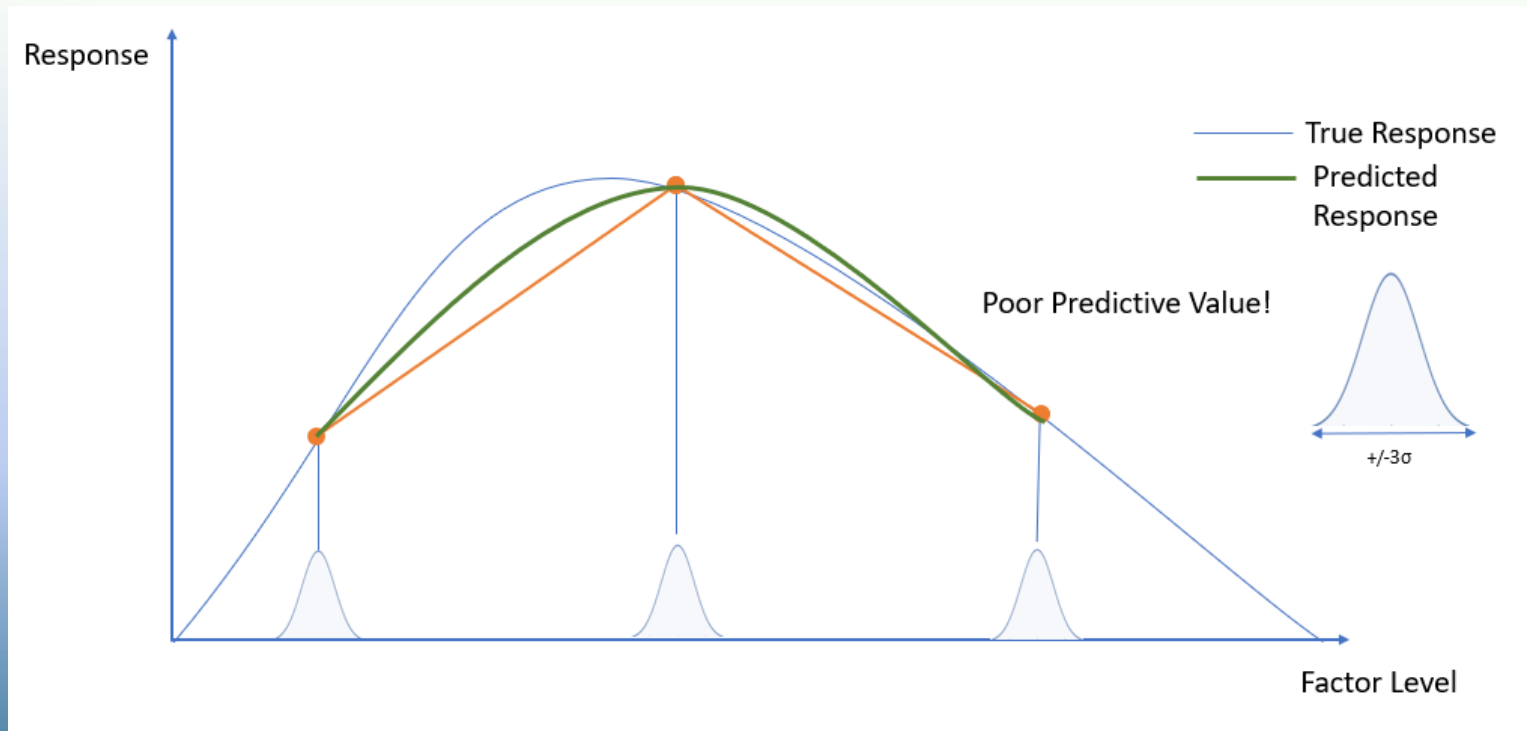
Predictive value gets closer to the true value with higher number of levels



# How to Define Suitable Study Factor Levels and Ranges.

## Distance of Target Level Setting:

- Not too large



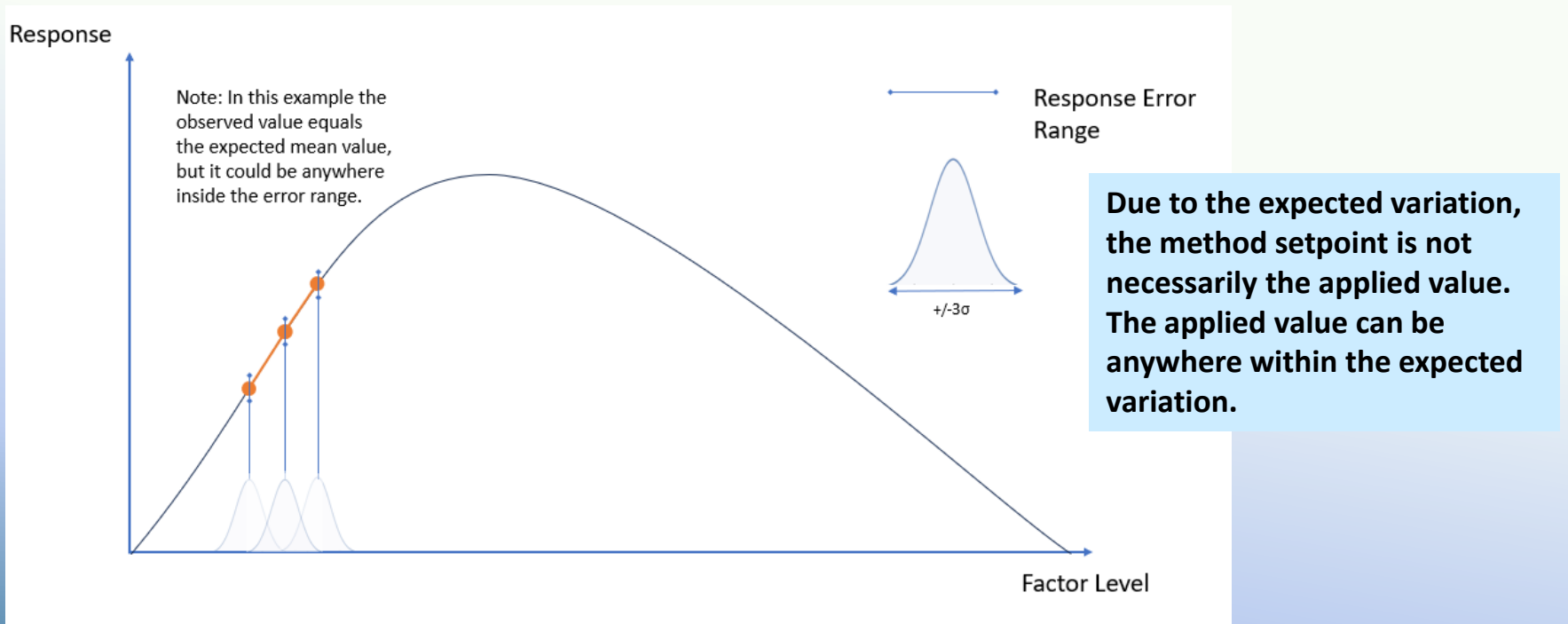
- The true value can't be predicted precisely with a too large interval between the single target level settings.
- If you are only interested in certain level settings, treat them as a categorical variable (use the type variable function in Fusion QbD)



# How to Define Suitable Study Factor Levels and Ranges.

## Distance of Target Level Setting:

- **Not too small**



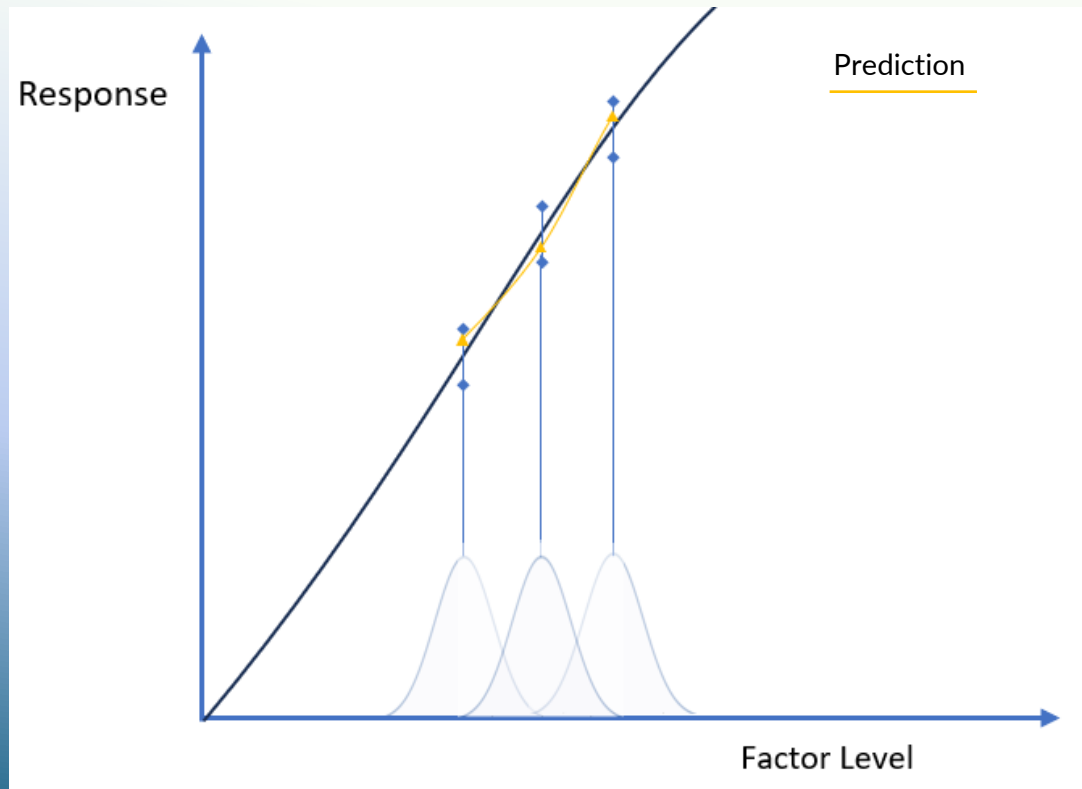
- Target level settings overlap with the expected random variation.
- Factor effect is covered up by random effect and therefore can't be clearly characterized.

**Never set the expected variation as lower and upper bound of your study design!**



# How to Define Suitable Study Factor Levels and Ranges.

## Distance of Target Level Setting: Too small



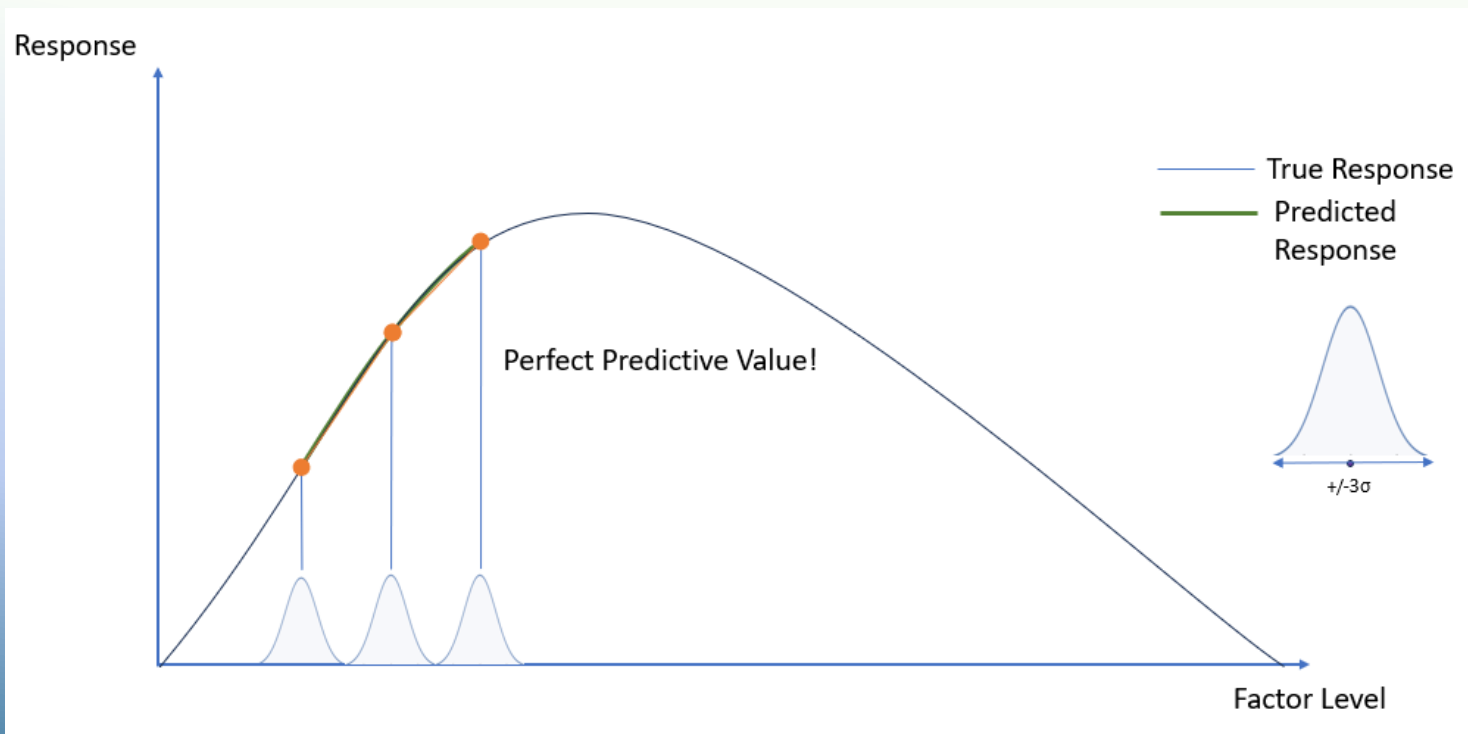
- Note in DOE we only have a single observation for each measurement that needs to be conducted according to the study protocol whereas the target level uncertainty is determined by a few and defined repeats.
- Therefore, the random error of a study factor variable has much larger effect on the prediction error when target level intervals overlap with the expected variation.



# How to Define Suitable Study Factor Levels and Ranges.

## Distance of Target Level Setting:

- Ideal Distance



- Ideal distance between target levels is aligned with the  $\pm 3\sigma$  range and avoids any overlap.
- By this the entire range will be between  $12\sigma$  (3 levels) and  $24\sigma$  (5 levels).



## How to Define Suitable Study Factor Levels and Ranges.

**Please note:**

**There are of course much more aspects to consider when generating a design, such as the study goal, the selection of study factors, blocking and randomisation, the ratio between study effort and study benefit, extent of preliminary pilot experiments....**

**And although Fusion QbD takes over most of these tasks, when working in the automated mode, there are still some decisions that needs to be taken by the educated analyst.**

**A full education about all these aspects is provided during our training session, but we are also happy to assist our customers in these topics as part of an active support and maintenance agreement.**

# Contact us for more Information



Fusion QbD® is a mature LC method development software especially designed for AQbD approaches in the pharmaceutical industry.

If you want to get the full understanding of how the design region is modelled in Fusion, please contact us for our **training or consultancy services**.

Cromingo e.K. – All Fusion products and services from a single source in close collaboration with S-Matrix Corporation.

Reach out to us directly for further information [info@cromingo.com](mailto:info@cromingo.com)

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