

# An Innovative Approach to Select the Prediction Model in the Development of NIR Spectroscopic Methods

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- Near InfraRed Spectroscopy: non-invasive, non-destructive and fast data acquisition  
→ key PAT tool
- Use of conventional criteria:  $R^2$ , RMSEC, RMSECV and RMSEP  
→ no objective decision rule

## Method

- Pilot batches of non-coated pharmaceutical pellets manufactured at:
  - 80%, 100% and 120% API content formulation

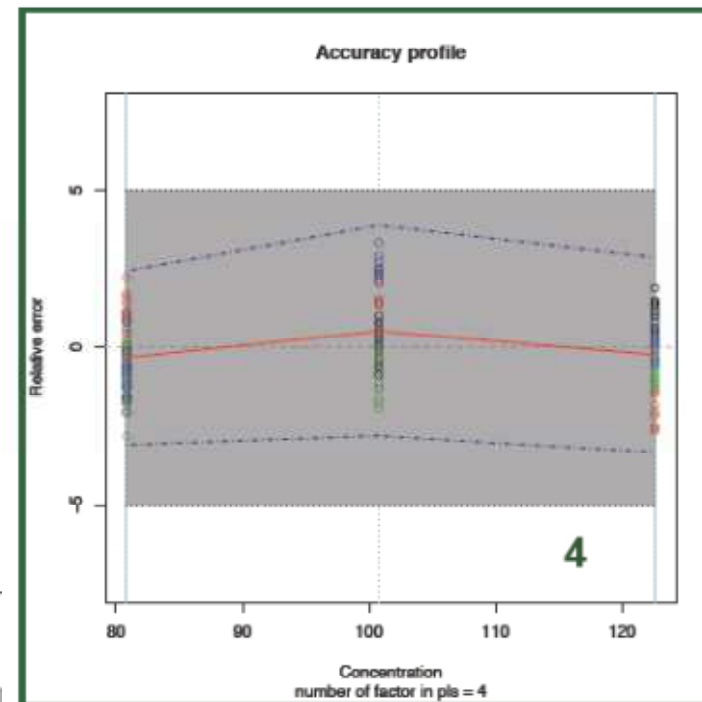
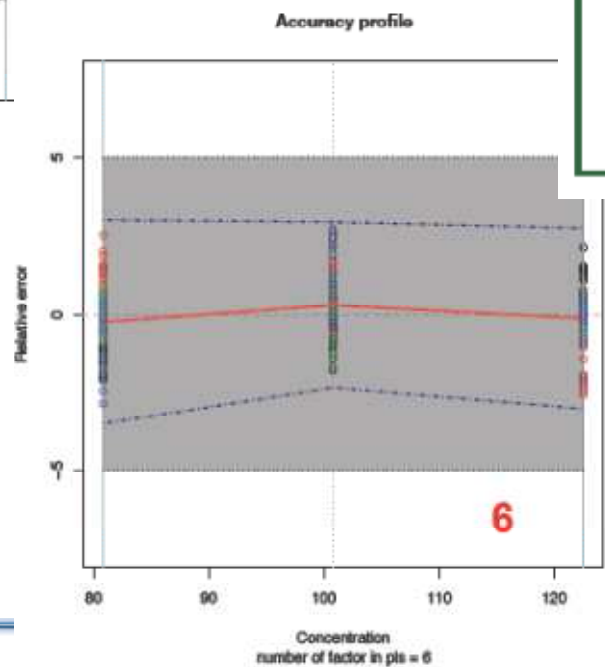
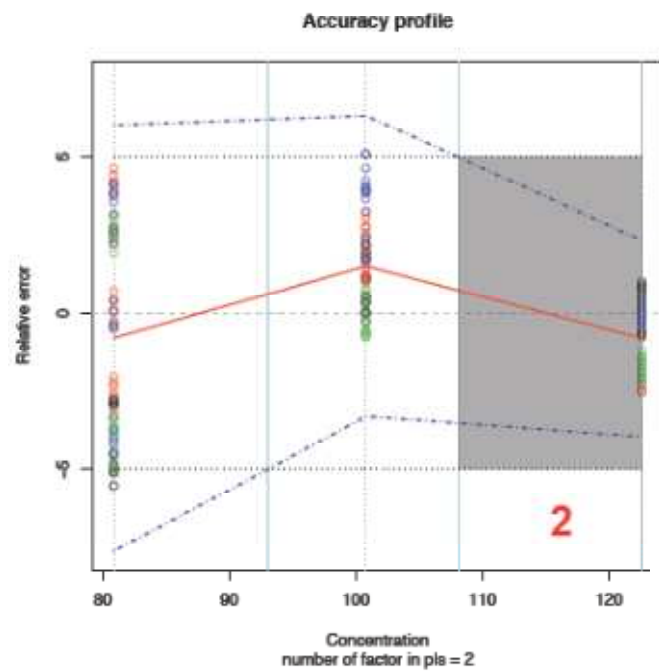
Sources of variability	Calibration set <sup>a</sup>	Calibration set <sup>b</sup>
Analyte of interest (%)	80 - 100 - 120	0.5 - 1 - 2 - 4 - 5 - 10
Batches	9	3
Operators	2	
Series	4	
Temperature (° C)	25 - 35	5 - 25

## Method

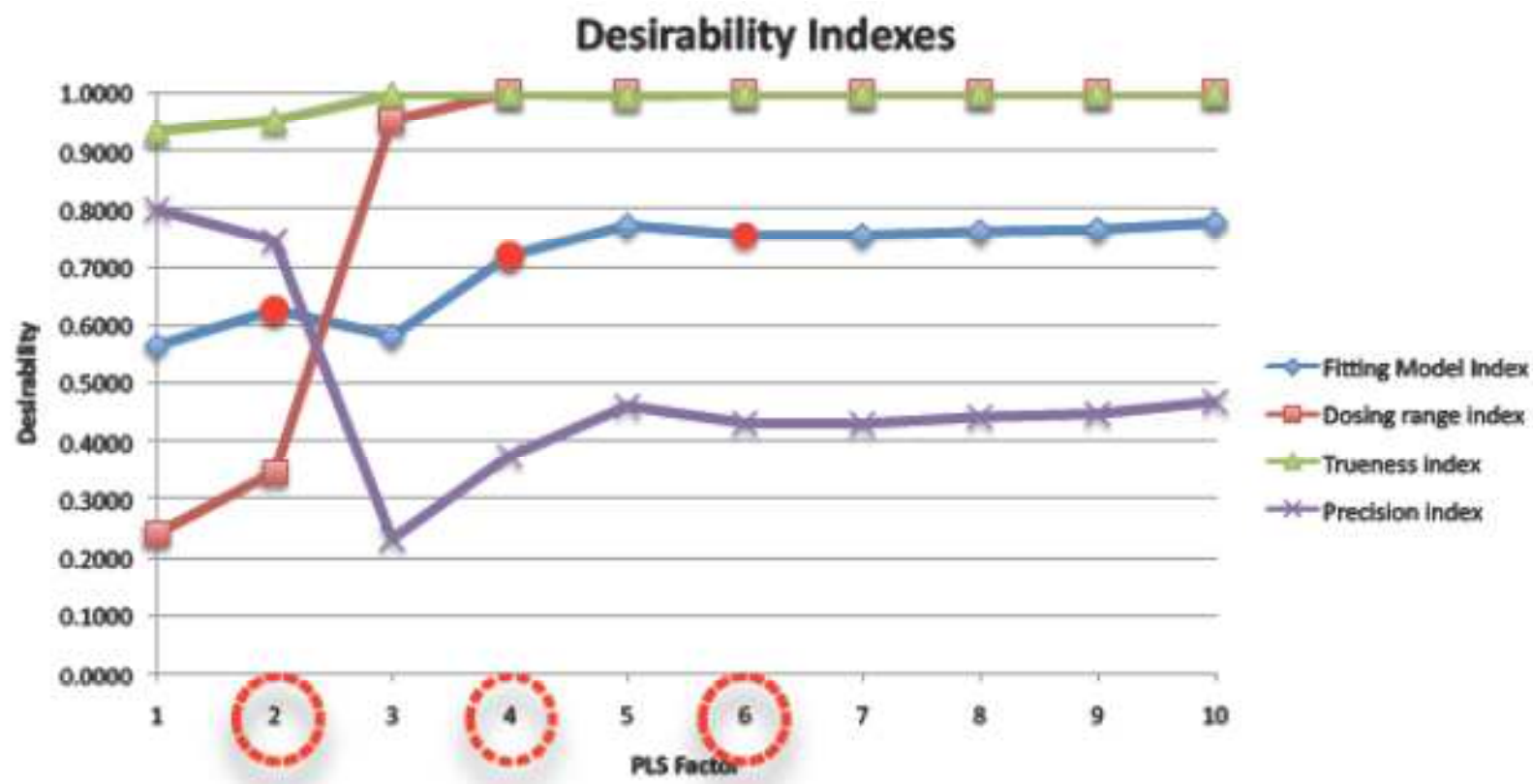
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- PLS regression using cross-validation: leave-one-out.
- Tolerance intervals (95%) and desirability indexes calculations based on the cross-validation results
- Dosing range, trueness, precision and Fitting Model Index (FMI) were used as desirability indexes.
- FMI is a global desirability function based on the 3 other indexes.

# Results



# Results



# Conclusions

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- The innovative approach based on desirability indexes and tolerance intervals enables to **select the most appropriate prediction model in full accordance with its very final goal**, to quantify as accurately as possible the analyte of interest.
- Desirability indexes, especially Fitting Model Index (FMI):
  - **Increase** significantly the **objectivity** of the decision process
  - **Reduce** dramatically the development step
  - **Ease** the implementation of NIR quantitative methods on pharmaceutical manufacturing process.

# Thanks for your attention

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