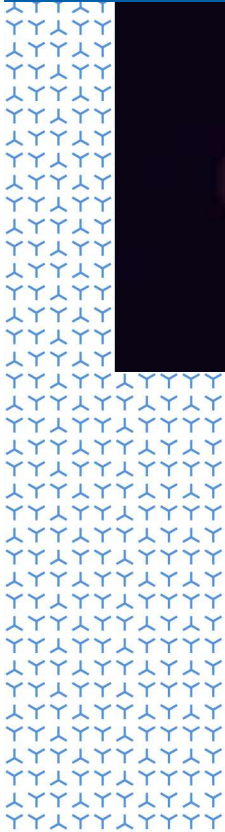


Cross-functional PoS team



# Unraveling a single number: Using graphics to explain Probability of Success

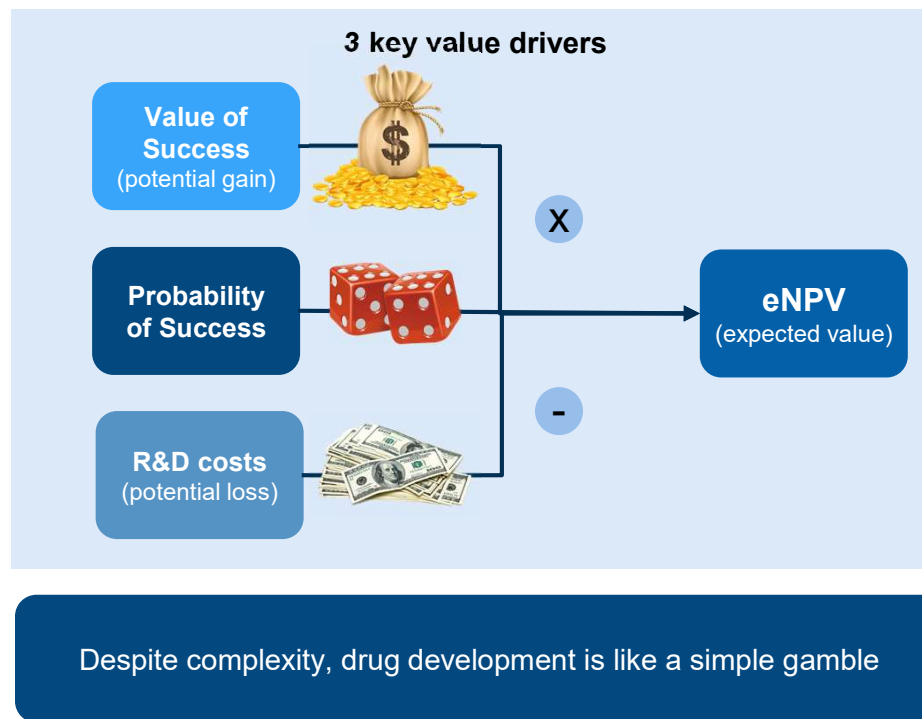
Markus Lange (on behalf of the PoS initiative)

March 8<sup>th</sup>

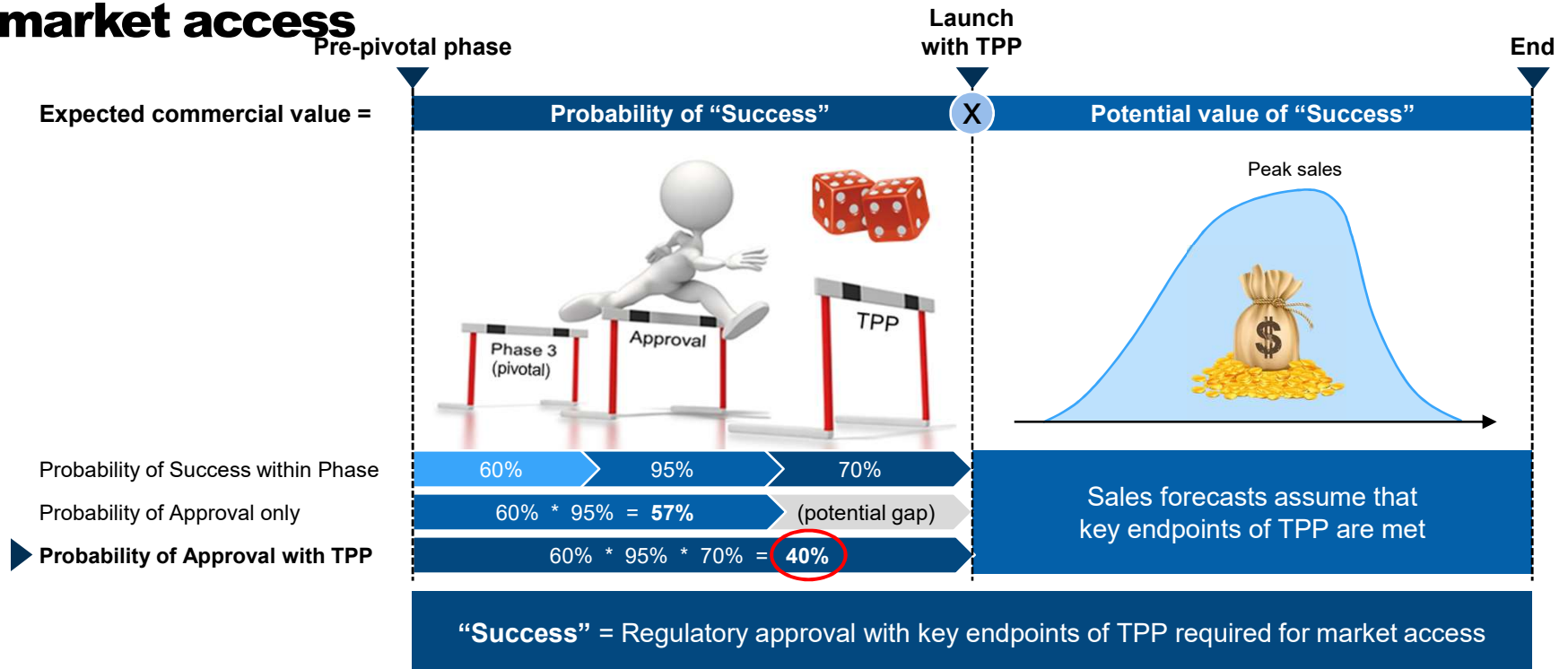
# Agenda

- Introduction to the new Probability of Success framework
- Using graphics to unravel the final PoS estimate (and to explain how we got there)

# PoS is one of 3 key value drivers: Expected value is maximized as a trade-off between potential value, R&D costs and PoS



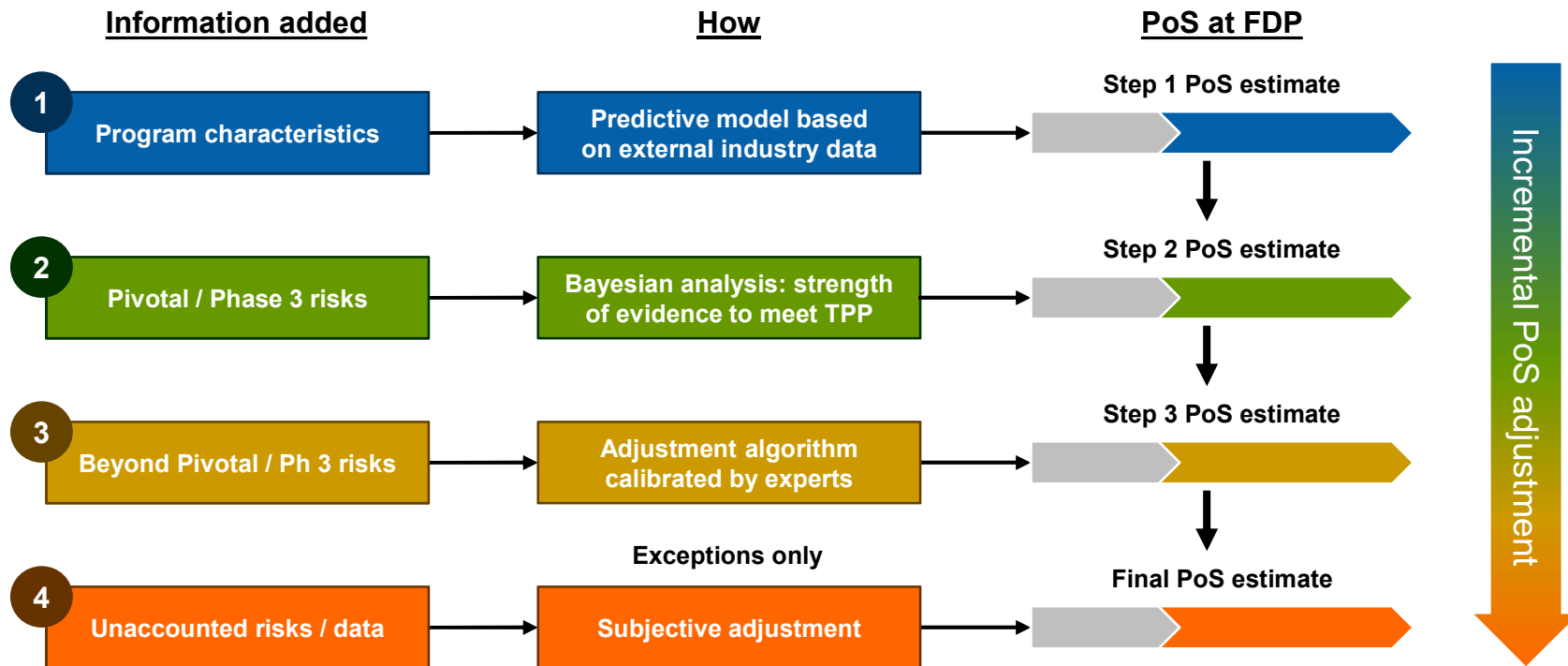
# “Success” is more than regulatory approval: We must also meet key endpoints of the *target product profile (TPP)* required for market access



# We saw room for improvement in the current PoS assessment

- We need a more appropriate definition of success
- The old approach had limitations:
  - How have we done it in the past?
    1. Use “crude” benchmark probability as a starting point
    2. Subjective review and adjustment
  - PoS estimates are crude, subjective, unreliable
- We want to use any available project specific information, and want to explicitly use the data we have already collected in clinical trials.
- We want to be consistent and transparent

# New PoS Framework estimates PoS to Approval with TPP at FDP by evaluating all available data in 4 incremental steps



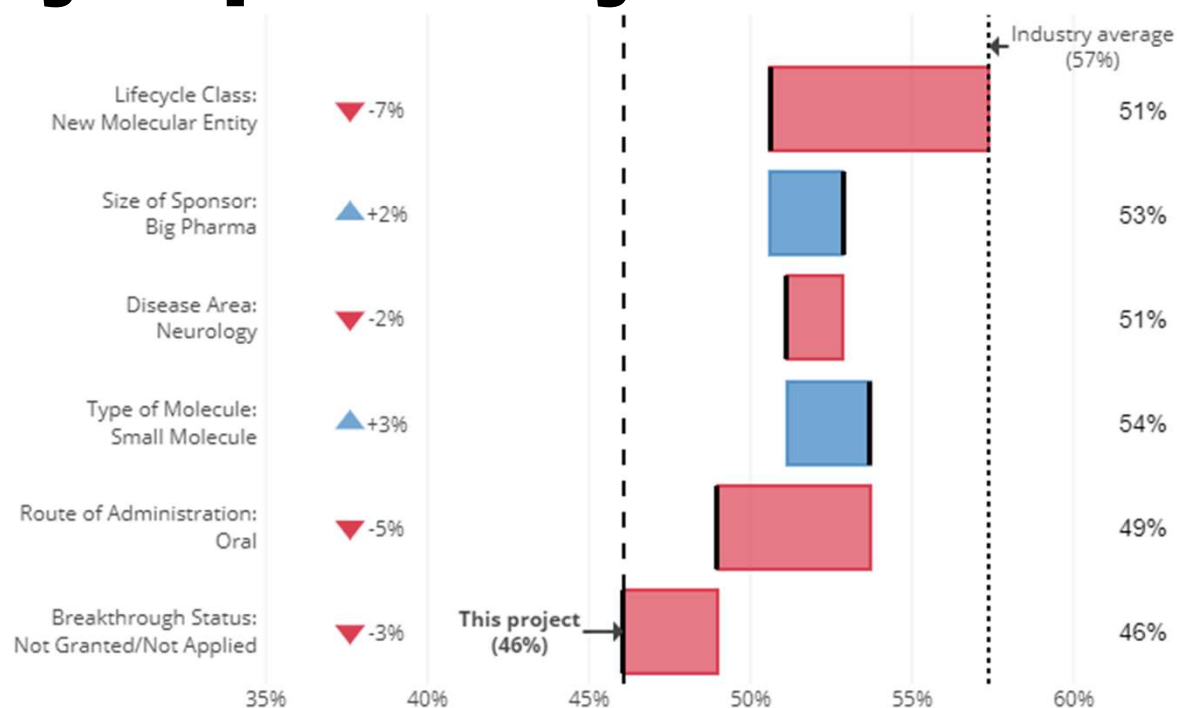
# Step 1: Use industry data to derive a tailored benchmark for the probability of approval at FDP



- **Disease Area** (11 categories)
- **Lifecycle Class** (NME / LCM / Biosimilar)
- **Molecule Class** (Protein / Small molecule / Other)
- **Drug Target** (Receptor / Enzyme / Other)
- **Route of Administration** (IV / IM / SQ / Other)
- **Size of Sponsor** (Big Pharma / Other)
- **Breakthrough Status** (Yes / No)

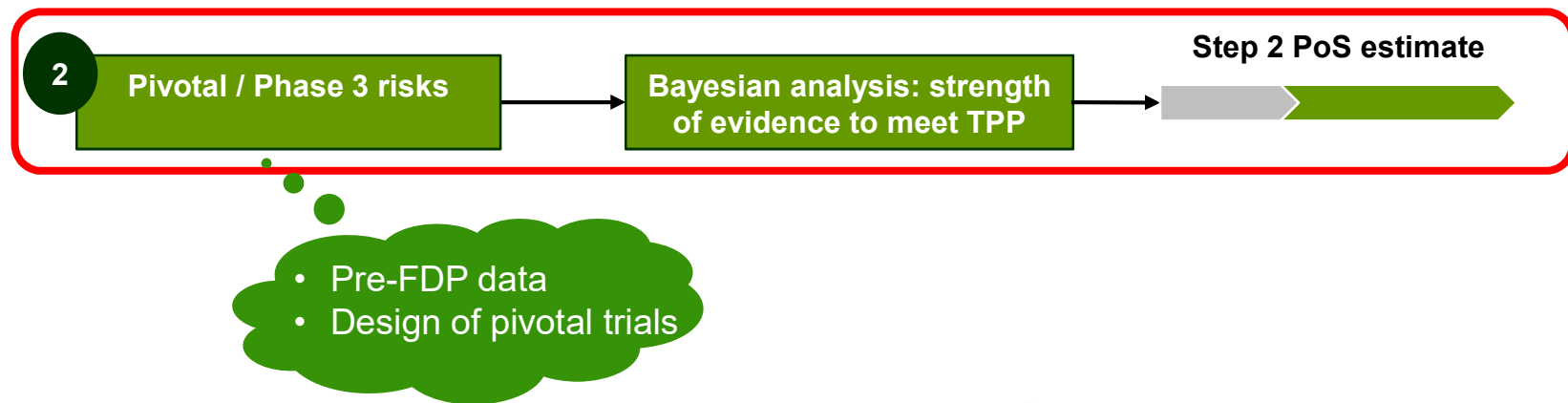
# Use breakdown plots to assess the impact of any explanatory variables

*Individual contribution of each program characteristic to the benchmark probability of success in phase 3*



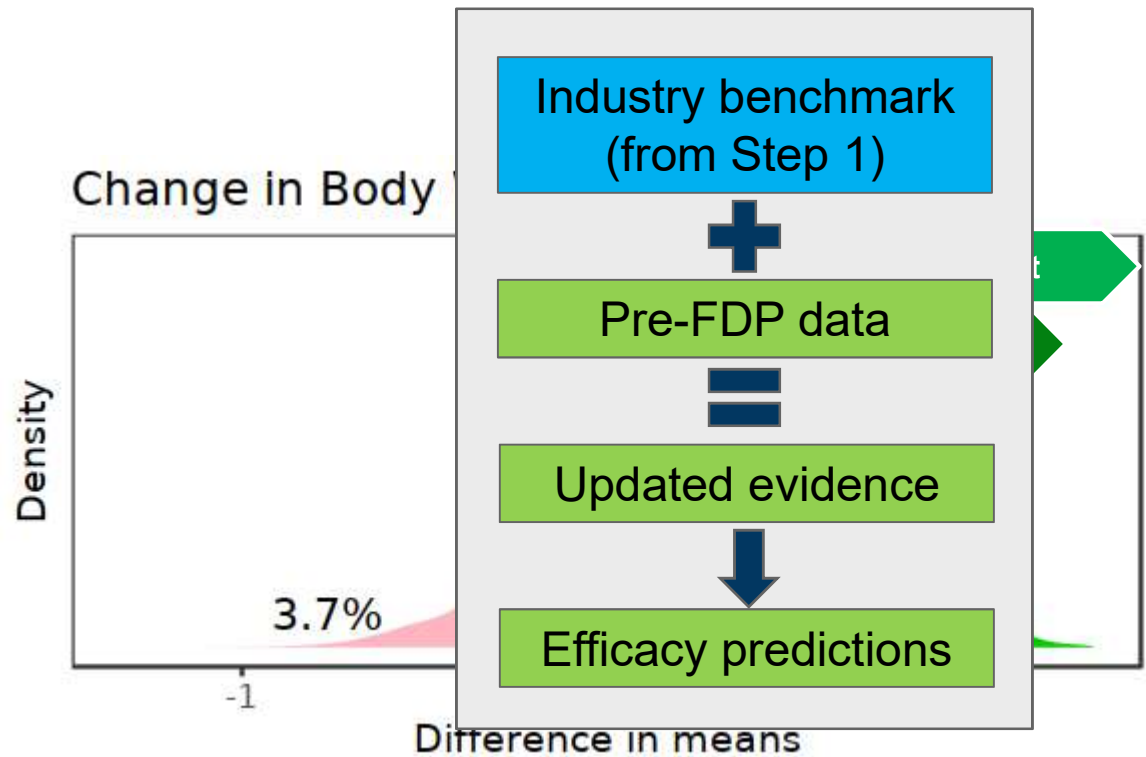


## Step 2: Leverage clinical data to assess the chance of success in pivotal studies

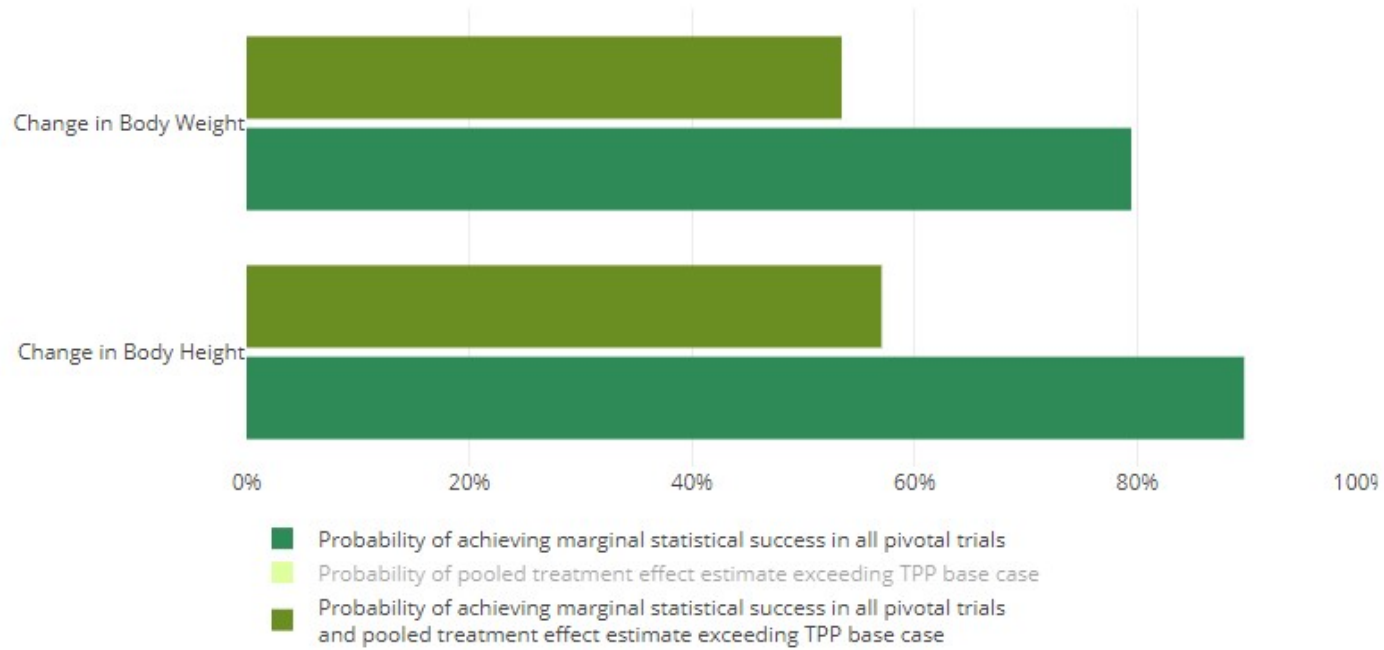


# Combine external and project-specific data to assess the chance of success in pivotal trials

- Use a **Bayesian approach** to quantify evidence @FDP about treatment effects on 1 - 2 efficacy endpoints.
- Then **simulate future pivotal trial(s)**
- ... and assess the probability of meeting key efficacy success criteria.



# Use bar charts to see how endpoints compare and to identify bottlenecks



# Demo of application dashboard

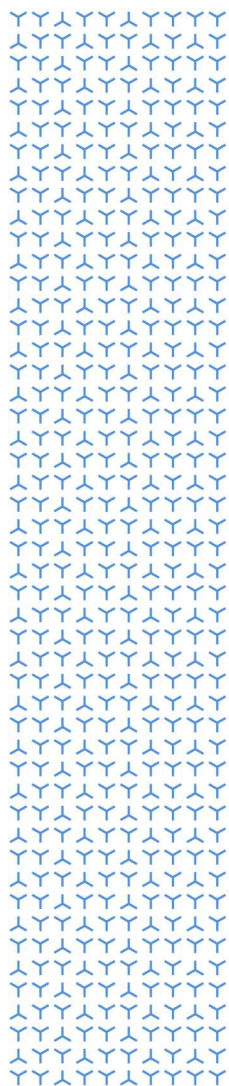
Using graphics to explain Probability of Success | BBS

# Conclusions

- New PoS framework can give valuable new insights and a more objective view of reality...
- ... But any good statistical analyses will only be considered when presented appropriately
- Graphics are particularly essential in a many-step-process to manage expectations on the way to the final estimate



**Thank you**



# Backup

# Unraveling a single number: Using graphics to explain Probability of Success

*Probability of success (PoS) is an important metric that is used by Novartis governance boards to inform decisions about which development programs to prioritize, and by teams to optimize their development strategies. To improve the accuracy, transparency and consistency of our PoS estimates, we have developed and implemented a quantitative Bayesian approach for calculating the probability of success before the planning of any pivotal trials. This approach integrates internal clinical data generated to date, together with cross-industry success rates, and the outcome is a probability.*

*It needs a lot to understand a single number, and visualizations are key to inform how this number came to be. In this talk, we will discuss how the use of graphics can increase the acceptance of this metric. In particular, we will demonstrate how graphics allow us to gain deeper knowledge (e.g. by identifying bottlenecks and by contextualizing information) and as a result improve decision-making.*



## **Summary: New PoS framework can give valuable new insights and a more objective view of reality**

- ✓ Fully aligned with TPP
- ✓ Simple flexible process
- ✓ Uses all available information
- ✓ Transparent
- ✓ More reliable PoS estimates enable better decisions at project & portfolio level
- ✓ Provides clear insights on impact of risk factors
- ✓ Enables effective risk management

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