**IDEA2 2022 | Need Statement Template**

Bioreactor users (the World bioreactor market is USD 2,5 B/year, of which 90% are stirred bioreactors and about 65% in EU and USA). [who/population; include % and/or #]

experience growth culture problems due to inhomogeneity, low oxygen transfer and cell damage due to shear stress. [negative outcomes]

Users are aware that these problems reduce process reproducibility and increase processing time. [why the who cares; optional, if it is additive to the negative outcome]

and currently try to avoid that outcome by using different agitator geometries and aeration strategies, so that when they need higher oxygen concentration increase the agitator revolutions, increasing shear stress, and when grow shear-sensitive cultures reduce the agitation, increasing mixing time and reducing oxygen transfer. [current approach]

However, that approach fails because commercial agitation and aeration systems are not optimized to obtain the appropriate flow pattern inside the bioreactor, which depending on the culture could maximize oxygen transfer (+90%) and mixing (+75%) reducing at the same time shear stress (-40%). [gap/failure point in current approach]

The cause of these problems lies in the use of commercial impellers, limited to standard geometries, and not using the recent advances in fluid dynamics for the design of agitation/aeration systems. [challenge]

Accordingly, there is a need to design innovative agitation/aeration systems to optimize the flow conditions for different biological cultures. [unmet need]

Which if solved would lead to more than 40% reduction of processing time for the production of important pharma drugs. [measurable change; metric for success]