# How Pharma Saves Tons Money:
# On-Demand Hits from Docking Ultralarge Spaces

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Efficient Chemical Space navigation approaches exploit the combinatorial nature of the chemistry underneath: 1,000 acids and 1,000 amines create a virtual million amides. Joining this rationale with validated reactions can be mirrored in the computer. Using anchor and grow strategies, the respective chemistry can be mimicked in docking approaches highly efficiently.
We have set up a system that does just that: Using validated synthons in combination with applicable reactions, a receptor site can be probed by docking non-enumerated Chemical Spaces that currently comprise several trillion virtual, tangible molecules.

With our partners at Enamine, WuXi, Ambinter/Greenpharma, eMolecules, OTAVA, and Chemspace, the resulting molecules are readily purchasable at significantly lower prices compared to in-house, bespoke molecule synthesis.

Beyond delivery of active compounds from current projects that cannot yet be disclosed, we will report on docking into an apo binding site,[1] and a fragment growing project that started from an x-ray determination of very weak fragment binders.[2] In both cases, hit rates ranged in the 40% region. The application and algorithms run on standard hardware, do not require a cloud environment, and shall soon be accessible to anyone.[3]

Bibliography:

[1] Beroza, P. et al. Chemical Space Docking Finds Novel ROCK1 Kinase Inhibitors by Large-Scale Structure-Based Virtual Screening. Nat. Commun. 13, 6447 (2022). DOI: 10.1038/s41467-022-33981-8
[2] Müller, J. et al. Magnet for the Needle in Haystack: “Crystal Structure First” Fragment Hits Unlock Active Chemical Matter Using Targeted Exploration of Vast Chemical Spaces. J. Med. Chem. 65, 15663–15678 (2022). DOI: 10.1021/acs.jmedchem.2c00813
[3] SeeSAR v13.2, BioSolveIT GmbH, St. Augustin Germany (2024), biosolveit.de/SeeSAR