

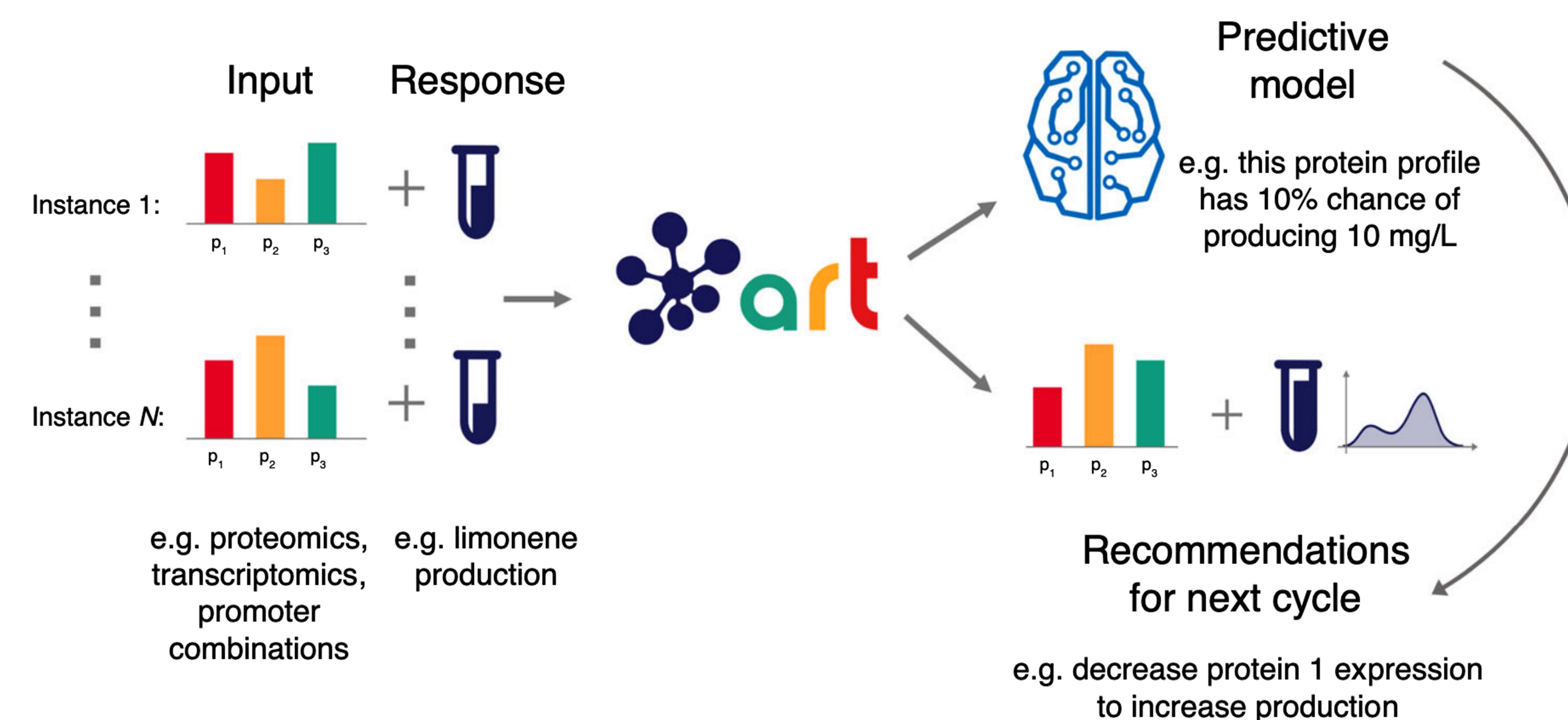
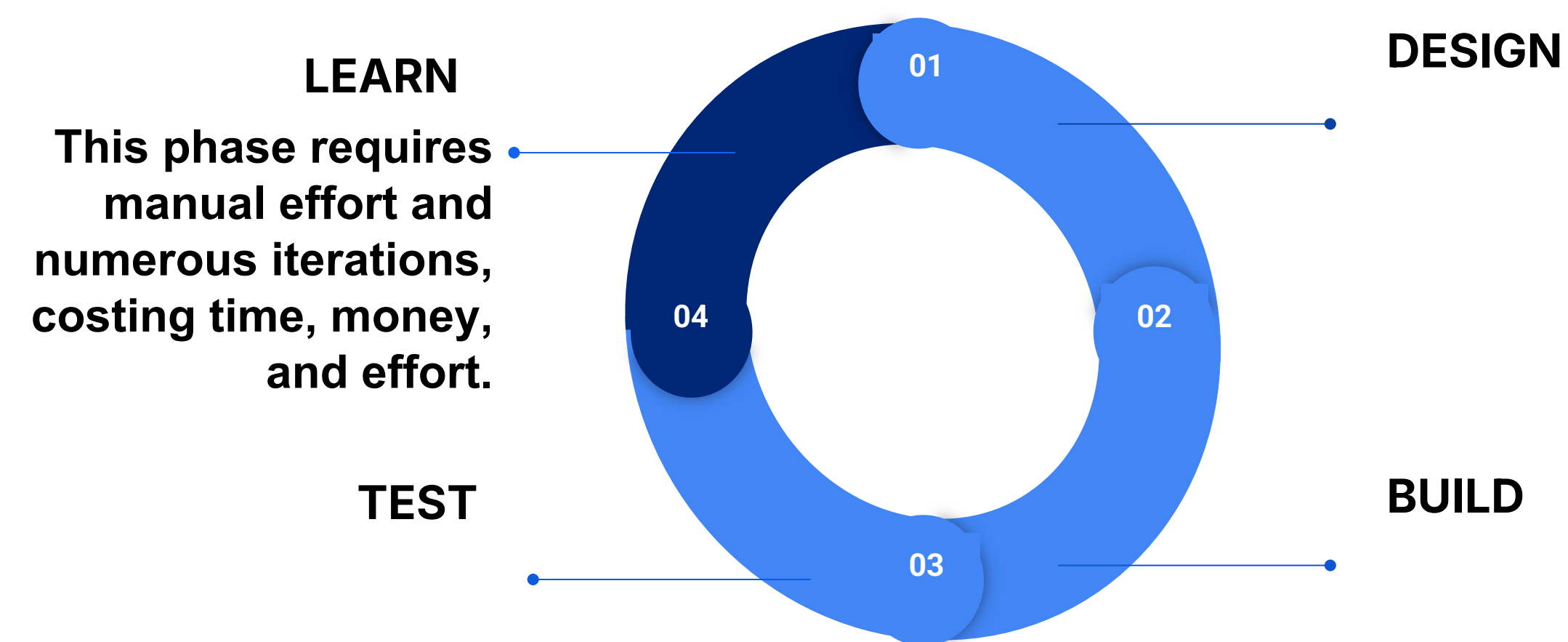
# Automated Recommendation Tool (ART) Machine Learning for Synthetic Biology



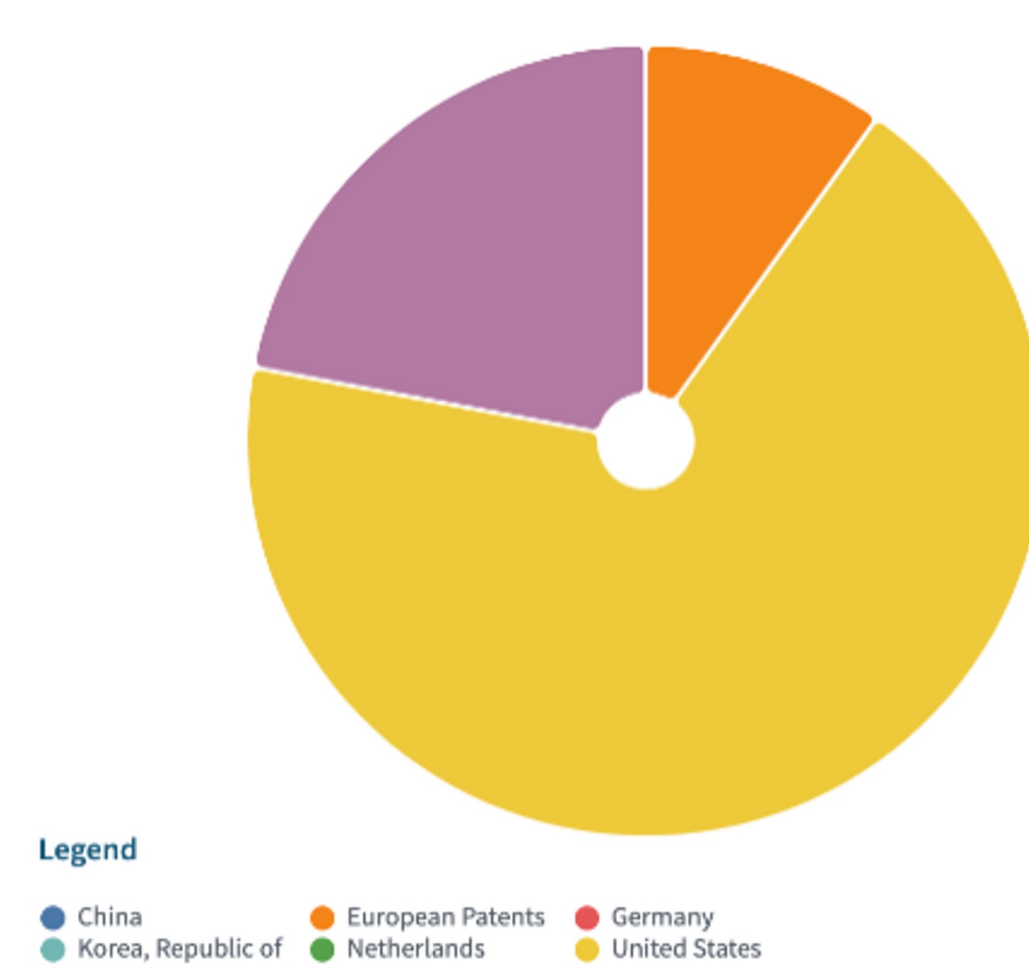
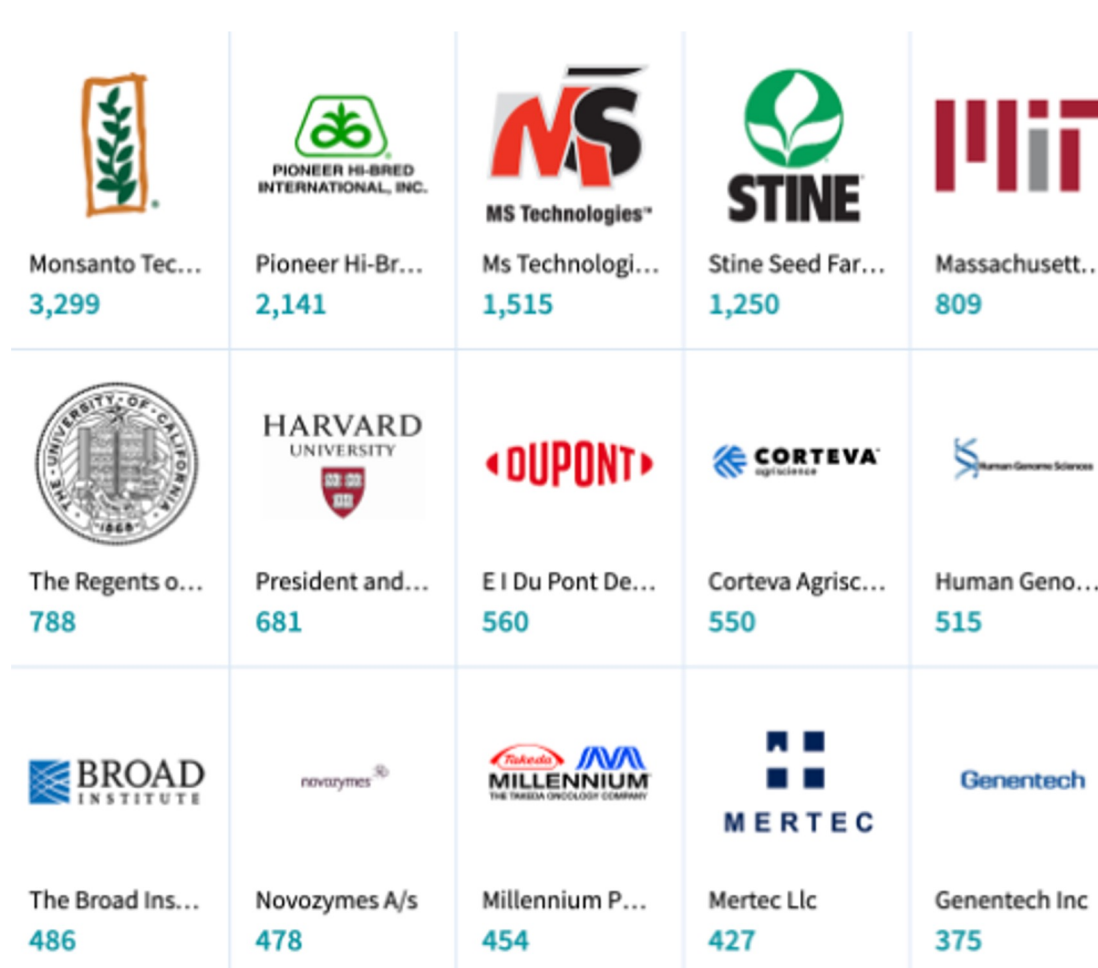
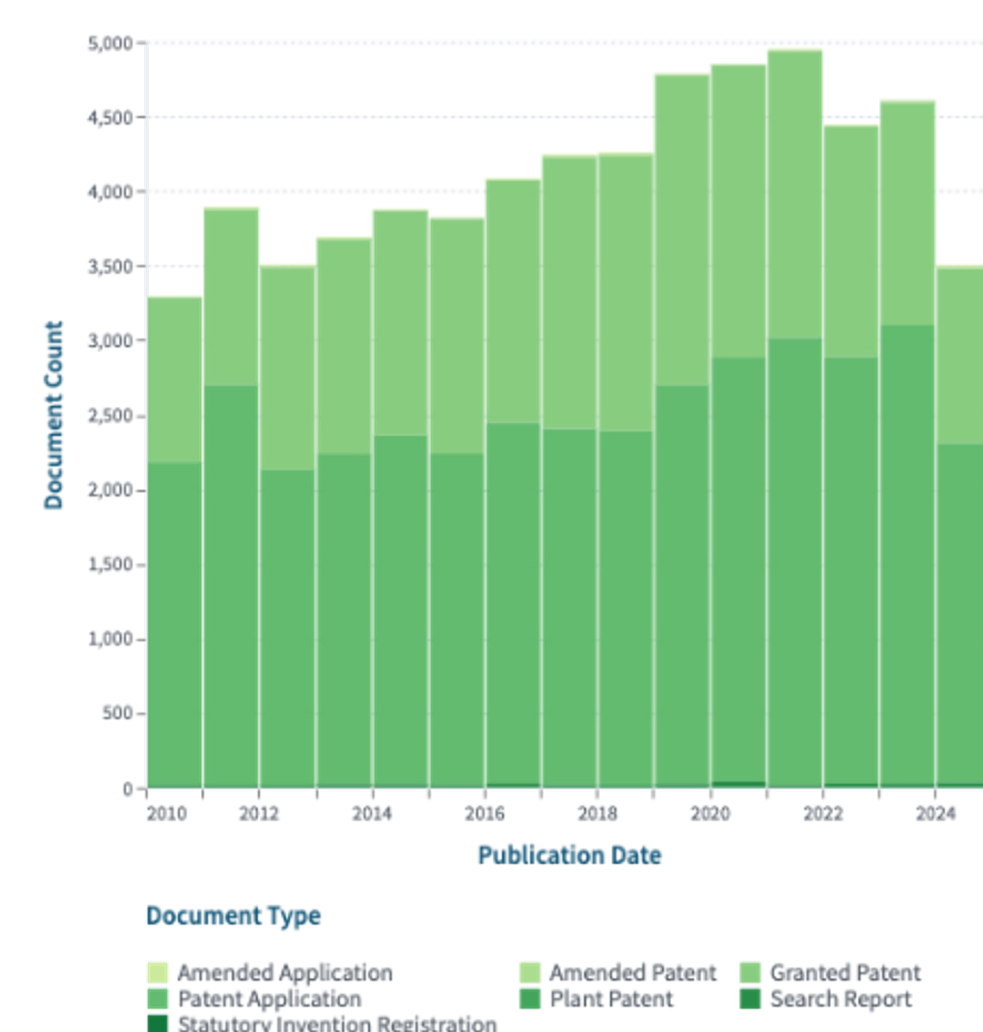
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**Advisor:** Leah Edwards

ART offers solutions for more efficient "Learn" phase, applicable to wide-range of research and development areas

The "Learn" phase presents a major pain points for Synthetic Biology companies



## Publications and Patents Landscape



High publication velocity in synthetic biology and ML patents reflects high innovation and market demand.

With leading institutions like MIT and Harvard dominating the landscape as top assignees, ART's development at the Berkeley Lab positions it as a competitive player.

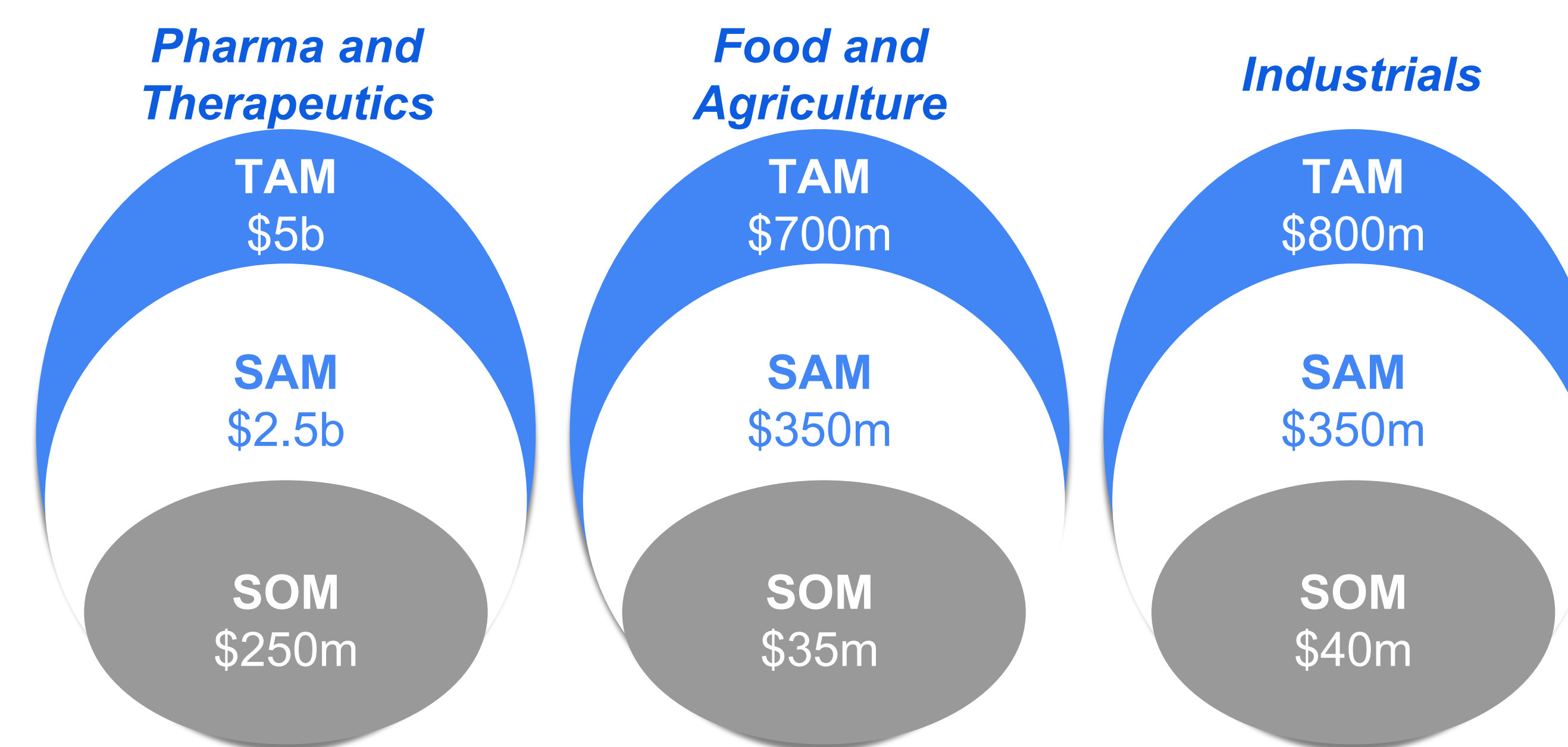
In terms of geographic distribution, the U.S. leads in synthetic biology and ML patents, making it the key market for ART licensing.

## Market Application for Different Domains

	Pharma and Therapeutics	Food and Agriculture	Industrials (chemicals, materials, textiles, automotive, and coatings)
Market Size and Investment	Large and growing; high level of continued R&D investment	Lower relative startup investment; less profitable application area	Moderate levels of R&D investment; continued strong growth
Cost Savings Potential from ART	High potential: High production costs offer ample cost savings potential	Low potential: Lower relative production costs offer less cost savings potential	High potential: High production costs offer ample cost savings potential
Conclusion	Strong Fit	Weak Fit	Strong Fit
Confidence	Medium	High	High

## Competing Technologies

<b>Manual</b>	<ul style="list-style-type: none"> <li>Extend the time frame required for development, ultimately requiring additional cost and resources</li> </ul>
<b>Homegrown solutions</b>	<ul style="list-style-type: none"> <li>Fit-for-purpose ML development requires expensive data science talents and resources, is cost-prohibitive for startups</li> </ul>
<b>Third-party software</b>	<p><b>SOFe by POW.BIO</b></p> <ul style="list-style-type: none"> <li>Advanced hardware and intelligent software drives 5x gains in productivity for a fraction of the capital expense of traditional systems</li> <li>Performance against ART is unknown</li> <li>Specific only for fermentation scale-up while ART is applicable to other research areas</li> </ul>
	<p><b>EVOLVE by teselagen BIOTECHNOLOGY</b></p> <ul style="list-style-type: none"> <li>Full-stack DBTL software developed by VC-backed start-up</li> <li>Performed worse than ART in head-to-head testing</li> </ul>



Average startup dollars raised yearly by application area x 50% budget dedicated to R&D x 10% R&D budget dedicated to software tooling