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SIMPATH

A SIMPLE PATH TO INNOVATION

## The Idea

**Product Description:** SimPath delivers a simple and low-cost DNA assembly solution for synthetic biologists in industry and academia. Combining this patented method with state-of-the-art DNA synthesis and intuitive web-based design tools, synthetic biologists using SimPath have access to all arrangements of their DNA assembly for significantly lower cost and quicker turnaround.

**The Problem:** As synthetic biologists use genetically modified organisms to produce high-value products at the efficiency needed for industrial processes, they are turning away from single-gene engineering and towards multi-gene engineering. This results in synthetic biologists needing to assemble multiple genes at a time; however, current DNA assembly services are both costly and slow. Current alternatives also do not efficiently or economically address the synthetic biologists' preference to test multiple arrangements of their DNA assembly.

**The Solution:** SimPath combines state-of-the-art DNA synthesis and assembly methods to construct multiple arrangements of a DNA assembly **quicker** and **cheaper** than present day services. Our advantage is our assembly method, which is **10x** more efficient than today's methods and 100% flexible, allowing us to synthesize a DNA part only once for its use in any arrangement of an assembly. In addition, SimPath has partnered with Lattice Automation to provide a user-friendly, intuitive web-interface for designing assemblies, an element our competitors lack.

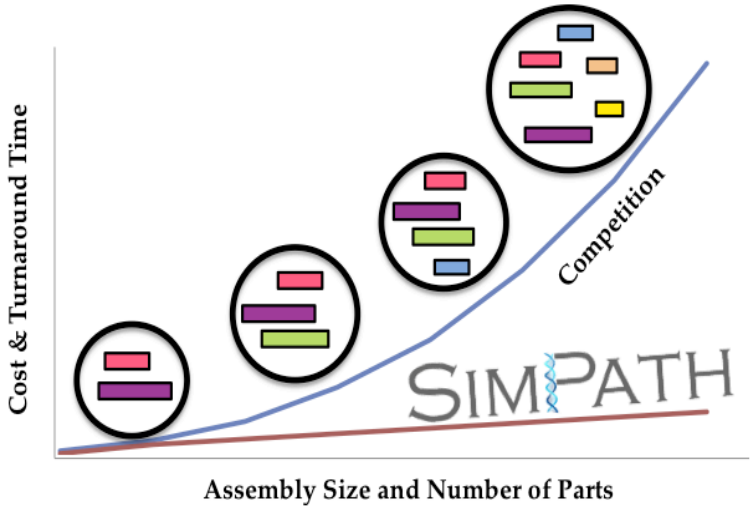


***Fig 1. SimPath outperforms competitors in both cost and turnaround time as size of assembly and number of parts (colored rectangles) increases.***

**Competition:** Competing DNA assembly services are available at higher costs and with a slower turnaround. Due to the nature of our assembly method, we can reduce cost significantly by reducing the volume of DNA synthesis needed, which accounts for the largest expense to a customer. Turnaround times are not only impacted at the DNA synthesis and assembly stage, but also at the company-customer interaction stage due to inefficient or non-existent web portals/tools for designing and ordering DNA assemblies. SimPath's state-of-the-art and intuitive web portal and our DNA parts library allows for easy designing and ordering of DNA assemblies. With these advantages, SimPath offers a DNA assembly service that allows researchers access to **all** variants of their DNA assembly of interest at a low cost with a quick turnaround.

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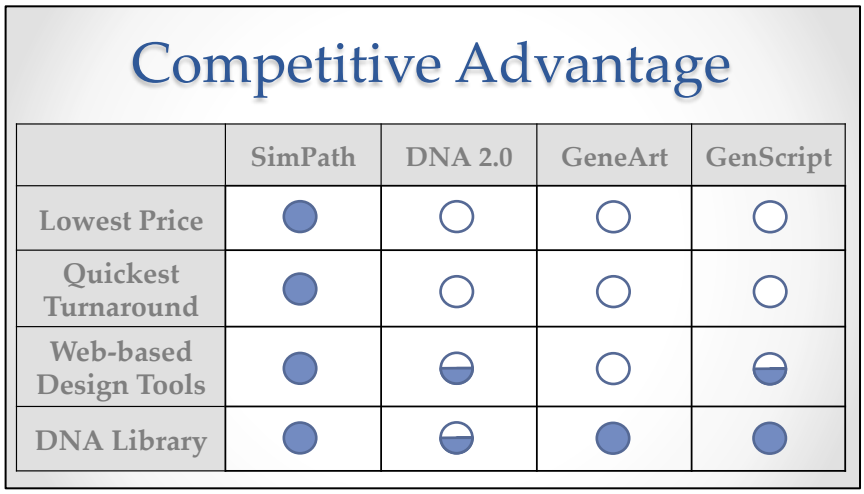


***Fig 2. SimPath's competitive advantages against DNA 2.0, GeneArt, and GenScript.***

## Technology & Innovation

**Technology:** The DNA assembly method leveraged by SimPath consists of a patented method, a set of DNA plasmids, and a buffer mix. We combine this method with conventional molecular biology techniques to assemble DNA parts in a quick, inexpensive manner. In addition, our patented, state-of-the-art, web-based assembly tools not only provide customers tools for easy design of DNA assemblies, but also provide straightforward assembly instructions for SimPath employees, reducing human error.

**Innovation:** Our DNA assembly service will be the first of its kind to combine and package DNA synthesis, DNA assembly, and state-of-the-art assembly tools into one service without having to significantly increase price and turnaround. When synthetic biologists want to design and build assemblies from multiple DNA parts, they no longer will have to work with multiple companies. We will be the "one-stop shop" for DNA assembly.

**Stage of Development:** Our technology is in the research and product development stage. The patented Oak Ridge National Lab (ORNL)/UT-Battelle DNA assembly technology is currently in Phase I of the ORNL Technology Innovation Program (TIP). TIP provides R&D funding for promising technology at the lab (Phase I = $250,000). Phase II of TIP starts in November 2016 and awards an additional $300,000 for R&D. The money is awarded to the company who licenses the TIP technology and we have positioned ourselves to acquire an exclusive license for the DNA assembly technology. The assembly technology has been tested at ORNL and Lawrence Berkeley National Lab with great appraisals. The design of the web-based DNA assembly tools is currently in the planning stage, with the prototyping stage starting in January 2017.

**Intellectual Property:** The DNA assembly technology is based on US Patent No. 14/789112 awarded to ORNL via UT-Battelle, LLC, where Dr. Henrique De Paoli is the primary inventor. We are currently in the process of acquiring an exclusive license from ORNL, UT-Battelle, and the Department of Energy. The code for the graphical user interface, inventory management system, and customer communication system will be owned by SimPath, and the libraries for the algorithms will be acquired through an exclusive license from Lattice Automation, LLC.

**Sustainability:** Moving forward, automation with fluid handling robots is a key improvement that we will be pursuing to further reduce costs and turnaround, while reducing human error and improving throughput. Additionally, by 2019, a DNA assembly kit based on our technology will be made available for use in a bioengineer's own lab, establishing an additional reoccurring revenue stream. Through market analysis, we will determine whether researchers prefer us to supply a library of parts or if they prefer to use their own parts with our robust technology, with the former generating another revenue stream. Finally, the development of specialized enzymes for our assembly process is a key research topic moving forward. These enzymes will increase the efficiency and flexibly of the process and be an additional source of intellectual property.

## Market

**Market Overview:** Synthetic Biology is a young but quickly growing industry, characterized by a multitude of product applications and a wide range of burgeoning markets. Considerable room for innovation remains and many large synthetic biology companies are cutting costs through outsourcing of R&D functions. Furthermore, synthetic biologists are turning towards multi-gene engineering instead of single-gene engineering, to keep up with the growth of the industry. These characteristics result in favorable conditions for SimPath to enter the market. We will focus on the R&D segment of the Synthetic Biology industry ($7.5B), which is approximately 25% of industry revenue ($1.8B). Within this segment, we will grab 0.015% of the market, valued at $276K, by the end of 2017. Within 3 years, we can grow to 0.406% of the market, valued at $13.6M. Medium barriers to entry, room for new products, and increasing demand for multi-gene assemblies will drive our penetration into these markets.

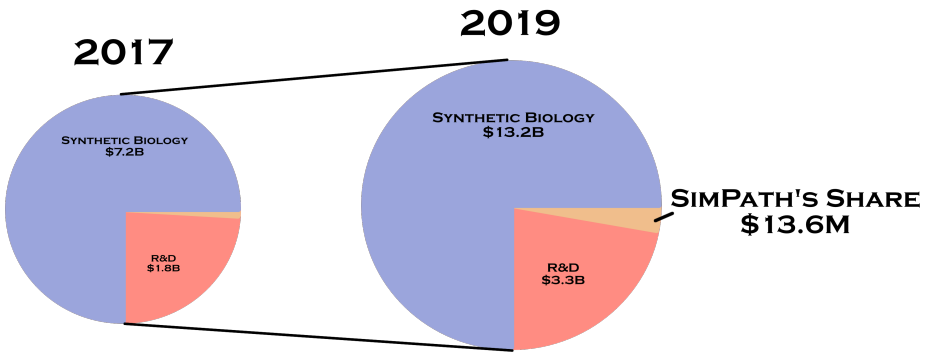


***Figure 3 SimPath's market penetration in the synthetic biology market.***

**Go-to-Market Strategy:** Synthetic biologists are the decision makers and end users of these services, and we will be marketing to them through conferences, trade shows, publications, sponsorships, and relationships with universities and national laboratories. A beta trial will go from mid 2017 to mid 2018 to create initial traction and refine the service pipeline. Work generated from the beta trial will be used to acquire key opinion leaders (KOL) with the previous channels described. Publications from KOLs will generate exposure to career academics and bio-based manufacturing companies. Furthermore, sponsorships will be given to student teams in synthetic biology competitions to target younger scientists.

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## Team

**Rob Moseley – Co-Founder/CEO, Plant Systems Biologist and Bioengineer**
Rob Moseley received his B.S. in Environmental Science and M.S. in Biology from Georgia College and is currently pursuing his Ph.D. in Energy Science and Engineering through the Bredesen Center at the University of Tennessee in partnership with Oak Ridge National laboratory. Applicant 1's research expertise is in the area of applying bioinformatics and genome engineering to plant systems biology issues.

**Ben Mohr – Co-Founder/CTO, Synthetic Biologist**
Ben Mohr received his B.S. in Biochemistry and Evolution and Ecology from The Ohio State University and is currently pursuing his Ph.D. in Energy Science and Engineering through the Bredesen Center at the University of Tennessee in partnership with Oak Ridge National laboratory. Applicant 2's research focus and expertise are in the area of metabolic engineering with a focus on cell-free systems.

**Jeremy Baldi – Co-Founder/CFO**
Jeremy received his B.S. in Biology from Butler University. In 2013, he co-founded Archway Physician Recruitment, a medical staffing firm. Acting as CEO and CFO, he has helped expand the team to 11 members and produce profits over $1,000,000 in the third year of operation. He also oversaw their market expansion in late 2015.

**Future Team Needs:** As we progress beyond the beta trial phase, we will need to hire a sales employee, preferably with sales experience and a background in biology. We anticipate making this hire near the beginning of the beta trial phase, around mid 2017. Additionally, two lab techs will be added in 2018 to handle increased workload from user growth.

**Milestones:** We have begun discussions with interested parties from the University of Tennessee, ORNL, and two Knoxville-based biotech companies for spots in the beta trial. We have also signed a statement of work with Lattice Automation for development of the DNA assembly web portal. In addition, we have an early relationship with Twist Bioscience, a DNA synthesis company that synthesizes DNA at half the price of its competitors. We aim to have the majority of our laboratory work automated by early 2019, driven by research and development in the prior two years. Furthermore, we have recently been accepted into the LifescienceTN Mentor Program, an accelerator program that connects companies with mentors to help further develop their business model. We have attracted five mentors to help us refine the areas of IP, competitive positioning and strategy, and marketing.

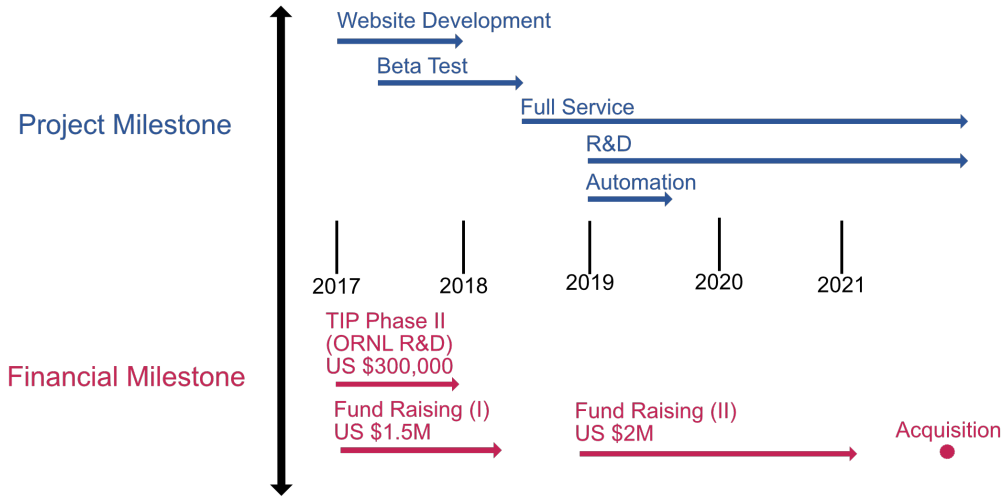


***Fig 4. SimPath's target milestones for the next 5 years.***

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**Exit Strategy:** Acquisition is our primary exit strategy and is a common trend for biotech startups. Competitors such as GenScript, DNA 2.0, and GeneArt are targets, as well as suppliers such as Twist Bioscience.

**Financial Ask:** We are seeking $1.5 million in funding to begin operations and $425,000 will be used for our most pressing needs, which includes the capital to execute our license agreement with ORNL/UT-Battelle, purchase of our initial inventory supplies, payment for lab space, payment to Lattice Automation, and hiring a sales employee.

**Use of Funds Statement:** At this time, we have an R&D plan for the next 12 months to test and optimize our service pipeline. We cannot begin execution on these plans, or solicit additional funding, until we have completed our licensing agreement with ORNL/UT-Battelle and secured our base of operation. In total for the next 12 months, we anticipate requiring $425,000 to move us from in-house testing to beta testing, with sufficient data to support our claims of quick and low-cost DNA assembly. The remaining funding will be used to pursue research and development of automation for implementation by 2019, as well as a cash reserve. If awarded the maximum amount of $20,000 from the Boyd Venture Fund, it would be used on these primary items, also outlined in our budget below.

| | |
|---|---|
| $15,000 | Execution of a full license from ORNL/UT-Battelle |
| $2,200 | Legal Fees (Drafting NDAs and LOIs and license agreement) |
| $4,000 | Lab space start-up cost |
| **$21,200** | **Total** |

**Projections – 5 years**

| | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|
| **Headcount** | 4 | 6 | 7 | 9 | 9 |
| **Customers (new)** | 80 | 262 | 445 | 676 | 700 |
| **Cost of Goods Sold** | $53,394 | $464,086 | $1,533,026 | $3,742,413 | $7,377,347 |
| **Revenue** | $276,500 | $3,612,600 | $13,592,600 | $33,846,800 | $74,090,600 |
| **Gross Margin** | 80.69% | 87.15% | 88.72% | 88.94% | 90.04% |
| **Operating Cost** | $418,591 | $450,808 | $333,668 | $456,988 | $471,028 |
| **Profit** | -$195,485 | $2,697,706 | $11,725,906 | $29,647,399 | $66,242,225 |
| **Net Margin** | -70.70% | 74.67% | 82.59% | 87.59% | 89.41% |
| **Market Penetration** | 0.015% | 0.122% | 0.406% | 0.765% | %1.269 |

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## Pro Forma – 12 months

| Start-up Requirements | |
|---|---|
| **Start-up Costs** | |
| Licensing – Patent | $15,000 |
| Professional Fees (Legal & Accounting) | $3,000 |
| Rent – Lab space | $4,000 |
| Website Development | $240,000 |
| Equipment | $22,190 |
| DNA Assembly consumables | $4,026 |
| **Total Start-up Expenses** | **$288,216** |
| | |
| **First year Costs (excluding start-up)** | |
| Professional Fees (Legal & Accounting) | $19,800 |
| Rent | $44,000 |
| Labor (sales) – 6 months | $35,000 |
| Overhead | $10,000 |
| Marketing | $20,504 |
| DNA Assembly | $5,736 |
| Shipping | $1,309 |
| **Total First year Expenses** | **$136,349** |
| | |
| **Total Requirements** | **$424,565** |
| | |
| **Start-up Funding** | |
| Expenses to Fund | $137,613 |
| Assets to Fund | $286,952 |
| **Total Funding Required** | **$424,565** |
| | |
| **Capital** | |
| Planned Investment | $0 |
| Additional Investment Requirement | $424,565 |
| **Total Planned Investment** | **$424,565** |