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CASE STUDY · MARLUC SYNOPSIS

Institute for Protein Design, University of Washington

IMPLEMENTED 2014 ONWARDS · HEALTH AND LIFE SCIENCES · US · BAND D · PARTLY PROVED

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An academic institute led by 2024 Nobel laureate David Baker that designs new proteins by computer, with a record of spinout companies and a vaccine approved in South Korea and the UK.

ABOUT THIS SYNOPSIS

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Facts and figures are as reported by the sources listed below, which may be incomplete, self-reported or out of date. Check the original source before relying on any figure.

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NOTICE WORDING LAST UPDATED 16 NOVEMBER 2026

AT A GLANCE

Frontier case: AI used for a scientific, medical or engineering breakthrough. The transformation is potential and unproven; MarLuc grades what has changed in practice so far.

AI and automation used: Deep learning protein design tools (RoseTTAFold and RFdiffusion) alongside earlier computational design software.

Implemented: 2014 onwards. Grade: band D, Task support, Partly proved.

Headline result, as reported: Computationally designed proteins are in an approved vaccine and in clinical testing; designs from the newer AI tools are so far reported in preclinical work

1 · The case

The facts, as reported by the 7 sources listed at the end. Where a source is silent, the field says "Not reported".

Organisation

Institute for Protein Design, University of Washington. Academic research institute within the University of Washington School of Medicine, directed by David Baker. It is funded mainly through grants and philanthropy, per its own account. Canvas block: 4. Operations and process. Also 3. Customers and proposition, 6. Data and technology.

Business challenge

The challenge. Not reported in these terms. The institute says it designs new proteins from scratch to solve problems in medicine, technology and sustainability.

How it was addressed. The institute builds protein design software and designs new proteins by computer, including with the deep learning tools RoseTTAFold and RFdiffusion. Its Translational Investigator Program helps researchers turn designs into products and spinout companies, and the institute lists 11 spinouts. [1] [2] [3] [4] [5] [6] [7]

Who implemented it

In-house (In-house): Institute for Protein Design, University of Washington: Develops the design software and designs the proteins..
SK Bioscience and GlaxoSmithKline developed SKYCovione jointly with the institute, per The Korea Times. Spinout companies carry designs into development. The sources do not name a consultancy or integrator.

Technology (SEAM pillar E)

SEAM types: T5 Custom / fine-tuned models. Deployment: Not reported. Vendors and products: RoseTTAFold, RFdiffusion, Rosetta.

Where it was built in: Design software is used in the institute's own laboratories and in spinout companies; designed proteins are then produced and tested experimentally.

What changed

Before: protein design started from nature's existing proteins. After, by the institute's account: designed proteins are in an approved COVID-19 vaccine and in clinical testing, and the Nature papers report designs generated by computer and then confirmed in the laboratory. For the AI-era tools, reported results so far are preclinical. [1] [2] [3] [4] [5] [6] [7]

What it cost

Not reported

What it saved

Not reported [1] [2] [3] [4] [5] [6] [7]

Governance and control

A regulator approved SKYCovione after a phase 3 trial, per The Korea Times. The institute describes Responsible AI commitments and 2024 community standards, by its own account. Accountable owner for product decisions: Not reported.

S2 · Accountable owner · Not reported
Not reported.

A1 · Safe use · Claimed
The institute describes a Responsible AI commitment, a 2023 safety summit and community standards signed by over 170 scientists in 2024, by its own account. [7]

A2 · Human in the loop · Evidenced
A regulator approved the vaccine after a phase 3 trial, and Neoleukin tested NL-201 in a phase 1 trial before stopping it. [3] [6]

A3 · Monitoring and assurance · Evidenced
The Nature papers report experimental structure and activity tests of designs. [4] [5]

A4 · Vendor AI · Not reported
Not reported.

A5 · Agent controls · Not reported
Not reported. The tools are not agents.

A6 · Standards and regulation · Claimed
The institute says the 2024 community standards cover obligations to report concerning research practices and to buy synthetic DNA only from providers that screen it. [7]

What worked, what did not, what is unproven

WORKED

– SKYCovione, developed with SK Bioscience and GSK, was approved by South Korea's regulator in June 2022, per The Korea Times; the institute says it is approved in the UK and South Korea and has a World Health Organization Emergency Use Listing.

– RFdiffusion solved 23 of 25 benchmark motif-scaffolding problems against 15 for one earlier method and 19 for another, per the Nature paper, and a designed influenza binder matched its model by cryo-electron microscopy.

– Designed proteins neutralised snake venom toxins in vitro and protected mice from a lethal challenge, per Nature (January 2025).

– Spinouts: 11 so far and over $1 billion raised by alumni, per the institute; Icosavax was acquired by AstraZeneca in 2024 and PvP Biologics by Takeda in 2020.

DID NOT

– Neoleukin discontinued NL-201, which it described as the first fully de novo protein evaluated in clinical trials, and cut about 40% of staff in November 2022. The company said preliminary data showed target engagement, and that after weighing the expected benefit to risk ratio and developments in the field of IL-2 therapeutics, resources would be better applied to its next generation of de novo proteins.

– The snake venom results are in vitro and in mice. No clinical result is reported in the sources.

UNPROVEN

– Whether machine learning, as against earlier computational design, was used to make the products now approved or in clinical testing: Not reported.

– Whether designs from RFdiffusion and similar tools will reach approval.

– Independent evidence of how widely other laboratories and companies now use the institute's tools: Not reported.

Timeline

2017 Spinout Icosavax founded to develop vaccines; acquired by AstraZeneca in 2024 [2]

2018 Spinout Neoleukin founded to advance proteins for cancer immunotherapy [2]

2020 PvP Biologics, the celiac disease spinout, acquired by Takeda Pharmaceuticals [2]

Jun 2022 South Korea's regulator approves SKYCovione, developed jointly by SK Bioscience, GSK and the institute [3]

Nov 2022 Neoleukin discontinues NL-201, which it describes as its first de novo protein tested in patients, and cuts about 40% of staff [6]

Jul 2023 RFdiffusion paper published in Nature [4]

2024 David Baker, the institute's director, awarded the Nobel Prize in Chemistry for computational protein design, per the institute [7]

Jan 2025 Nature paper reports designed proteins that neutralise snake venom toxins in vitro and protect mice [5]

2 · Grade and SEAM assessment

MarLuc's opinion, made on the evidence above. How cases are graded: marluc.co.uk/case-studies/how-we-rate

Level of change and impact

Claimed: A. Grade: D, Task support. Proof: Partly proved. Level of change: Task support.

Task support (Level 1, band D), claimed as transformation (band A). Computationally designed proteins have reached an approved vaccine and clinical testing, but the sources do not show that AI-era tools produced them, and their own results are preclinical. Transformation is potential and unproven. Band C could be argued for the design-to-product pipeline.

Graded D, claimed A. The institute has put computationally designed proteins into an approved vaccine and into clinical testing, but the sources do not say that machine learning was used for those products. The AI-era tools are reported in peer-reviewed preclinical work, with no clinical result reported in the sources. A change in how medicines are discovered is potential and unproven.

The SEAM view and lessons learnt

This case separates what has been proved from what is promised. The proved results rest on computational design that came before today's generative tools, and the newer tools have peer-reviewed preclinical results. For a buyer, a published benchmark is a reason to pilot, and a clinical or regulatory result is the test of value. One spinout stopped its lead drug, which shows that designed does not mean effective.

1. Ask whether a reported result came from the AI tool being sold or from earlier methods.
2. Separate benchmark results, animal results and human results when judging evidence.
3. Plan for the failure of individual candidates when funding a design platform.

Evidence

Score 2 of 4. Partly independent: a regulator approval reported by the press and peer-reviewed preclinical papers; the record of spinouts and impact is the institute's own account.

Evaluation method. Peer-reviewed papers and press reporting: two Nature papers (preclinical), The Korea Times on a regulator approval, a company release on a stopped trial, and the institute's own pages for spinouts and impact; no independent evaluation of the institute's overall effect.

Sources disagree. Not reported. The institute calls SKYCovione the world's first computationally

3 · Original sources

Read these in full. To challenge a fact or a grade, use the contact form at marluc.co.uk or the link on https://marluc.co.uk/case-studies/institute-for-protein-design

[1] Institute for Protein Design, University of Washington: home page (accessed November 2026)
https://www.ipd.uw.edu/

[2] Institute for Protein Design: Translational Investigator Program and spinouts
https://www.ipd.uw.edu/translation/

[3] The Korea Times: SK Bioscience gets final approval for Korea's 1st COVID-19 vaccine (29 June 2022)
https://www.koreatimes.co.kr/business/companies/20220629/sk-bioscience-gets-final-approval-for-koreas-1st-covid-19-vaccine

[4] Nature: Broadly applicable and accurate protein design by integrating structure prediction networks and diffusion generative models, RFdiffusion (11 July 2023)
https://www.nature.com/articles/s41586-023-06415-8

[5] Nature: De novo designed proteins neutralize lethal snake venom toxins (15 January 2025)
https://www.nature.com/articles/s41586-024-08393-x

[6] Neoleukin Therapeutics: Third quarter 2022 financial results and corporate update, as republished by 1stOncology (14 November 2022)
https://www.1stoncology.com/blog/?p=81091

[7] Institute for Protein Design: Responsible AI in protein science
https://www.ipd.uw.edu/responsible-ai/

Institute for Protein Design, University of Washington website: https://www.ipd.uw.edu

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