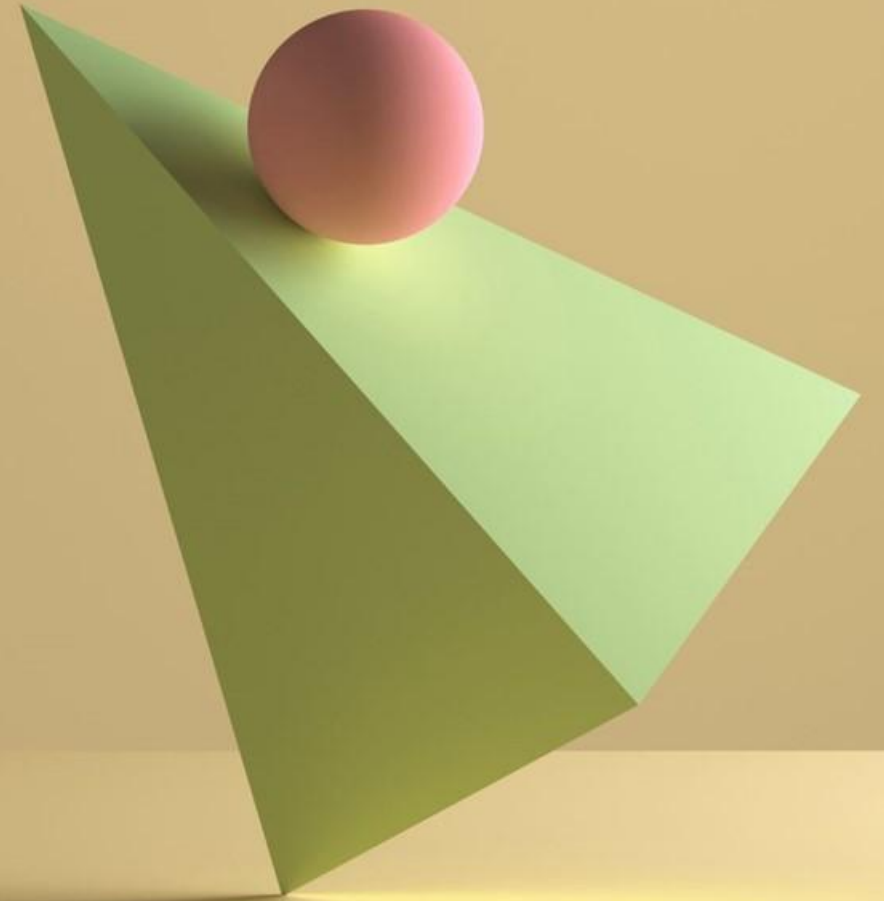


# Developing Enterprise-Ready Judgement

Embedding secondary market evidence in  
GenAI-enabled STEM innovation projects

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Dyson School of Design Engineering



# What has changed in student project work

PROBLEM

## Pre-GenAI

- Idea generation was effortful
- Students had to search across domains
- Claims were narrower, though often traceable
- Weakness usually showed up as thin evidence

## GenAI-enabled

- Options expand almost instantly
- Synthesis arrives fluent and confident
- Narratives look comprehensive and complete
- Weakness now hides inside polished plausibility

**Fluency has accelerated. The need for justification has not.**

# A real example of AI in the wrong decision role



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Zillow is a US real-estate platform. It went public on Nasdaq in 2011, and it still trades under **Z** and **ZG**.

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In 2021, Zillow shut down **Zillow Offers**, its home-buying and reselling arm.

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Management said home-price forecasting was far less predictable than expected.

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Zillow reported a roughly **\$304 million** inventory write-down, with a further **\$240–265 million** of losses expected in the next quarter.

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The case became a warning about treating model output as business judgement in a volatile market.

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a major public real-estate firm whose AI-led home-buying bet broke down in a messy real market

# What approach is Zillow taking now



In February 2026, Zillow launched a Google **NotebookLM** notebook for home-buying guidance.



The tool answers questions from Zillow's own guides and shows citations back to the original pages.



Zillow frames it as a preparation tool for buyers, not as a replacement for estate agents.



Zillow states that agents remain essential for high-stakes, personalised transactions.

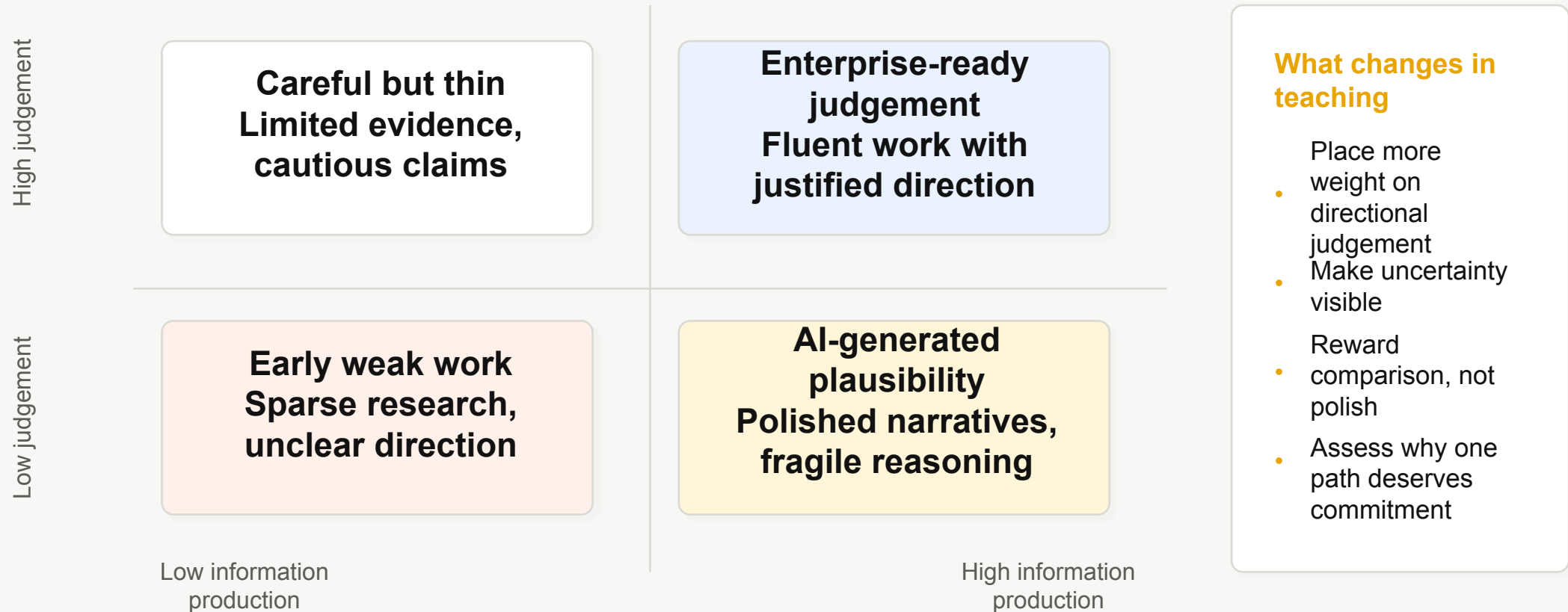


The new model is clear: AI supports human judgement; it does not take over the judgement role

# The educational bottleneck has shifted

FRAME

AI pushes student work quickly into a zone of high fluency. Teaching still has to move it into high judgement.

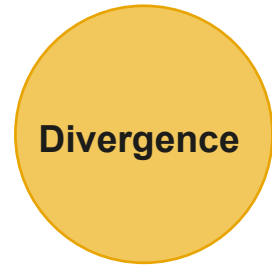


The bottleneck is no longer idea production. It is justified direction.

# AI's cognitive role in project work

SHIFT

## AI strengthens



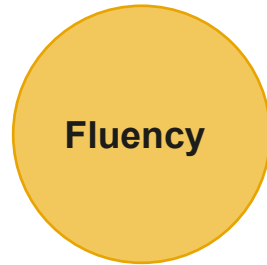
**Divergence**

More options  
more quickly



**Compression**

Cross-domain  
synthesis



**Fluency**

Confident  
framing

## Human judgement still provides

- Prioritisation
- Trade-off reasoning
- Uncertainty assessment
- Directional responsibility

**AI expands options. It does not choose responsibly.**

# Where reasoning breaks down

DIAGNOSIS

## Visibility mistaken for demand

What is easy to find starts to look like what the market wants.

## Single-source certainty

One report, one AI summary, or one interview gets treated as enough.

## AI over-smoothing disagreement

Conflicting signals vanish inside a clean, coherent answer.

**These are not information gaps. They are judgement gaps.**

# Why these gaps appear in STEM enterprise work

LOGIC

## What students validate well

- Technical feasibility
- Performance optimisation
- Literature support
- Limited user interviews

The question often stays here

**Can this work technically?**

## What is often under-validated

- Behaviour under constraint
- Substitution patterns
- Regulatory feasibility
- Procurement logic
- Demand stability

Enterprise education begins here

**Where should this go first commercially?**

# When fluency feels like validation

EXAMPLE

AI Gen video- Prompt “university students try to use 3D food printer for protein food in the UK”



## What the output creates

- Confident tone
- Smooth success narrative
- Technical viability implied
- No visible uncertainty

## What still is not validated

- Who adopts first
- What system constraints block rollout
- What substitutes already exist
- Why this direction is stronger than alternatives

The result is persuasive plausibility, not justified direction.

# Case example: 3D-printed protein food

CASE

## Technical promise

- Personalised nutrient control
- Texture adaptation
- Design flexibility

## Evidence students often gather

- Food engineering literature
- Prototype demonstrations
- AI-generated market summaries
- Small-scale interviews

## Missing rollout checks

- Who adopts first
- What system blocks entry
- What substitutes already exist
- Which segment shows stronger convergence

**Feasible technology and positive interest do not yet tell students where the idea should push first.**

# When AI agents do the research

VALIDATION

## What agents can do

- Gather sources fast
- Summarise domains
- Generate options
- Draft conclusions

## What students still must do

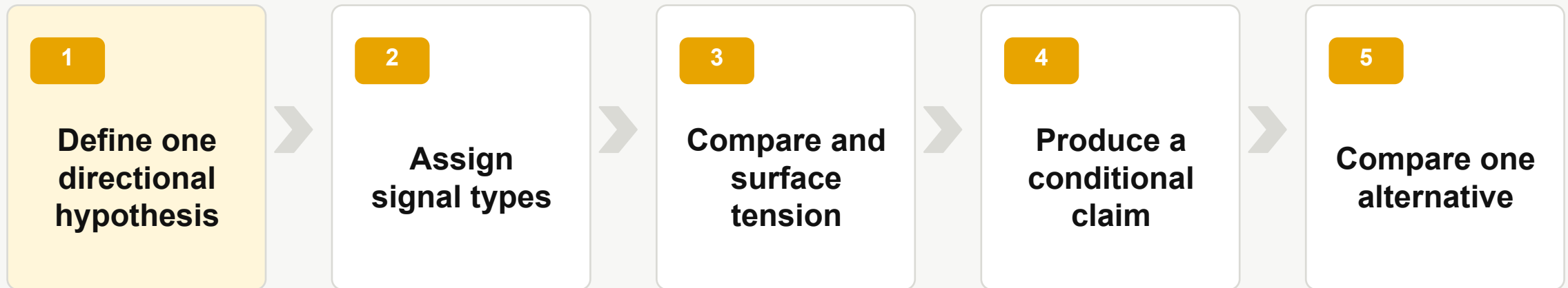
- Verify source traceability
- Compare signal types
- Identify missing constraints
- Justify one direction against alternatives

**Automation reduces effort. It does not remove responsibility.**

# A judgement scaffold for STEM enterprise projects

FRAMEWORK

The teaching move is to make judgement explicit, visible, and comparable.



Students move from a promising idea to a justified first direction.



## Step 1: Define One Directional Hypothesis:

“3D-printed protein food is best positioned for hospital nutrition”

# Step 2: assign signal types

## Context signals

Does the surrounding system support the idea?

- Regulatory pathways
- Procurement systems
- Safety standards
- Cost ceilings

### Typical sources

Guidance, standards, policy documents, procurement frameworks

## Demand proxies

Is there stable or convertible interest?

- Search trend stability
- Regional variation
- Volume over time
- Early willingness-to-pay signals

### Typical sources

Google Trends, crowdfunding traction, pre-orders, category comparisons

## Behavioural signals

Will people actually switch or adopt?

- Substitute behaviour
- Routine compatibility
- Willingness to switch
- Trust and legitimacy concerns

### Typical sources

Forums, reviews, interviews, community discussion, observational cases

**Students need more than sources. They need distinct kinds of signal.**

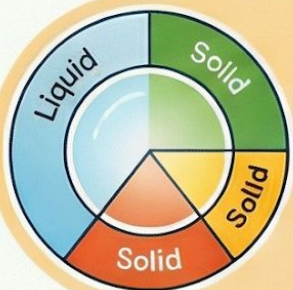
# Precision Gastronomy: The Strategic Case for 3D-Printed Protein in Healthcare

## CLINICAL SAFETY & MATERIAL SCIENCE

### The 1:1 "Gold Standard" Formulation



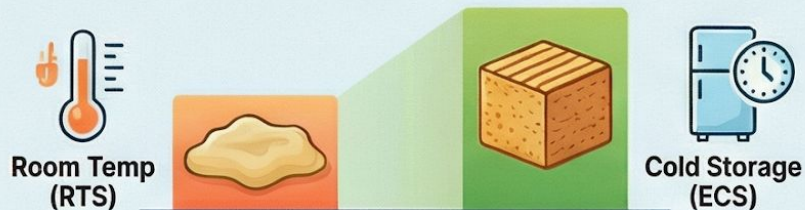
Blending **Mashed Potato** and **Pea Protein** at a 1:1 ratio ensures structural stability.



### IDDSI Framework Compliance

Formulations like the **40:27 HOC matrix** provide reliable safety for dysphagia patients.

### 60.6% Increase in Structural Firmness

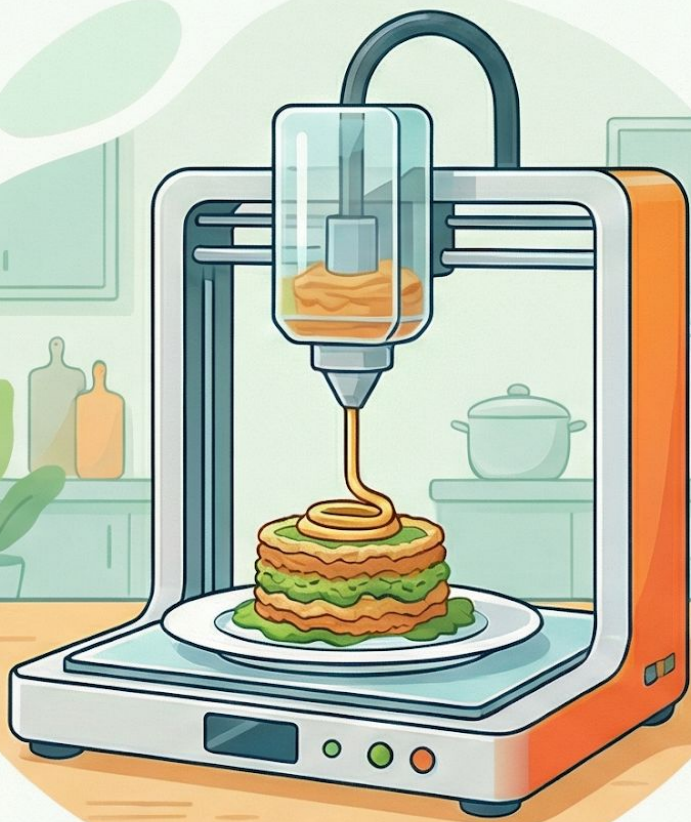


**1.71 N**

Unstable; unsuitable for advance preparation.

**2.54 N**

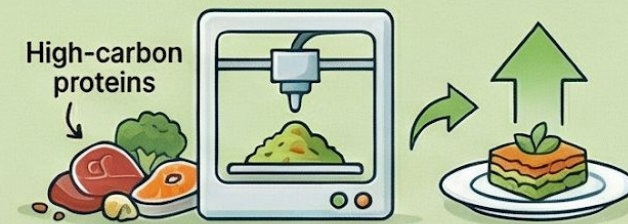
60.6% firmer; enables 24-hour advance preparation



Students can use NotebookLM to quickly learn about the contextual signals

## STRATEGIC OPERATIONS & ROADMAP

### Net Zero & Waste Elimination



Just-in-time printing replaces high-carbon proteins and reduces food waste by **15-30%**.

### The Hub-and-Spoke Logistics Model



### 2027 NHS Compliance Deadline

3DFP will be a prerequisite for suppliers to meet net-zero contract mandates.

# Demand Proxy: Google search trend

## Explore search trends

Clear

I've provided search terms for comparing **3D printed food** with current and alternative approaches to **hospital nutrition**.

- protein supple... Search term
- hospital nutrition Search term
- parenteral nutriti... Search term
- enteral nutrition Search term
- personalized nut... Search term
- 3d printed food Search term
- nutritional shake Search term
- therapeutic diet Search term

United States Past 3 months Web Search

Suggest search terms

What's your area of interest?

if 3d printed protein food is best positioned for hospital nutrition

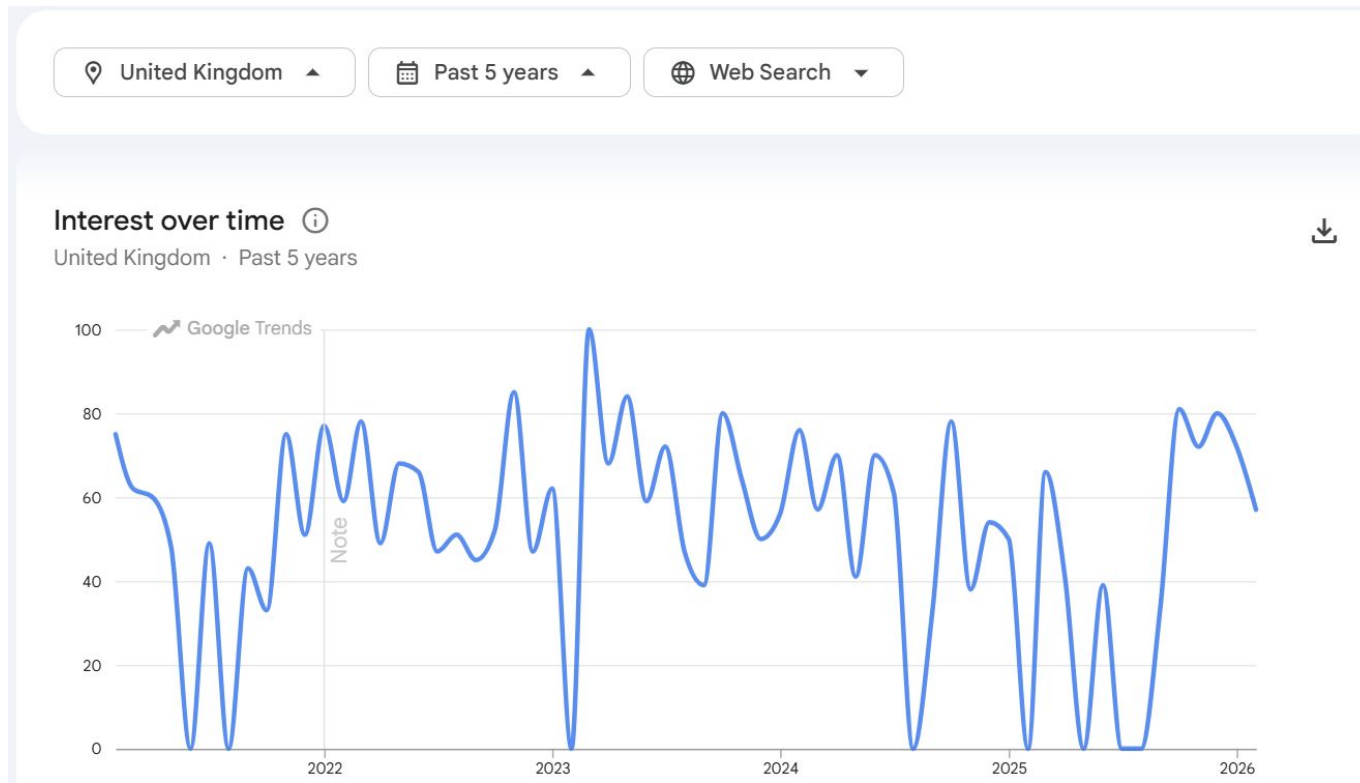
Find search terms

Other ideas to explore

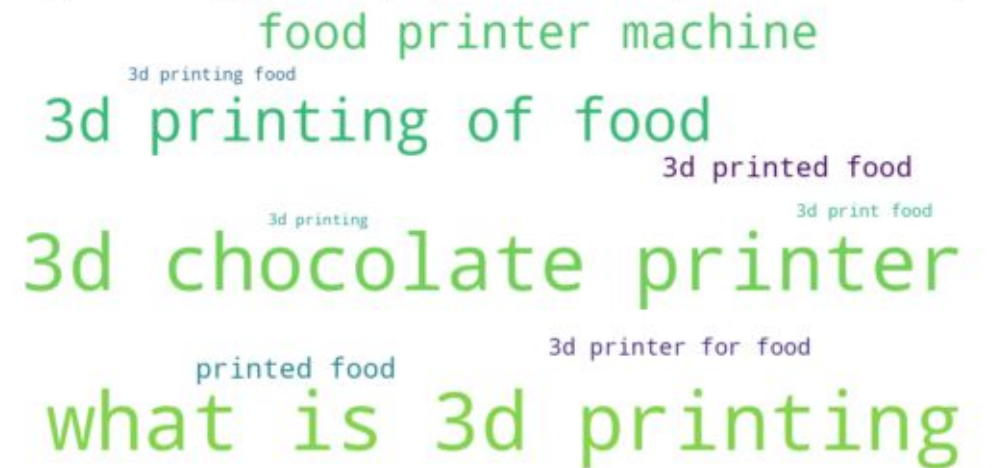
3D printed food vs personalized nutrition

Applications of 3D printing in healthcare

# Demand Proxy: Google Trends – “protein supplement”

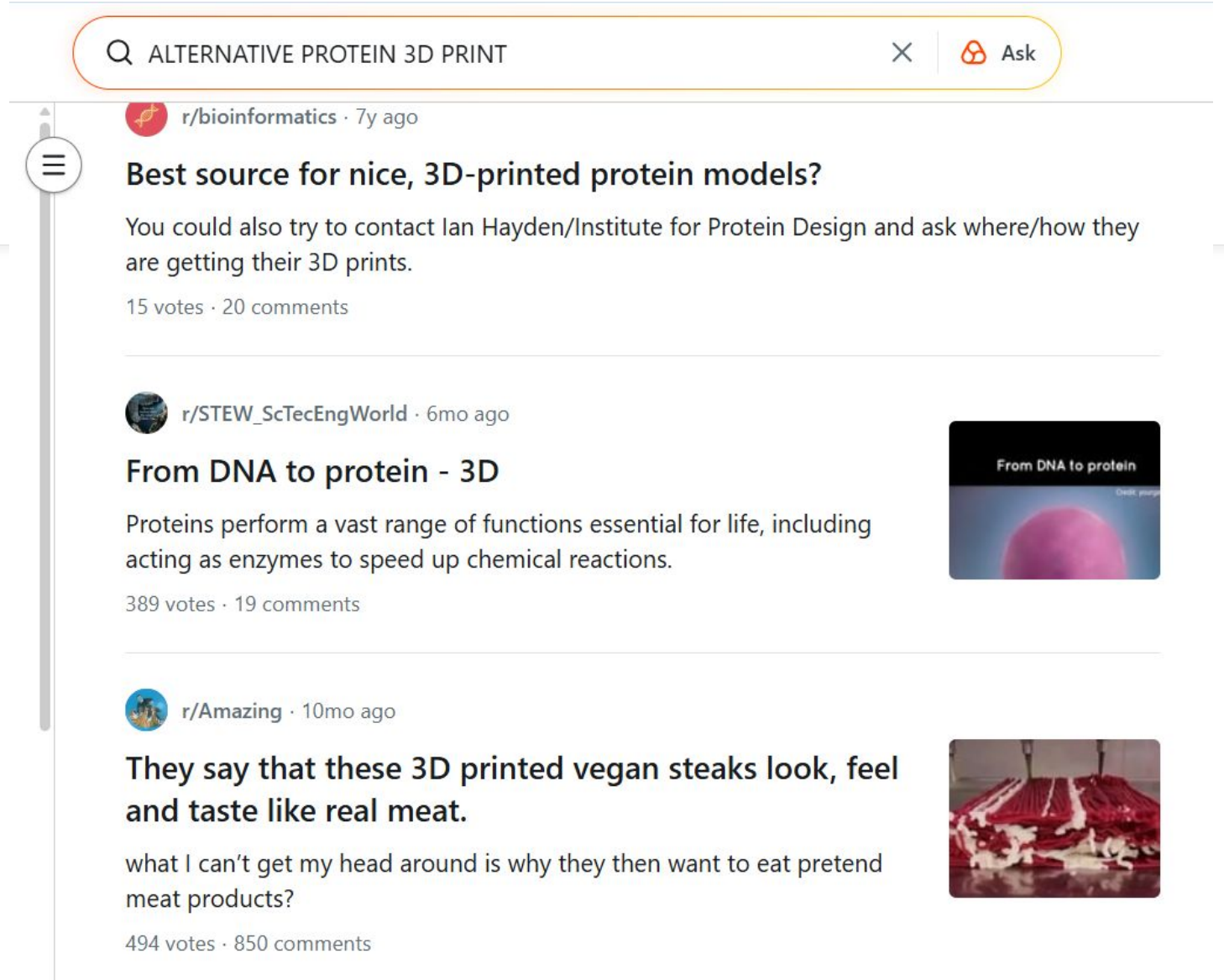


Top 10 Rising Queries (UK) – Word Cloud (Size = Growth %)



# Behavioural Signals

- some discussion reflects skepticism rather than enthusiasm
- the category may feel novel, confusing, or unnecessary
- search interest does not show clear user intent
- rollout judgement needs more than surface visibility



Q ALTERNATIVE PROTEIN 3D PRINT X Ask

r/bioinformatics · 7y ago

### Best source for nice, 3D-printed protein models?

You could also try to contact Ian Hayden/Institute for Protein Design and ask where/how they are getting their 3D prints.

15 votes · 20 comments


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r/STEW\_ScTecEngWorld · 6mo ago

### From DNA to protein - 3D

Proteins perform a vast range of functions essential for life, including acting as enzymes to speed up chemical reactions.

389 votes · 19 comments




r/Amazing · 10mo ago

### They say that these 3D printed vegan steaks look, feel and taste like real meat.

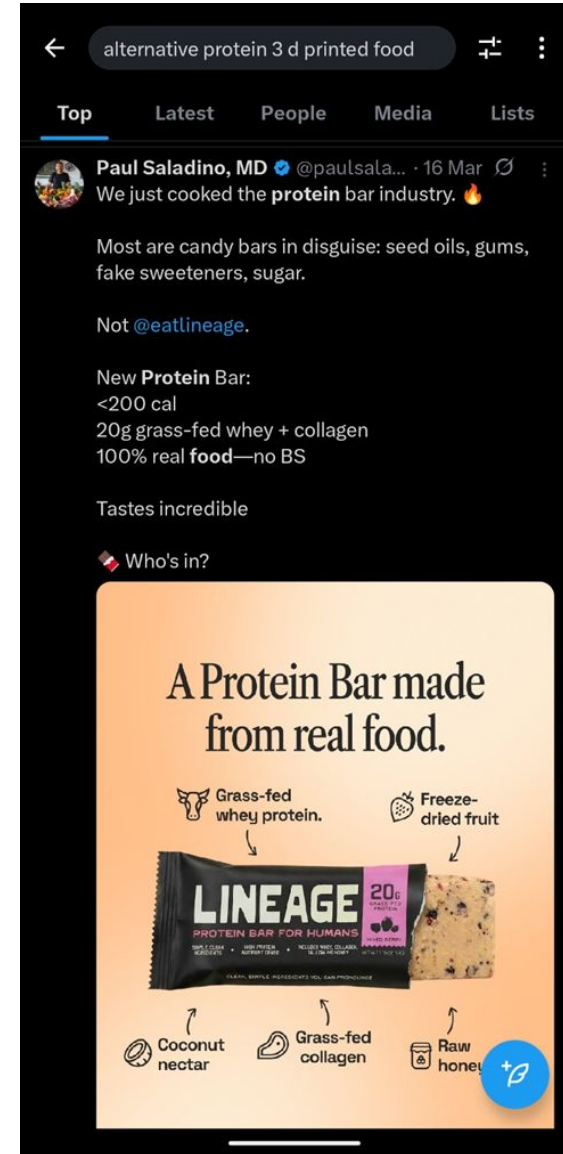
what I can't get my head around is why they then want to eat pretend meat products?

494 votes · 850 comments



# Behavioural Counter Signals

- Interest in protein is strong
- But some category voices reject foods seen as over-processed
- “Real food” framing may clash with 3D-printed protein concepts
- This creates a tension between **functional promise** and **perceived naturalness**



## Step 3

### Compare and surface tension

Identify alignment, conflict, and the dominant constraint.

#### Example tension

- Search attention exists.
- Public discourse is noisy; results mix curiosity, confusion, and scepticism.
- “Real food” framing suggests some users may distrust engineered protein formats.
- Hospital procurement remains slow, regulated, and budget-sensitive.

## Step 4

### Produce a conditional claim

#### A good claim includes

- One supporting convergence
- One explicit uncertainty
- A confidence rating

3D-printed protein food may have a plausible route in targeted clinical nutrition, where texture adaptation and personalised dosing matter. Confidence drops for wider hospital rollout, as procurement friction and naturalness concerns weaken adoption.

Confidence: medium - low.

## Step 5

### Compare one alternative

#### Ask

Would specialist medical nutrition or sports recovery show stronger signal convergence than general hospital catering?

Testing even one alternative stops the first plausible idea from becoming the default direction.

**A direction is stronger when it survives comparison.**

## What GenAI changes in STEM enterprise education

- AI makes opportunity narratives easier to produce
- It does not reduce uncertainty about rollout
- Teaching should reward justified direction, not polished plausibility

**The key skill is not generating opportunities. It is judging which opportunity deserves commitment.**