TRANSFORM
TO SUSTAIN THE FUTURE

cerealdocks
GROUP

Research & Innovation Methodology and Examples

Business has only two basic functions:
Marketing and Innovation.

Peter Ferdinand Drucker

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1 Design and management of innovation initiatives

Mission and scope of innovation initiatives

1. Developing **new business by identifying new areas of creation**
2. Contributing to significant **improvements in internal processes,** surpassing mere continuous improvement.

Aspects of documentation and work management

DOCUMENTATION AND RECORDING OF RESULTS

Several tools are utilized to document specific project-related activities:

- **Report** (in Word, PDF or Power Point format) stored within the SharePoint platform
- **Laboratory notebooks,** subdivided by subject area (e.g. research calls, specific projects...)

IT WORK MANAGEMENT

To optimize the management of project-specific activities, the IT tool 'ClickUp' was adopted —a digital platform facilitating the planning and monitoring of members' activities. It provides an overview of project progress through the creation and assignment of tasks (e.g., experimental activities, formulation, receptive activities, etc.).

Mission and scope of innovation initiatives

- Developing **new business** by identifying **new areas for value creation.**
- We aim to significantly **improve internal processes,** surpassing mere continuous improvement efforts

As such, the Research & Innovation Department is responsible for developing **new processes/products** and **substantially enhancing** existing ones. These activities encompass **marketing research and market analysis** preceding scientific and technical design. Additionally, we spearhead notably innovative **digital transformation** projects within this realm.

They may require the possible support of the Research and Innovation Department, but they are **outside the scope,** the industrialization of innovative projects, and the continuous improvement of processes and products.

To adequately address these latest projects and offer necessary support, an **internal ticketing system** was established. This system allows interested parties to request support from the Research & Innovation Department.

1. Sourcing of ideas

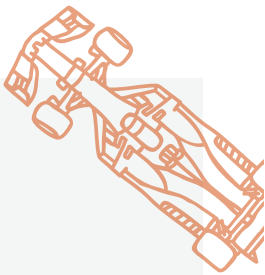
New business and innovative project ideas, regardless of their origin, must align with the six innovation areas outlined in the strategic plan:

- **Circular and functional ingredients for feed**
- **Innovative proteins**
- **Gluten-free ingredients and functional flours**
- **Healthy nutrition and Enjoyable eating**
- **By-product utilization**
- **Nutraceuticals and superfoods**

2. Alignment of the innovation hypothesis in the context

In corporate innovation, aligning innovation hypotheses with the reference context is crucial, considering all potential synergies across logistic, agronomic, industrial, commercial, etc., levels.

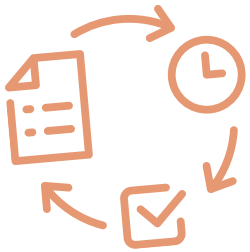
Despite possessing winning characteristics, innovations not correctly contextualized risk yielding results lower than expected.



For instance, in Formula One: the introduction of KERS (Kinetic Energy Recovery Systems).

When Kinetic Energy Recovery Systems (KERS) were first introduced in Formula One, it was considered a winning technological innovation on paper. However, the most innovative cars didn't always secure victories. This was due to the fact that the performance of Formula One cars represents a complex system. The ultimate performance isn't solely derived from the innovation in a single component but rather from how the entirety integrates into the overall architecture, encompassing technical aspects (such as effects on engine power, efficiency, aerodynamics, etc.) and human factors (including the driver's adaptation to the novelty and the team's support in the garage).

3.Project design and flow monitoring



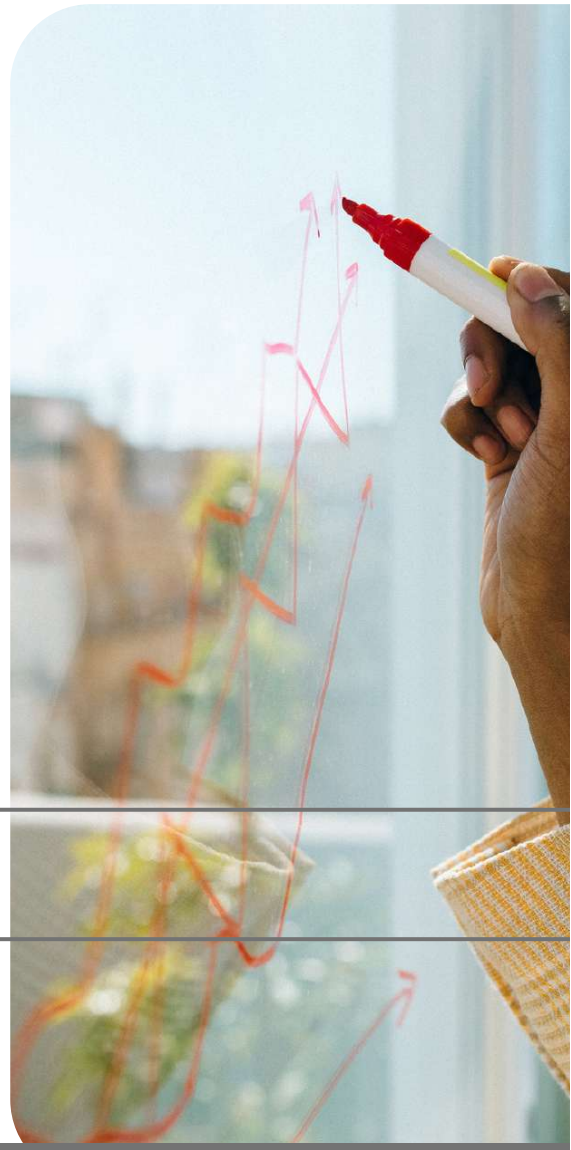
Given the high level of innovation and subsequent uncertainty in projects, a hybrid methodology (combining agile and traditional methods) is adopted. This approach aims to account for uncertainty and gradually diminish it until reaching the industrialization phase (TRL9).

4.Need/market assessment and technical evaluation

Two **assessment ladders** work in tandem to provide a comprehensive view of the project's technological advancement and its development status for the intended market or internal users. Within the context of need/market assessment, the ladder outlines the progressive stages of project development necessary to ensure readiness for the target market or user.

For **market evaluation ladder,** it is divided in nine steps:

- STEP 1: Trend analysis and BM definition
- STEP 2: Preliminary economic and market analysis
- STEP 3: Set up user research (needs, pain points and BM design)
- STEP 4: User research and testing (needs, pain points, BM)
- STEP 5: BM iteration and market pre-validation
- STEP 6: MVP (Minimum Viable Products) realization
- STAGE 7: MVP testing with possible customers
- STEP 8: First sale or pre-sale
- STEP 9: Scale-up plan



In the **technical assessment,** we employ the **TRL ladder,** which stands for Technical Readiness Level, categorized into nine stages of advancement:

- TRL 1: Observation of basic principles, through research and bibliography
- TRL 2: Formulation of the technology concept
- TRL 3: Experimental testing of the technology
- TRL 4: Validation of the technology in a laboratory environment
- TRL 5: Validation of the technology in an (industrially) relevant environment
- TRL 6: Technology demonstration in (industrially) relevant environment
- TRL 7: Testing of the prototype in an operational environment
- TRL 8: Complete and qualified system
- TRL 9: Real system tested in operational environment (competitive production, commercialisation)

TRL 1 initiates with fundamental research, followed by concept development and initial laboratory validation spanning TRL 2 to TRL 4. Subsequently, TRL 5 to TRL 8 encompass technology validation and demonstration, spanning both industrial and operational levels. The scale reaches its pinnacle at TRL 9, signifying the development of a completed, fully functional system tested in a real-world environment.

5.Validation of Transition, Progress, Modifications, and Closure of Projects

Given the hybrid methodology (agile + traditional), projects have the potential to regress along the scales if they fail to meet the criteria for advancing to the subsequent levels.

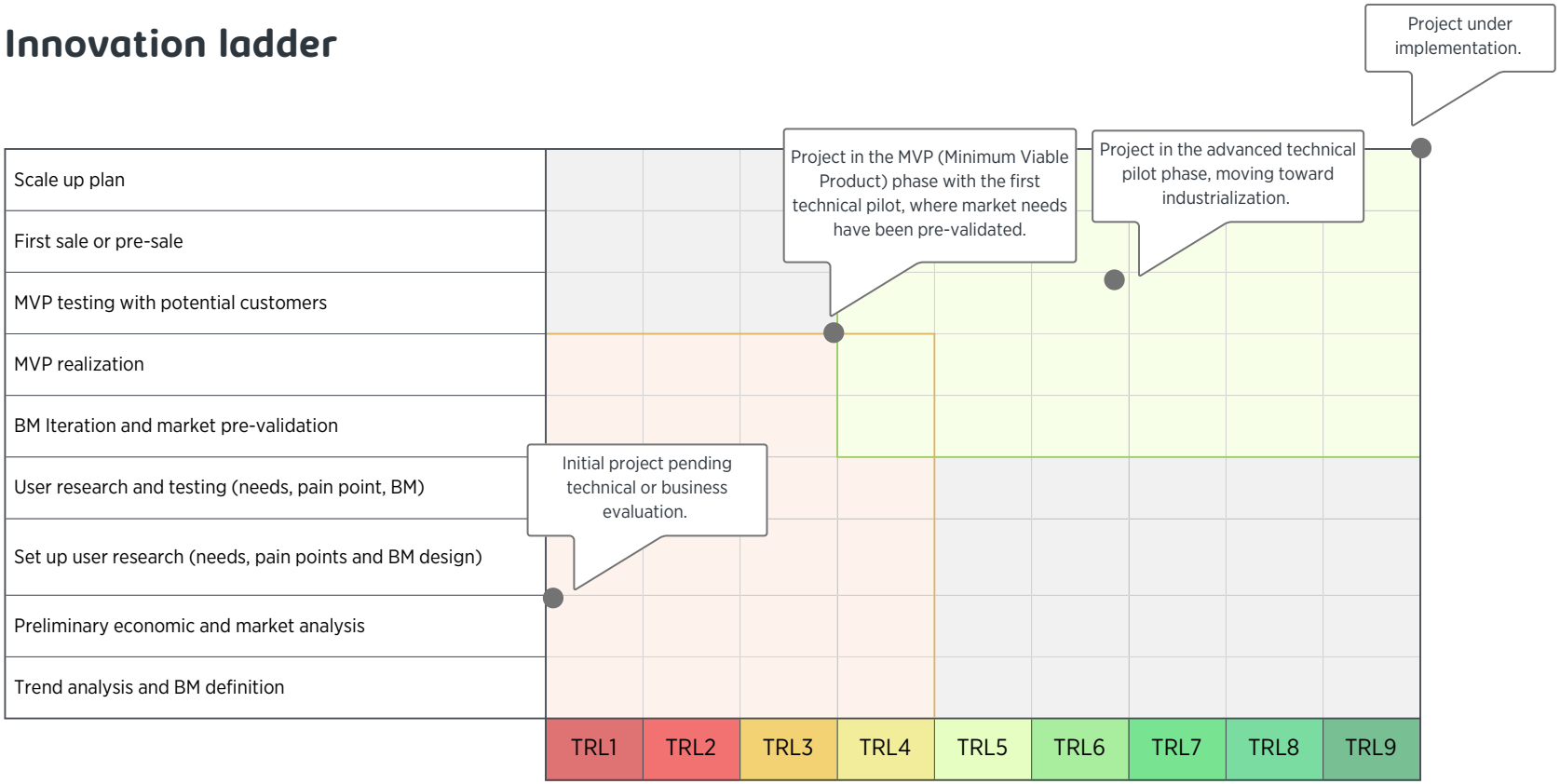
Specific scenarios may occur at each juncture:

- When underlying technical or market assumptions are verified:
  1. The project progresses to the next stages.

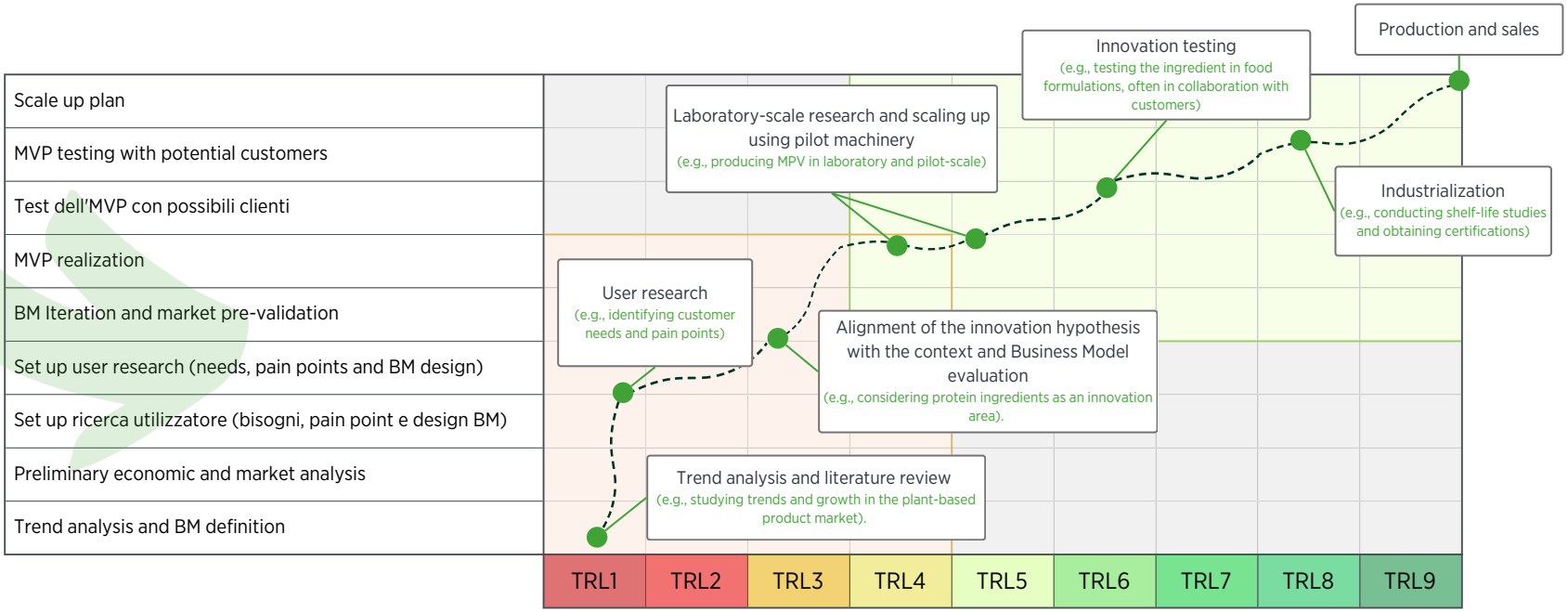
- When underlying technical or market assumptions are not verified:
  1. The project undergoes review in technical or market aspects, or both, potentially regressing along one or both scales.
  2. If strategic, economic, or technical conditions are absent, the project may terminate as the prerequisites for continuation into subsequent phases are not met.

Projects overseen by the Research & Innovation department advance up to **TRL 6,** undergoing **'MVP testing with potential customers'** before **transitioning to other departments or entities** within the Group. Subsequently, they integrate into the implementation phase.

Innovation ladder



The birth and development of an innovation project, **such as the creation of a new protein ingredient,** undergoes the following stages to assess its impact on the market and technological advancement:



2 Attracting and developing skills and resources

Attracting and developing **expertise** is key to implementing the **statement**

“developing new opportunities for Cereal Docks by identifying novel avenues for value creation and contributing to significant improvements in internal processes, moving beyond continuous enhancements”

Only the right attractiveness can support the **vision**

"to become a European leader in the areas of food and nutrition for humans and animals, sustainability, and the circular economy."

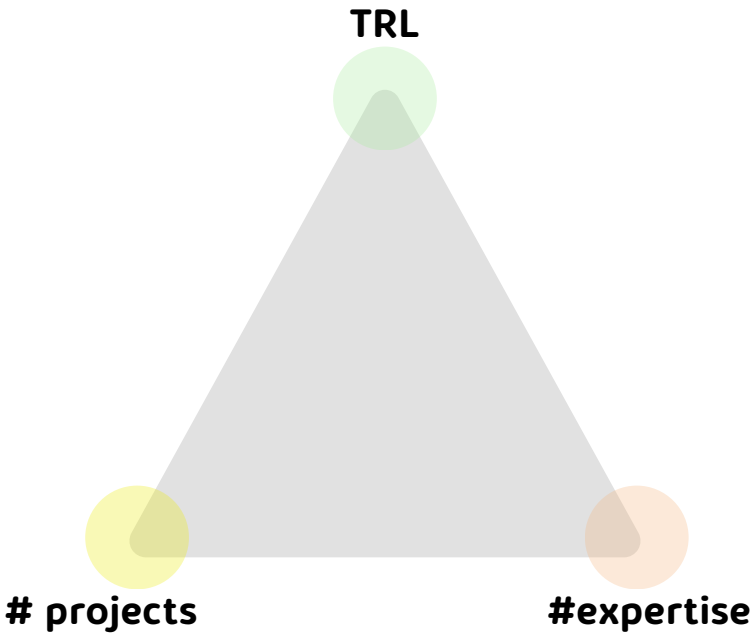
Research & Innovation activities are primarily people-based, as they heavily rely on human capital-intensive activities.

Monitoring available human resources becomes crucial. In the triangle illustrated in the figure, each vertex corresponds to:

1. the number of projects;
2. the breakdown of projects based on TRLscale (Technical Readiness Level);
3. the level of expertise required.

Observations reveal that:

1. More **advanced projects** (with higher TRLs) demand **greater resources.**
2. The **higher the expertise** demanded for a project, the more significant the **impact on personnel;**
3. It's crucial **crucial to either limit the number of active projects or expand the staff count.**



3 How it works

Innovative proteins

Let's explore an example that illustrates how to integrate the aforementioned elements to innovate: the creation of new protein ingredients.

Trend analysis

Recent discourse highlights a surge in plant-based products, predominantly containing or exclusively composed of plant-based proteins. Initial insights into this trend can be gleaned from various sources:

- the mass media
- Internet
- trade magazines
- business newspapers

These sources collectively depict the growth of this sector.

This growth is supported by numerical data: milk-alternative beverages displayed robust and consistent growth, boasting a CAGR of +11%, escalating from $2 billion in 2019 to $2.8 billion in 2022.

(Retrieved from: https://gfi.org/marketresearch/#category-sales.)

Similarly, retail sales of plant-based meat in the US exhibited a CAGR of +13% between 2019 and 2022, surging from $1 billion to $1.4 billion, despite a post-COVID plateau and subsequent inflation.

Additionally, bakery products incorporating plant-based proteins in the US soared from $26 million in 2019 to $35 million in 2022.

This burgeoning trend has led to increased consumption of plant-based protein ingredients like soya and yellow pea proteins. However, these proteins possess weaknesses prompting the market's exploration for alternatives.

For instance, soy protein's 'green' aftertaste is unsuitable for some recipes. Moreover, soy protein faces stiff competition in a crowded market, leading to low-margin returns due to non-certified supply chains.

Yellow pea protein, although perceived as more sustainable and allergen-free, exhibits inferior technical-functional properties compared to soy, notably a pronounced 'beany taste,' limiting its applications.

Market demand for innovative solutions is fueled by sustainability, traceability, allergenicity, and technological functionality concerns regarding plant proteins.

This prompts the hypothesis for Cereal Docks: **developing new plant-based protein ingredients** to meet current and future market needs.

User research

protilla
PLANT BASED PROTEINS

o gather primary data from individuals involved in food product development, the digital project Protilla—created as a prototype for plant protein research—was launched in 2020.

Protilla, known as 'the protein database,' functions as an online tool aiding the selection of suitable protein ingredients for precise product formulations. It leverages a database of technical-functional properties (e.g., color, water-holding capacity, foam production) shared in exchange for user data (name, company role, etc.).

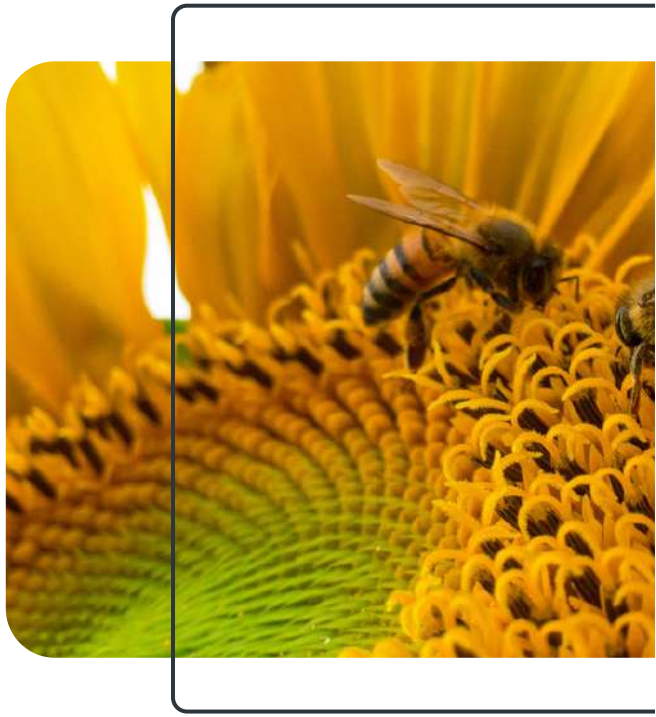
Pre-totype

Method for testing and evaluating the value of an idea for the customer/user before and independently of its technical feasibility (which is tested with a prototype).

Alignment of the Innovation Hypothesis with the Reference Context

User research results align with the Group's strengths, highlighting sunflower protein ingredients as an innovative area.
Sunflowers stand out for:

- their resilience to climate change
- biodiversity support
- low water usage
- adaptability to various soils
- integration into the Italian supply chain
- consumer familiarity
- absence of notable allergies.



Laboratory-Scale Research and Scale-Up using Pilot Machines

The transition from product concept to practical realization involves solving technical challenges across various TRLs (Technical Readiness Levels) from 1 (bibliographic research) to 9 (industrialization). In the food industry, the ingredient's properties are intertwined with its production process.

In the food industry, the properties of an ingredient are closely tied to the production process employed. For instance, for a product to be labeled 'Italian,' it necessitates the raw material's Italian origin, or at least that the processing occurs within a specific geographical area — as seen in the case of coffee. Similarly, an 'organic' product must adhere to specific standards.

Why the scale-up?

Scale-up is essential because a laboratory-developed process differs significantly from an industrial-scale process. This phase tests and refines processes at different scales, leading to final industrial production (TRL 9).

5.Innovation Testing

Innovation undergoes testing and evaluation, refining the product further. In the case of food ingredients, evaluations encompass multiple formulations representing the food companies' usage scenarios.

To ensure the innovation's effectiveness and potential for further refinement, **testing and evaluation** are essential. In the case of a **food ingredient,** this evaluation involves testing it in various **formulations**—those that will be utilized by the ingredient's users, such as food companies.

To consistently provide our customers with innovative solutions that meet increasingly higher standards, meticulous and comprehensive evaluations occur in our **kitchen lab.** Here, ingredients undergo testing, and formulations across diverse food categories are prepared.

These evaluations encompass aspects evaluated by both **end consumer** (e.g., reduced weight loss during cooking) and **industrial user** (e.g., potential reduction in the use of colorings)

6. Industrialization

Industrialisation of the product/process is carried out after the TRL8 level. In the case of a food product, this involves, for example, studying shelf-life and obtaining any necessary certifications.

Industrialisation is delegated to the relevant structures and departments, with the support of the Research & Innovation Department.

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