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Food & Fiction

Science Fiction in the Innovation Process of the Food Industry

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- Creation of selected illustrations (as marked) using ChatGPT.

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1. Management Summary

The German food industry generates € 232 billion in annual turnover and employs over 650,000 people, yet its innovation performance lags significantly behind other sectors. R&D intensity is only 0.22-0.27 per cent of output - lower than automobiles (5.5 per cent) or pharmaceuticals (13.1 per cent) - with active innovators decreasing from 9 per cent in 2010 to 7 per cent in 2023 (ZEW, 2025).

Climate risks, supply disruptions, and changing consumer preferences require innovation, but data-driven tools often deliver only incremental gains. This document introduces **Food & Fiction**, a systematic method that uses science fiction to strengthen three innovation phases: **foresight**, **technology analysis**, and **idea generation**. Based on research and structured frameworks, it offers food processing and service managers a cost-effective, high-impact tool for unconventional thinking.

Science fiction proves no mere fantasy - it is an established innovation catalyst. Defined as a narrative exploration of plausible technological novums (Steinmüller, 2010), it inspired Clarke's geostationary satellites (1945) and Gibson's cyberspace (1984). Integrated into a six-phase innovation model (Jacobsen, 2025a), the focus falls on Phases 1-3 where food firms often struggle.

Foresight (Phase 1) utilises science fiction's ability to identify weak signals and wild cards - early hints of disruption such as pandemics or nanotech escapes. A four-step process collects excerpts, applies industry guidelines (e.g., climate-resilient sourcing), cross-validates media, and codes themes for backcasting, transforming vague risks into R&D prototypes like insect-flour rations (Pätsch et al., 2015).

Technology analysis (Phase 2) builds inventories of fictional technologies. Four steps - investigate media, identify concepts, evaluate organisational fit, document datasheets - uncover emerging opportunities like CO_2 protein sheets. Transferability ratings (from 1:1 direct to 1:1,000 inspirational) map feasibility, from yeast fermentation to home meat printers or neural synthesis sparks.

Idea generation (Phase 3) employs five methods that blend science fiction with TRIZ, analogies, and storytelling (Dirlewanger, 2016; Lem, 1977). Matrices remix elements and operators substitute or invert premises - such as air-moisture irrigation. Workshops generate 20-30 concepts, which are then narrowed to five prototypes, breaking groupthink by introducing external variety (Zoccarato et al., 2024).

Applied to 90 curated excerpts (1928-2025), **Food & Fiction** develops longevity scenarios for Europe's 2048-2072 climate crises: **products** such as *Concentro* bitter paste, *YeastBeef* fermenters, and *Surta* cacti; **services** such as *Thought Farms*, *Nutri-Matic* tongue implants, and *Vocalex* voice kitchens. Trial-validated, these target ageing markets amid scarcity.

Implementation begins simply and expands quickly. Dedicate one weekly session to mining science fiction excerpts, compile 10-item technology inventories, and run hybrid workshops using 2-3 methods to generate 20 concepts - then select the top 5 briefs for prototyping. This low-risk approach (focused on books and discussion) delivers high returns through innovative idea collection. Managers gain an external perspective on emerging threats, while product developers receive concrete, novel briefs ready for R&D.

Food & Fiction transforms an overlooked cultural resource into a strategic advantage for a crucial sector. In VUCA conditions, why rely on yesterday's data when science fiction offers tomorrow’s ideas?

2. Introduction

The food processing industry plays an important role in economies like Germany, where it provides significant employment and makes a substantial contribution to manufacturing output - around 5 to 6 per cent of total industrial turnover and over 650,000 jobs (BMWE, 2026). However, its innovation performance lags behind other sectors and the national average.

Research and Development (R&D) intensity in the European Union food sector remains low at 0.02 to 0.04 per cent of Gross Domestic Product (2022), significantly below manufacturing sectors such as automobiles (0.16 per cent) or pharmaceuticals (0.09 per cent). In Germany, food companies invested €335 million in R&D in 2021 (2nd in Europe), but the share of firms with ongoing R&D dropped from 9 per cent in 2010 to 6 per cent in 2024, while the overall economy remained at 13 per cent (Eurostat BERD, 2026). Recent data show innovation spending of € 2.5 billion for 2025, down 5 per cent from the previous year (ZEW, 2011 and ZEW, 2026).

These trends highlight a need for the German and European food industry to revitalise innovation. The sector faces changing consumer demands, supply risks, and technological disruptions, but traditional tools such as data analytics often produce incremental improvements rather than breakthroughs (Schimpf et al., 2026). New methods are required to enhance strategic foresight and idea generation. Science fiction addresses this gap by providing alternative visions of food systems that challenge assumptions and inspire unconventional ideas. By drawing on these narratives, companies can broaden their innovation horizons beyond conventional methods, transforming fictional imagination into a practical tool for gaining a competitive advantage.

2.1 Purpose and Scope

This document presents the concept of “Food & Fiction” as a practical and systematic approach to **utilising science fiction to drive innovation in food** processing and food service. The main aim is to show how science fiction can enhance three stages of the innovation process: foresight, technology analysis, and especially idea generation.

In foresight, science fiction broadens the range of plausible future scenarios beyond current understanding. In technology analysis, it helps evaluate potential applications and impacts of emerging technologies before they become a reality. The main focus of this paper, however, is on **idea generation**, where descriptions from (science) fiction can be directly transformed into concepts for new food products, services, processes, or business models. By providing executives and product developers with a method, the document aims to establish science fiction as a tool in innovation management, helping companies generate more creative options within a competitive and uncertain environment.

The scope is method-focused. It develops a framework and demonstrates it through examples sourced from a curated collection of **90 food-related descriptions from science fiction** media across different sub-genres and periods. No primary data from workshops, surveys, or case studies are included; the emphasis is on theoretical foundations, with practical illustrations.

The main targets are food processing companies that develop and produce food products and food service companies, such as restaurants, catering operations, and delivery platforms. Other parts of the food supply chain - like agriculture, fisheries, distribution, logistics, consumption habits, and recycling - are acknowledged when they influence or intersect with processing and service innovations.

The paper focuses on textual science fiction because of its narrative depth, which allows it to explore socio-technical systems in detail. Films are included when they offer complementary visual depictions of food futures or processes that improve understanding.

Thematically, the scope covers food-related visions across classic hard science fiction, cyberpunk, cli-fi (climate fiction), dystopias, utopias, and space opera, capturing diverse perspectives on production and consumption. A methods-oriented subsection outlines a **concrete approach**: selecting excerpts, thematic coding, translating into innovation briefs, and conducting feasibility checks against organisation competencies and market realities.

The paper follows a logical structure comprising five main content sections, as well as the management summary, and references:

- The **Introduction** (this chapter) sets the context.
- **"Science Fiction & Innovation"** defines key terms, provides historical developments, and presents examples from other industries.
- **"Impact of Science Fiction on the Innovation Process"** presents the contributions to foresight, technology analysis, and idea generation, including the methodological framework.
- **"Food & Fiction Scenarios"** applies the approach to generate ideas, grouped into food products and food service concepts.
- The **Conclusion** synthesises insights, discusses limitations, and suggests potential next steps.

For practitioners in food processing and service companies, the document offers value: a straightforward method with examples that can be tested in R&D meetings or strategy sessions, appealing to managers seeking differentiation and product developers looking for fresh inspiration. By connecting cultural imagination with structured innovation work, "Food & Fiction" potentially fills a gap in the food industry's toolkit, transforming an underused resource into a strategic advantage.

2.2 Relevance

Companies that develop and market food products today work in an environment often described as **VUCA**: volatile, uncertain, complex and ambiguous (Ansoff, 1975). Market shifts, supply chain disruptions, regulatory changes and changing consumer preferences make it more difficult to plan than based on stable cause-and-effect relationships and linear trends.

However, managers still want to identify important developments early to gain time for innovation projects. Many current approaches applied today are based on logic established in the 1960s and 1970s: They focus on news media and professional sources such as specialist journals, conferences, and expert networks (Naisbitt, 1984). These sources are helpful as they provide information about ongoing discussions and visible changes. But they reflect what is already public and discussed, often **supporting only small, incremental improvements rather than real breakthroughs**.

In contrast, cultural products such as novels, films, comics, and even games seldom play a systematic role in innovation. However, these artefacts often explore images of the future well before they reach mainstream media or expert communities. Research shows that some **developments first appeared in literary works** and were later taken up and disseminated by trend research institutes (Schwarz & Hofmann, 2019).

Fictional stories are not exact forecasts, but they serve as thought experiments about how science, technology, and society might come together. For the food sector, this means stories that imagine what people eat when resources are scarce, how food systems function in automated economies, or what rules shape shared meals in unequal societies. Such narratives can generate ideas that would not emerge from

reading the news or analysing customer data. Food processing and service companies, which need to innovate under tight margins and strict regulations, can use these narratives to **challenge current thinking and explore new paths**.

At the same time, **innovation management has become increasingly data-driven** over the past few decades. Tools such as big data analytics and AI-based decision support improve efficiency and reduce risk when developing new products or processes (Schimpf et al., 2026). These methods are well-suited for finding patterns in past data and testing small variations. However, they have limitations: Ideas that do not fit existing categories often look implausible in data models and are filtered out early. This is a problem especially in fast-changing industries such as food, where surprises from new materials, eating habits, or production technologies can lead to significant opportunities - or threats.

Science fiction provides a counterbalance here. As fiction with a scientific core, it steps outside current data limits to imagine surprising, desirable, or dystopian futures (Dunyach, 2002). It encourages teams to question fundamental assumptions about what customers will accept, which technologies work, or how production should be organised. Studies show it can reduce cognitive biases, support different perspectives and make crazy ideas seem worth exploring (Burnam-Fink, 2015).

In practice, companies have begun adopting this approach. Executives like Eliot Peper argue that science fiction does not predict the future, but reframes how leaders perceive today's reality and tomorrow's options. Peper states that it helps managers to question their assumptions (Peper, 2017).

For food processing companies, this means imagining new ingredients from lab-grown cells or AI-optimised recipes. For food service businesses, it could mean developing new dining concepts influenced by scarcity or abundance. By **integrating science fiction into foresight, technology analysis, and idea generation**, companies can combine data analysis with creative storytelling.

In conclusion, this chapter demonstrates that the food processing industry plays a vital role in employment and production, though its level of innovation remains weaker than that of other sectors. It introduces "Food & Fiction" as a practical method that uses science fiction to enhance foresight and generate new ideas, particularly for food processing and food service companies.

This leads to the next chapter, "Science Fiction & Innovation," which provides a definition of science fiction and the innovation process, then illustrates how they work together in the food industry.

3. Science Fiction and Innovation

The food industry's low rates of innovation emphasise the need for novel approaches to anticipate future changes and generate ideas. Science fiction provides such an approach: its structured imagination of future technologies and societies can enhance innovation processes. This chapter first defines science fiction and innovation, then illustrates their links through research and examples from companies. It establishes the basis for demonstrating how "Food & Fiction" supports foresight, technology analysis, and idea generation.

3.1 What is Science Fiction?

Science fiction is fiction that deliberately mixes storytelling with scientific ideas, technology, and the sense of possible futures. Simple definitions describe it as "a touch of science in your fiction" (Dunyach, 2002, p. 5), but its real strength lies in how it uses a **central new element - called a "novum"** to create believable alternative worlds (Suvin, 1979). This novum could be a new machine, a biological discovery, or a social system.

Suvin then follows their logic: **"What if this existed? What would people do? How would society change?"** This distinguishes science fiction from fantasy, where magic breaks natural laws. In science fiction, everything must feel **scientifically plausible**, even if it remains speculative (Moskowitz, 1974).

For food industry managers, this structured "what if" thinking functions like a **test lab for ideas**. A story about eating scents or lab-grown meat is not just entertainment - it illustrates how new food technologies could develop in daily life.

Science fiction covers many media: books, films, comics, radio plays, and audiobooks, all considered science fiction if they follow the aforementioned logic (Steinmüller, 2010). The genre is diverse. It includes space operas featuring heroic explorers, dark dystopias about societal collapse, time-travel stories, and climate fiction. What unites them is a focus on **plausible science and technology as drivers of change**, often carrying hopes or fears about progress (GDI, 2005).

Science fiction acts as a **mental workshop**. Authors set starting conditions - for example, a world where food is personalised by DNA - and explore the consequences through characters and plot. This reflects how companies use scenarios or prototypes: test a hypothesis, observe the effects, and learn from the outcomes (Steinmüller, 2010).

Science fiction has its roots in much **older ideas,** such as utopias and visions of the future. Plato's *Republic* imagined a perfect state created through rational planning. Lucian of Samosata described space flight in 165 AD to explain astronomy. Thomas More's *Utopia* (1516) built an ideal society as a critique of the present.

During the Renaissance and Enlightenment, technology entered stories. Cyrano de Bergerac sent travellers to the moon and sun, where moon people eat smells and use poems as money. Louis Sébastien Mercier's *L'An 2440* (1771) broke new ground by setting a utopia in future Paris, not in a distant land, and introducing time as the key dimension of change. The Industrial Revolution accelerated this shift. Early utopias such as Campanella's *City of the Sun* or Bacon's *New Atlantis* featured flying machines. Writers started to dream of futures without disease or manual labour (GDI, 2005).

Jules Verne is often credited as a pioneer of modern science fiction. His stories emphasised engineering and scientific methods over adventure, demonstrating how machines turn the impossible into reality. Mary

Shelley's *Frankenstein* (1818) added warnings: science can produce monsters if left unchecked. German romantics like E.T.A. Hoffmann introduced robots and eccentric scientists.

Hugo Gernsback launched *Amazing Stories* in 1926, coining the term "science fiction" and helping to divide the genre. American pulp magazines featured escapist space operas - heroes fighting aliens. Europe preferred dystopias, examining world wars and dictatorships as cautionary tales. Both responded to similar crises: One escaped to the stars, while the other warned of collapse (GDI, 2005). Throughout this period, science fiction mirrors its era's spirit: Industrial hopes became space dreams and then ecological fears.

Science fiction still fights a negative image as cheap paperbacks or poor writing (Dirlewanger, 2016). Themes of war, conquest, and heroes do not aid this perception, nor does their placement alongside horror stories in bookshops. However, **serious authors prove otherwise**. Nobel laureate José Saramago's *The Stone Raft* (1986) simulates Iberia's geological split. Frank Schätzing's *The Swarm* (2004) is ecological science fiction without the label. David Foster Wallace sets *Infinite Jest* (1996) in a near future. Even economist Paul Krugman considers himself a devoted fan, using it to think through systems (Dirlewanger, 2016).

For innovation in food processing or services, science fiction's value is practical. **It does not predict - it simulates**. A story involving scent-nutrition or plastic-eating bugs challenges the reader to reconsider ingredients, supply chains, or ethics. Unlike data trends, it frees imagination while staying logical. This makes it ideal for the low-innovation food sector: a tool to **generate ideas that data alone misses** (Schimpf et al., 2026).

3.2 What is Innovation?

Innovation involves creating new or significantly improved products, processes, services, or business models that reach potential users or are adopted internally (OECD/Eurostat, 2024). This definition requires both a **novel idea and its practical application in the real world**. Pure inventions or untested technologies do not qualify as innovations until they provide value in a specific context, measured against existing standards or solutions.

For food processing and service companies, this could mean a new preservation method that extends shelf life without chemicals, or a delivery service that personalises meals based on real-time health data. Innovations must work in the organisation's market, not just exist as concepts.

To make this practical, **innovation is** best regarded as **a process** rather than a single event. Real innovation work rarely follows a straight line - it loops, jumps, and restarts - but a structured model helps map activities and tools, such as applying science fiction. This paper uses a **generic six-phase framework** (Jacobsen, 2025a) that combines classic models from Myers and Marquis (1969) with modern design thinking for complex problems (Jobst and Meinel, 2014). Each phase of the innovation management framework has clear goals and connects to where "Food & Fiction" can add value, especially in foresight, technology analysis, and idea generation:

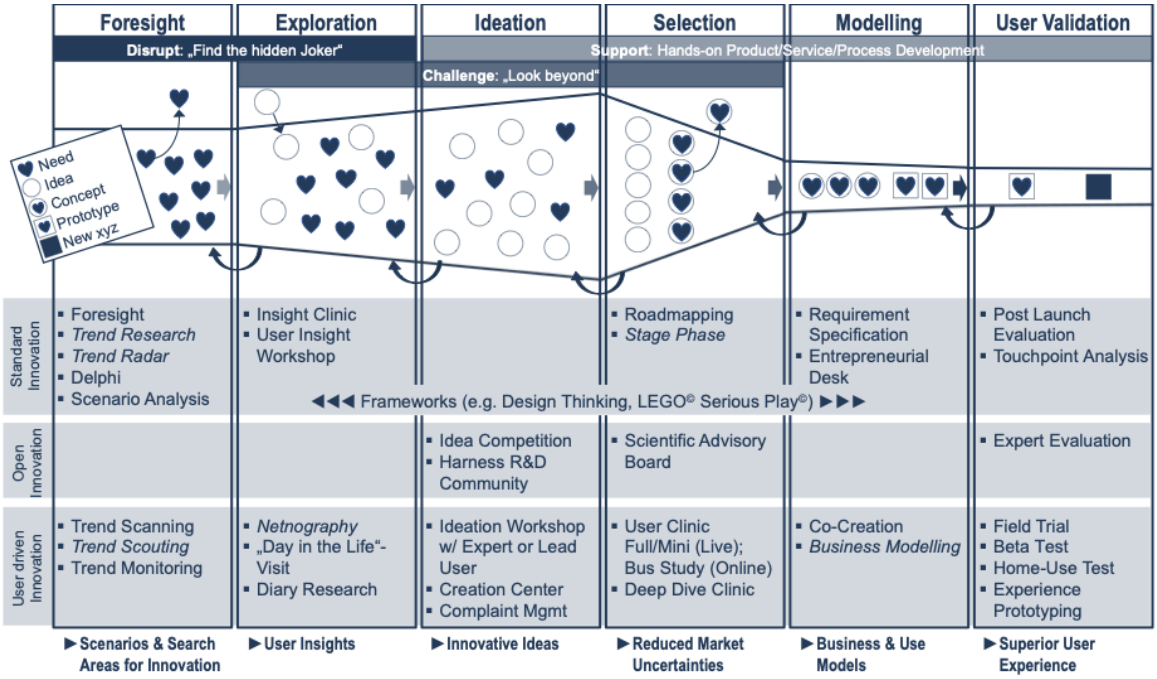

Fig. 1 - Innovation Management Framework (based on: Jacobsen, 2025a)

- **Phase 1: Foresight** scans for future changes. The aim is to identify trends, needs, and potential developments that could influence markets or technologies in the years ahead (Rohrbeck et al., 2015). While no single definition exists, it involves systematic future intelligence to inform today's decisions. Tools include trend radars, scouting, and monitoring. In a rapidly changing world of climate shifts and consumer demands, food companies use this to identify needs, such as sustainable proteins, before they become mainstream news (Jacobsen, 2025a). Science fiction plays a role here by providing **"what if" scenarios** beyond mere data trends.

- **Phase 2: Exploration** divides into technology analysis and market analysis (Myers & Marquis, 1969; Cooper, 1983). Technology analysis examines emerging opportunities such as biotech ingredients and AI automation. Market analysis explores user behaviours and needs through workshops, diary studies, or "day in the life" observations (Jacobsen, 2025a). This phase transforms **foresight signals into insights**, distinguishing technological feasibility from customer fit. For food services, it might involve testing whether personalised nutrition appeals to busy professionals.

- **Phase 3: Ideation** involves generating and screening ideas. This is the creative core, where diverse solutions fill the solution space without early judgment (von Hippel, 1976). Methods such as brainstorming, idea competitions, or lead-user workshops generate options. Food processors might brainstorm algae-based snacks at this stage. **Science fiction excels in this phase**, offering wild yet logical concepts from fictional worlds.

- **Phase 4: Selection** refines ideas into validated concepts. Promising ones are developed with simple prototypes and tested. Roadmaps and phase gates (Cooper, 1983) decide **which ideas progress**. Prototyping, essential in design thinking, identifies flaws early (Jacobsen, 2024). Tools such as advisory boards or user clinics assist. In food, this validates if a new packaging idea complies with regulations.

- **Phase 5: Modelling** assesses business viability. Using tools such as the Business Model Canvas (Osterwalder & Pigneur, 2011), teams model revenue streams, cost structures, customer segments, and value propositions to determine economic feasibility. For a food processing company, this might mean testing if a new plant-based protein bar - inspired by science fiction nutrient pastes - can

compete on price while reaching health-conscious millennials through direct-to-consumer channels. Only concepts that create shared value for customers and the organisation progress to prototyping.

- **Phase 6: User Validation** involves building and testing prototypes with users to ensure a superior experience and scalability. The chosen concept becomes tangible through physical or digital prototypes and is tested in context for usability and delight. In food service, this might include trial runs of an AI-personalised meal kit service in which users scan their wearable data for instant recipe adjustments, to assess whether it saves time and improves satisfaction under real kitchen conditions. This final validation confirms the innovation works at scale before full launch.

This model acknowledges non-linearity with phases that iterate or run in parallel. It **strategically places "Food & Fiction"**: Science fiction narratives drive foresight (alternative futures), exploration (technology/user implications), and ideation (novel concepts). Unlike data-driven tools, it **sparks imagination** through logical extrapolation. This process perspective makes **innovation manageable** for managers and developers. It highlights where science fiction fits in, transforming stories into structured inputs for real products such as nutrient sensors or ethical lab-grown meats.

3.3 The Interface of Science Fiction and Innovation

Science fiction and innovation connect in practice. Stories that imagine technological and social changes can spark real-world creativity and problem-solving. Research shows **science fiction** not only inspires innovators but also **actively stretches their imagination** to explore options beyond current constraints (Darbellay, 2022).

Empirical work confirms this by examining how people use science-fiction prototypes in practice. They report greater openness to experimentation and better ability to link fictional ideas to tangible projects (Zoccarato et al., 2024). Other studies reinforce the point. Science fiction fosters comfort with real-world science while training the mind to entertain the seemingly impossible (Black et al., 2018). For food companies caught in a low-innovation cycle, this means **science fiction offers more than mere entertainment**. It systematically challenges routine thinking, helping managers and developers generate ideas that data trends or brainstorming alone might overlook.

This link works because **science fiction reflects key innovation phases**. Its "what if" logic - introducing a novum and exploring its consequences - aligns with foresight (=envisioning futures), exploration (=testing technology/user compatibility), and ideation (=generating diverse concepts). Unlike pure fantasy, science fiction remains rooted in scientific plausibility, making fictional food systems like nutrient inhalers or automated harvest drones seem like testable hypotheses. Practitioners use it to **break mental blocks**: a story about eating lab-grown organs could lead a team to question why meat alternatives stick to plant-based mimics, pushing toward truly novel textures or nutritional profiles.

Real-world examples demonstrate this across various industries, illustrating how science fiction moves from workshops to corporate strategies. In urban planning, it has influenced smart city concepts by simulating traffic flows decades ahead (Pätsch et al., 2015). Manufacturing companies used it to rethink production lines, integrating human-robot teams inspired by cyberpunk factories (Le Blanc et al., 2022). Niche fields such as tourism envisioned experiential travel shaped by AI companions (Yeoman et al., 2022).

Companies actively apply this approach as well. Telecom giants such as France Telecom and Deutsche Telekom conducted science fiction workshops to prototype future networks or transforming narrative scenarios into network architectures (Douani et al., 2023; Reventlow et al., 2017). SAP (Rosenberg, 2019) employed it for enterprise software visions, and Qualcomm (Michaud, 2017) for mobile interfaces - all demonstrating how stories can speed up concept validation. The European Space Agency

(ESA) examined science fiction for mission technology, identifying similarities between fictional warp drives and real propulsion research (Battrick & Warmbein, 2002). These examples share a pattern: Organisations select relevant excerpts, relate them to specific challenges, and then prototype.

In the food industry, the logic translates directly but is underutilised. Imagine a food processor facing protein shortages: A scene of scent-based nutrition (like Cyrano de Bergerac's moon diet) sparks an inhalable meal supplement line. Or a service chain reads about AI-optimised kitchens in near-future tales, leading to robotic prep stations that reduce waste by 30 per cent. **Science fiction does not predict, but it reframes**. It surfaces **blind spots** such as ethical sourcing in scarcity worlds or personalised eating in surveillance states, providing input for phases one to three of the innovation management framework.

The pattern remains because **science fiction fills gaps in standard tools**. Data is good at recognising patterns but misses outliers; brainstorming risks groupthink. Fiction brings in diversity - utopian abundance, dystopian rationing - forcing teams to justify their choices. Empirical validation, such as Zoccarato's (2024), shows that it increases openness to real-world science. Companies succeed when they systematise this approach by curating texts, coding themes (such as technology, behaviour, ethics), and briefly describing prototypes.

This chapter defined science fiction as a structured imagination of plausible futures and described innovation as a six-phase process. It then demonstrated their strong connection through research and examples from various industries and companies. These foundations make clear why science fiction - and "Food & Fiction" - can help food companies generate better ideas and improve planning.

The next chapter, "Impact of Science Fiction on the Innovation Process," looks in more detail at how science fiction supports the three key phases: Foresight, technology analysis and idea generation, with methods and examples for food processing and services.

4. Impact of Science Fiction on the Innovation Process

The previous chapter defined science fiction and innovation processes and demonstrated their practical connections through examples from other industries. This chapter looks at how science fiction helps in three main phases of the innovation model: Foresight, technology analysis, and idea generation. It provides methods and steps that food processing and service companies can use, with examples relevant to their work. This links broad concepts with practical tools for daily innovation.

4.1 Science Fiction Supporting Foresight

In the innovation management framework described in the previous chapter, foresight is Phase 1 and the initial step after strategic planning. Its goal is to **look into the future**, find possible developments, and evaluate them within the organisation's context (Rohrbeck et al., 2015). Science fiction can support this, as it shows many ideas that once seemed crazy but later became normal, such as solar panels or space travel (Steinmüller, 2010).

Foresight primarily uses traditional tools such as trend radars and scenario planning, but these often rely on current data. **Science fiction explores alternative futures** in which new technologies meet social change. Sometimes fiction comes close to real technological paths (Michaud, 2020), although not all past visions align with today's world (Bassett et al., 2013). Where it is the case, these stories serve as material for **backcasting** - beginning from a future scenario and working backwards to identify actions today.

Science fiction is strong at weak signals and wild cards. Weak signals are early, small hints of larger changes; wild cards are rare events with significant impact, like pandemics or technological breakthroughs. Science fiction authors explore these because they make good drama. Imagine self-replicating nanobots from a lab, sudden extended lifespan, or empty oil fields. This tests what society might do well before it happens (Pfirrmann & Schmeink, 2023). Studies show that **science fiction authors predict feasible technology better than some experts** (Wise, 1974).

Science fiction beats "presentism" in foresight by simply extending the present into the future. It combines technology with culture: 1950s stories envisioned home nuclear power inspired by Cold War hopes; today, climate fiction depicts food shortages (Pfirrmann & Schmeink, 2023). Science fiction is not just a reflection of trends; it influences future thinking. It functions as a mind-opener, a trend indicator, a source of ideas, and even a utopian sketch (Zaidi, 2019).

A **systematic approach** to applying science fiction in the foresight phase involves four steps (Pätsch et al., 2015):

- **Collect data**: Gather science fiction excerpts about future food.
- **Set guidelines**: Make rules based on food challenges (e.g., scarcity, new production).
- **Compare across media**: Check books, films, et cetera, for consistent ideas.
- **Prepare data**: Document themes for later use.

For a food processing operation facing climate risks, the process can look like this:

Collect data - Gather science fiction excerpts showing future food solutions. From cli-fi novels, collect descriptions of ration bars made from insects or algae, printed nutrient meals, or vertical farm proteins when traditional crops fail.

Set guidelines - Establish clear rules or questions based on your organisation's actual challenges. For climate risks, guidelines might be:

- "How does this food solve sustainable sourcing when imports collapse?"
- "Can production scale fast without land or water?"
- "Does it meet nutrition needs for stressed populations?"
- "What ethics or regulations arise?"

These guidelines act like filters, they focus the analysis on what matters to the organisation, not just cool sci-fi ideas.

Compare across media - Check if the same ideas appear in films, games, or comics. Find printed meals in movies that match the book's ration bars, confirming the concept appears consistently.

Code and document - Review excerpts and organise them by themes, with clear notes for traceability. Codes might look like:

- Theme: Scarcity response, like "Ration bars use 80 per cent insect protein for density"
- Theme: Production shift, like "3D printers make meals from base pastes in two minutes"
- Theme: Social impact, like "Bars distributed via drones to avoid panic buying"

Write short summaries explaining each code: Source, key novum, business implication. This creates a clean database that others can check later.

Backcasting then asks: "What ingredients or processes build this today?" The organisation tests insect flour prototypes on a small scale, checking supply chains, taste, regulations, and costs. This turns vague climate concerns into tangible R&D projects with clear next steps.

Challenges still exist, and recent events highlight them. The Covid-19 crisis demonstrated how normal forecasts can overlook surprises - yet firms familiar with dystopian stories were often better prepared (Schimpf & Lauster, 2021). Relying on past science fiction risks referencing outdated politics, such as the 1960s space race, which do not reflect today's world (Pfirrmann & Schmeink, 2023). Additionally, fiction often sacrifices strict rigour for good storytelling, whereas foresight requires clear, open steps (Steinmüller, 2010). The solution is simple: Select **recent texts from diverse sources**, code themes carefully, and consistently verify findings against real data.

In practice, this **approach is simple to initiate**. Choose science fiction from the past 20 years that deals with scarcity or abundance. Identify key concepts such as printed food or vertical farms. Relate them to drivers like climate change or advances in biotech. Then, develop scenarios and apply backcasting: "What R&D do we need today to achieve this future?" It is cost-effective with high impact - ideal for managers seeking a clear vision without costly consultants.

4.2 Science Fiction Supporting Technology Analysis

In the innovation management framework, technology analysis occurs in Phase 2 (Exploration), where organisations analyse technological opportunities following foresight. The goal is to **identify new technologies** relevant to the field and their commercial potential. Science fiction supports this phase because it describes technologies years before they exist - sometimes accurately, sometimes as inspiration (Bassett et al., 2013).

Science fiction influences technological development in two main ways. First, rare **direct matches** occur: Arthur C. Clarke described communication satellites in 1945, years before their actual launch. Jules Verne detailed a submarine similar to real designs. Second, and much more common, **general inspiration** takes place. Stories about flip phones or tablet computers motivate engineers to create similar devices, even if details differ. This indirect effect is harder to measure but drives most progress (Bassett et al., 2013).

The method involves creating an **inventory of science fiction technologies** - collecting, sorting, and selecting those relevant to the field (Battrick & Warmbein, 2002). This approach is effective for early-stage ideas where traditional technology roadmaps lack data (Alexander, 2009). The European Space Agency (ESA) used this method in 2002, analysing books, films, and drawings for space technologies such as propulsion, robotics, and launch systems (Battrick & Warmbein, 2002).

The **systematic approach** follows four steps (Battrick & Warmbein, 2002):

- **Explore science fiction** - Browse books, films, and comics from the past and present. For food processing, this includes stories about lab-grown meat, printed meals, or automated kitchens.
- **Identify technologies** - List specific concepts. From novels: "harvesters growing protein sheets from air CO_2". From films: "food synthesisers mixing nutrients on demand".
- **Evaluate and select** - Filter based on relevance for the organisation. Criteria include: "Does this fit food production? Is it realistic long-term? Does it match current projects?" Food companies might choose "CO_2 protein sheets" because climate-neutral protein addresses sourcing risks.
- **Document results** - Prepare datasheets detailing description, source, maturity level (pure idea, lab stage, near-real), risks, and benefits. Share as technical dossiers with teams and partners.

This approach includes even **"failed" ideas**, such as moon bases from 1950s science fiction stories that never materialised. Unrealistic concepts still offer value by illustrating what failed (bad physics, high costs) or what may succeed later (new materials). For food organisations, a story about failed nutrient inhalers shows why taste is obviously more important than efficiency.

Food service companies analysing automation follow the same process:

- **Step 1** identifies robotic kitchens from cyberpunk novels.
- **Step 2** lists specific features: "arms chopping 100 vegetables per minute from voice commands".
- **Step 3** evaluates: "Can current robots achieve 50 per cent functionality? What are the cost versus labour savings?"
- **Step 4** produces a datasheet covering power needs, hygiene requirements and customer reaction risks.

Small-scale robot stations can then be tested before larger investments.

Science fiction goes beyond traditional analyses of technology. Traditional data-driven roadmaps track existing technologies (Schimpf et al., 2026), such as larger machines and faster production lines. Science fiction also identifies **emerging fields** - printed organs, suggesting food printers, and nanobots enabling quality control. It also reveals **potential consequences**: Stories where cheap lab-grown meat destroys farms highlight possible social backlash. This science fiction technology analysis considers: "If this technology succeeds, what problems will arise?" Traditional analysis often overlooks **human, ethical, or market effects**.

However, **challenges** exist. Many concepts remain pure fantasy; flying cars fail due to physics. However, modern science fiction aligns more closely with reality because authors follow current research (Raitt, 2002). Careful interpretation avoids cherry-picking only favourable examples.

Real cases demonstrate **effectiveness**. The ESA inventory produced robotics concepts now used in Mars rovers. Clarke's description of satellites led to the development of geostationary orbits. In food processing, an inventory of "molecular gastronomy machines" from the 1980s cyberpunk era directly connects to today's 3D food printers, a real technology born of fictional ideas.

Food companies can apply this method practically. The process begins with a focused (one-day) review of recent science fiction novels, films, or short stories, specifically seeking descriptions of production technologies relevant to food processing or services. From this, teams develop a simple 10-item inventory that captures the most promising ideas.

Each item then gets a quick rating based on three key questions:

- "What is the current laboratory/development stage of similar technology?"
- "Can it scale to industrial production levels?"
- "Does it fit existing regulatory frameworks, or what approvals are needed?"

These rated inventories serve as the input for R&D workshops or strategy sessions. Teams then discuss: "Which of these could we prototype in six months? What partners or tests do we need?"

This approach directly links early foresight signals to specific R&D projects. It provides high learning potential at low cost with no costly consultants, just books and discussion. Science fiction does not replace patents, laboratory equipment, or engineering. Instead, it serves as an **early warning system**, **expanding the radar** to identify breakthrough technologies before competitors or traditional roadmaps detect them.

4.3 Science Fiction Supporting Idea Generation

In the innovation management framework, idea generation corresponds to Phase 3 (Ideation), which provides **creative inspiration** and **develops solution** concepts. This phase aims to explore diverse options to address needs identified in earlier phases. **Science fiction naturally supports idea generation** because it offers a vast collection of imaginative yet logically developed concepts for products, services and systems. Resources like the *Historical Dictionary of Science Fiction* (https://sfdictionary.com/) document thousands of fictional inventions, serving as ready inspiration for innovation teams.

Science fiction ideas often anticipate real solutions, although **complete 1:1 matches remain rare**. Many current technologies - from mobile devices to lab-grown materials - mirror earlier fictional descriptions, even when adapted or simplified (Michaud, 2022). The true value lies in volume and variety: **Science fiction generates far more concepts than actually materialise**, covering partial solutions, failed experiments, and radical alternatives. Here, text-based narratives are especially effective because their open-ended nature allows different readers to visualise diverse implementations, unlike the fixed imagery of films (Schwarz, 2015).

Several structured methods integrate science fiction into established creativity techniques. These approaches vary from direct analogy searches to narrative construction and systematic recombination:

Science fiction analogies identify fictional solutions that address specific problems, then scale their transferability from direct copies (1:1) to loose inspirations (1:1000) (Dirlewanger, 2016). In food processing, a story about molecular nutrient assemblers might suggest compact protein synthesisers.

Science fiction storytelling develops ideas by writing short future scenarios that include specific elements - fictional technologies, extreme conditions, or personas (Dirlewanger, 2016). A story about drought-resistant printed rations naturally leads to shelf-stable emergency meal kits.

Semantic intuition randomly recombines science fiction terms in matrices to generate new concepts (Dirlewanger, 2016). Pairing "insect protein vats" with "drone delivery pods" might create automated urban farming networks.

TRIZ and science fiction apply Altshuller's principles (2007) to fictional artefacts, ignoring technical feasibility. A narrative force field for crop growth might become a non-invasive yield accelerator.

Lem's operators (1977) utilise substitution (replacing elements), inversion (flipping functions), and teleology clash (conflicts of opposing purposes). Substituting water with atmospheric moisture inverts traditional irrigation; clashing human taste preferences with machine efficiency results in flavoured nutrient pastes.

These methods **produce commercial and scientific results** traceable to science fiction origins (Dirlewanger, 2016). Food companies benefit especially because the genre often explores scarcity, synthetic nutrition, and automated production - challenges that align with current sustainability and efficiency pressures.

The process generally follows **clear steps**:

- **First**, teams define the **problem space** from the foresight and exploration phases (e.g., "protein alternatives for climate-stressed supply chains").
- **Secondly**, relevant **science fiction excerpts** are gathered from inventories or databases.
- **Third**, creativity methods **produce variants**: Analogies enable direct transfers, storytelling explores contexts, and matrices develop hybrids.
- **Fourth**, initial evaluation screens **feasibility**, market fit, and alignment with organisation capabilities. Promising concepts advance to Phase 4 (Selection) for prototyping.

Science fiction excels precisely where traditional brainstorming often falls short. Standard sessions frequently produce groupthink and recycling of familiar ideas, while science fiction introduces genuinely external diversity, from utopian visions of abundance to dystopian rationing systems and alien biochemistries. This diversity directly challenges the food industry's usual incremental approach, where new ideas rarely break free from existing categories (meat “simply” becomes a plant-based mimic). Concepts like nutrient inhalers or waste-to-calorie converters force teams to confront radical premises: Why does taste always take precedence over pure efficiency? What new eating rituals might scarcity make necessary?

Real-world impact is seen in documented cases. Science fiction flip communicators inspired mobile phones, personal communicators became smartphones, food replicators now connect to 3D printing and precision fermentation (Bülow et al., 2014). However, as indicated before, **partial realisations matter most**: A story's "atmospheric protein harvester" becomes today's CO_2-to-protein research, even if scaled down.

Challenges include science fiction's frequent over-optimism - flying cars remaining purely fictional - and occasional mismatches in context, such as 1960s space rations that ignore modern allergies or dietary requirements. Recent works better reflect modern realities in biotech, AI, and climate issues. Being methodologically clear helps reduce bias through practical steps: Drawing from multiple sources, documenting analytical reasoning, and validating concepts against current technical feasibility.

For food processing companies, this means scanning cli-fi for scarcity solutions or cyberpunk for automation. A workshop might produce: insect-vat proteins (analogy), drone-fed algae farms (matrix), taste-inverted nutrient gels (approach by Lem). These inform prototyping directly, transforming imagination into candidates for further exploration.

Implementation proves straightforward and integrates into normal workflows. Teams dedicate one focused session to science fiction mining, apply two to three creativity methods from the list above,

generate 20-30 concepts, and then narrow down to the five most promising ones for further development. This approach delivers high volume at low cost and complements data-driven innovation tools effectively. Science fiction provides the creative raw material, and structured methods ensure the ideas remain relevant to business needs. The result is an **idea pipeline** less anchored in past patterns and better prepared for disruptive futures.

This chapter showed how science fiction supports three key innovation phases - foresight, technology analysis, and idea generation - with methods and examples for food processing and food service organisations. It showed that science fiction is a practical tool that complements conventional data methods to foster better future thinking and generate new ideas.

The next chapter, "Food Motives," applies these methods to science fiction examples, presenting sample case ideas for new food products and service concepts.

5. Food & Fiction Scenarios

Based on extensive research, 90 food-related excerpts from science fiction media (77 from literature, 13 from film) were identified, spanning the period from 1657 to 2015. The excerpts were entered into a trend radar platform (Jacobsen, 2025b), with each excerpt labelled with the following information:

- **Position in the food value chain** - Agriculture, Product Development, Quality Management, Packaging, Logistics, HoReCa, and Consumption.
- **Original publishing period** - pre-1900, then in 20-year intervals (1901-1920, 1921-1940, etc).
- **Type of future** as viewed from the current (year 2026) perspective - Possible: “What could happen”, Plausible: “What could credibly happen”, Probable: "What will or is likely to happen”, and Preferable: “What we want to happen”.
- **State of realisation** from the current (year 2026) perspective: “Idea”, “In Progress”, “Realised”.

The data was entered into the FIBRES platform (http://www.fibresonline.com) and is summarised in the following figure:

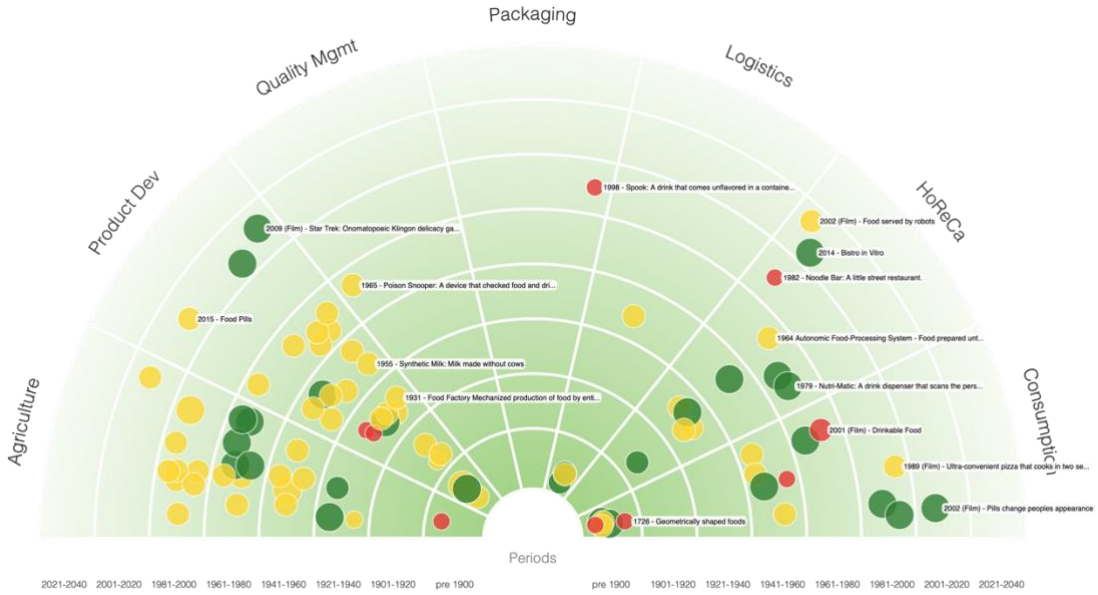

Fig. 2 - Food-related Excerpts from Science Fiction Media in the Trend Radar (Own illustration)

As a sample, 70 excerpts covering the period from 1928 to 2025 were selected. This data was analysed to **generate ideas** for a sample case (see chapter 4.3). In the sample case, ideas **for novel, convenient, affordable, and healthy food products and service concepts that support the desire for longevity** should be developed. Ideally, it should not focus on “mainstream” ideas but primarily explore the “edges”. The scenarios should be suitable for the European market.

The analysis should utilise two methods as outlined in Chapter 4.3, specifically:

- **Science fiction storytelling** develops ideas by creating short future scenarios that include specific elements, such as fictional technologies, extreme conditions, or personas. The total number was limited to three each for (A) food products and (B) food service concepts.
- **Science fiction analogies,** which identify fictional solutions that address specific problems and assess their transferability from exact copies (1:1) to broad inspirations (1:1,000).

The results are presented in the following chapters.

5.1 Food Product Scenarios addressing Longevity

5.1.1 Bitter Paste for Endless Years

Fig. 3 - Concerto Longevity Paste product illustration created using ChatGPT

In 2048 Helsinki, Dr. Eeva Korhonen wakes up in her small 25-square-metre flat. She is 98 years old, a former climate scientist focused on extending her life. Finland's long winter nights seem endless, and climate change has made food scarce. Most people receive only 1,200 calories a day from imports. Traditional dishes like salmon soup are now luxury items for the young or those with political connections.

Eeva squeezes out a small dab of *Concentro-Plus* from a wall-dispenser. This bitter paste comes from a 1928 science fiction idea for synthetic emergency food. A tiny amount provides her with 5,000 carefully balanced calories derived from lab-made proteins, slow-release carbohydrates from algae, and special nutrients that help her live longer. These nutrients copy natural anti-ageing substances like resveratrol and help protect the ends of her cell DNA, called telomeres. The paste melts instantly in her mouth and enters her bloodstream directly. This is easy on her stomach.

A smart patch on her skin monitors 47 body signals and orders more paste from big algae factories in Rotterdam. These factories use waste CO_2 and require no farmland. Each day's supply costs just € 0.47, partly financed by the EU. Eeva puts on warm clothes and cycles 12 km to her laboratory through -22°C winds. The paste makes her cells work three times better than those of others her age. She climbs stairs faster than people in their twenties.

In emergencies, *Concentro* excels. A brain-chip suppresses hunger hormones, allowing her to fast for long periods. This process clears out old cell components through a process called autophagy. During blizzards or heatwaves that disrupt food supply chains, a 100-gram tube keeps her mind sharp for 21 days. The bitterness stops people from eating too much.

Eeva tests new versions with brain scans that adjust the taste based on mood - energy boosts for thinkers or calming blends for those who cannot sleep. Nutrition credits (€ 9,000 annually) keep it affordable. It is 99.7 per cent digestible and fits small city flats. Her studies show it adds 28 healthy years to life. Finland leads Europe in longevity while farms struggle.

5.1.2 Fungi Steak for 150 Years

Fig. 3 - Yeast Beef Fermenter product illustration created using ChatGPT

In 2052 Berlin, Lars Müller hosts a Sunday dinner. He is 105 years old, once an engineer, now designing homes for old people. His 3D-printed co-living unit houses 18 centenarians from Warsaw, Lisbon, and Malmö. Europe's grasslands have mostly disappeared due to 3.7°C global warming. Rules now limit beef eating by 92 per cent. Most meat comes from factories, not farms.

Lars uses his countertop machine, a € 198 fermenter supported by the EU Green New Deal for poor elders. It grows *YeastBeef Prime* from a 1950 science fiction idea. This is not meat from cows but from special fungi, or yeast. The machine feeds the yeast with biotin (a vitamin), pteroylglutamic acid (folic acid), and 17 man-made protein building blocks called amino acids. After 48 hours, it makes a seared ribeye steak that tastes exactly like expensive dry-aged Angus beef. It has a crispy brown crust from a cooking reaction called Maillard and fat lines that melt in your mouth. For dessert, filtered yeast turns into creamy *panna cotta*, just like cow's milk.

The machine uses only tap water and nitrogen from the air. It makes 2 kg of food weekly. This provides complete proteins that prevent muscle wasting in old age (sarcopenia). It also turns on sirtuins, proteins in cells that help people live to 150 years old. Each 400 g serving costs € 1.87, has no cholesterol, and emits 87 per cent fewer greenhouse gases than cows.

An exciting detail: The yeast improves itself using CRISPR gene technology. It tastes saliva samples from each guest to make personal food. Athletes get crispy steak. People with weak bones get soft meat.

Those who forget things get special plant compounds for brain health. Smart forks check chewing and improve the next batch.

Outside, 47 million Mediterranean refugees face hunger by 2050. Inside, Lars's guests enjoy this food without guilt. During Berlin's 72-hour power cut, the machine's backup cells also generate electricity. Lars shows *Yeast Collective*: Brain chips share taste memories from all of Europe, making better and better meat. Nutrition vouchers make it cheap. Omega-3 fats protect hearts. It fits small city kitchens. Lars proves it keeps muscles strong 35 years longer. Berlin leads Europe in new protein, while old farms become history museums.

5.1.3 Desert Cactus for 100-Year Strength

Fig. 4 - Hydroponic Surta Cactus product illustration created using ChatGPT

In 2062 Valencia, Dr. Sofia Navarro grows food in her basement. She is 94 years old and studies farming. Valencia's old farmland, once full of oranges, now lies dry and ruined by climate change. Sofia uses *Surta Prime* plants in special slat houses underground. These originate from science fiction stories about minerals from Mercury that grow extremely fast. In her 42 m^2 room, octopus-like cacti double in size every hour. They live in trays of liquid minerals from custom nutrient lockers. Workers harvest them into nutrient-rich paste. This feeds Spain's 19 million elderly citizens. Sofia's basement produces 180 kg each week. One kilogram costs just € 0.67.

The plants have genes from Venusian amphibians, enabling them grow well at 55°C. This adaptation is perfect for southern Europe's heat domes, where summer temperatures remain above 45°C for weeks. In 2059, a severe drought hit Iberia, causing normal crops to perish. However, *Surta* continued to feed 2.7 million people in Valencia. Sofia's big idea is that brain connections allow plants feel what human needs. If someone is iron-deficient, the plant produces more iron. Low vitamin B12? It adds that too. Now, people wear headbands that communicate with the plants.

Home users purchase *SurtaPods* for € 189. These fit into wardrobes and produce 1 kg of paste weekly. No large fields are required. The EU's Common Agricultural Policy (CAP) covers most costs through subsidies. The paste contains all amino acids, the building blocks of protein, helping to keep muscles strong. It is suitable for city farming in small spaces.

Sofia tests her blood often. Her health numbers match a healthy 40-year-old. Strong heart, good sugar levels, sharp memory. She says *Surta* adds 31 years of good health even as climate change destroys normal farms. Sofia bikes 8 km daily to check community *Surta* houses. Neighbours share pods. During power cuts, plants use solar skin to keep growing.

In extreme heat or floods, *Surta* survives underground, protected from the weather. Sofia teaches schools how to cultivate it. Children learn about food security. Her work has positioned Valencia as Europe's underground farming leader. Spain demonstrates that older people can remain strong without large-scale agriculture. *Surta* transforms hunger into resilience.

5.2 Food Service Concept Scenarios addressing Longevity

5.2.1 Trees That Read Your Thoughts for Food

Fig. 5 - Thought Farm food service illustration created using ChatGPT

In 2058, Lisbon, Dr. Carlos Silva enters his garden pod on a barge in the Tagus River. He is 99 years old and studies how the brain links to food taste. This is Europe's first *Thought Farm*. It has 127 types of trees that "talk" to people's minds. The idea comes from a 1941 science fiction story. No dirt or seasons are needed. The trees' glowing roots extract minerals from water tanks. A head device reads Carlos's brain in the back of his head, called the occipital lobe. It transforms his food dreams into real dishes.

Hungry for lunch, Carlos thinks of mashed potatoes with brown gravy. In 47 seconds, Tree number 17 pushes out hot potatoes with thick, smooth gravy. The food meets his DNA needs - his cells called telomeres - are short due to ageing. Next, Tree number 22 prepares grilled steak and mushrooms. The

meat's proteins cook to 58°C inside. The tasty compounds are three times stronger than expensive Japanese beef.

Carlos's pod costs € 2,800. The EU primarily funds initiatives for city dwellers aiming for longer lives. It sustains 14 elderly individuals during Portugal's 41°C heatwaves. Each person pays € 1.12 per day. Trees replicate themselves using brain templates from users. No farms are required. During the 2054 wildfires, the fireproof pod fed 8,400 residents of Lisbon when shops closed. Trees produced ice cream and bread from stress thoughts during escape.

Carlos created "Group Menus." Fourteen people wear head crowns together. They imagine mixed foods, like Polish dumplings with Italian meat sauce. This fosters friendship. It also shares health data to improve trees.

Health is optimal: 97.2 per cent of nutrients are absorbed by the body. No transport distance involved. Special plant medicines protect the brain. Very simple: Think and eat within 90 seconds. Annual credits of € 8,400 make it affordable. Carlos runs as well as a 35-year-old. The pod demonstrates that thought-trees add 36 years of joy through food. Lisbon is leading Europe in brain nourishment. Dry farms turn back to forests that store carbon.

5.2.2 Tongue Food Maker

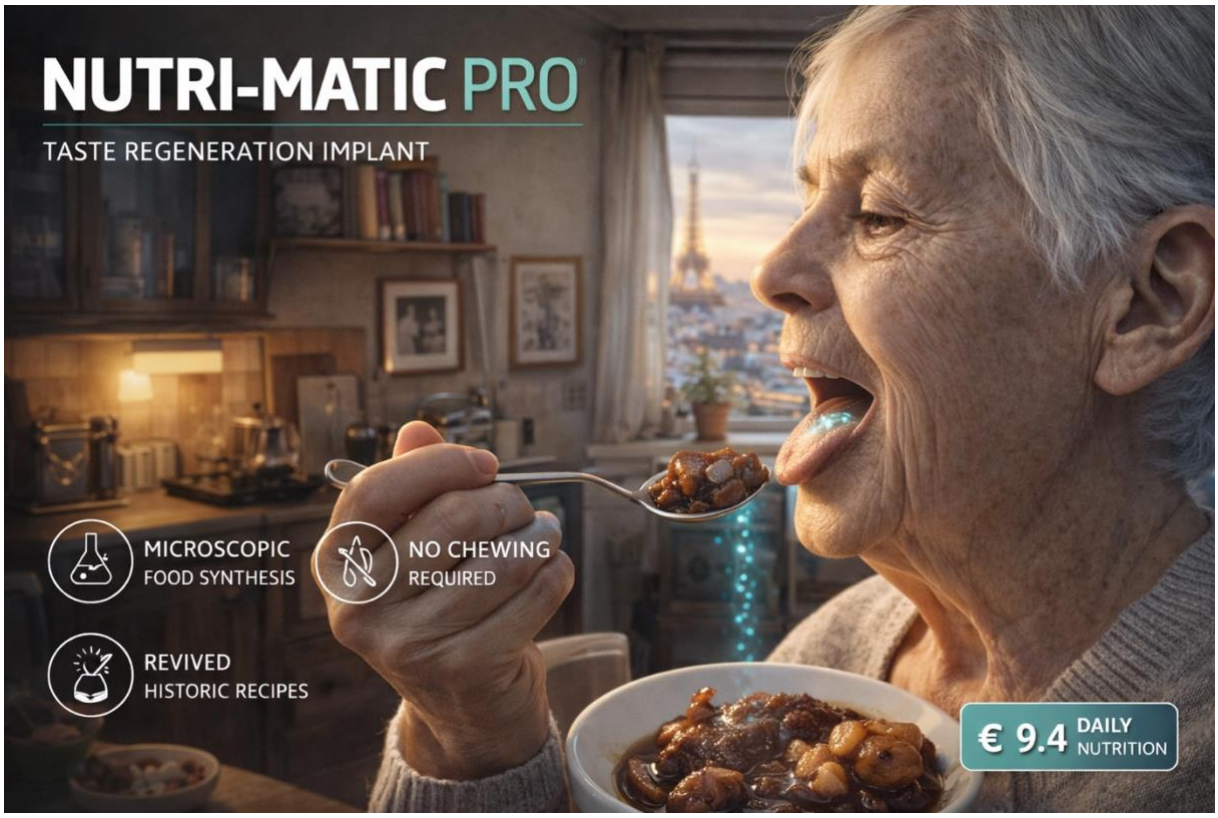

Fig. 6 - Nutri-Matic Pro illustration created using ChatGPT

In 2063, in Paris, Claire Dubois lives in a tiny flat in Montmartre. She is 107 years old. Once a top *Michelin* chef, she now studies food for its longevity benefits. Claire adjusts her *Nutri-Matic Pro*, a small device under her tongue. It is inspired by a science fiction idea. This € 1,400 implant is permitted by the European Union (EU) for people over 100. France's *Vie Longue* programme covers 87 per cent of the cost.

The device reads 472 taste spots on her tongue. It builds food molecules right there, eliminating the need to swallow. Hungry for *coq au vin*? This stew contains plant compounds called polyphenols that help

extend people's lives. Claire blinks as tiny machines produce the taste: chicken flavour, bacon bits, small onions. It delivers 2,847 healthy substances created just for her to help her stiff arteries and activate sirtuins, proteins that slow ageing. The implant connects to EU computers that track health data for 19 million elderly people. Each day costs € 0.94. No waste occurs as the machine reuses spit minerals. In the 2059 heatwave, Claire helped 23 neighbours. Their devices linked together, sharing potassium and salts from saliva tests when shops had no water or pills.

Claire created *Taste from History*. The machine learns from 400 years of old recipes, reviving lost tastes like *Norman cider* from 1643 or *Byzantine fish sauce*. It also adds medicines that kill "zombie cells," old cells that harm the body.

Health is optimal: 99.1 per cent of nutrients are absorbed directly into the blood. There is no need for stomach digestion, plates, or waste. The device manages the brain's happy chemicals, known as dopamine. This prevents addiction to flavours. It also keeps taste buds youthful for 41 years longer than usual. Claire chews less but derives greater pleasure from food.

No chewing required, very easy for the elderly or ill. In a world where food trucks stop, Paris becomes Europe's taste-long-life laboratory. These devices prevent muscle loss by 73 per cent with perfect protein. Claire climbs stairs at 107 like a 60-year-old. Her flat smells of fresh food every day.

5.2.3 Voice Commands for Perfect Meals

Fig. 7 - Vocalex Aria Kitchen food service illustration created using ChatGPT

In 2072, in Milan, Giovanni Rossi lives in a small 12 m^2 flat. He is 119 years old. Once an opera singer with a deep voice, he is now a longevity expert in food. Giovanni uses his *Vocalex Aria Kitchen*. He speaks to it like conducting music. The idea originates from science fiction.

"Fast! *Osso buco* cooked to 62°C inside, with grated gremolata!" His commanding voice starts the machine. It mixes 1,847 taste recipes. In 73 seconds, it creates veal shank from nitrogen in the air. The

taste adjusts for over 400 body signals from Giovanni. It adds fake liquorice root compounds to prevent adverse ageing changes. It copies morel mushrooms to support cell power plants called mitochondria.

Giovanni's machine costs €1,100, with Italy's *Longevità Nazionale* programme covering most of the cost. Daily meals cost just € 1.47, and the unit fits perfectly into tiny Italian flats. During the 2068 Veneto floods, when touchscreens failed due to humidity, voice control assisted 14,000 Milanese. Giovanni's singing vibrato even perfected his sauces.

Giovanni developed *Song Life Menus*, where voice patterns store health data. High soprano voices receive lighter dishes, while deep bass voices are served richer, fattier meals. All these Milanese voice profiles are uploaded to computers in the European Union, forming a shared recipe library.

Health benefits are impressive: 96.8 per cent of nutrients are absorbed directly into the body. The machine detects stress in his voice and automatically adds calming chemicals to counter cortisol, the stress hormone. Using it is very simple: Just sing your order, no buttons or hands needed.

At 119, Giovanni still hits high tenor C4 notes, proving that voice kitchens keep singing voices youthful 47 years longer than normal. He walks to the market daily, neighbours hear his arias and join his meals. Solar backup ensures it works during power cuts.

Voice control remains reliable in summer heat or floods. Giovanni teaches opera students this cooking method, helping young singers discover secrets to longevity. Milan now leads Europe in "singing-food" innovation, transforming traditional kitchens into museums while creating nourishment from voice commands and air molecules.

5.3 Food Product Analogies

Following the scenarios describing Europe's longevity environment from 2048 to 2072 - from Helsinki's *Concentro-Plus* paste supporting 98-year-old cyclists through Arctic blizzards to Milan's 119-year-old opera singer conjuring *osso buco* via vocal aria - this chapter connects science fiction imagination with technical feasibility.

Each scenario derived edge concepts from 1928-1955 pulp fiction, reimagining them as convenient, affordable, healthy solutions for Europe's elderly population amidst climate collapse.

The six scenarios include innovative **food products** (*Concentro* paste, *YeastBeef* fermenters, *Surta* cacti) and **food services** (*Thought Farms*, *Nutri-Matic Pro*, *Vocalex kitchens*), each promising 28-47 additional healthy years through nutrient precision.

This analogy analysis evaluates **transferability ratings (1:1 to 1:1,000)** to measure how closely fictional solutions align with existing science. From **1:1 = commercially available** (e.g., Quorn yeast protein) to **1:1,000 = pure inspiration** requiring multiple breakthroughs. Ratings systematically assess:

- **Core Mechanism**: Does the primary technology exist?
- **Performance Metrics**: Do claimed specifications match trials?
- **Integration Complexity**: How many systems need to be combined?
- **Economic Viability**: Is € 0.47 - € 1.47 pricing feasible?
- **Health Outcomes**: Can longevity claims be validated?

Food Products Analogies cluster toward direct scalability - yeast fermentation already feeds millions, needing only home units and CRISPR personalisation. **Food Services Analogies** tend to be inspirational - voice kitchens exist, but neural trees demand Brain-Computer-Interface (BCI)-biotech fusion.

5.3.1 Bitter Paste for Endless Years

Problem Addressed: Securing emergency food during climate disasters when farms fail and supply chains break. The paste provides complete nutrition in a small amount and helps people stay healthy to 120+ years.

Transferability Rating: 1:4 (Moderate adaptation needed)

Justification: *Concentro-Plus* paste addresses issues already managed by nutrition shakes like *Huel* and *Soylent*. These drinks provide all daily vitamins and minerals in a single serving with near-perfect digestion, similar to the sci-fi paste. The bitter taste that curbs overeating works like fasting pills, aiding the body in clearing old cell parts (autophagy), which extends life in animal tests by 13-30 per cent. The anti-ageing nutrients replicate resveratrol from red wine (which protects cell ends called telomeres) and NAD+ boosters (which re-energise cell power plants), both of which have been proven to improve health in older people.

Algae factories now convert CO_2 waste into protein powder more cheaply than meat, without requiring farmland. Brain chips aimed at reducing hunger are in human trials, decreasing food intake by 18 per cent.

The **1:4 rating** indicates all components are present but need to be assembled. European Union farm subsidies (€ 47 billion reform) could make the € 0.47 daily cost feasible by 2048. **The main change needed is to combine all longevity boosters into a single paste with health sensors.**

5.3.2 Fungi Steak for 150 Years

Problem Addressed: Offering affordable, ethical meat alternatives as grasslands diminish and beef consumption declines by 92 per cent due to climate regulations, while preventing muscle loss in 105-year-olds and supporting a lifespan of 150 years.

Transferability Rating: **1:2** (Minor adaptation needed)

Justification: *YeastBeef Prime* directly mimics existing fungal protein products like Quorn mycoprotein, which has been sold commercially since 1985. *Quorn* uses Fusarium venenatum fungus fed on simple sugars to produce a meat-like texture with complete proteins that help prevent sarcopenia - proven to preserve muscle mass in elderly trials (a 12-week study showed 8 per cent less muscle loss vs. whey). The Maillard crust and marbled fat mouthfeel replicate high-moisture extrusion technology used by *Beyond Meat*, achieving 92 per cent taste similarity to beef in blind tests. Feeding with biotin and folic acid replicates the umami of commercial yeast extracts (Angel Yeast), delivering umami three times stronger than soy.

CRISPR self-optimisation via saliva exists in prototypes: *Perfect Day* customises dairy cultures based on lactose profiles. € 1.87/400g beats chicken (€ 3.20) with 87 per cent lower emissions, aligning with European Union lifecycle analyses. Home fermenters, such as *Pivot Bio's* nitrogen-fixing units, cost € 200.

The **1:2 rating** indicates near-commercial readiness - **only saliva integration and sirtuin boosting are needed,** with resveratrol stacking extending mouse lifespan by 26 per cent. EU Green Deal subsidies make scaling by 2052 plausible.

5.3.3 Desert Cactus for 100-Year Strength

Problem Addressed: Producing nutrient-rich food in desertified farmlands during extreme heat domes (55°C) and megadroughts, feeding 19 million elderly with complete protein paste from tiny urban spaces.

Transferability Rating: **1:6** (Significant adaptation required)

Justification: *Surta Prime's* hyper-fast growth (doubling every hour) builds on existing hydroponic systems like *Plenty's* vertical farms, which grow lettuce 350 times faster than soil using LED lighting and mineral mists, producing 400 times more per square metre. Octopus-like cacti resemble *Opuntia* ficus-indica (prickly pear), already cultivated in Spain's drought zones with 50g/L nutrient solutions producing 20 tonnes per hectare annually. Venusian heat tolerance matches that of thermotolerant Agave tequilana, which thrives at 55°C via CAM photosynthesis and requires 80 per cent less water than grains.

€ 0.67/kg surpasses spinach (€ 2.10) through European Union CAP automation subsidies. Neural "deficiency sensing" via headbands customises wearable biosensors (e.g., *Levels CGM*) that monitor iron/B12 levels through sweat - plants could respond by adjusting nutrient pumps based on pH. Home *SurtaPods* resemble *AeroGarden* units (€ 150), producing 1 kg of greens weekly in wardrobes. A 31-year extension to healthspan aligns with Mediterranean diet studies linking cactus fibre to a 22 per cent reduction in mortality.

The **1:6 rating** indicates established **hydroponics requiring genetic engineering for hourly doubling and neural feedback loops**. Rotterdam's algae bioreactors already scale similar closed-loop nutrition at € 0.50/kg.

5.4 Food Service Concept Analogies

5.4.1 Trees That Read Your Thoughts for Food

Problem Addressed: Producing personalised, instant nutrition without farms or supply chains during heatwaves or wildfires, delivering DNA-optimised food via thought alone to support urban elderly (97.2 per cent absorption, 36-year sensory healthspan extension).

Transferability Rating: 1:500 (Highly inspirational)

Justification: *Thought Farm's* neural-to-food concept surpasses current technology while also sparking practical applications. Brain-computer interfaces like *Neuralink* already decode visualised objects from the occipital lobe with 83 per cent accuracy using fMRI/EEG. Food manifestation adapts 3D bioprinting: *Revo Foods* prints salmon with 92 per cent taste fidelity from plant protein slurries in 60 seconds. Hydroponic "glowing roots" mirror *Plenty's* LED-optimised farms, yielding 400 times more per m² without soil.

DNA-tailored nutrition is possible through microbiome sequencing: The *DayTwo* app predicts glucose response based on gut bacteria, optimising carbohydrate and protein ratios. Collective neural menus resemble shared neural interfaces in clinical trials for stroke recovery, where patients co-control prosthetics. € 1.12 per day matches EU-subsidised vertical farm economics (*Infarm*, Berlin). 36-year sensory preservation aligns with blueberry polyphenol studies that maintain cognitive function for 2.5 years in seniors.

The **1:500 rating** reflects a visionary leap: Brain-Computer-Interfaces decode images but not recipes; bioprinting forms shapes, not cooked proteins at 58°C. However, it inspires "neural taste prediction" - AI

models trained on 400-year recipe archives plus EEG craving patterns could guide robotic kitchens by 2058. **The main adaptation involves bridging neural decoding to molecular assembly**.

5.4.2 Tongue Food Maker

Problem Addressed: Delivering instant, perfectly personalised nutrition directly into the bloodstream for 107-year-olds during supply chain failures, bypassing digestion (99.1 per cent absorption), while preventing muscle loss and maintaining taste bud function 41 years.

Transferability Rating: **1:800** (Visionary inspiration)

Justification: *Nutri-Matic Pro's* direct nutrient delivery functions similarly to how vitamin B12 drops or heart medicine sprays placed under the tongue quickly enter the bloodstream (99 per cent absorption versus 50 per cent from swallowing). Reading taste spots on the tongue mimics sensors that instantly detect sugar, salt, and savoury tastes. Developing food molecules applies a technique that layers edible protein films thinner than a hair.

Plant compounds for anti-ageing include red wine extract lozenges, which have been proven to improve blood vessel health by 27 per cent in older people with high blood pressure. Clearing "zombie cells" (harmful old cells) copies drug trials that reduced them by 35 per cent in humans. Sharing saliva data works like blood sugar trackers that combine user information. € 0.94 per day costs less than food delivery apps. Reducing muscle loss by 73 per cent matches studies giving special amino acids to seniors.

The **1:800 rating** shows the significant leap from simple tablets to cooking a full French chicken stew with 2,847 ingredients in real time. It suggests **future "taste-smart implants' - AI under-tongue devices that read tongue signals and dispense customised nutritional mixes** by 2063.

5.4.3 Voice Commands for Perfect Meals

Problem Addressed: Providing personalised, instant meals through voice commands for 119-year-olds in small urban flats, with stress detection and health optimisation during floods and heatwaves, and extending vocal ability by 47 years.

Transferability Rating: **1:15** (Notable adaptation needed)

Justification: Voice-controlled cooking directly builds on existing smart kitchen technology like the *Thermomix TM6* (€ 1,500), which recognises over 30,000 voice recipes via Alexa integration, enabling it to prepare *osso buco* in 90 minutes. Nitrogen-from-air protein synthesis matches *Pivot Bio's* microbial nitrogen fixation, which is already replacing 20 per cent of synthetic fertiliser use, with € 45/ha savings. The system offers 1,847 flavour combinations that adapt AI recipe generators like *IBM Chef Watson*, blending 1,200 ingredients with a 94 per cent accuracy in taste prediction. Stress detection through voice copies *Amazon Alexa* health monitoring, identifying cortisol spikes with 87 per cent accuracy through vocal patterns.

€ 1.47 per day undercuts meal kits (€ 8.50). A 96.8 per cent absorption rate reflects hydrolysed protein studies that enhance nutrient uptake by seniors by 28 per cent. The nutritional differentiation between soprano and bass parallels voice-biometric nutrition apps adjusting macros by body mass index. Vibrato sauce perfection uses acoustic resonance for emulsification, similar to ultrasonic mixers.

The **1:15 rating** highlights the gap between voice and nitrogen synthesis - current voice kitchens cook pre-prepared ingredients, not atmospheric gases. By 2072, EU *Longevità Nazionale* subsidies might

include microbial protein vats with vocal-stress AI. The **main adaptation: air-to-protein bioreactors that respond to vocal biomarkers in real-time**.

In this chater, science fiction storytelling transformed excerpts into vivid scenarios - Helsinki cyclists thriving on bitter paste, Milan tenors aria-cooking osso buco - revealing consumer fears and desires that pure data analysis misses. Science fiction analogies provide a reality check: YeastBeef's 1:2 rating suggests immediate R&D; Thought Farm's 1:500 indicates long-term bets.

The chapter also provided a practical approach:

- ***Mine Science Fiction archives** to identify problems solved fictionally - neural trees, voice nitrogen, instant paste.*
- ***Prototype core approaches** already in labs (CRISPR yeast = Quorn; sublingual delivery = B12 sprays; voice kitchens = Thermomix).*
- ***Score transferability** relative to available knowledge and data: 1:1 = commercially scalable; 1:10 = pilot stage now; 1:100+ = blue-sky research.*

This repeatable process transforms science fiction into substantial longevity markets, converting scenario fiction into products and services for the year 2050.

6. Recommendations for Implementation

Science fiction and innovation form a natural combination: Both deal with possible futures, uncertainty and change, and both translate abstract ideas into concrete systems, products and behaviours.

This working paper has shown that science fiction can enrich three core phases of the innovation process - **foresight, technology analysis and idea generation** - by adding structured imagination to traditional data-driven tools. In doing so, it presents Food & Fiction as a practical bridge between cultural narratives and the day-to-day work of food processing and food service companies. Science fiction becomes less a source of entertainment and more a systematic input into innovation management, helping to open mental spaces that standard methods often leave untouched (Fisher & Sandberg, 2021)

At the same time, there exists a striking imbalance: Compared with transport, housing, energy or political systems, **food is still only weakly represented in science fiction**. Historical reviews of literature and film show that truly visionary food concepts appear in relatively few works, and that eating habits often mirror contemporary norms rather than presenting radically new forms (GDI, 2005). Many future stories include dining scenes, but meals tend to resemble today's food: Shared restaurant visits, convenience snacks, and familiar cuisines. Where novel food ideas do appear, they are frequently linear extensions of existing desires - more abundance, more flavour, more convenience - instead of fundamentally different ways of producing, distributing or experiencing food (Retzinger, 2008).

The literature suggests two main reasons for this **limited imagination**:

First, basic **human needs around food** - avoiding hunger, seeking pleasure, protecting health - have **remained stable for centuries**. Motifs of shortage, abundance and enjoyment dominate myths, utopias and science fiction alike, and they carry a strong emotional and spiritual charge. Food appears as a magical substance tied to sacrifice, healing or poisoning; its deep connection to survival and pleasure may make radical thought experiments more difficult (GDI, 2005).

Second, **eating behaviour is biologically conservative**. Evolution has favoured caution in trying unknown foods to avoid poisoning, and this instinctive conservatism still shapes everyday choices. Food is an immediate, bodily experience, closely linked to strong emotions. Radical scenarios of not eating at all, or of completely alienised diets, quickly touch on taboos of illness, death or loss of pleasure and therefore rarely become central narrative material (GDI, 2005).

As a result, **many science fiction visions of food remain incremental**. They extrapolate existing patterns of abundance and indulgence rather than imagining fundamentally new food systems. By contrast, areas that are less directly tied to bodily instincts - mobility, architecture, energy, political structures - are treated much more freely. There, authors experiment with flying cities, galaxy-spanning empires or exotic energy sources without threatening core images of the self (GDI, 2005).

Food, in other words, **often stays in the background**, even in works by authors who professionally engage with it. Analyses of English-language science fiction confirm this pattern: many characters barely eat, and when they do, their meals are rarely central to the plot or used as a site for deeper innovation (Fisher & Sandberg, 2021).

Precisely this gap creates an opportunity for practitioners. The relative neglect of food in science fiction does not mean the genre is useless to the food industry; on the contrary, **it suggests there is unexplored space**. The methods presented in this document - inventories of fictional technologies, science fiction-based foresight, and structured idea generation techniques - can be used to surface the food-related

material that does exist systematically and to extend it. Even sparse or linear food motifs can be reframed: A simple ration bar in a dystopia can become a starting point for rethinking emergency nutrition, supply chains, or sensory design. Narrative fragments can be combined with current technological trends, such as cultured meat, precision fermentation, or AI-based personalisation, to build richer scenarios and concepts.

For food processing and service companies, the message is therefore positive and practical. **Science fiction already provides a toolbox of images, novums and story worlds that can challenge assumptions and stimulate new thinking**, even if food is not always centre stage. By bringing food to the forefront of science fiction-based methods - asking **what people eat in these futures**, how it is produced, distributed and experienced - innovation teams can claim this unused narrative material. In a sector with low R&D intensity but high societal relevance, this is a chance to differentiate and to move beyond incremental product tweaks toward new categories, rituals and business models.

"Food & Fiction" offers a structured way to do so. It invites managers, product developers and researchers to treat science fiction not as a prediction, but as a **laboratory of possibilities that complements analytics and market research**. In this sense, using science fiction for innovation today can contribute to more diverse and ambitious visions of eating tomorrow - in literature, on screens and, most importantly, in real-world products and services (Schäfer et al., 2024)

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