



FORMULATION TOOLKIT

THE RECIPE FOR SUCCESS

Smart, data-driven tactics for healthier
and more sustainable formulations



Today, more consumers are prioritizing health, wellness and sustainability. They want products that can help them lead better lives.

According to the International Food Information Council Foundation, around 69% of consumers are examining a product's nutrition label to gauge its health value¹. But while they desire better nutrition, consumers don't wish to compromise on texture and taste.

Instead, consumers want sensory experiences with healthier food ingredients; clean skincare formulas with more natural and beneficial active ingredients; and eco-friendly household products that are safer for families and the environment — a critical task for formulation teams.

As a reflection of changing consumer values, regulatory agencies are introducing guidelines and legislation to help make products healthier and more sustainable.

Strict guidelines and growing instances of taxes on sugar, salt and fat are forcing consumer packaged goods (CPG) companies and retailers to rethink product offerings to remove preservatives and artificial colorings. The challenge lies in maintaining the same sweetness, mouthfeel and texture given by the original ingredient.

¹ International Food Information Council Foundation (2019)

To succeed, companies need to deploy a smart, data-driven strategy, powered by the **3DEXPERIENCE®** platform.

Armed with this strategy, companies can:



Improve lab efficiency and identify new ingredients at lower costs



Accelerate cost-optimized product formulas



Comply with different regulatory conditions efficiently



Grow profitability while managing ingredient price swings



Beat the competition with healthier products



Satisfy the market's insatiable appetite for continuous innovation



Meet sustainable manufacturing targets

Ready to turn formulation dreams into a market reality?
Turn the page and explore the recipe for success.

This toolkit contains:



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THE DIGITAL LAB



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In a lab network, data is the most valuable currency. The more effectively your formulation teams can view, manage and utilize data, the better they can fuel innovation.

In reality, information is scattered across multiple data silos and often, difficult to access. Whether paper or electronic, when data is isolated, it can become lost or unusable, particularly if a scientist leaves the company or if the notebook becomes misplaced.

So, how can formulation teams best **harness scientific data** generated across a company's lab network? By using **smart technology**.

Smart Formulation Proof Points

**80%**

less time

aggregating information through centralized data management

**90%**

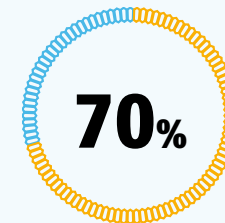
fewer materials

used in product development with accurate inventory management

**30%**

increase in efficiency

with cloned experiments and templates

**70%**

less time

spent on data reviews and approvals

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PUT YOUR DATA TO WORK

To improve laboratory throughput and efficiency, many CPG companies invested in automation and lab instruments that generate data electronically. Ironically, most scientists still had to print pages of data and paste them into paper lab notebooks for review and approval. But this is not the case with the Dassault Systèmes' **BIOVIA Scientific Notebook**.

Powered by the **3DEXPERIENCE** platform, BIOVIA Scientific Notebook is a flexible, collaborative solution that everyone including formulators, analysts and their managers can document, review, share and approve.

“Data needs to be easy to find, share and use for teams to innovate and get products to market faster. Smart technology is the key. BIOVIA Scientific Notebook empowers teams to be more efficient in initiating test requests, running experiments, analyzing results and uncovering insights while driving R&D forward.”

— Dr. Kai ZHANG
BIOVIA Brand Marketing Director,
Dassault Systèmes

With access to accurate data in real time, formulation teams get to fast track product development from years to days and weeks. As a result, companies can deliver high-quality products consistently and cost-effectively while keeping pace with consumer expectations.



Learn how BIOVIA Scientific Notebook makes it easy for formulation teams to unlock data-driven insights.
[Read here.](#)

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BOOST LAB EFFICIENCY

The Dassault Systèmes Perfect Lab solution on the **3DEXPERIENCE** platform uses digital science tools to optimize how teams collect, store, access and reuse their data. All from a single location.

This **unified, data-driven environment** creates a foundation for teams to innovate more quickly with access to historical insights – and to think outside the box by comparing experiment data from various tests and sources.

By aggregating all data through a collaborative platform, teams can:



Cut down time spent

on repeat physical experiments and data reviews, thus reducing documentation efforts



Pair decades

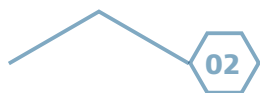
of valuable scientific data and experimental results with machine learning and artificial intelligence (AI) to generate formulation suggestions quickly



Reduce time spent

on redundant activities, thanks to automated data collection from lab instruments

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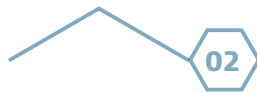


ENSURE TRACEABILITY AND COMPLIANCE

Managing and tracing materials and chemicals used in the lab is **critical for formulation teams**; they need to have full control for safety and compliance purposes.

Whether for R&D, testing or manufacturing, each facility has a **safety plan** in place. However, the procedures this plan governs are often paper-based or carried out using outdated spreadsheets. Compiling reports with these methods will take too long in an era where regulatory agencies expect information rapidly upon request. This has to change.

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“ BIOVIA provides strong capabilities for quality, safety, and compliance. With the integration of barcode labeling, remote inventory control and Safety Data Sheet (SDS) management, companies gain real-time visibility of the project, materials and safety information. Compliance is strengthened when employees can access the right data to understand the equipment and methods needed to work with different chemicals.”

— Dr. Kai ZHANG

BIOVIA Brand Marketing Director,
Dassault Systèmes

Perfect Lab's **materials management capabilities** ensures the traceability of chemicals and materials inventory across different R&D, testing and manufacturing facilities. Chemicals and materials are given unique ID codes automatically, barcoded and scanned along the product lifecycle. This makes it easy for teams to track where a compound was used, where it's stored and in which quantity.

That's not all. The Perfect Lab solution allows for the **enforcement of specific procedures** for food safety testing, equipment cleaning and quality control measures, all within a **unified environment**.

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FORMULATION WIN: BRIDGING INNOVATION AND GROWTH



A leading multinational consumer and professional products manufacturer wanted to revolutionize new product development to enable innovation and support growth.

The company had numerous disparate sources of product development data including spreadsheets, shared drives, personal computers and notebooks. This led to inefficiencies, bottlenecks and errors between product development and manufacturing.

THE SOLUTION:

The company embarked on a digital lab transformation through Dassault Systèmes' Perfect Lab and Perfect Formulation solutions on the **3DEXPERIENCE** platform.

THE RESULTS:

- ✓ Connected product and formulation development processes, from the lab through to manufacturing and the supply chain
- ✓ Streamlined data from a consistent, single source of truth
- ✓ Digitalized and integrated consumer trend insights into the ideation process for faster innovation
- ✓ Extended system collaboration capabilities
- ✓ Simplified regulatory and sustainability assessments

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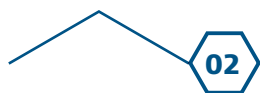
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PROJECT MANAGEMENT AND COLLABORATION



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Isolated decisions, work duplication and reduced speed to market are just some of the limitations of traditional top-down silos apparent in the world of formulation today.

In a siloed environment, different functional teams may not be aware of what others are doing. As such, a small change to the chemical compounds, ingredients or recipe data can ripple across product development and impact time, cost and quality.

The way forward is through **closer collaboration** on a single platform where teams can **deliver more sustainable formulations faster**.

Smart Formulation Proof Points



Extended visibility

by connecting all stakeholders in a single environment



300x

more intellectual property knowledge accessed and shared by all stakeholders on a collaborative platform

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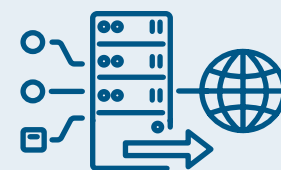
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COLLABORATE ON A SINGLE PLATFORM



Through closer collaboration, formulation teams can:



Access and share IP
knowledge faster



Eliminate costly
inefficiencies



Streamline approvals
and reviews



Leverage virtual
scorecards to strengthen
accountability and
improve quality

A bird's eye view of product development activities is essential to keep track of changes, and speed up decisions and approvals.

With the **3DEXPERIENCE** platform, formulation teams can **collaborate quickly and securely on formula development across the enterprise, and ensure traceability throughout the entire lifecycle.** The extended visibility provided by the platform eliminates the cost of trial and error, especially when reviewing virtual models, validating lab test results and approving new formulations.

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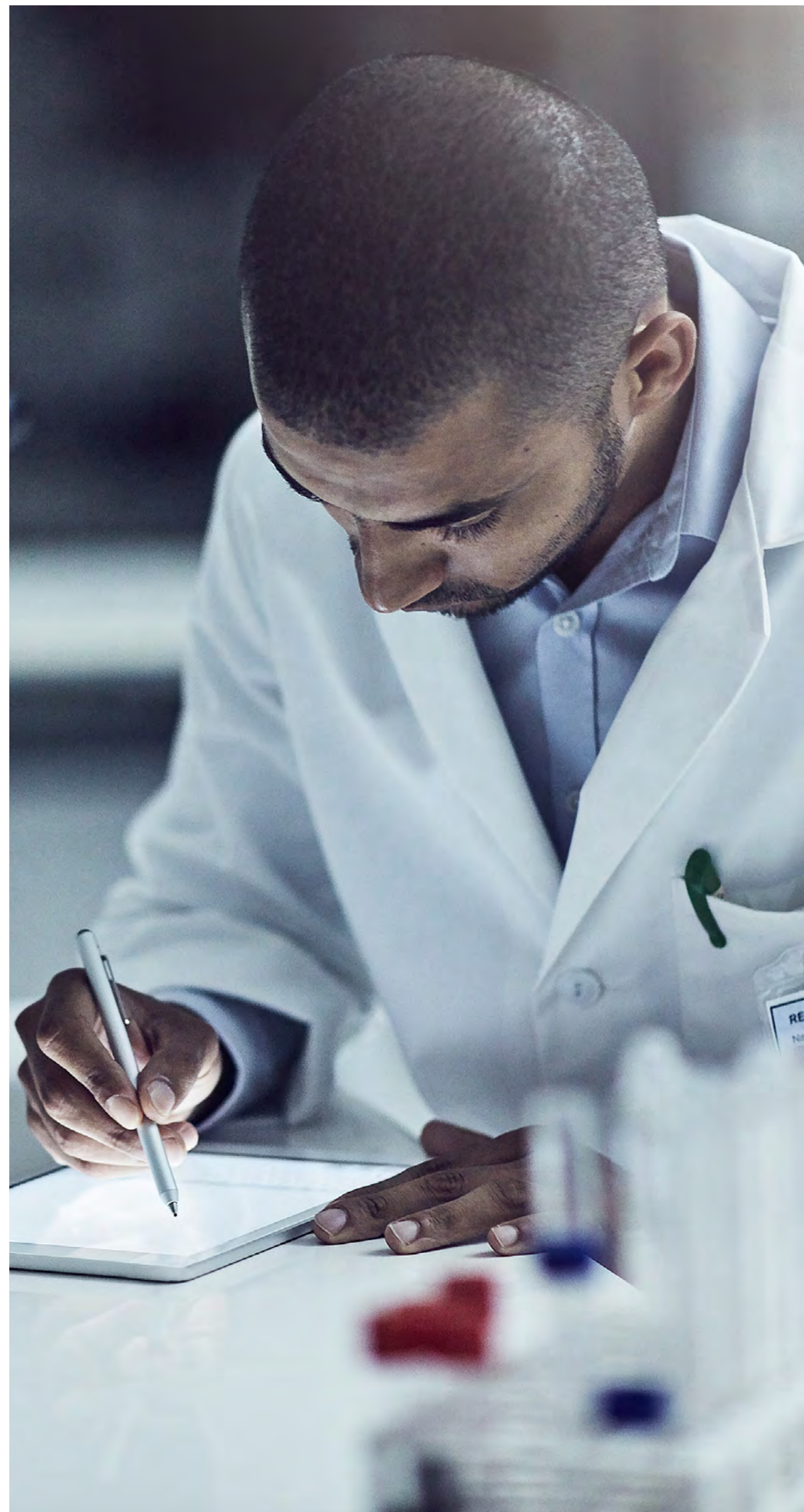
AUTOMATE WORKFLOWS

With many departments involved in formula development including R&D, engineers and regulatory representatives, there's a need to streamline and better connect all individual systems.

“ Formulation teams are still using spreadsheets and disconnected systems to work on critical tasks like ingredient selection. **This is highly inefficient.** There should be a single, continuous flow of data connecting the dots across design, development, testing and compliance.”

— **Raymond WODAR**
CPG and Retail Industry Value Expert,
Dassault Systèmes

By automating data connections and work practices across functional departments, companies can gain more value from smart technology like **machine learning and AI**.



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FORMULATION WIN: SPEEDING UP R&D PRODUCTIVITY

“We want our researchers and scientists to stop spending a significant amount of time gathering data and instead, focus on cutting-edge innovation and consumer insights.”

– R&D manager of a leading CPG brand

The company faced over a million product development data entries daily and aimed to eliminate duplication and increase accessibility.

THE SOLUTION:

The company leveraged the **3DEXPERIENCE** platform to **connect formulation teams** in a single environment.

THE RESULTS:

- ✓ Improved project efficiency
- ✓ Increased lab innovation productivity
- ✓ Reduced the time needed to launch a product

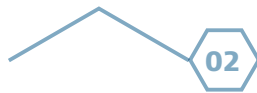
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FORMULA DESIGN



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Whether you are launching a new alternative protein food spread, sunscreen with new skin benefits or face cream without artificial ingredients, the science of formulation is driving significant changes in the speed, performance and safety of product development.

“Through science, companies can better understand how changes in product formula will not only affect taste and texture but also, how it will impact the human digestive system, and our skin and hair,” explains Dr. Zhang.

As consumers shift to more alternative proteins and natural products, **science will be the instrumental force** in how new molecules, ingredients and formulas are transformed into safe and effective products.

Smart Formulation Proof Points



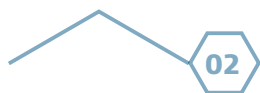
Error-free calculations

in recipes and ingredients with in-silico modeling



decrease in physical experiments, thanks to virtual testing that delivers accuracy with speed and cost savings

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ACCELERATE PRODUCT INNOVATION

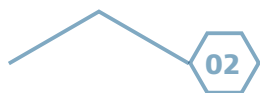
At the heart of the **3DEXPERIENCE** platform is virtual twin technology — enabling scientists to test the viability of formulation changes in-silico at speeds that could never be matched by costly physical tests.

“ Through data science and in-silico modeling on the **3DEXPERIENCE** platform, companies can **optimize the product formula virtually**, taking into account various parameters, such as ingredient interactions and sensory targets. At the same time, companies can optimize the process parameters and correlate the data with the product formula.”

— **Nathalie HANET**

CPG and Retail Industry Solution Experience Manager,
Dassault Systèmes

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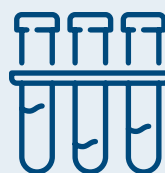


Virtual twin technology can rapidly narrow the field of potential outcomes. This is critical when formulation teams have to consider multiple factors like cost, access to raw materials in multiple forms, compliance and many other performance characteristics. For a human to weigh all these factors, it's almost impossible — this is where virtual twin technology can assist in the selection of the best-fit solution.

Through BIOVIA's capabilities for **formulation design and management**, companies can:



Make accurate
ingredient-level
calculations



Manage master
and site recipes while
optimizing costs across
plants



Define formula
characteristics and
compare performance
results against
specifications



Edit formulas
with real-time
regulatory violation
flagging, and easily find
material alternates and
substitutes



Launch more
sustainable formulations
while maintaining
quality, stability and
manufacturability



Simplify formulation development and experiments with the integrated BIOVIA Scientific Notebook and Formula Design. [Learn more.](#)

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UNCOVER NATURAL AND ACTIVE INGREDIENTS

Product formulations that prove unstable over time could create poor consumer experiences or lead to health incidents. **This is where virtual testing can add value.**

“When formulating with natural and active ingredients, teams should consider the aesthetics and safe usage of the formula. Changes in ingredients could affect the texture of the product, make some ingredients unstable, create poor absorption of active ingredients, or change the dispersibility profile of the product. Just like shampoos that don’t foam well,” highlights Dr. Zhang.

The multi-physics capabilities of virtual testing can help formulators uncover new active ingredients; understand the relationship between the formula and product packaging; and how to replace ingredients without compromising product performance.

In addition, virtual twin technology allows teams to **virtually design and test** new novel ingredients, create recipes in virtual factories to optimize the operations, and scale up from the laboratory.



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SCALE UP FROM LAB TO FACTORY

Today, there are many critical points of failure from the company's lab network to large-scale manufacturing plants.

“ The problem lies in scaling up the formula to a bigger production size with more materials and larger equipment. For example, it takes longer to increase the temperature in a 5,000 liter tank than in a 500 milliliter lab flask. During this lapse of time, unwanted enzymatic reactions can occur, thus modifying the final product. To obtain the same quality and consistency, **formulation teams need simulation** to find the right impeller shapes, and shearing and stirring rates.”

— **Nathalie HANET**

CPG and Retail Industry Solution Experience Manager,
Dassault Systèmes

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“As the product transitions from marketing requirements to the lab, it can lose the original intent as it makes its way to full-scale production,” says Wodar. In a long product development process with lots of manual data being moved around, it’s easy to run into errors or deviate from the original list of requirements.

He adds, “But with the **3DEXPERIENCE** platform, connected processes have an audit trail from product requirements, tests and claims, to recipe and manufacturing. The audit trail is a historical development record, where teams can make sure execution is being completed as originally intended.”

By managing master and site recipes more effectively through the **3DEXPERIENCE** platform, formulation teams can **scale the formula from the lab to the factory while optimizing costs across different manufacturing plants.**



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MANAGING COMPLEX REGULATORY COMPLIANCE

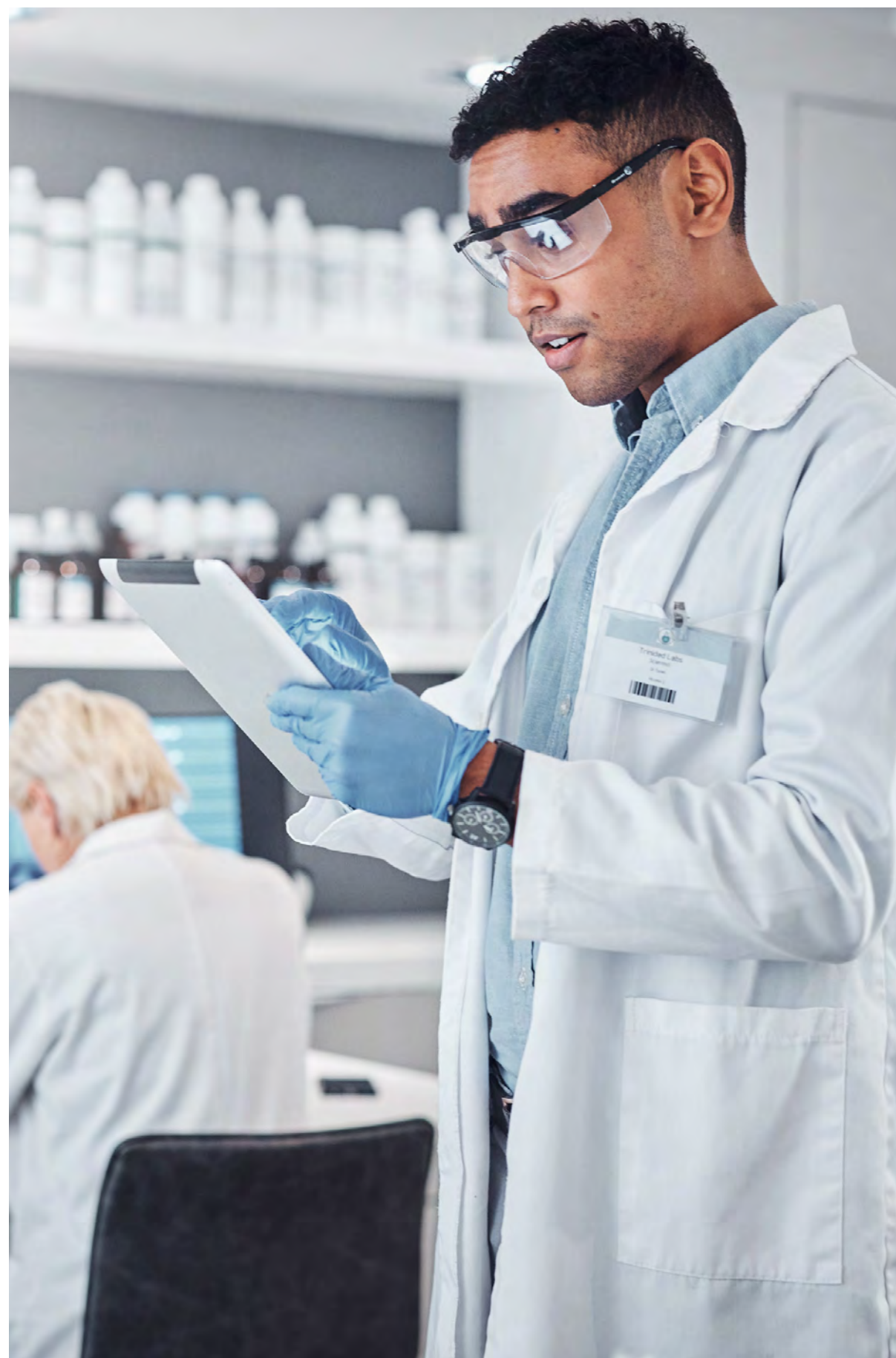
Ingredient compliance is becoming complex as more countries are focused on creating safe and healthier supply chains.

In reality, many companies wait until the very end of the development and testing process before they run compliance requirements, only to find out that they must reformulate or change a key ingredient before moving into production. The **3DEXPERIENCE** platform can help companies manage regulatory compliance more effectively.

“ Through the **3DEXPERIENCE** platform, formulation teams can screen potential ingredients very early in the development process, and eliminate any unsuitable options ahead of time.”

— **Raymond WODAR**
CPG and Retail Industry Value Expert,
Dassault Systèmes

Supported by the **3DEXPERIENCE** platform, BIOVIA's formulation design and management solution enables teams to gain regulatory guidance throughout formulation development and access current and historical product data. This helps them to **navigate complex regulatory requirements more effectively while managing the product formulation, packaging and intellectual property on a single platform.**



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FORMULATION WIN: ACHIEVING MORE WITH LESS

A consumer products company looked to improve R&D with virtual testing to bring new products to market faster.

THE SOLUTION:

The company leveraged Dassault Systèmes' solutions on the **3DEXPERIENCE** platform and achieved the following:

- ✓ Optimized product development for quality, performance and compliance
- ✓ Accelerated time to market



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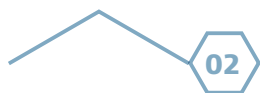
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SPECIFICATIONS MANAGEMENT



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Without accurate and accessible product specifications, formulation teams run the risk of developing sub-optimal recipes that may extend approval times.

During product development, it's critical to ensure that specifications are accurate, from receiving the raw materials, through formulating a recipe to launching a new product. However, disconnected systems and outdated data make it harder for formulation teams to guarantee the accuracy of their finished product specifications.

Accurate and accessible specifications through a centralized repository are the key to fast track product development without costly delays and recalls.

Smart Formulation Proof Points



Global access

to product specifications through a single platform



Zero product recalls

related to formula non-compliance

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STANDARDIZE SPECIFICATIONS



Slash development time and boost speed to market by standardizing product specifications on the collaborative **3DEXPERIENCE** platform.

Claiming a product recipe is free from gluten, sugar, fat or preservatives is not as simple as it looks. With end-to-end traceability from the **3DEXPERIENCE** platform, formulation teams can **provide the necessary proof points to substantiate health and nutrition claims – and to avoid harsh penalties and costly product recalls.**

By standardizing product specifications, formulation teams can:



Accelerate knowledge

reuse, drive quality and achieve regulatory compliance



Ensure

that any changes including raw material pricing, new allergens and different nutritional values are automatically calculated and incorporated into the specifications

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FORMULATION WIN: CONSOLIDATING PRODUCT SPECIFICATIONS

A global CPG manufacturer aimed to consolidate product specifications and accelerate artwork creation while meeting manufacturability and in-store shelf suitability requirements.

THE SOLUTION:

The manufacturer leveraged the **3DEXPERIENCE** platform to standardize specifications.

THE RESULTS:

- ✓ Streamlined requirements and specifications management
- ✓ Reduced artwork production costs
- ✓ Improved knowledge reuse

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THE FUTURE OF FORMULATION IS DATA-DRIVEN

From sensory experiences with healthier ingredients to natural and organic products, consumers are the driving force behind the future of product formulation.

This is where we add value. Backed by deep scientific expertise and experience with today's CPG leaders, Dassault Systèmes is uniquely positioned to help you **launch more sustainable formulations** with speed, quality and cost savings.

The future of the industry will go to the innovators – the brands and retailers that deploy a smart, data-driven formulation strategy. Will you be one of them?

Get in touch with us today or explore more insights [here](#).



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MEET OUR EXPERTS

The formulation toolkit features insights from these experts:



Nathalie HANET
CPG & Retail Industry Solution
Experience Senior Manager,
Dassault Systèmes

A Ph.D. in biochemistry and pharmaceutical sciences, Nathalie has 15 years of experience in dairy and plant-based food research and development. She has improved the quality of brands' nutrition portfolios by leading projects to build health claims and front-of-pack labeling with scientific substantiation. Today, she adapts Dassault Systèmes' solutions to the needs of F&B manufacturers from ingredient discovery to product formulation and process design.



Raymond WODAR
CPG & Retail Industry Value
Expert, Dassault Systèmes

With over 20 years of business experience, Raymond's expertise focuses on innovative platform strategies in the CPG, Life Sciences, and Specialty Chemical industries. For the past 17 years at Dassault Systèmes, he has been responsible for R&D product strategy and business development functions worldwide, particularly in formulation development, packaging design and simulation, and manufacturing production and supply chain optimization.



Dr. Kai ZHANG
BIOVIA Brand Marketing
Director, Dassault Systèmes

Dr. Kai Zhang has over 15 years of experience in global marketing, R&D and product development. He's passionate about empowering scientists to innovate better and faster with advanced software solutions. Dr. Zhang holds a Ph.D. in Organic Chemistry from University of Pittsburgh and an MBA from Carnegie Mellon University.

Our 3DEXPERIENCE® platform powers our brand applications, serving 11 industries, and provides a rich portfolio of industry solution experiences.

Dassault Systèmes, the 3DEXPERIENCE Company, is a catalyst for human progress. We provide business and people with collaborative virtual environments to imagine sustainable innovations. By creating 'virtual experience twins' of the real world with our 3DEXPERIENCE platform and applications, our customers push the boundaries of innovation, learning and production.

Dassault Systèmes' 20,000 employees are bringing value to more than 270,000 customers of all sizes, in all industries, in more than 140 countries. For more information, visit www.3ds.com.

