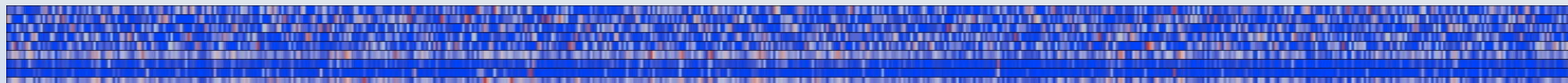# MATERIALSIN

Data intelligence for materials innovation

Product Overview

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Our Mission

materialsIN is a software-based venture that revolutionizes materials discovery and development by combining cutting-edge AI, advanced analytics, and deep material science expertise to deliver actionable insights, accelerate innovation, and drive sustainable solutions to clients. Our scalable, automated solution transforms raw or unprocessed information (or client input) into actionable insights, empowering clients to achieve their objectives with precision and efficiency.

Key value propositions of our approach:

**Accelerate Material Innovation**

Bridge Data to Decision Gap

Drive Sustainable Solutions

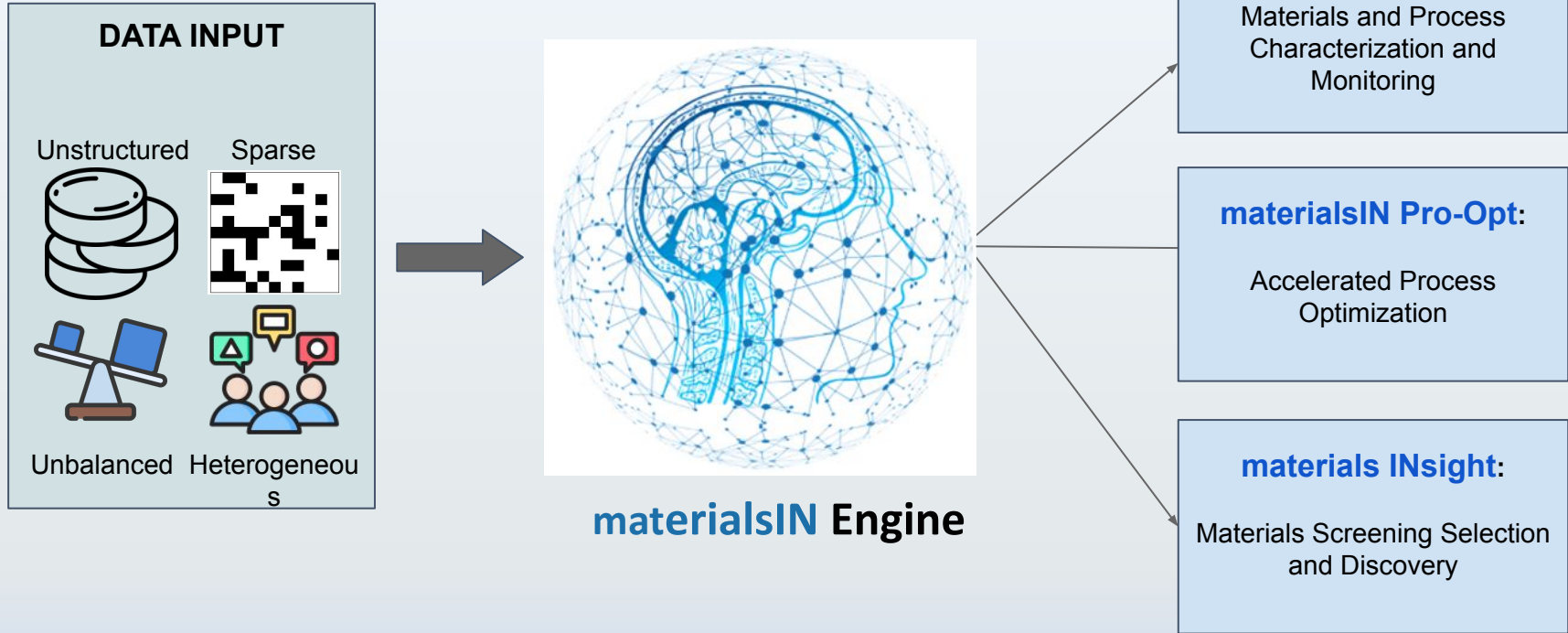**Customize Client Outcomes**

Champion Informatics Leadership

Proprietary Methodology

- a proprietary data-driven methodology, which has been developed over 40 years by Dr. Krishna Rajan, a leader in the materials informatics space

- uses machine learning/data analytics improve production processes and materials usage and development

- harnesses AI methods with scientific data and computational techniques to solve provide customer with data maturity and solve materials-related issues
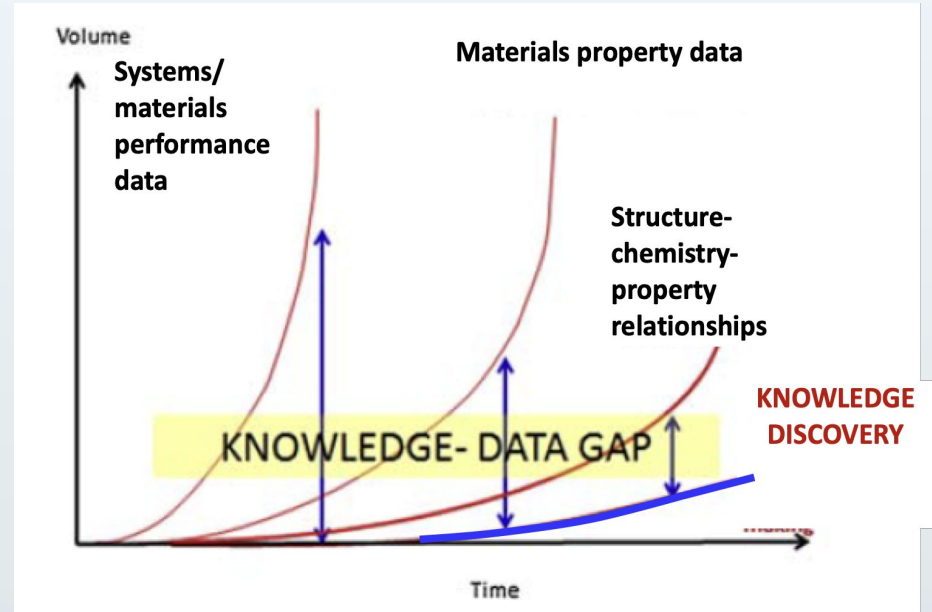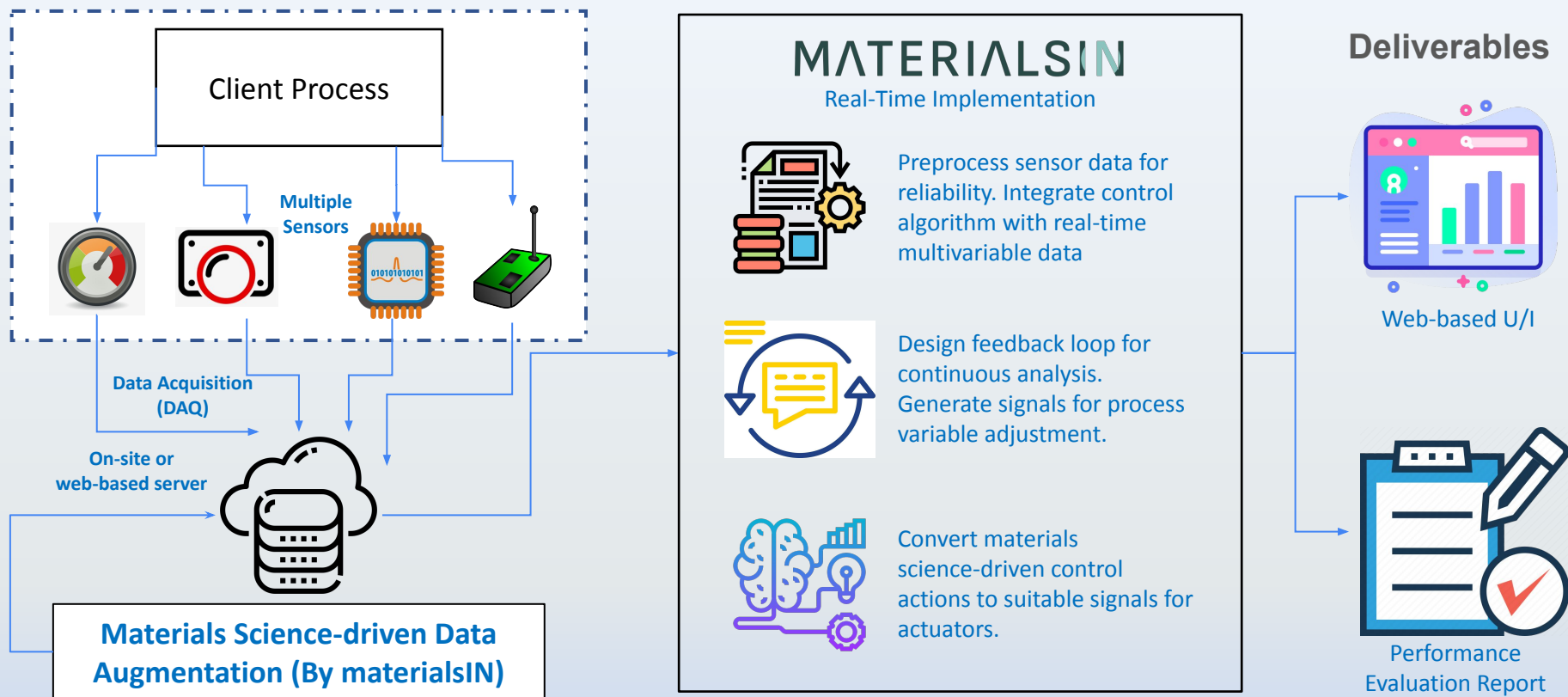

Ontologies and Databases Knowledge Engineering for Materials Informatics ; Joseph Glick In Informatics for Materials Science and Engineering: ed. Krishna Rajan; Elsevier (2013)

Methodology and Deliverables

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Client Process

Multiple Sensors

Data Acquisition (DAQ)

On-site or web-based server

Materials Science-driven Data Augmentation (By materialsIN)

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Real-Time Implementation

Preprocess sensor data for reliability. Integrate control algorithm with real-time multivariable data

Design feedback loop for continuous analysis. Generate signals for process variable adjustment.

Convert materials science-driven control actions to suitable signals for actuators.

Deliverables

Web-based U/I

Performance Evaluation Report

materials INspect

Real-time quality assurance system by identifying in-line defects and imperfections, ensuring product quality and customer satisfaction

Ensuring top-tier quality standards by detecting defects and imperfections in materials

Employs cutting-edge sensors, imaging, and data analytics for instant quality checks, preventing subpar product risks with real-time feedback to production teams.

Automation boosts product quality, slashes defects, and fortifies company reputation for efficiency and customer loyalty, yielding substantial savings.

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Cost Saving Real-time Decision

Minimize operational costs through real-time data-driven decision-making

Quality Control

Ensure high-quality standards and products via detection

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Automation

Boost productivity and efficiency by automating control over inspection defects

materials IN Pro-Opt

Real-time parameter monitoring and adjustment for consistent production, ensuring consistency, compliance, and efficiency, reducing production risks.

Ensures precise manufacturing, quality, and compliance with industry standards

Real-time process monitoring and automated adjustments to maintain optimal conditions, preventing variations in production
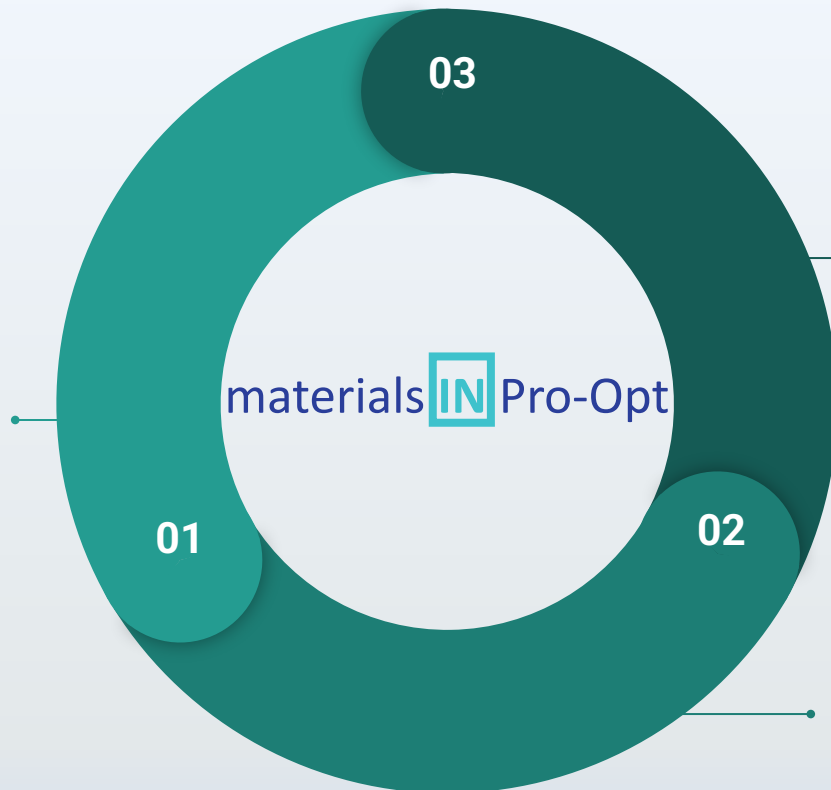

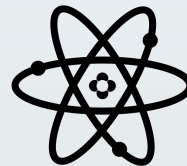Optimizes quality, efficiency, and compliance for streamlined production

materials **IN** sight

Solution for identifying safer, environmentally friendly material alternatives using advanced data analytics and machine learning

Utilizes a robust database of material descriptors to accurately represent and analyze their properties
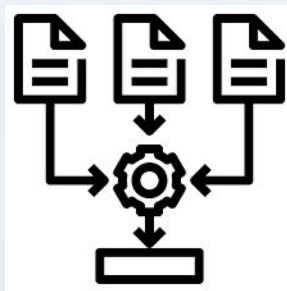
Searches for similar, safer material alternatives, ensuring compatibility and safety in various applications.
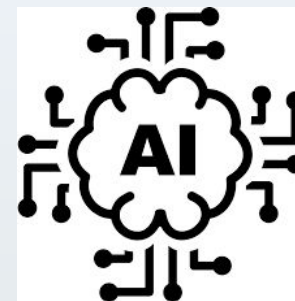
Integrates state-of-the-art ML models to design against multiple types of secondary properties, offering a reliable assessment of alternative materials

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Rapid Screening

Material alternatives rapidly screened using chemical and structural descriptors
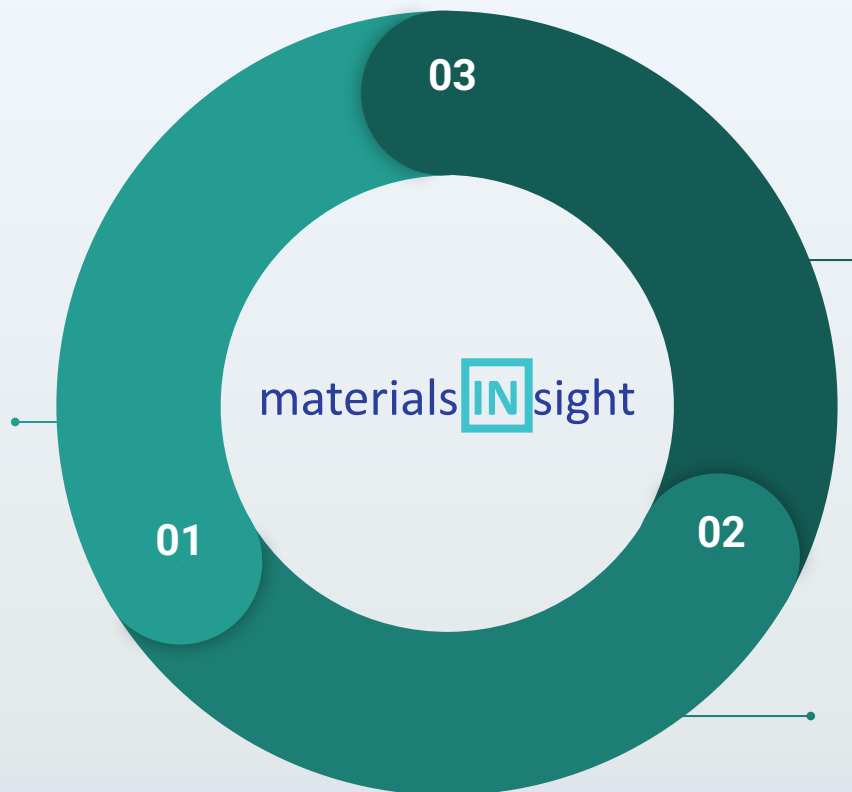
Safer Alternative Materials

Safe alternatives ranked according to the physicochemical and structural similarity
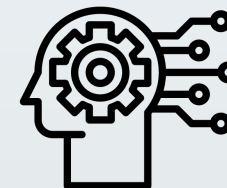
Proprietary ML and Database

Boost predictive capability through curated database and powerful ML technology

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materials **IN** sight

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Value Proposition *

20% Decrease in Energy Consumption

Drove **cost savings by reducing energy consumption by 20%** in cement industry by optimizing manufacturing process parameter

Quality Control - 98.3% Predictive Accuracy

Improved Quality Control of battery tab ultrasonic welds by replacing batch assessment with real-time monitoring. Achieved **98.3% accuracy**
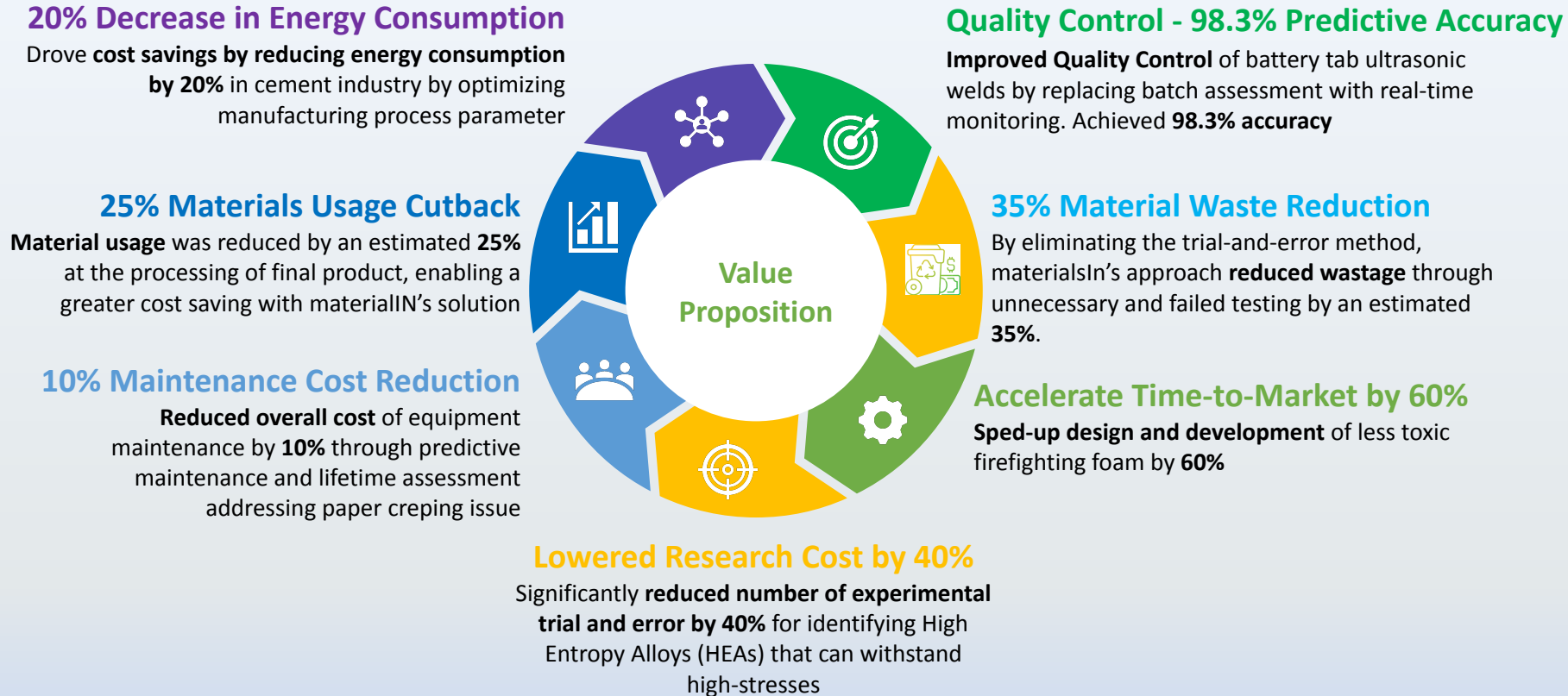
25% Materials Usage Cutback

Material usage was reduced by an estimated **25%** at the processing of final product, enabling a greater cost saving with materialIN's solution

35% Material Waste Reduction

By eliminating the trial-and-error method, materialsIn's approach **reduced wastage** through unnecessary and failed testing by an estimated **35%**.

10% Maintenance Cost Reduction

Reduced overall cost of equipment maintenance by **10%** through predictive maintenance and lifetime assessment addressing paper creping issue

Accelerate Time-to-Market by 60%

Sped-up design and development of less toxic firefighting foam by **60%**

Value Proposition

Lowered Research Cost by 40%

Significantly **reduced number of experimental trial and error by 40%** for identifying High Entropy Alloys (HEAs) that can withstand high-stresses

*Examples from customers' use of materialsIN products
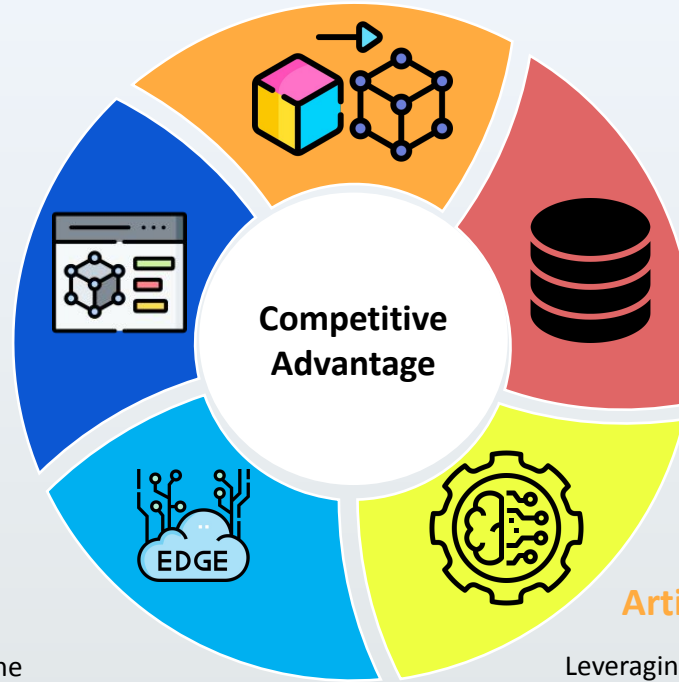
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Digital Twin Technology
Virtual replicas of physical systems to simulate, predict, and optimize the performance of materials and manufacturing processes in real-time

Multiscale Modeling
Advanced computational methods to simulate and predict material behaviors at the atomic or molecular level

Multimodal Data Ingestion
System's capacity to handle all kinds of data, including structured, unstructured, and semi-structured data from various sources and in multiple formats

Competitive Advantage

Edge Computing
Allows for data processing closer to the source of data generation, significantly reducing latency and enhancing real-time decision-making capabilities

Artificial Intelligence and Machine Learning
Leveraging AI and ML for predictive analytics, process control, and autonomous optimization of material synthesis and processing parameters. Sophisticated data analytics and visualization tools to handle complex datasets, revealing deeper insights into material properties and process efficiencies

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Partnership Structures

materialsIN leverages partnerships with larger companies and NGOs to bring the company's products to market.

materialsIN provides its robust suite of products to its partners to enhance their offerings, get-to-market quicker, generate revenues, and better service their customers.

Partnership structures include:

- Strategic Partnerships
  - Licensing Deals
  - Joint Ventures

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Team

A serial entrepreneur and business consultant, Frits has founded, operated, provided strategy for, and raised funding for a wide array of startup ventures in New York City, Boston and Buffalo over the last twenty years.

E. Frits Abell
CEO

A pioneer in developing the field of Materials Informatics, Krishna is a materials scientist with over thirty years of experience in advanced materials development for applications in medicine, aerospace, microelectronics and manufacturing industries.

Krishna Rajan
CSO

Chitra, trained as an economist, has twenty-four years of executive level experience in academic and research administration with extensive experience in developing and implementing large-scale programs, research consortia, and technology based partnerships.

Chitra Rajan
COO

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Ruhil Dongol Dir, Materials Science Applications

Ruhil is highly experienced in data-driven projects to find innovative machine learning solutions for engineering problems, and a recent project includes implementing dimensionality reduction techniques to explore chemical space for automatic detection of classification patterns. Previously, he has worked with private clients to develop prototypical machine learning models that rapidly searches a composition space for desired materials property and collaborated in natural language processing (NLP) projects to build a zero-shot learning text classification model.

Arpan Mukherjee Dir, Data Science Applications

Arpan Mukherjee is a computational scientist who has conducted research in developing algorithms that can be applicable to various engineering problems. His areas of specialization are Statistical Modeling, Machine Learning, Deep Learning, Scalable Algorithms, Nonlinear Dynamics, Uncertainty Quantification and Multi-objective Optimization.

Ilya Kuchuk Dir, Product Development

A senior operating executive with over 25 years of experience in management, strategic planning, business, industry and university research, and product development, Ilya has operated several companies, where he defined business and product development strategy, successfully negotiated licensing and cooperation agreements and was responsible for developing new business opportunities, including product development, positioning & promotion, pricing, and policy decisions.

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www.materialsIN.com