

SHIONOGI's Spotfire Data Science Story

In July 2024, SHIONOGI presented their
Spotfire usage at Spotfire Pharmaceutical
Workshop Seoul.





SHIONOGI's company-wide data utilization initiatives and how Spotfire is used

07.04.24

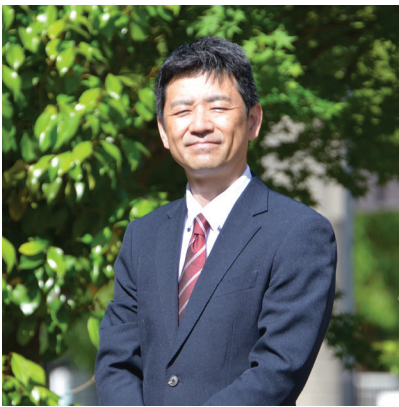
Shionogi & Co, Ltd.

DX Promotion Division

Data Science Department

Director

Shinichi Fukunaga



The presentation, delivered by Shinichi Fukunaga san from the Data Science Department of Shionogi, is titled "SHIONOGI's Company-wide Data Utilization Initiatives and How Spotfire is Used."

It is divided into two parts: an overview of Shionogi's data initiatives and specific Spotfire use cases, which will be introduced by Masayuki Kobayashi san in the second half.

Shinichi Fukunaga-san outlined his career, highlighting his experience as a medical representative since 1996 and his transition to data warehousing and data science roles from 2020. Shionogi, a Japanese pharmaceutical company established in 1878, is focused on its 2030 vision of "Creating the Future of Healthcare on a New Platform," including AI-SAS development. The company specializes in areas like infectious diseases, the central nervous system, and cancer pain.



Company Name	Shionogi & Co., Ltd.
President and CEO	Isao Teshirogi
Establish	March 17 th , 1878
Head Quarter	Osaka, JAPAN
Employee	5,680
Sales Revenue	426.7 billion JPY

(FY 2023 4Q)

SHIONOGI's 2030 Vision

Creating the Future of Healthcare on a New Platform

- Innovation through the evolution of creativity and expertise, the core of collaborative platform creation.
- Creating innovative products and delivering them to the world with the right information at the right quality and price.
- Work to achieve the SDGs and contribute to the realization of days when no one is afflicted by disease or suffering.

Focus Area

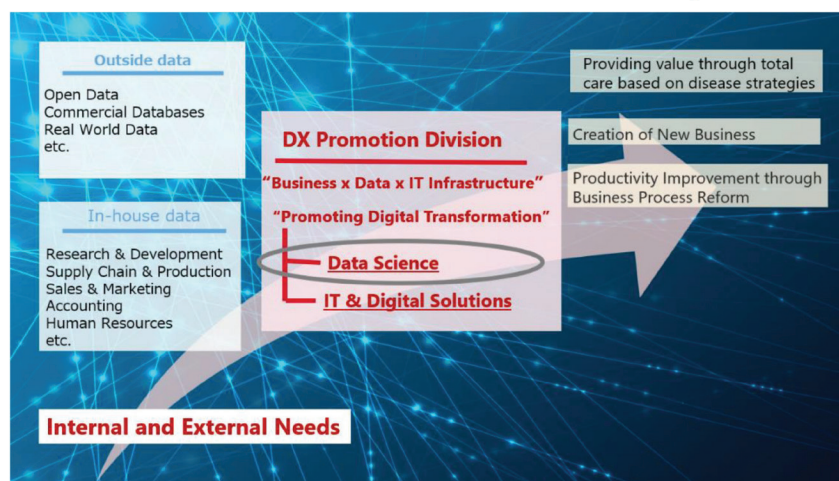
- **Infectious Disease Drugs** (e.g. COVID-19, influenza, antibiotics)
- **Antidepressant** (e.g. depression, etc.)
- **Cancer Pain and Side-Effect Relievers**

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The Data Science Department, positioned under the DX Promotion Division alongside IT, plays a critical role in achieving digital transformation (DX). Collaboration between these departments is key to Shionogi's success, as evidenced by being recognized as a "DX Stock 2023" by Japan's Ministry of Economy, Trade, and Industry. Their work spans the entire value chain, including research, clinical trials, sales, HR, and accounting.

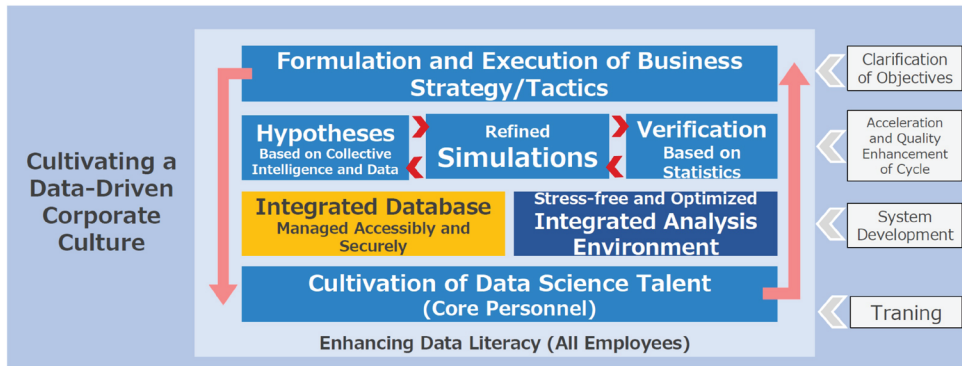
Roles of DX Promotion Division and Data Science Department



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Focus Area of Data Science Department



In order to execute a data-driven business, it is important to rapidly understand the status of strategy and tactic implementation, and to have a system that can identify and address issues.

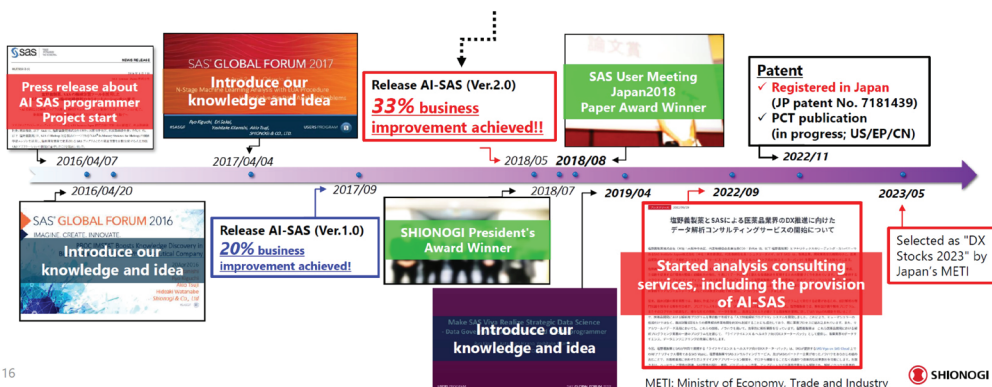
The accumulation, analysis, and visualization of data are crucial.

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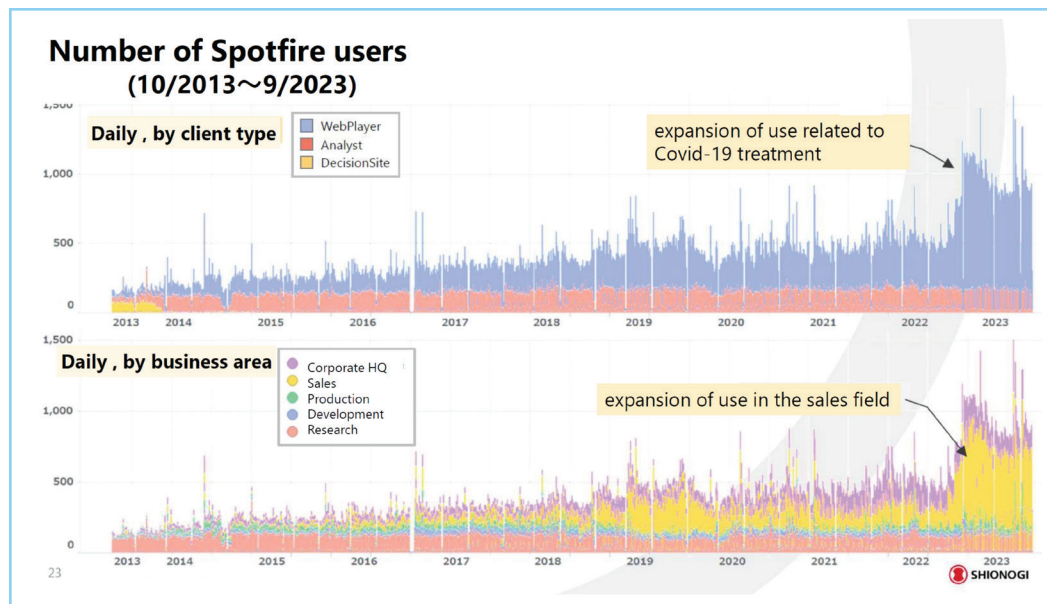
A significant portion of the presentation introduced AI-SAS (Artificial Intelligence SAS), a system developed with SAS Institute Japan starting in 2016. AI-SAS operates in three steps: recognition, learning, and action. It analyzes clinical trial data and semi-automatically generates programs, significantly improving efficiency. Version 1, released in late 2017, achieved a 20% business improvement, while Version 2, released in 2018, improved productivity by 33%, reducing standard programming time by 100 hours. AI-SAS has been recognized both internally and externally for its impact.

AI-SAS's History and Result

Achieved a reduction of 100 hours out of 350 hours of standard work time per clinical trial



Shinichi Fukunaga san explained the changes in the number of users of Spotfire Analyst and Spotfire Consumer at Shionogi, using data from 2013 onwards. In particular, we can see that the number of daily users exceeded 1,000 around the time of covid19 treatment in the latter half of 2022. Looking at the number of users in the sales department, the growth in the number of users has clearly increased sharply since the latter half of 2022.



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Leveraging Spotfire for Clinical Research

Efficiency and Beyond: Expanding SHIONOGI's Capabilities

07.04.24

Shionogi & Co, Ltd.

Department of Data Science, DX Promotion Division

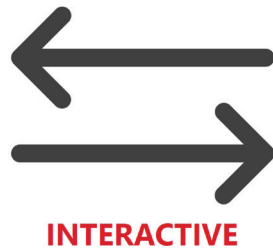
Masayuki Kobayashi



In the second half of presentation **“Leveraging Spotfire for Clinical Research Efficiency and Beyond: Expanding SHIONOGI's Capabilities”** by Masayuki Kobayashi san, a member of Shionogi's Data Science Department, at the Spotfire Pharmaceutical Workshop 2024 in Seoul focuses on leveraging **Spotfire** to enhance clinical research efficiency and explores its broader applications.

What I want to share with you today

To unlock the value of data, **interactive** visualization is necessary



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Introduction and Background:

- Masayuki Kobayashi san's background includes roles in pharmaceutical sales and digital transformation within Shionogi.
- The presentation emphasizes the importance of interactive visualization in unlocking data value for clinical research.

Using Spotfire in Clinical Research:

- Spotfire excels in post-marketing clinical research, enabling the testing of unverified hypotheses and generating new ones.
- The analysis process is outlined in three steps:
 1. Examining data distributions.
 2. Evaluating relationships between variables.
 3. Stratifying visualizations to uncover insights.

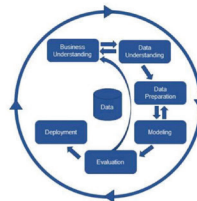
What is Spotfire ?

I consider Spotfire specialized for data mining.

Once you input the data, you can easily and interactively visualize hypotheses.



Hypotheses are generated
in a chain reaction



Accelerate
the analysis cycle
at high speed

Shneider C. The CRISP-DM model:
the new blueprint for data mining. J Data Warehousing (2000), 5:13-22.

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Why should we use Spotfire in clinical research?

It is valuable to visualize ideas on the spot during discussions with other professionals

Without Spotfire

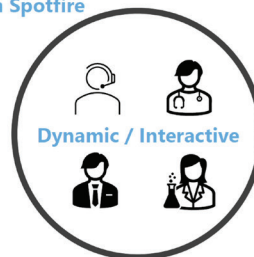


One-way



If there are any suggestions,
they need to be taken back for analysis,
which lacks agility.

With Spotfire



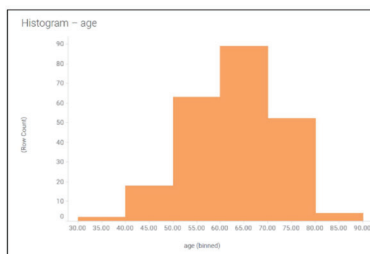
Statisticians and programmers are not necessarily experts in medicine or pharmacology

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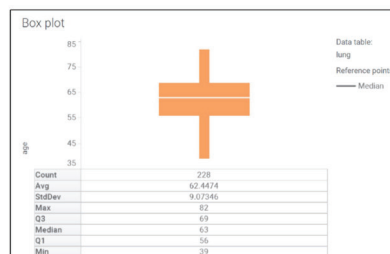


What is 1st step of using Spotfire in clinical research exploration?

The 1st step is to examine the distribution of the background information of the data



Is the variable normally distributed ?



Are there any outliers ? etc.

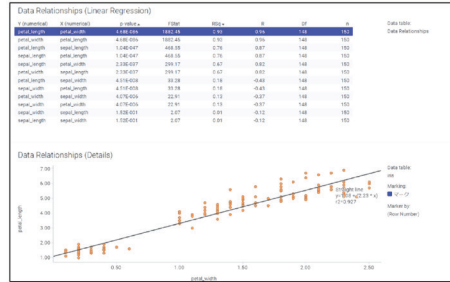
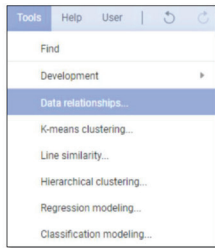
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[lung: NCTG Lung Cancer Data in survival: Survival Analysis \(rdrr.io\)](#)



What is 2nd step of using Spotfire in clinical research exploration?

To evaluate the influence between variables, we will use "Data Relationships"



What factors are influencing the results?
Is there any confounding due to correlations between factors?

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[The Iris Dataset — scikit-learn 1.0.0 documentation](#)

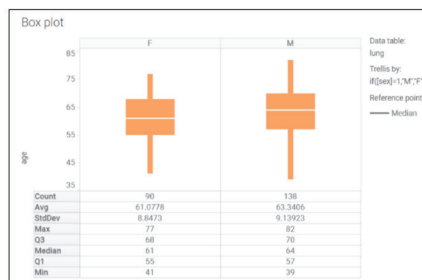


What is 3rd step of using Spotfire in clinical research exploration?

We stratify visualizations using filters and trellises to uncover further insights



For example, by narrowing down to subgroups, we can identify populations where the effects of the drug are more pronounced



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[lung: NCCTG Lung Cancer Data in survival: Survival Analysis \(rdrr.io\)](#)

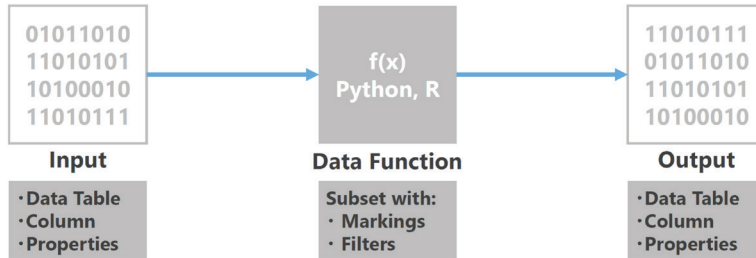


Advantages of Spotfire:

- Facilitates dynamic and interactive analysis, especially during discussions with medical and non-statistical professionals.
- Simplifies complex tasks, such as survival analysis and decision tree modeling, by integrating R and Python functions.

How can we further enhance the capabilities of Spotfire?

By using "Data Function", we can extend integration with Python and R



We can visualize the analysis results based on parameters specified by the user

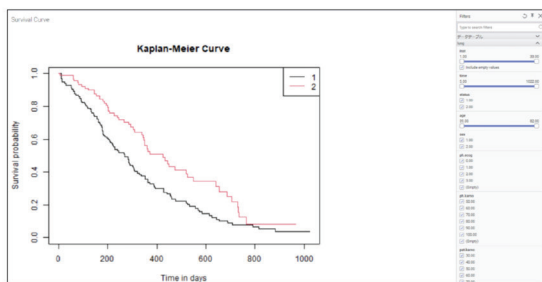
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TIBCO Spotfire Data Function Library: Python and R Scripts for Data Analysis

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Can survival analysis be implemented in Spotfire?

By combining Spotfire with R package "Survival," it can be easily implemented



Kaplan-Meier plots with custom parameters, filtering, and grouping can be implemented through the Spotfire UI

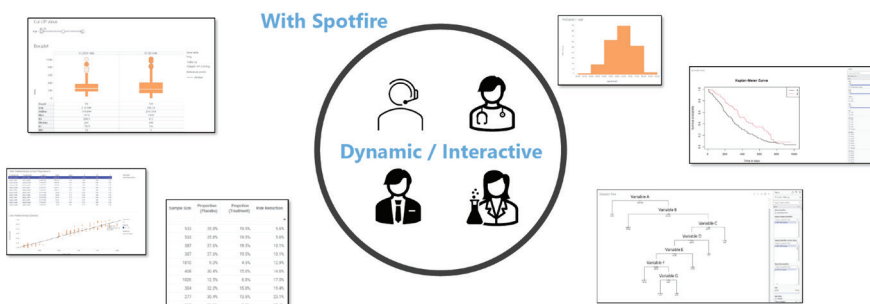
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lung: NCCCTG Lung Cancer Data in survival: Survival Analysis (rdrr.io)

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Conclusion: What are the benefits of Spotfire in clinical research?

Analysis becomes dynamic and interactive, deepening insights through diverse perspectives



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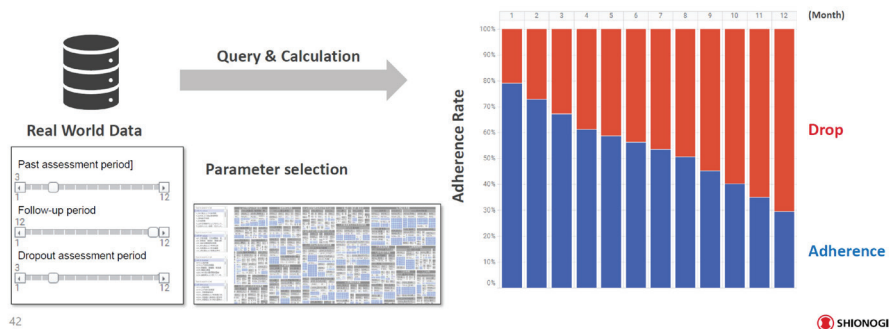
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Expanding Spotfire's Capabilities:

- Future plans include greater integration with SAS language and leveraging real-world data for actionable insights.
- examples include adherence rate visualization, patient journey analysis, and sales forecasting.

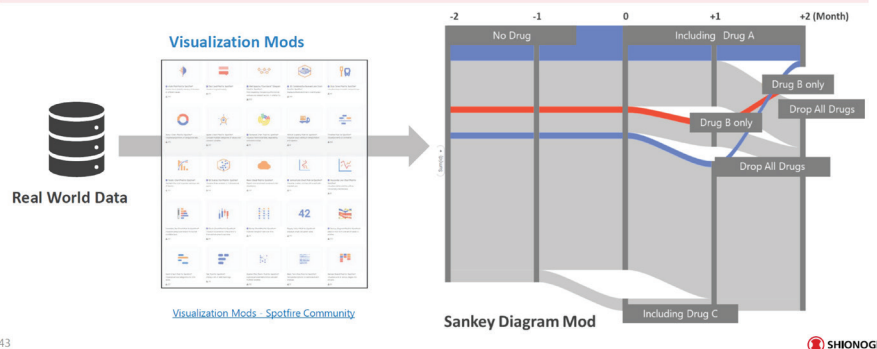
For example, what can be achieved with real-world data?

We can visualize adherence rates for any specified period and drug group



What else can be achieved with real-world data?

Visualize patient journeys and use this information to inform decision-making

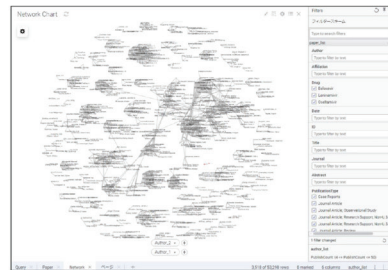


What can be achieved with the Network Chart Mod?

Spotfire can visualize co-authorship information of Key Opinion Leaders



The screenshot shows a Spotfire Data View with a table of co-authorship data. The table has columns for 'Author', 'Co-author', 'Year', 'Citation', and 'Co-citation'. The data is filtered for 'Author' and 'Co-author'.



By using Data Function, we can easily leverage the PubMed API

KOL MAP

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How is it contributing to marketing?

We can also easily create a sales forecasting tool using the SARIMA model.



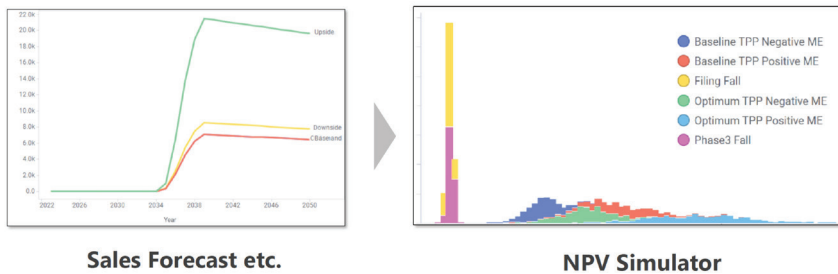
Sales Forecast

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How does it contribute to the product portfolio?

Implementing Monte Carlo simulations in Spotfire aids probabilistic decision-making



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Impact on Analysts:

- Spotfire transforms analysts' roles from data processors to key players in driving business digital transformation.
- Kobayashi san stresses the need for interactive analytics to democratize data-driven decision-making.

Conclusion: How does Spotfire change the role of analysts?



**Analysts have evolved
from data analysts
to key agents of business DX**

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Conclusion:

- Encourages adopting Spotfire to turn one-way meetings into collaborative, interactive sessions.
- Advocates expanding the "circle of co-creation" by leveraging Spotfire's capabilities.

Conclusion and Summary

How should we effectively utilize Spotfire?

- To transform one-way meetings into interactive discussions, making analyses interactive is essential.
- Analysts have the potential to drive business transformation through Spotfire.



Let's expand the circle of co-creation by leveraging this exciting tool!

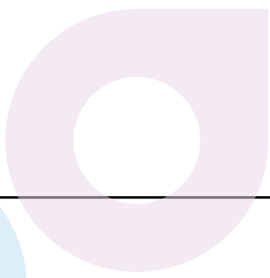
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Shionogi's presentation showcases how Spotfire is integral to advancing Shionogi's data-driven initiatives, offering a vision for broader use in clinical and business contexts.



Revvity Signals appreciated Shionogi's Spotfire usage and collaboration.





revvity signals

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