Better Use of Real-World Data through Predictive Analytics:
A Knowledge-to-Wisdom Conceptual Framework for Evidence-Based Practice

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Introduction

In the era of healthcare technology and advanced analytics in healthcare, it is inevitable to use analytics and predictive models. However, evidence-based medicine (EBM) should contain and accommodate these advancements and govern their use.

There is a need to better use real-world data (RWD) —routinely collected outside the context of clinical trials – to generate knowledge to inform clinical practice and apply Evidence-based Practice (EBP), to improve care and outcomes.

Objectives

To develop a conceptual framework about how to make better use of real-world data (RWD) using predictive analytics that transforms knowledge into wisdom for evidence-based practice (EBP).

Methods

We used the data analytics continuum model (descriptive, diagnostic, predictive and prescriptive analytics) to highlight the four stages of data analytics, where 'descriptive analytics answer the question of "what happened?", 'diagnostic analytics' answers "why did it happened?", 'predictive analytics' answer "what will happen?", and 'prescriptive analytics' answer "how can we make it happen?".
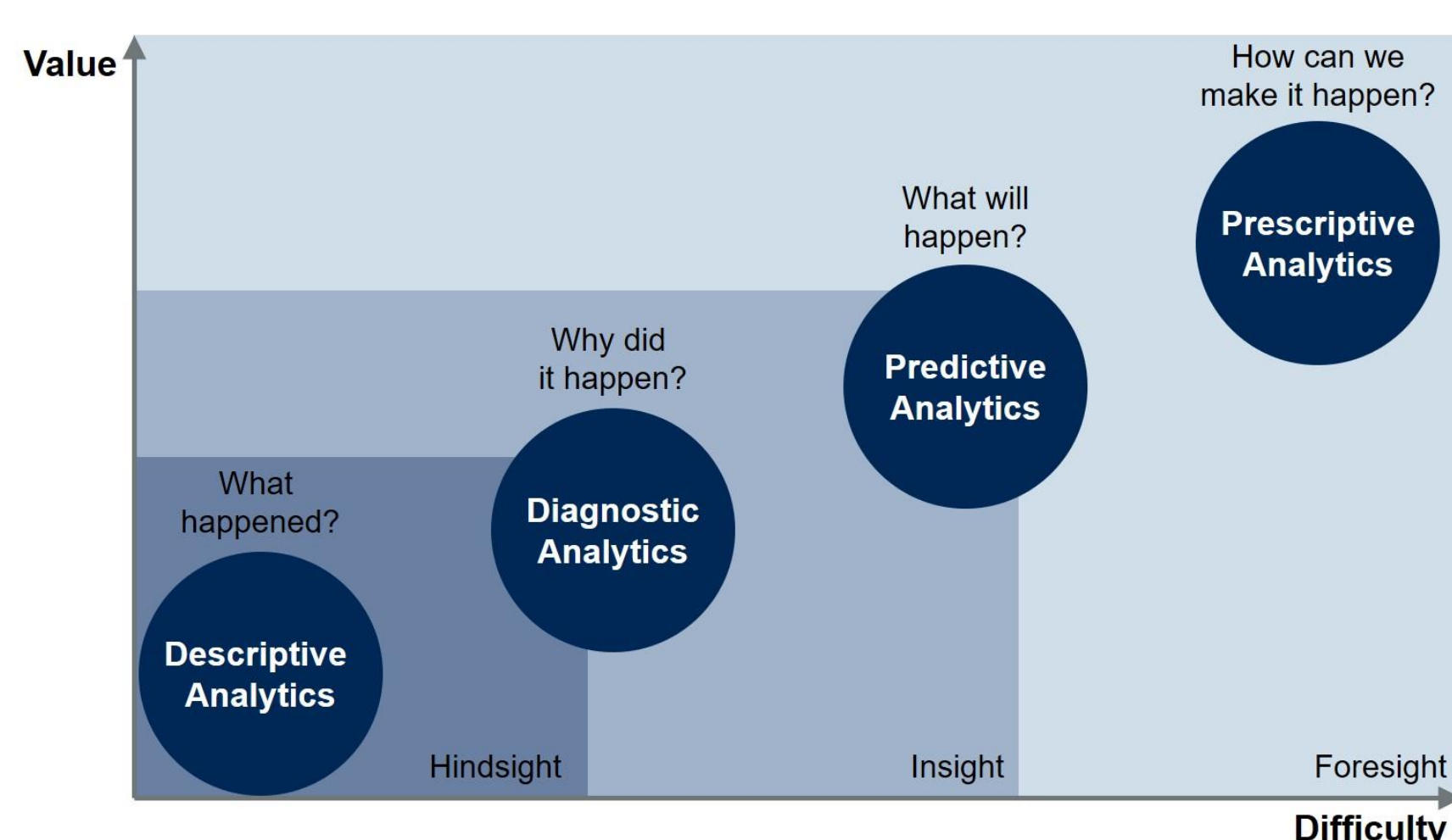

Figure 1. Gartner Data Analytics Continuum

The four phases of data analytics needed for decision-making include: descriptive, diagnostic, predictive and descriptive.

We also used the DIKW (data-information-knowledge-wisdom) hierarchy model referring to 'data' as real-world data (RWD), where 'information' represents understanding relations, 'knowledge' represents understanding patterns, and 'wisdom' represents understanding the principles. We combined the data analytics model and the DIKW hierarchy model to develop a novel conceptual framework that translates knowledge into wisdom with the help of predictive analytics. This framework builds on the concepts of evidence-based practice and the knowledge translation framework.
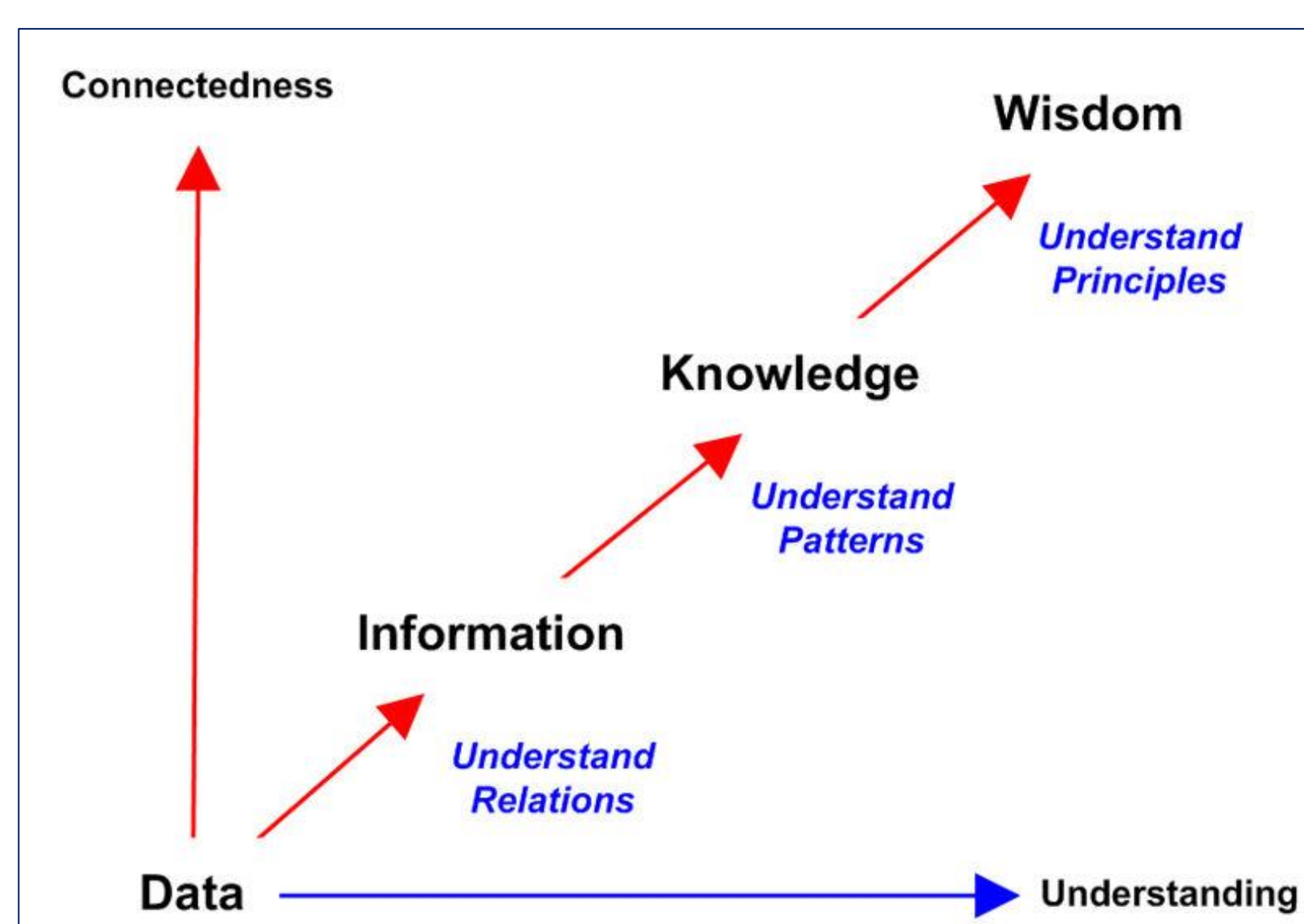

Figure 2. Data–information–knowledge–wisdom

The DIKW Pyramid represents the relationships between data, information, knowledge and wisdom. Each building block is a step towards a higher level.

Results

The developed conceptual model states that: descriptive and diagnostic analytics would translate RWD into real-world evidence (RWE), which corresponds to the knowledge generated. Then, applying predictive analytics (making predictions about the future based on RWE coupled with evidence from the literature and clinicians' experience) would generate the necessary knowledge based on contextual scenarios. After that, applying prescriptive analytics would translate knowledge into wisdom in making informed clinical decisions (implementing evidence-based practice).

Conceptual Framework to use RWD and translate it into EBP
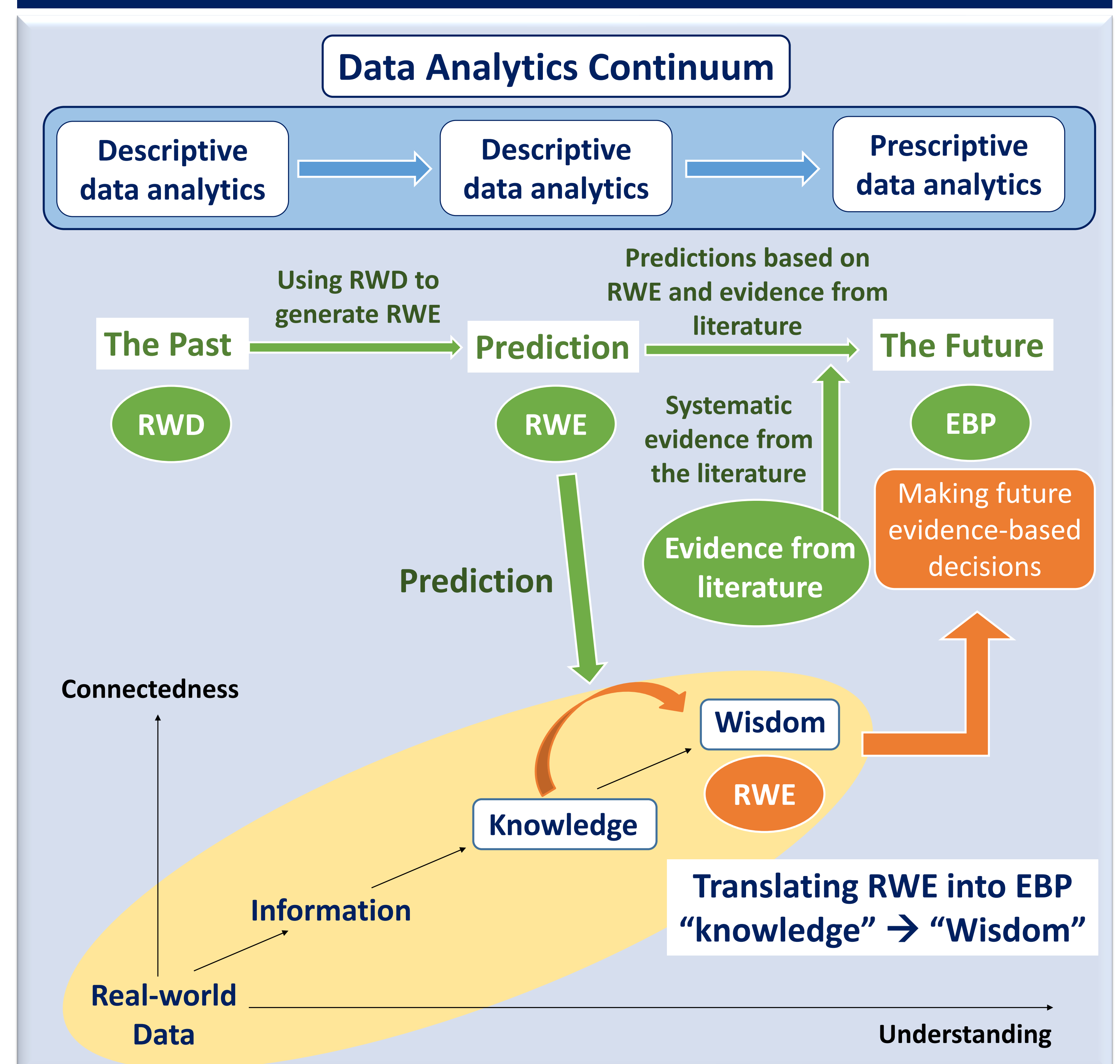
This would lead to creating learning healthcare systems that learn from RWD, make predictions about the future (generate the necessary knowledge), and turn this knowledge into wisdom in creating an evidence-informed culture that is driven by RWD.

Conclusion

This novel conceptual framework encourages better use of RWD and governs the application of data analytics to translate knowledge into wisdom to adopt evidence-based practice. This knowledge-to-wisdom framework would have practical implications in adopting data analytics in healthcare diagnosis, management, and decision-making, based on evidence.

References

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