

## Cognitive Recommendation Engine (CoRE)

Category name **Best Achievement in Data Analytics enabling Operational Excellence.**

### [Executive Summary]

*Synopsis: a 250-word synopsis of the Operational Excellence activity.*

IBM's breadth of product and service offerings can make it difficult for sales professionals to know which offering for a particular client's needs. Over many quarters, a shortage in sales pipeline has been observed, which has led to a situation where revenue targets are at risk.

The Cognitive Recommendation Engine (CoRE) is a groundbreaking artificial intelligence platform that enables the data-driven sales recommendations to assist sales professionals to better address the client's needs and help generate additional sales opportunities.

CoRE applies industry leading machine learning algorithms developed by IBM to discover sales opportunities automatically from vast amount of data. The underlying algorithm is defining the state of the art in the recommendation engine domain. CoRE empowers IBM's sales force to uncover deep client need, predict emerging opportunities and prescribe optimal solutions with unprecedented depth and precision — fundamentally transforming how sales opportunities are identified. CoRE is deployed with APIs to be easily scalable and consumable.

Building and implementing CoRE has also led to evaluate and remove existing overlapping initiatives and standardize sales recommendation analytics within IBM.

The impact CoRE has generated since its deployment in 2017 includes 80% increase in sales opportunity generation with 6% improvement in win rates in new client discovery space, over \$2B newly created opportunities from targeted clients and 83% reduction in overlapping initiatives around sales recommendations.

CoRE is a compelling demonstration and proof-point of how AI is being successfully deployed within IBM as we transform to become the world's premier Cognitive Enterprise – IBM's vision.

### [Problem Statement]

1. IBM continues to have a significant challenge in **identifying new opportunities** to meet revenue targets
2. **Multiple initiatives** addressing the same challenge have been underway pursued by **many internal organizations**. Each initiative is using **different data, analytics and tools**.
3. There is no single **cognitive solution** leveraging both **structured & unstructured data** from **internal & external** sources
4. IBM is transforming to be the **world's premier cognitive enterprise**. The **state of art solution** needs to be built and used to prove our internal transformation success.

## [IBM's solution]

The Cognitive Recommendation Engine (CoRE) provides high potential IBM offerings or solution recommendations for targeted clients and a list of high potential clients and prospects for targeted offerings.



Support sales professionals in identifying new sales opportunities

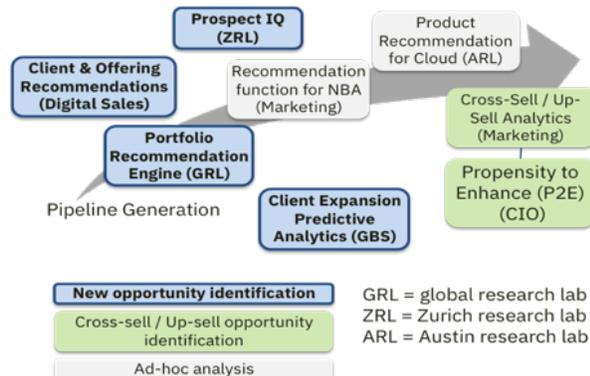


- **Cognitive solution using best-of-breed data and analytics** addresses the new opportunity generation challenges
  - Identify **high propensity offerings/solutions** for given clients
  - Identify **high propensity clients** for given offerings
  - Exploits **advanced cognitive techniques** to strengthen analytical model
  - **Information** to be surfaced for sellers to use through multiple delivery mechanisms (**APIs will be used**)

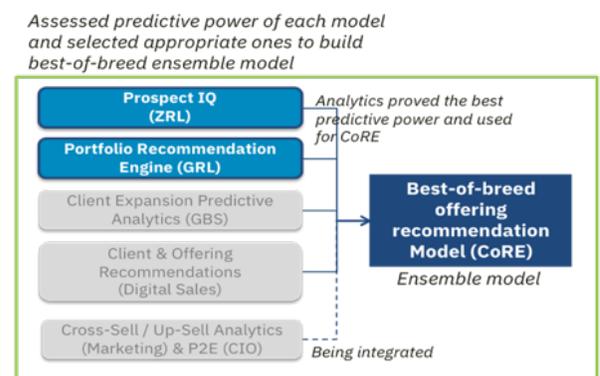
## [Development of CoRE]

During the development of CoRE we faced a number of challenges. There were multiple initiatives and tools providing overlapping capabilities. Each initiative was using different data sets and methodologies without evaluating accuracy of outcomes. The team took an approach to evaluate each initiative and analytics and assess a predictive power of the models.

**Before**  
Sellers have limited capacity to absorb multiple analytical assets with overlapping functions



**After**  
Single view of recommendations based on best-of-breed data and analytics are now available



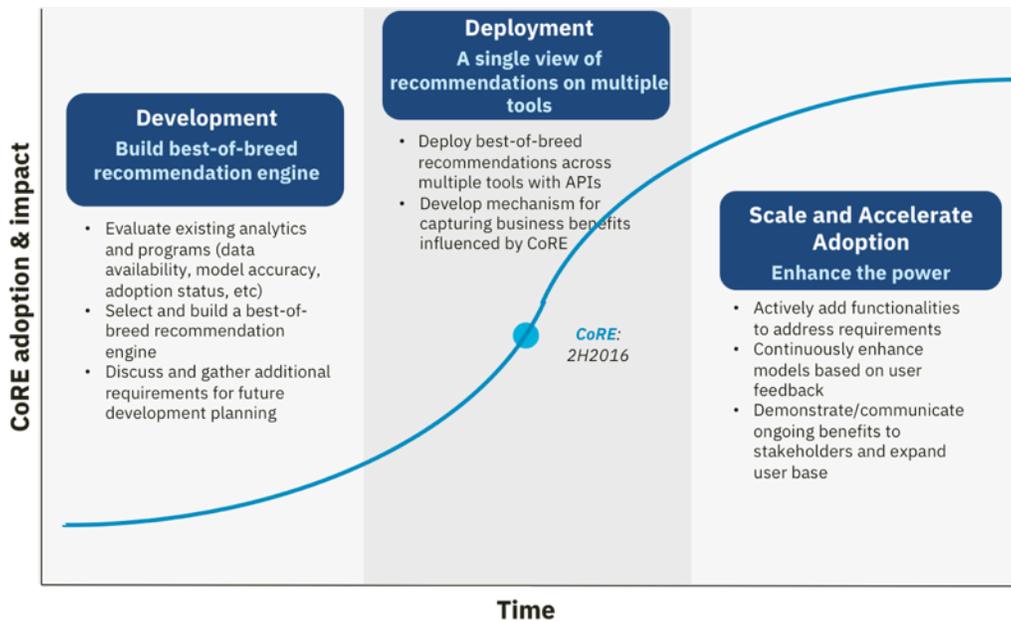
## [Implementation of CoRE]

APIs were used to make CoRE available to users. Using APIs has made CoRE more scalable and easily consumable by multiple sales tools including CRM systems. The team has worked very closely with each tool owner and sales team to develop an implementation plan, conduct educational sessions for users and continuously conduct feedback sessions to make improvements for the model as well as processes.

The collaboration with tool owners and sales teams has also impacted a culture of sales teams and processes - putting cognition in sales professionals' hands to help make the right

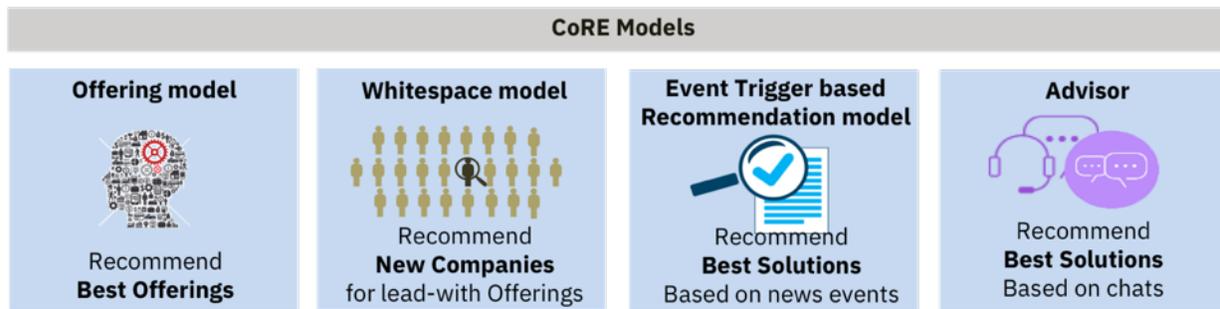
decisions, the data driven analytics is used widely through multiple tools to support opportunity discovery processes.

## Implementation and Adoption journey



### [Innovation to lead the world’s premier cognitive enterprise – IBM’s vision]

It was important for CoRE to build and integrate the most advanced cognitive capabilities to lead IBM’s vision of transforming into the world’s premier cognitive enterprise. CoRE has successfully built and integrated a number of artificial intelligence techniques and capabilities that are proven to be the state of art in the industry - the team has filed a number of patents and presented the methodologies at notable conferences. (e.g. NIPS)



A short 3-min video providing overview of the Cognitive Recommendation Engine (CoRE) is available at: <https://ibm.box.com/s/scfq15bdzm47c6wl55ts37flbucyqt52>.

Cognitive innovation CoRE model	Artificial Intelligence (AI) dimensions
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|---|---|
| <ul style="list-style-type: none"> <li>• Build <i>machine learning models</i> to identify hidden client purchase behaviors and sales patterns. Key methodologies include collaborative filtering (user based + item based), Naïve bayes, Co-clustering. <i>The ensemble model (greedy boost)</i> to combine outputs and ensure accuracy.</li> <li>• Build a <i>NLP model</i> to extract and understand unstructured data from websites, a <i>machine learning model (support vector machine)</i> to analyze purchase pattern of IBM new clients &amp; extracted text and produce recommendations. Extracted texts will also be structured and provided as rationales for recommendations.</li> <li>• Build a <i>NLP model</i> to extract relevant events from news, a <i>machine learning model</i> to analyze extracted events &amp; IBM solution data and provide recommendations</li> <li>• Build a <i>machine learning model (Word2Vec)</i> to connect user inputs, analyze it and provide recommendations</li> </ul> | <ul style="list-style-type: none"> <li>• <b>Understand:</b> machine learning models to discover hidden client purchase behavior and sales patterns</li> <li>• <b>Reason:</b> provide machine generated rationale of sales recommendations</li> <li>• <b>Learn:</b> <ul style="list-style-type: none"> <li>○ re-train a model on a regular basis to incorporate the latest data to reflect any changes and trends</li> <li>○ capture and incorporate user feedback on the recommendations for the model to continuously learn and provide better recommendations</li> </ul> </li> <li>• <b>Interact:</b> capture knowledge and information from users through a chatbot and use as an input for a model</li> </ul> |
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### [Results]

#### Financial benefits

- 80% increase in sales opportunity generation related to new clients
- 6% improvements in win rates for targeted products to new clients
- Over \$2B newly created opportunities from targeted clients

#### Process improvement

- 83% reduction in overlapping initiatives around sales recommendations. (6 different initiatives/analytics into 1 initiative/analytics providing a single view of recommendations)

Transformed processes	Before CoRE	After CoRE
<b>Opportunity discovery and sales enablement process</b>	<ul style="list-style-type: none"> <li>• Sellers conduct manual activities (e.g. calling IBMers) to identify best offerings to propose</li> <li>• No single view of sales recommendations leveraging cognitive capabilities available</li> <li>• Multiple initiatives exist with overlapping sales recommendation capabilities</li> </ul>	<ul style="list-style-type: none"> <li>• CoRE provides a single view of sales recommendations</li> <li>• During the evaluation of existing analytics, CoRE has led a consolidation of duplicated analytics and initiatives</li> </ul>

#### Sales professionals (end user) and customer benefits

Benefits for sales professionals and clients	Before CoRE	After CoRE
<b>For sales professionals</b>	<ul style="list-style-type: none"> <li>• Sales professionals struggle to identify sales opportunities in order to achieve targets</li> <li>• Sellers spend a significant amount of time researching what the best offerings to propose to their clients</li> <li>• Sales professionals do not have a compelling story to use for a conversation with clients</li> </ul>	<ul style="list-style-type: none"> <li>• CoRE provides next best offerings &amp; solutions for a given clients or proposes a list of potential clients &amp; prospects for a given offering – help identify new opportunities</li> <li>• CoRE analytics provides a set of business rationale to use for a conversation with clients</li> </ul>
<b>For clients</b>	<ul style="list-style-type: none"> <li>• Clients experience based on an existing seller relationship – not enough analytical insights and compelling stories during conversations</li> </ul>	<ul style="list-style-type: none"> <li>• Analytics based offering / solution recommendations with a compelling business rationale to consider purchase – improving client engagement</li> </ul>