

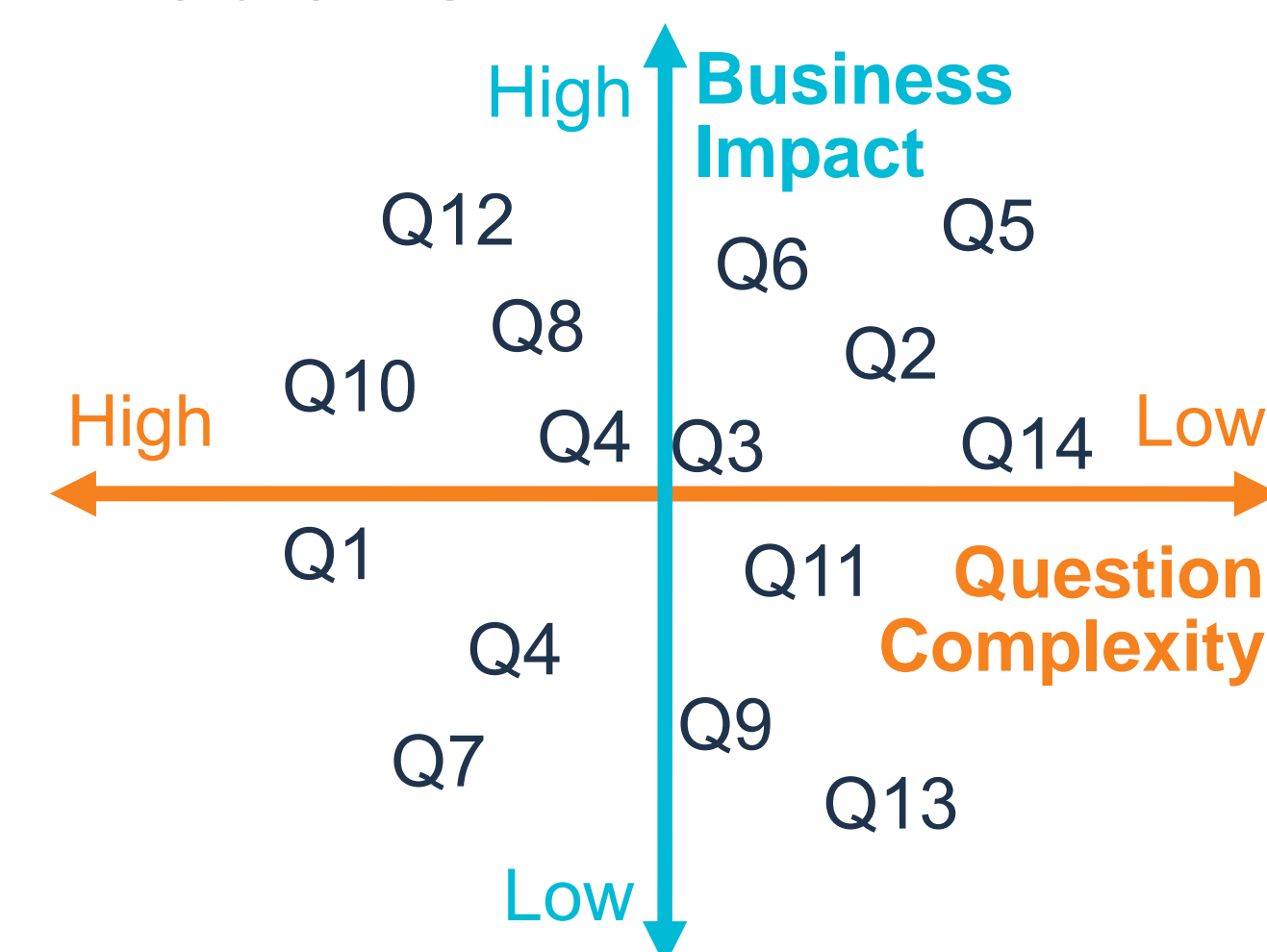
Recipe to Develop Artificial Intelligence

1. Identify Questions to Create Business Value

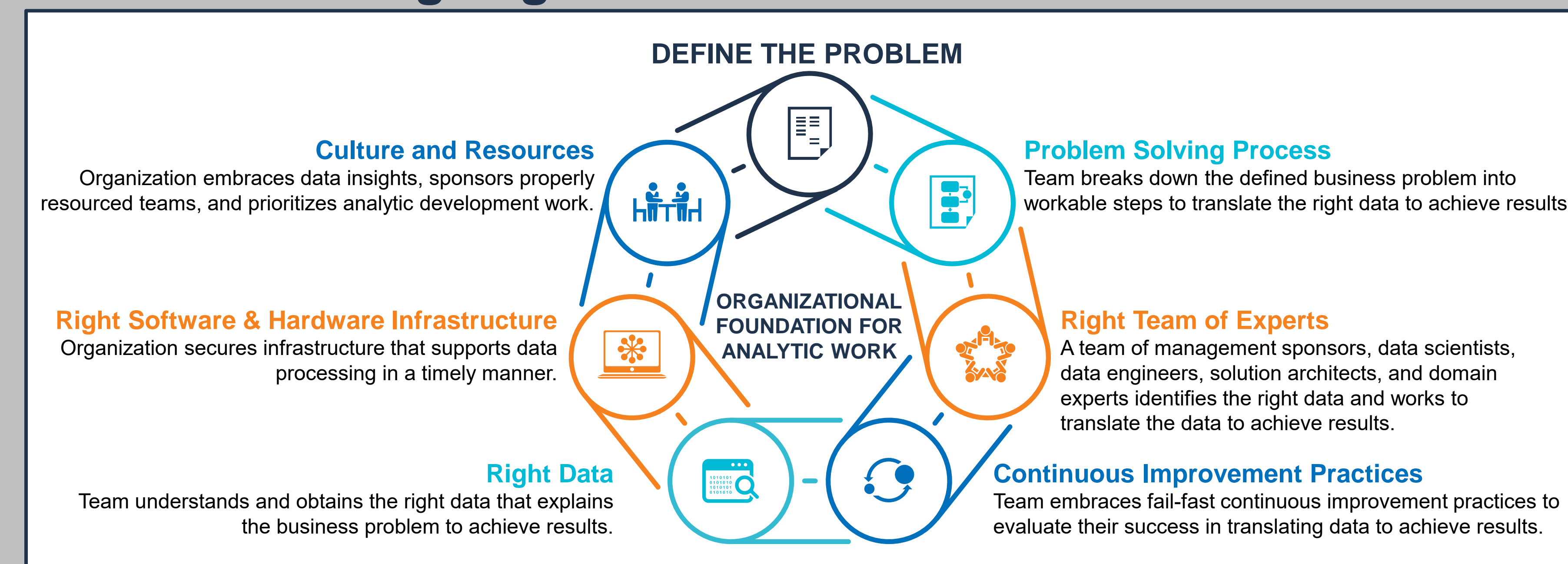
Brainstorm Business Problems

- Q1:** How can we minimize time to final product and consistently deliver in that time?
- Q2:** How do we cut waste from the system?
- Q3:** How do we predict when Machine A needs maintenance?
- Q4:** What are the top 10 defect issues for the Fab and predict when they occur?
- Q5:** Predict the overall yield for Widget for today?
- Etc.

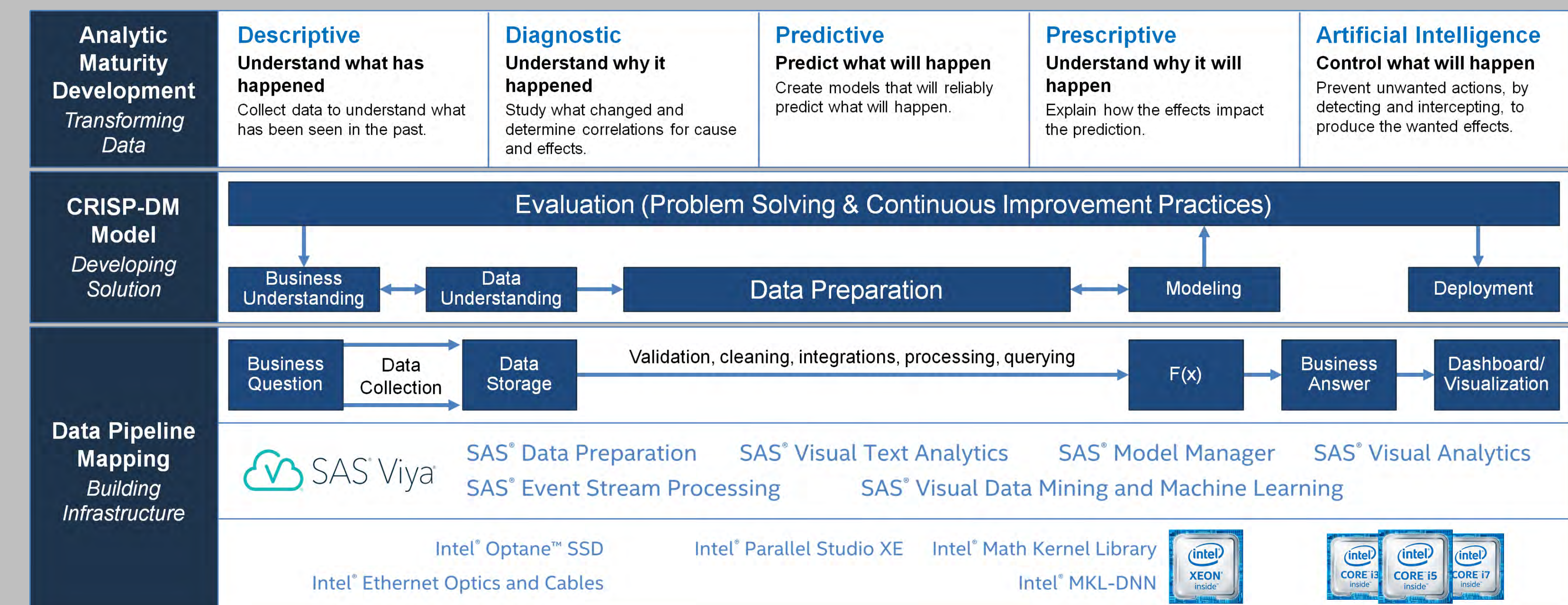
Prioritize the Business Problems



2. Mix in a Strong Organizational Foundation



3. Establish Processes to Achieve Results



4. Combine Results to Answer Bigger Business Questions

| | Analytics Type | QUESTION-ANSWER CONTEXT | | EXAMPLE | |
|-----------------------------|------------------------------------|--------------------------------|---|--|---|
| | | Who Asks Question | Answers Based On | Business Question | Correct Answer |
| Individual Business Results | Business Intelligence | Human asks a specific question | Compiled information | How many widgets need to be manufactured? | 100 |
| | Machine/Statistical Learning | Human asks a specific question | Algorithms using expert-defined features/attributes as inputs | Can we predict what our yield will be and determine what caused it? | Yield will be at 90%, where 10% yield loss is expected, based on process behavior. |
| | Deep Learning | Human asks a specific question | Algorithms that learn the input features/attributes | Which widgets have defects from pictures? | Widget 1003 Widget 1094 Widget 2045 |
| | Artificial Intelligence (Specific) | Human asks a specific question | Layer of algorithms with limited scoped contextual clues | What type of defects are detected? | Widget 1003 – Tolerance issue Widget 1094 – Etch issue Widget 2045 - |
| Combined Automated Results | Reasoning Systems | Human asks a specific question | Algorithms that learn associated related features/attributes | How are defect issues resolved? | Tolerance issue – Check that machine A is calibrated correctly Etch issue – Gas pressure dropped |
| | Artificial Intelligence (General) | System asks any question | Layers of algorithms that are aware of contextual cues determined by the system | If a yield loss is predicted, how many widgets are at risk and what needs to be done to correct the manufacturing process? | Machines A, B, & C start to drift in performance, indicating yield loss due to defect excursions from the above algorithm discovery. Algorithms send correction messages to the respective machines or take them off-line for maintenance to prevent further yield loss. The number of widgets to be manufactured is updated to 110, due to yield loss. |

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Sarah Kalicin
Intel Corporation



2. Mix in a Strong Organizational Foundation

DEFINE THE PROBLEM

Culture and Resources
Organization embraces data insights, sponsors properly resourced teams, and prioritizes analytic development work.

Problem Solving Process
Team breaks down the defined business problem into workable steps to translate the right data to achieve results.

Right Software & Hardware Infrastructure
Organization secures infrastructure that supports data processing in a timely manner.

ORGANIZATIONAL FOUNDATION FOR ANALYTIC WORK

Right Team of Experts
A team of management sponsors, data scientists, data engineers, solution architects, and domain experts identifies the right data and works to translate the data to achieve results.

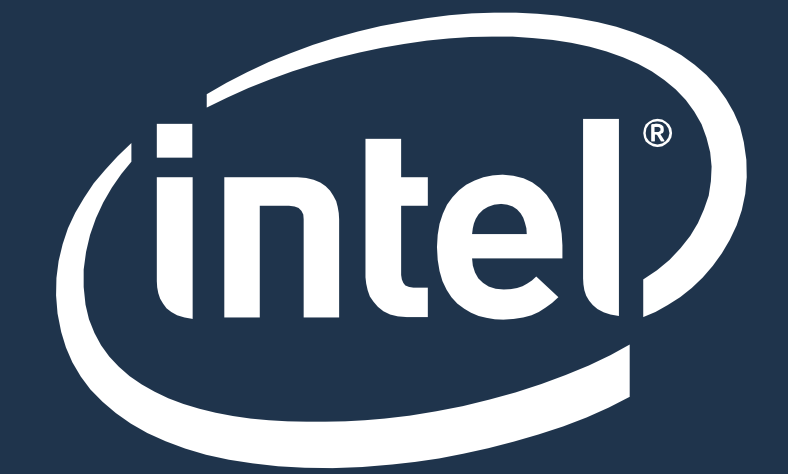
Right Data
Team understands and obtains the right data that explains the business problem to achieve results.

Continuous Improvement Practices
Team embraces fail-fast continuous improvement practices to evaluate their success in translating data to achieve results.

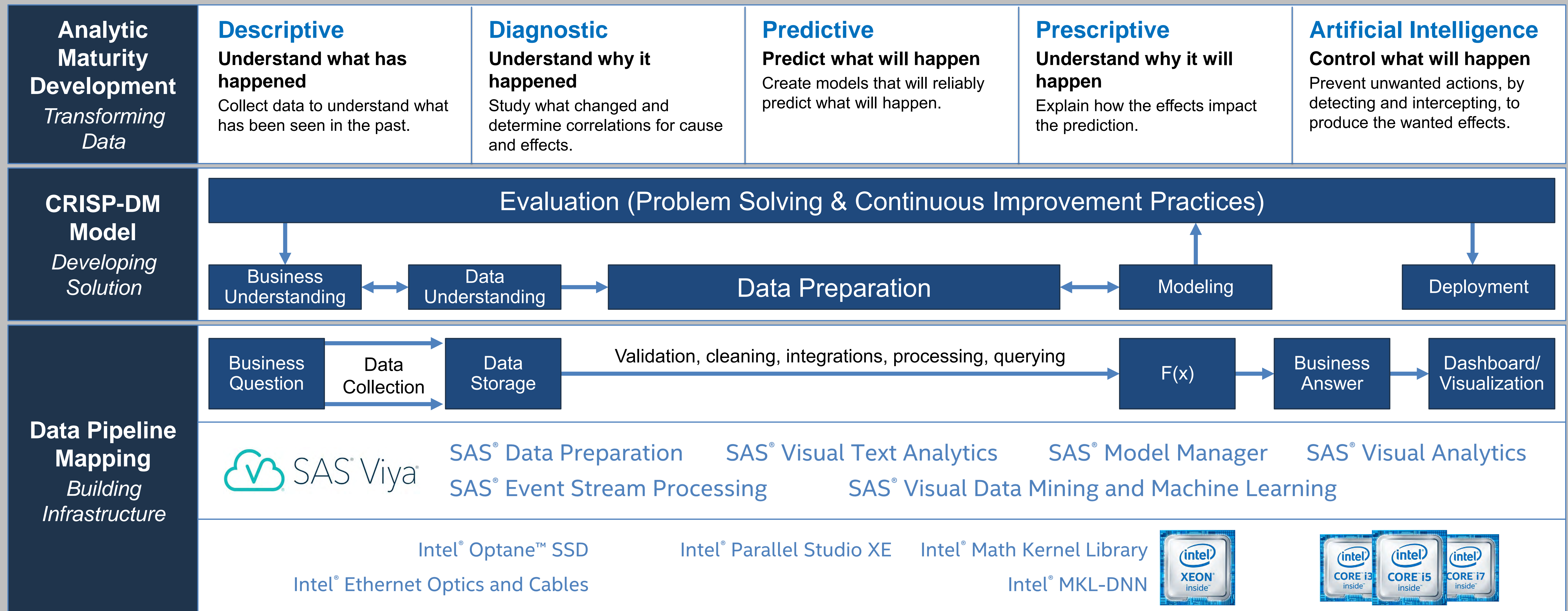


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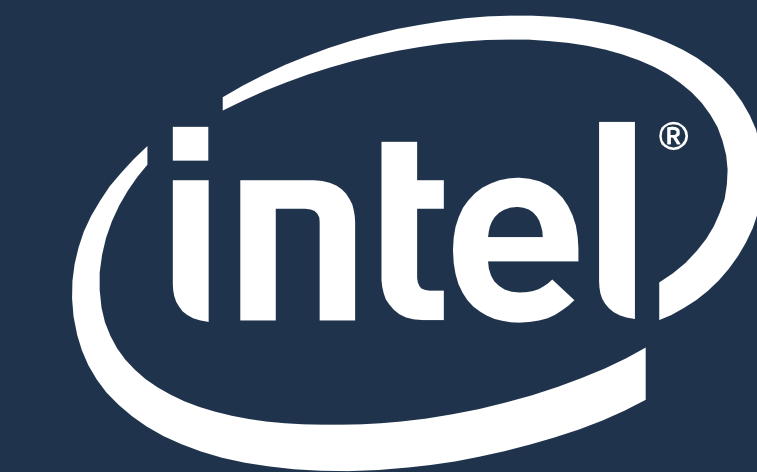
3. Establish Processes to Achieve Results



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