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Data-driven Decisions for Smart Enterprises

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Takeaway Messages

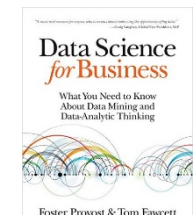
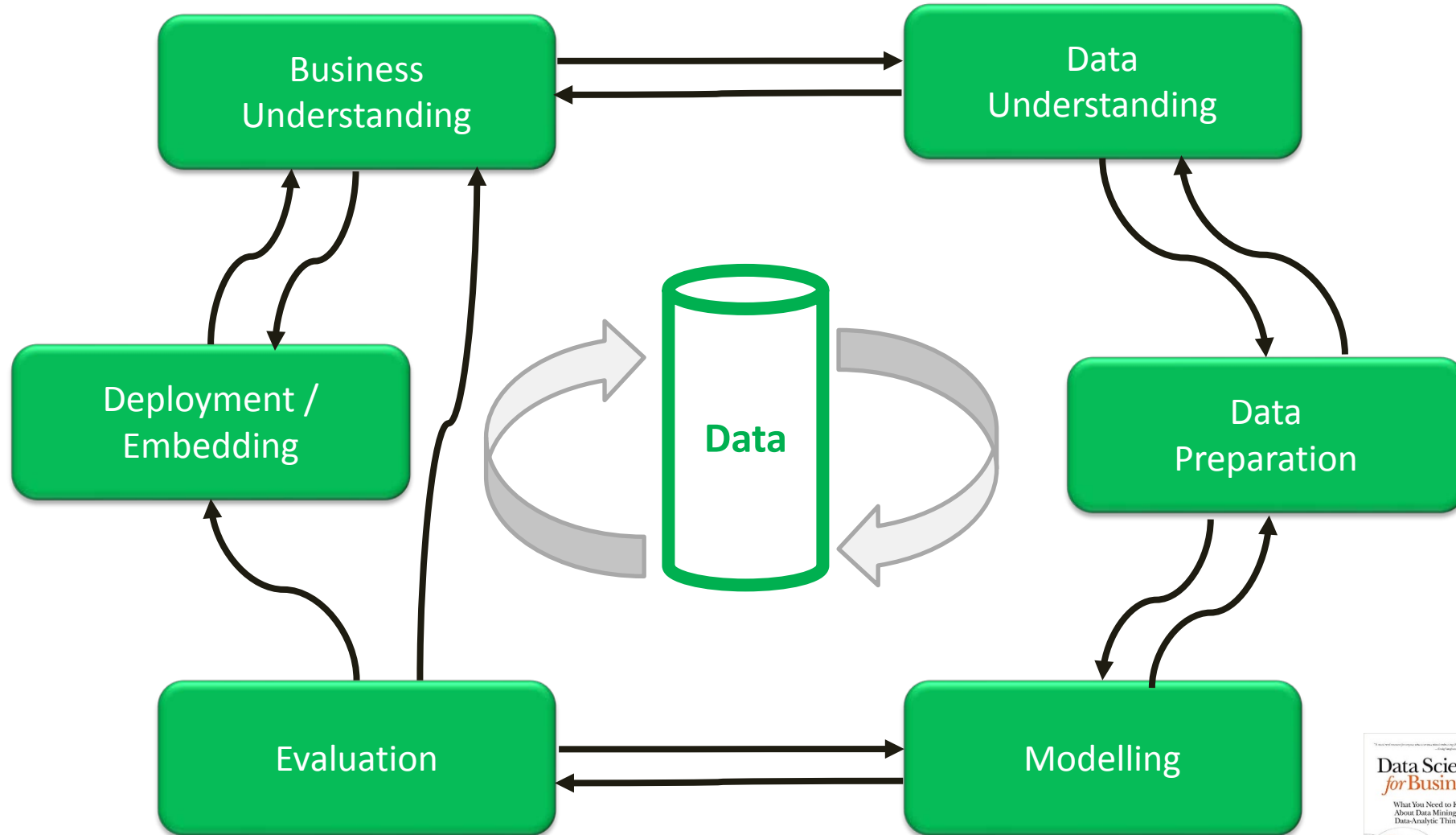
1. “Data-driven” is not only about data analysis
2. “Smart” means being able to use the knowledge immediately and in automated manner
3. Consider the dependencies between the data analytics results and the IT systems in use

Topics

- Data Science Life cycle
- Example: Use Case from Logistics
 - Results and additional recommendations
- Enabling the data-driven and smart enterprises
- Future Research

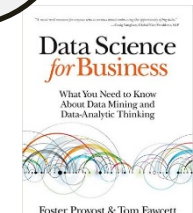
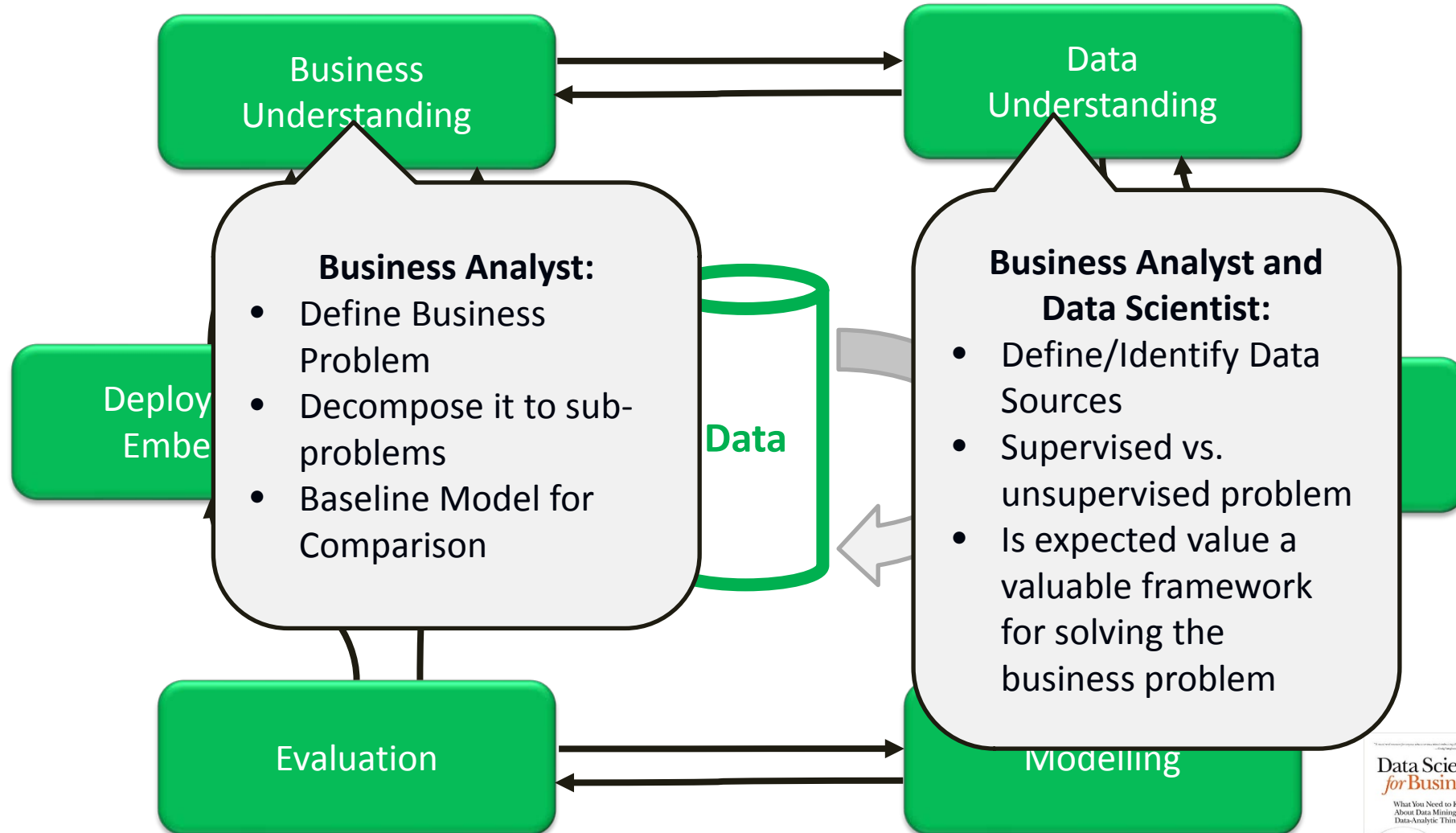
Data Science Life Cycle

- Life Cycle is of exploratory nature



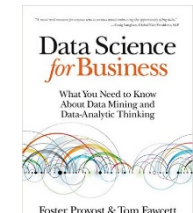
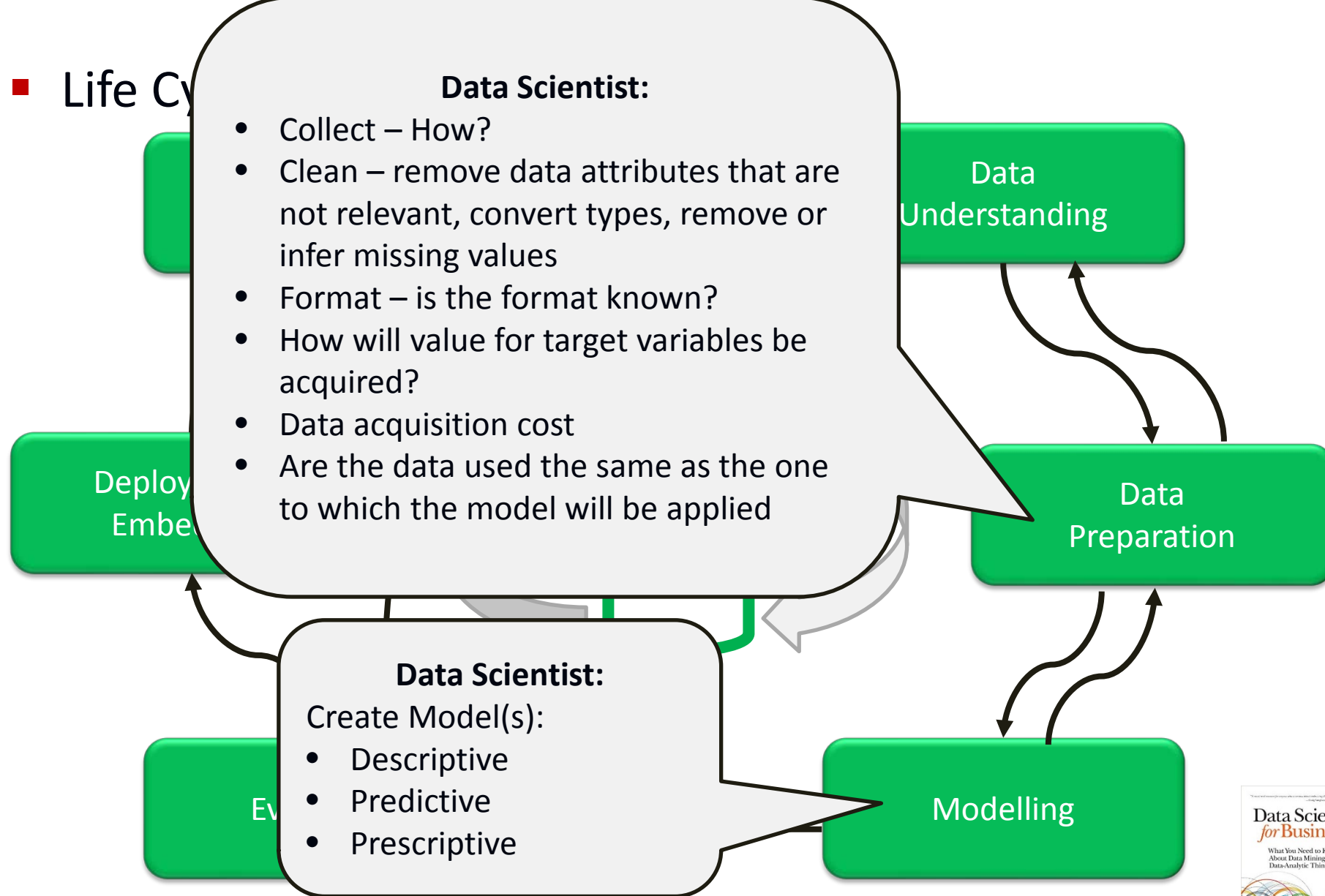
Data Science Life Cycle

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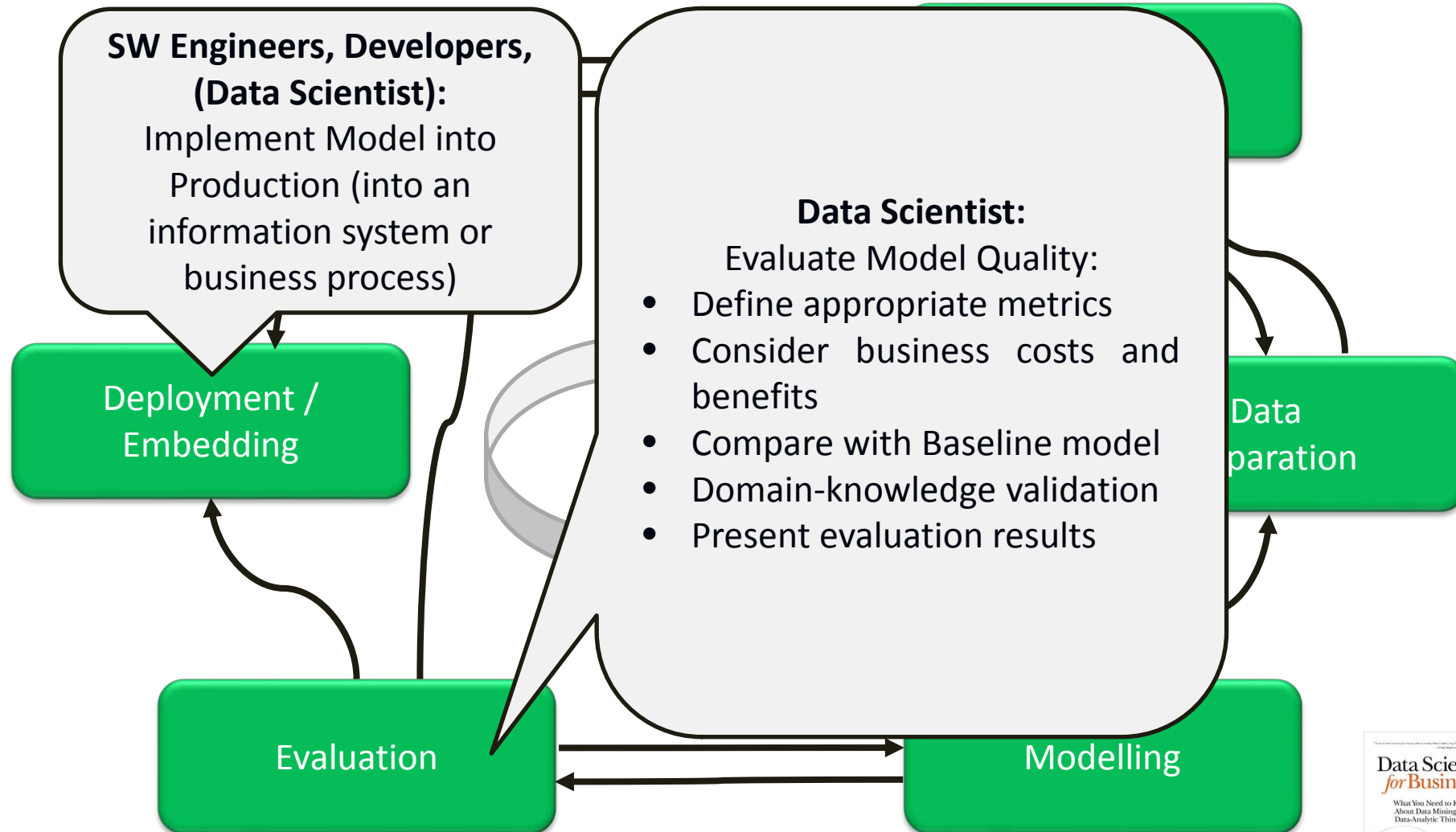
Data Science Life Cycle

Life Cycle

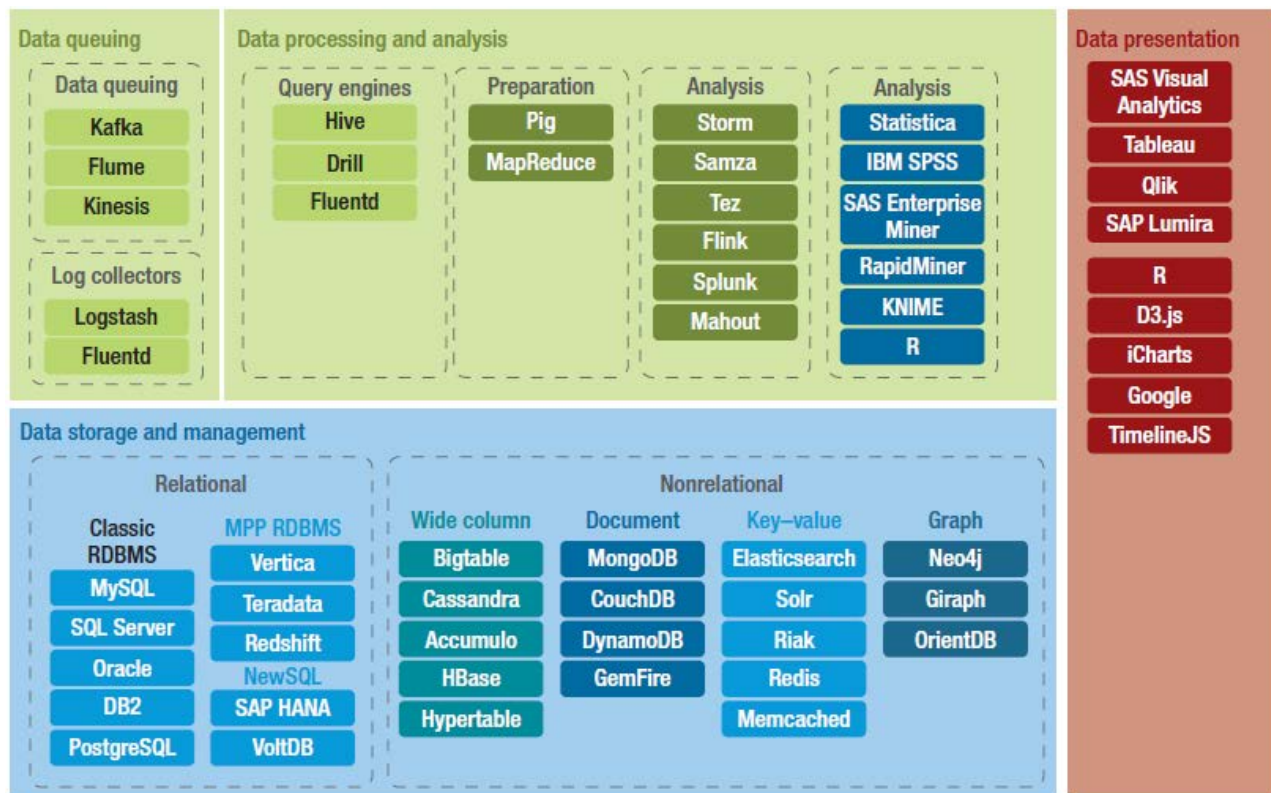


Data Science Life Cycle

- Life Cycle is of exploratory nature



Data-driven: (Big) Data Technologies

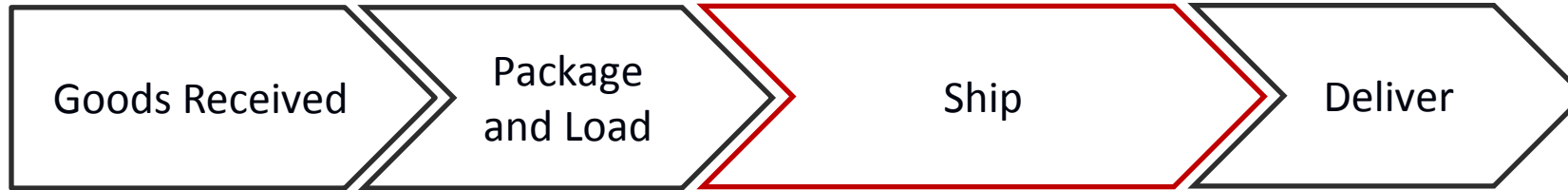


- Data Processing Chain
- Complexity of technologies and the available software
- Adaptation to use cases needed
- Data quality, data integration and data preparation must be improved

Source: Exploiting Big Data's Benefits. Heidrich, Trendowicz, Ebert, IEEE ComputingEdge, 2017

RDBMS =relational database management system.
MPP = massively parallel processing.

Data-driven Smart Logistics Scenario



■ Scenario:

- Transportation of temperature sensitive goods
- Sensor data gathered about the temperature values along the whole transportation route
- Alarms signalled when temprature does not comply with requirements
- There is a central team responsible for monitoring the alarms and deal with them

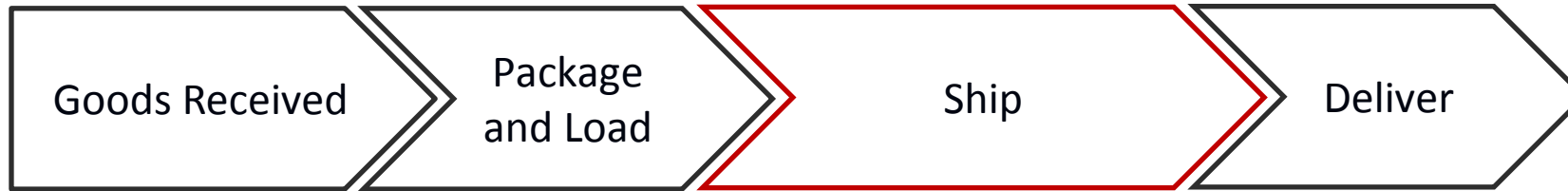
■ Input from LP

- Overview of IT system
- Sensor data and alarm data
- Assignment of sensors to containers
- The route and location
- Data about what has been done in case of alarm

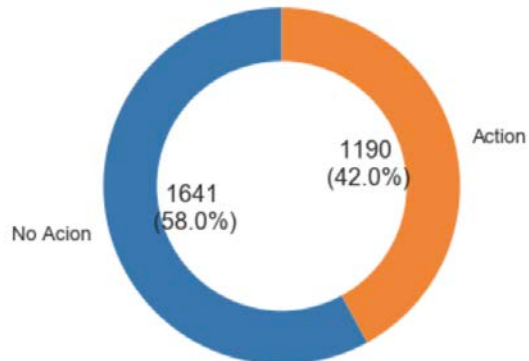
■ Goal

- Predict if a signalled alarm is real or not
- Improve quality of service to customers

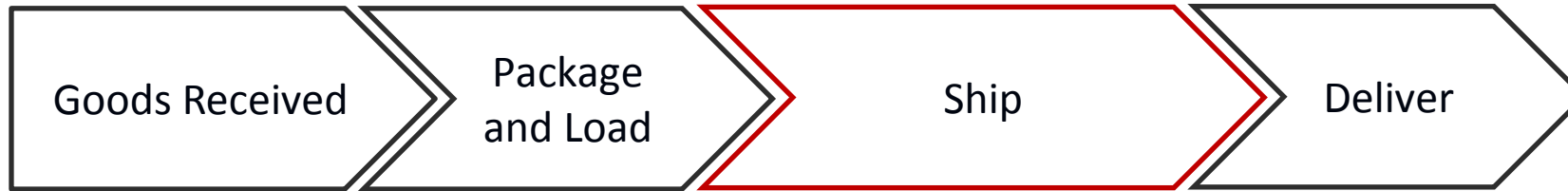
Data-driven Smart Logistics Scenario (2)



- Project steps followed the Data Science life cycle:
 - The goal was to solve the business problem
 - Baseline model was the current behavior
 - I.e. only less than half of the alarms needed action
 - Data understanding and preparation: understanding the actual processes, data cleaning, transformation, feature engineering
 - Supervised modelling and evaluation
 - Created several prediction models to accommodate different types of customers
 - Deployment
 - The models can be used by the LP

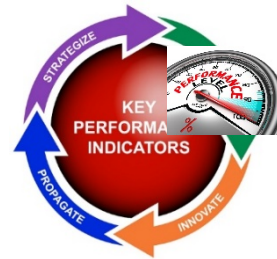


Data-driven Smart Logistics Scenario (3)

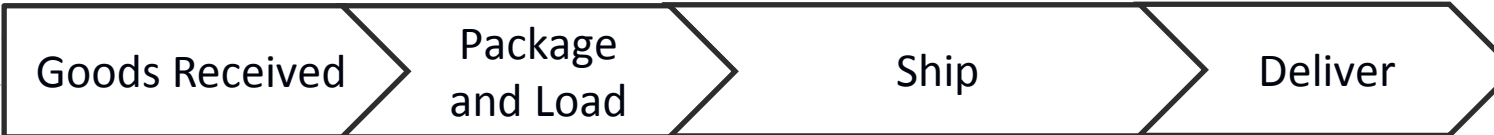
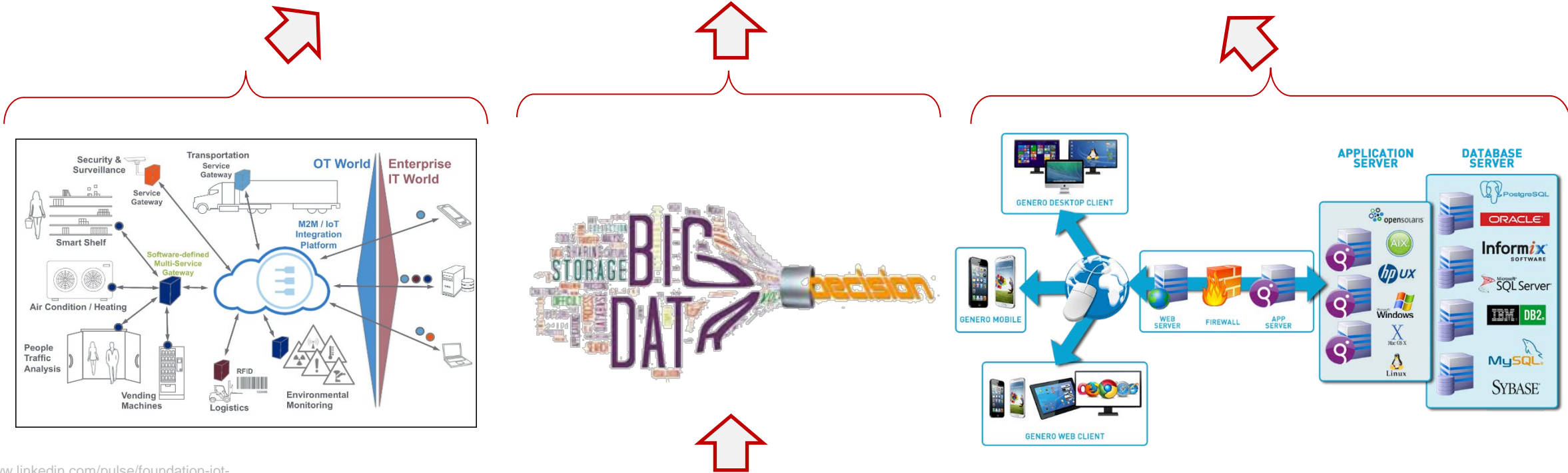


- What we recommended
 - Better data quality – cleaner data, more data
 - Labels for predicting if an alarm was real or not – roughly 50% missing...
 - Adapt IT systems so that target values can be collected to update the classifier
 - Change the process of how the IT systems interact (alarm handing team) – decentralized approach, use Web Service implementation of predictive model
 - Deploy the solution - Integrate the predictive model into the IT system, avoid acting upon false alarms, automatically

Being Data-driven and Smart Enterprise



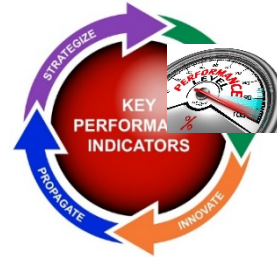
Predict true alarms?
Improve Efficiency?



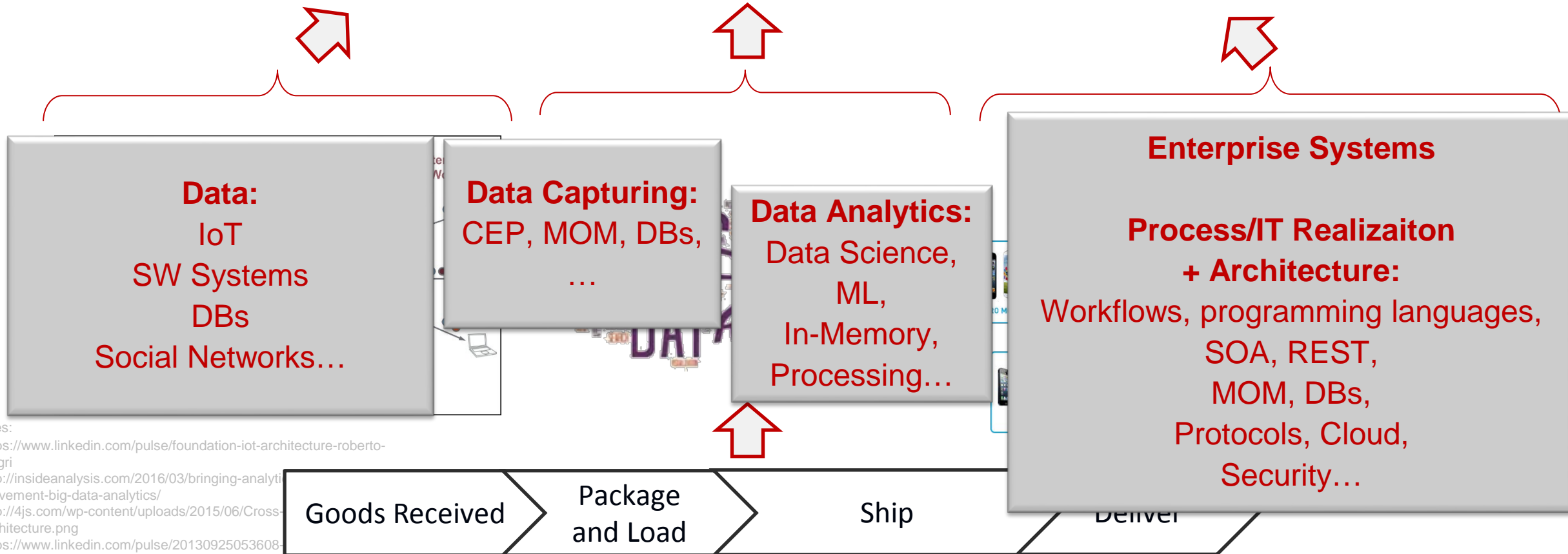
Sources:

- <https://www.linkedin.com/pulse/foundation-iot-architecture-roberto-siagri>
- <http://insideanalysis.com/2016/03/bringing-analyti-data-new-movement-big-data-analytics/>
- <http://4js.com/wp-content/uploads/2015/06/Cross-platform-architecture.png>
- <https://www.linkedin.com/pulse/2013092505360864875646-the-4-kpis-every-manager-has-to-use>

What Can Computer Science Contribute?



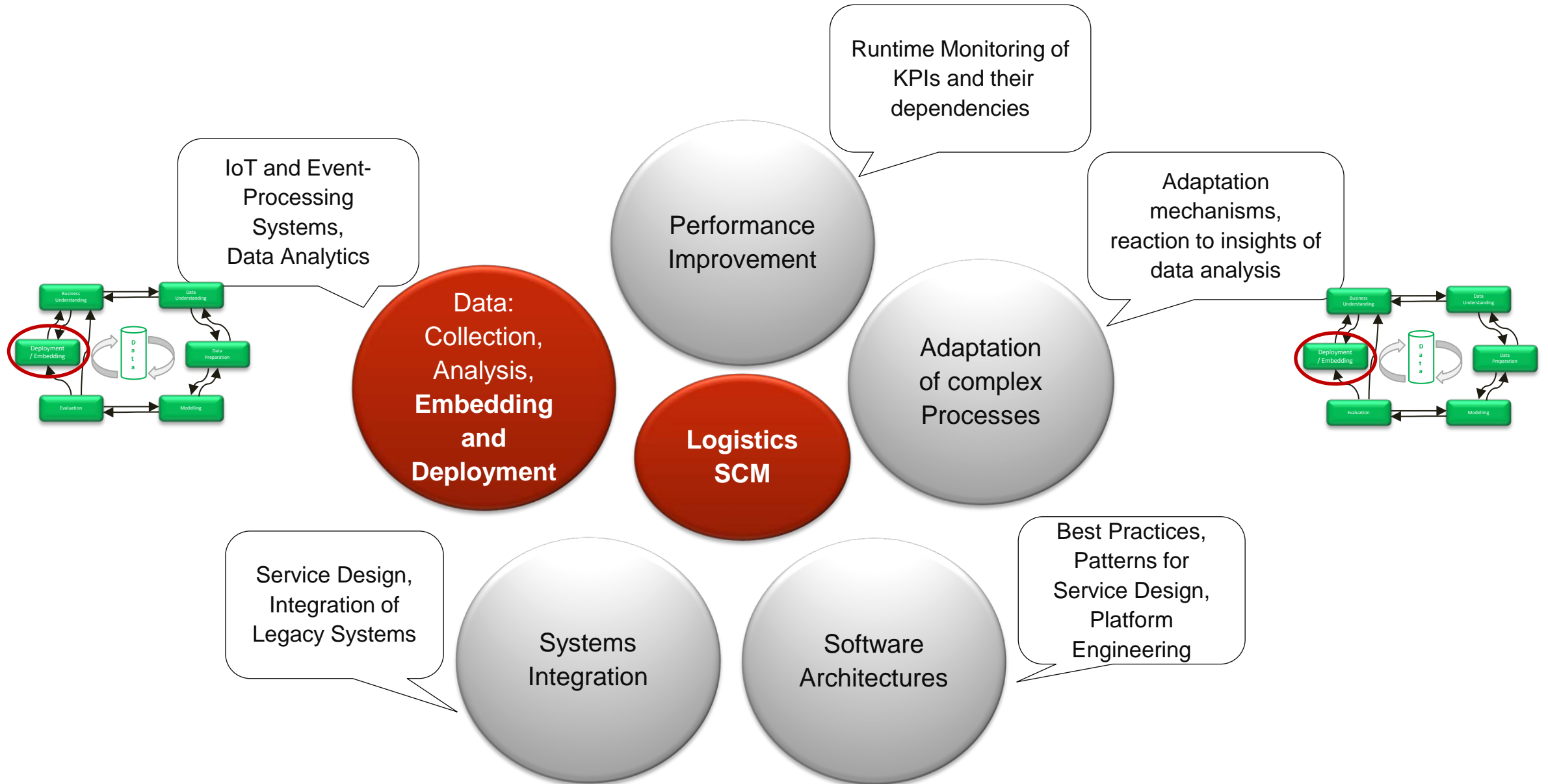
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- <https://www.linkedin.com/pulse/foundation-iot-architecture-roberto-siagri>
- <http://insideanalysis.com/2016/03/bringing-analytic-movement-big-data-analytics/>
- <http://4js.com/wp-content/uploads/2015/06/Cross-architecture.png>
- <https://www.linkedin.com/pulse/20130925053608-kpis-every-manager-has-to-use>

The Future – Close the Cycle



Takeaway Messages

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