# From Theory to Data Product: Applying Data Science Methods to Effect Business Change

## Tutorial Case Studies

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## Section 1: Advanced Analytics Entry Points

In the following case studies, you are presented with very early stage analytics projects. Read through the case study and discuss with your group how you would respond to the person presenting the project. In particular:

1) In what Entry Point quadrant does this project fall?
2) Do you need to adjust its track, and if so, what should you do?

Remember that your goal is just to set up the project for success! We will move on to defining project and business goals in the next section.

### Entry Points Case Study #1: Apples and oranges

You're working as a data scientist/analyst/analytics manager of a major supermarket chain, Avogadro's. The CEO, Isabel Newton, sends you an email saying that she wants to discuss a new project with you. She writes, "I've identified a problem that I think you could help with. We need to do a better job of marketing our products to our customers, and I believe that we can address this gap by harnessing the enormous amount of transaction data that we have available. I want a better understanding of when people buy different types of products, and what products are typically purchased together, so that we can better target marketing campaigns – both in store and mailed. We are missing opportunities when customers aren't being presented with the products that they are most likely to purchase."

In her email, Isabel gives you some more information about Avogadro's, pointing out that senior management wants Avogadro's to be known for superior products ("the broadest variety of fresh produce"), helpful and knowledgeable in-store managers, convenient locations, and targeted marketing.

Isabel wants to schedule a meeting with herself, you, and Charlie Boyle, the head of IT, who Isabel has already spoken with and is on board with the project.

How do you respond?

## Entry Points Case Study #2: Hit the mark

You are a data science strategist at Q2S Consulting, and you get a call from Steve Gladden, the head of the IT department at Bullseye, a brick and mortar clothing retailer. He heard that you gave a data science tutorial at a recent conference, and he says that he's sorry he missed it, but he'd like to discuss with you an opportunity to guide his company's data strategy.

He says, "We know that our data could be incredibly valuable, but we haven't been leveraging it. So we've been talking to Euphrates about putting our data into the Cerulean cloud computing platform. We'd like to hire you to help with this initiative, because of your big data and data science expertise. We have the blessing of upper management to make changes to our system, but to get everyone on board, we need to demonstrate that this will make a difference to the company's bottom line."

You ask him more about Bullseye, and he says that they are focused on affordable, fast fashion. They believe that their success is dependent on having the precise styles that customers are looking for each season, at reasonable prices that encourage customers to try new styles. They keep costs down by producing each style in relatively small quantities with fast turnover, to reduce waste. They also depend on a low turnover rate of their helpful and knowledgeable in-store sales staff, who are good at working with customers to suggest pairings between clothing items and with accessories.

What do you think of Steve's proposed project?

## Section 2: Asking the Right Questions

In the following case studies, imagine that you are at a Business Value Workshop, and representatives of the company you are working with present you with a series of business questions or problems that they would like you to help them solve using advanced analytics. Read through the list, and categorize each into one of the four groups:

1) Non-starters
2) Preconceived
3) Requires refinement
4) Candidate business question

Next, assign each group member one of the subject matter expert or facilitator roles listed below. Pick 4 questions or statements, and role play the conversations required to refine each so that it becomes an appropriate candidate business question (if necessary and when possible). What questions would you ask to guide this process? When you have identified several candidate business questions, prioritize them based on the criteria we have discussed.

### Asking the Right Questions Case Study 1: Widgets

**Company**: Gizmo is a manufacturing company that makes a variety of small, precise gadgets used in the production of household appliances. Gizmo's gadgets are purchased by several different companies, and some orders are consistent, whereas others depend on fluctuating needs. Gizmo ships from New York City but has customers across the US and Canada.

**Business drivers**:

- Cost of components to make gadgets
- Effective usage and continued high functionality of manufacturing equipment
- Ability to have gadgets available to customers within reasonable timelines
- Ability to produce high quality gadgets (minimize defects)

**At the table**:

- Data scientist/strategist/analytics manager
- VP of Manufacturing (product owner)
- Upper level manager on the manufacturing floor (process SME and data owner)

**Initial business problems and questions**:

- We want to use our warehouse and ordering data to optimize our response to clients' orders.
- We need to better understand when we should have our assembly lines and component parts ready to produce each kind of gadget, so that we can avoid delays when orders are placed and we don't have the gadgets on hand.
- We have heard from Euphrates that putting our data into Cerulean will help us increase our bottom line.
- Can we use predictive maintenance to predict failure of an instrument or machine before it occurs?
- We need an anomaly detection model so that we can classify gadgets we manufacture as normal or defective before they are shipped.
- Can we optimize our shipping times?
- How can we save money on parts and supplies for our different gadgets?
- We want to use Internet of Things devices to have a more technologically sophisticated manufacturing floor.
- We need to know which gadgets will become more popular in the next year so that we can optimize our workflows and production lines for those items.

## Asking the Right Questions Case Study 2: Let them eat cake!

**Company**: Louis & Antoinette's is a large-scale specialty bakery and deli that sells and delivers specialty foods in Montreal. Their customers place orders predominantly through an online interface, from 1 hour to up to a month in advance. Customers choose from a variety of baked goods and prepared foods, and can request custom cake flavors and decorations, as well as dairy-free and gluten-free options.

**Business drivers**:

- Availability of specialty ingredients to be used in their products
- Ability to provide a variety of options for customers
- An easy-to-use ordering process for customers
- Precise turn-around times for product delivery

**At the table**:

- Data scientist/strategist/analytics manager
- VP of Sales and Marketing (product owner)
- Head of IT
- Head baker (process SME and data owner)

**Initial business problems and questions**:

- We need a customer segmentation model so that we can increase revenue.
- Can we increase customer purchases by changing the layout of our website?
- Can we predict whether someone will purchase items based on their behaviour on our website?
- We want to know how to encourage repeat customers by offering special promotions.
- We need to model customer purchase patterns.
- We need to forecast weekly demand so that we have the right amount of perishable specialty ingredients on hand and they don't go bad before we use them.
- Can we optimize delivery on busy holidays, to avoid deliveries taking too long?
- Are all of our product offerings profitable?
- We think that we could do more short-delivery-time business if we had the right product offerings ready, but we don't know which those are.

## Section 3: Following a good process for Data Driven Decision Making

Congratulations – you've set yourself up for success, and you've identified and prioritized candidate business questions! For the case study below, imagine that you've selected one of the candidate business questions and are moving into the "Proof of Value" stage of work. Your next task is to map the influence points, and then do a risk:value:readiness assessment to prioritize the influence points for experimental modelling.

Using the information below, pretend you're in an influence point mapping workshop by:

- Discussing the workflow from (true) start to (true) end, paying particular attention to any moment that could be considered an 'influence point'
- Exploring an influence point- ask questions!
- Determining what you would need to begin a risk:value:readiness assessment.

### Process Case Study: Avoiding Anomalies

**Company**: Gizmo is a manufacturing company that makes a variety of small, precise gadgets used in the production of household appliances. Gizmo's gadgets are purchased by several different companies, and some orders are consistent, whereas others depend on fluctuating needs. Gizmo ships from New York City but has customers across the US and Canada.

**Business drivers**:

- Cost of components to make gadgets
- Effective usage and continued high functionality of manufacturing equipment
- Ability to have gadgets available to customers within reasonable timelines
- Ability to produce high quality gadgets (minimize defects)

**Selected business question:** Can we optimize our production schedule to reduce downtime between production runs?

**Workflow description transcript:**

- First we plan our production for the next month.
- We plan one month at a time, and we cover all the different products we make for that month.
- And we try to schedule them back to back so there are the fewest changes in equipment between each product.
- And then we adjust our plan as new orders come in, if they're urgent.
- But we also have a plan from the beginning of the year and it gets updated quarterly; and it sets out what we'll need based on predictions of products from last year.
- Once a product is in production we just run it through, as many as we need, and send them from the line to quality and then to shipping.
- As each machine in the line is done, we send someone through to adjust for the next product.
- Sometimes we only need to adjust one thing at the end, and sometimes all of the machines need a slight adjustment. Or a few need a big adjustment- it all depends on the next product coming through.
- The biggest time suck is our assembly line- it's designed for our main line of products, but the weird one-off stuff doesn't always make sense, so there are too many people jammed up on one spot and then big blank spots elsewhere.
- But you know, we do what we can, right?