# Unsupervised Bayesian Network Learning for Non-Obvious Marketing Insight

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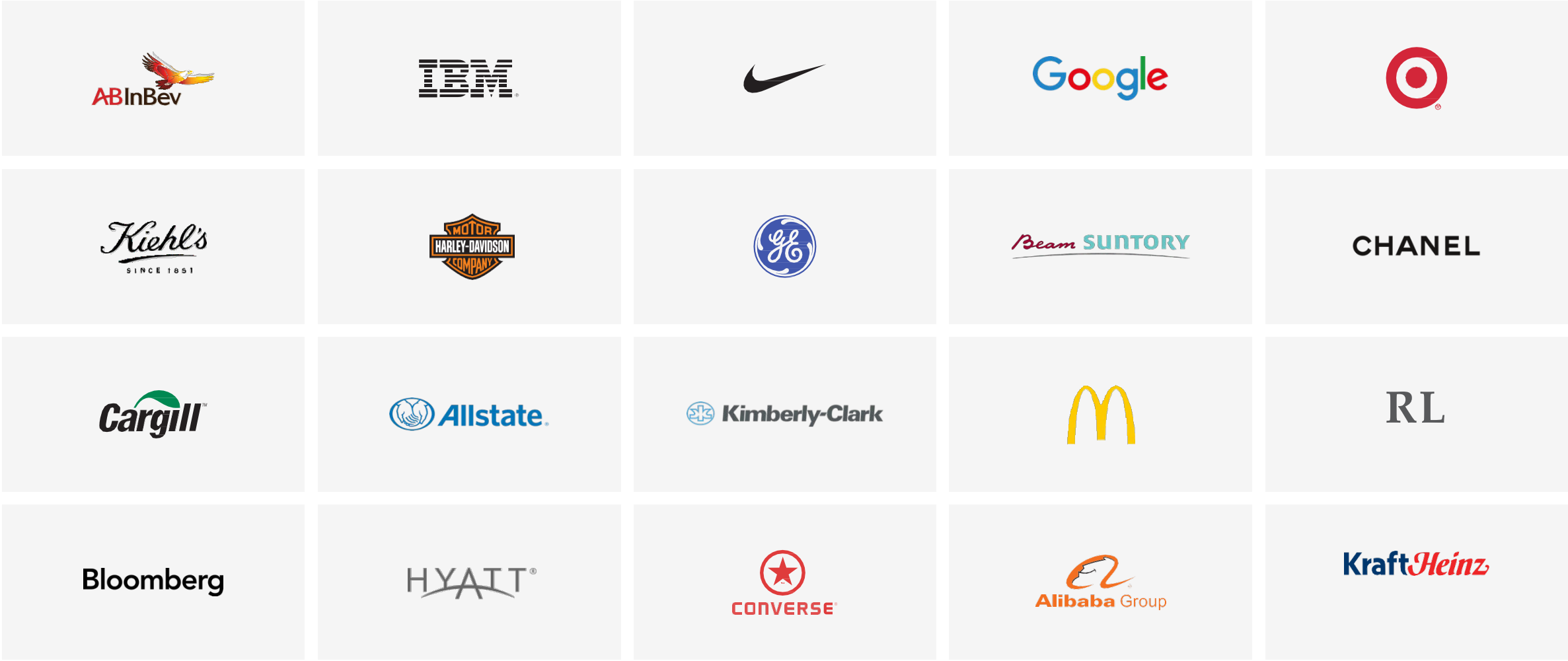
VSA Partners, Inc.

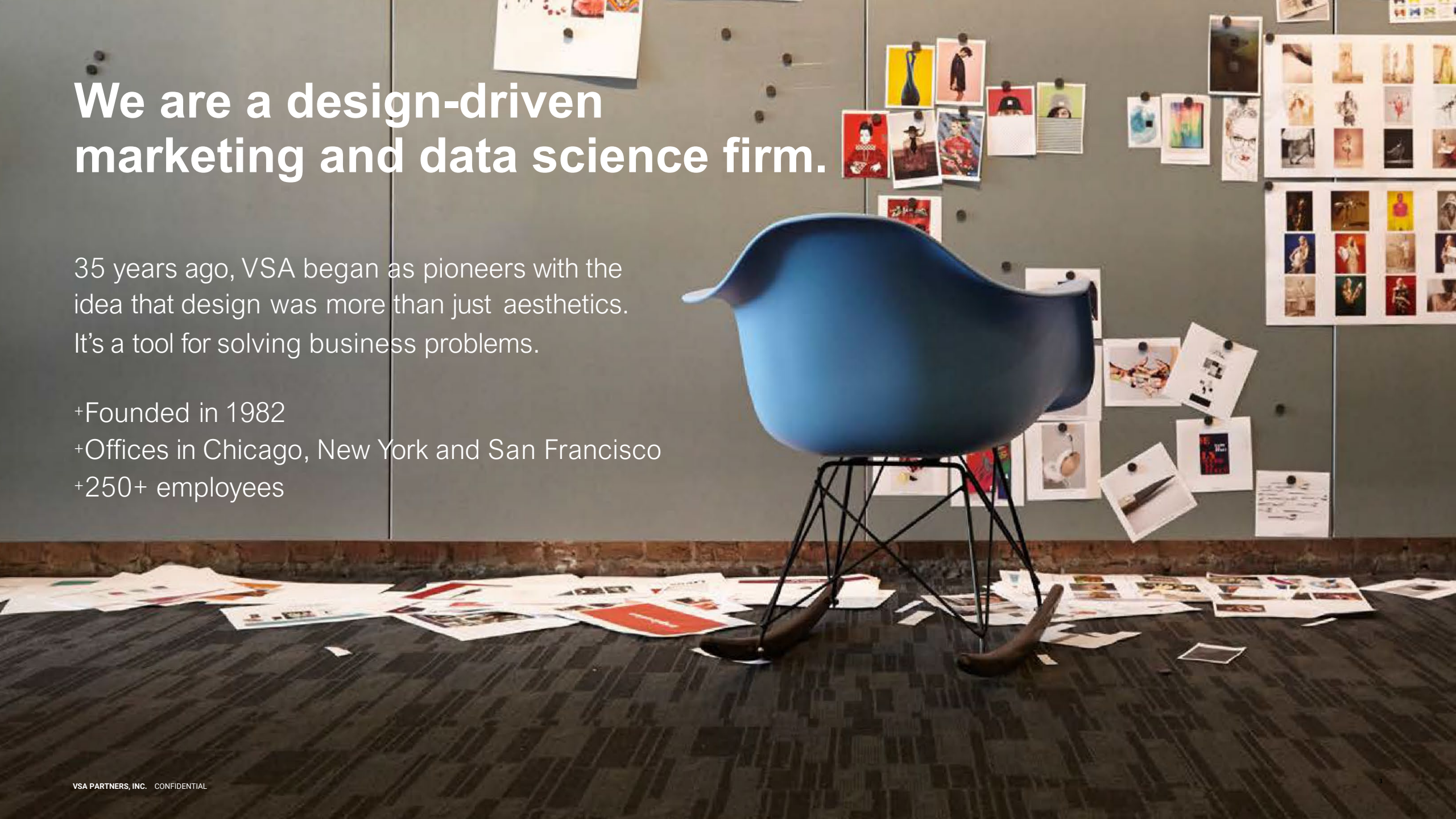
# We design marketing and data solutions for a diverse set of world-class clients.



# We are a design-driven marketing and data science firm.

35 years ago, VSA began as pioneers with the idea that design was more than just aesthetics. It's a tool for solving business problems.

+Founded in 1982
+Offices in Chicago, New York and San Francisco
+250+ employees



# The Most Exciting Phrase in Science Is Not ‘Eureka!’ But ‘That’s funny …’

# - Isaac Asimov

# The Problem

**There are many, many marketing consumer surveys.**

**Most analyses extract no more than 10% of the available information from the data.**

Most insights are frankly, obvious.

Unsupervised Learning can explore consumer survey data to find non-obvious marketing insights.

Here are some examples of how.

# The Structure of Consumer Demand for Music Listening Services

# Consumer Demand: Music Streaming Service

**Situation**

- A leading music streaming service client wants to understand music listening behavior to deepen the user experience and to increase revenue

**Approach**

- Launched a quantitative consumer study to understand music attitudes, behaviors, and consumption (~850 respondents)
- We used the BBN framework to understand the relationship between and interaction among variables
- An unsupervised network generates a parsimonious knowledge representation of underlying data structure

# Insights: Topology and Contents

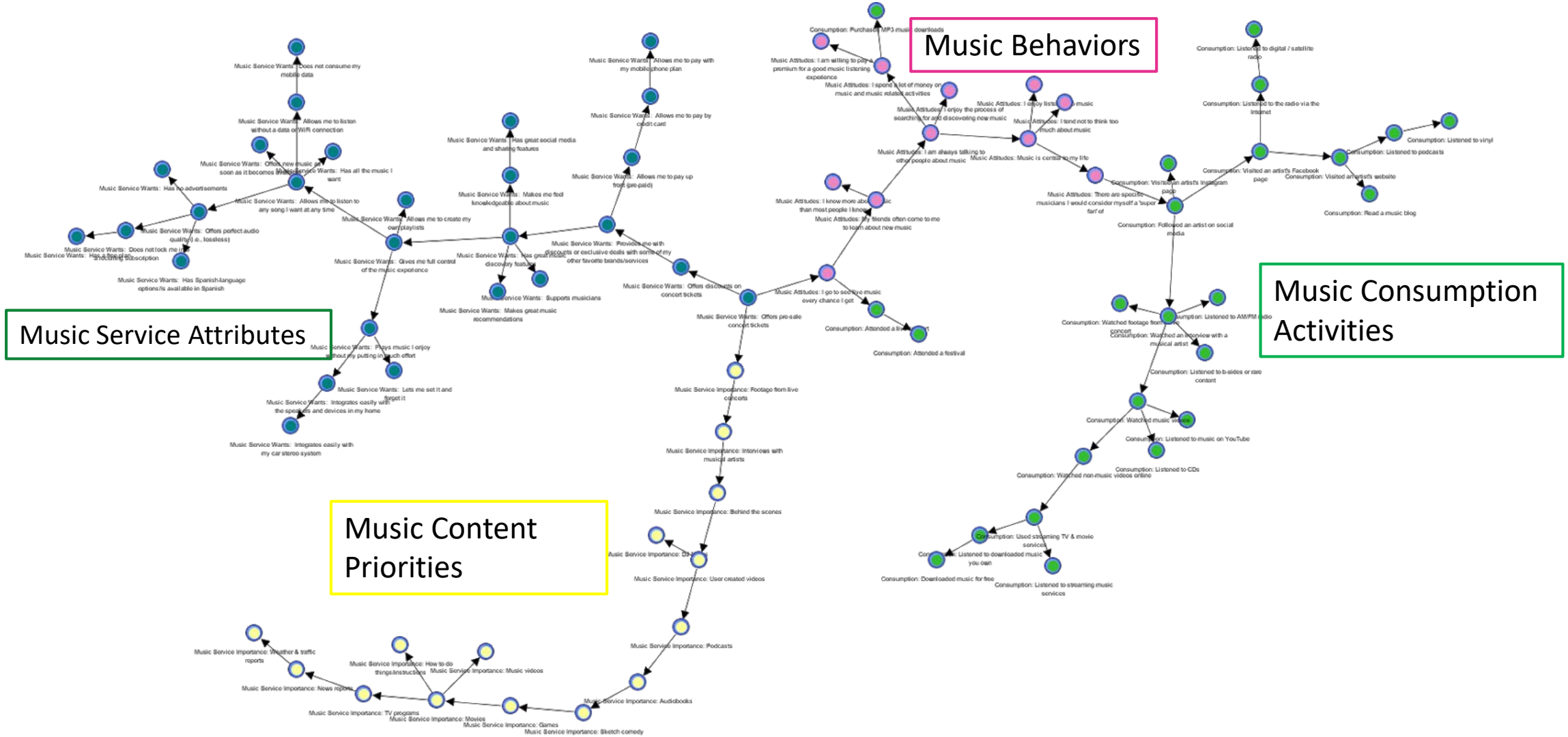
Topology:

- The network reproduced the categories of the questions (color coded) without prior knowledge
- The information content of each category branch varies: Music service Attributes and Content most important

Contents:

- The crux points in the topology are worth examining further

# Bayesian Network



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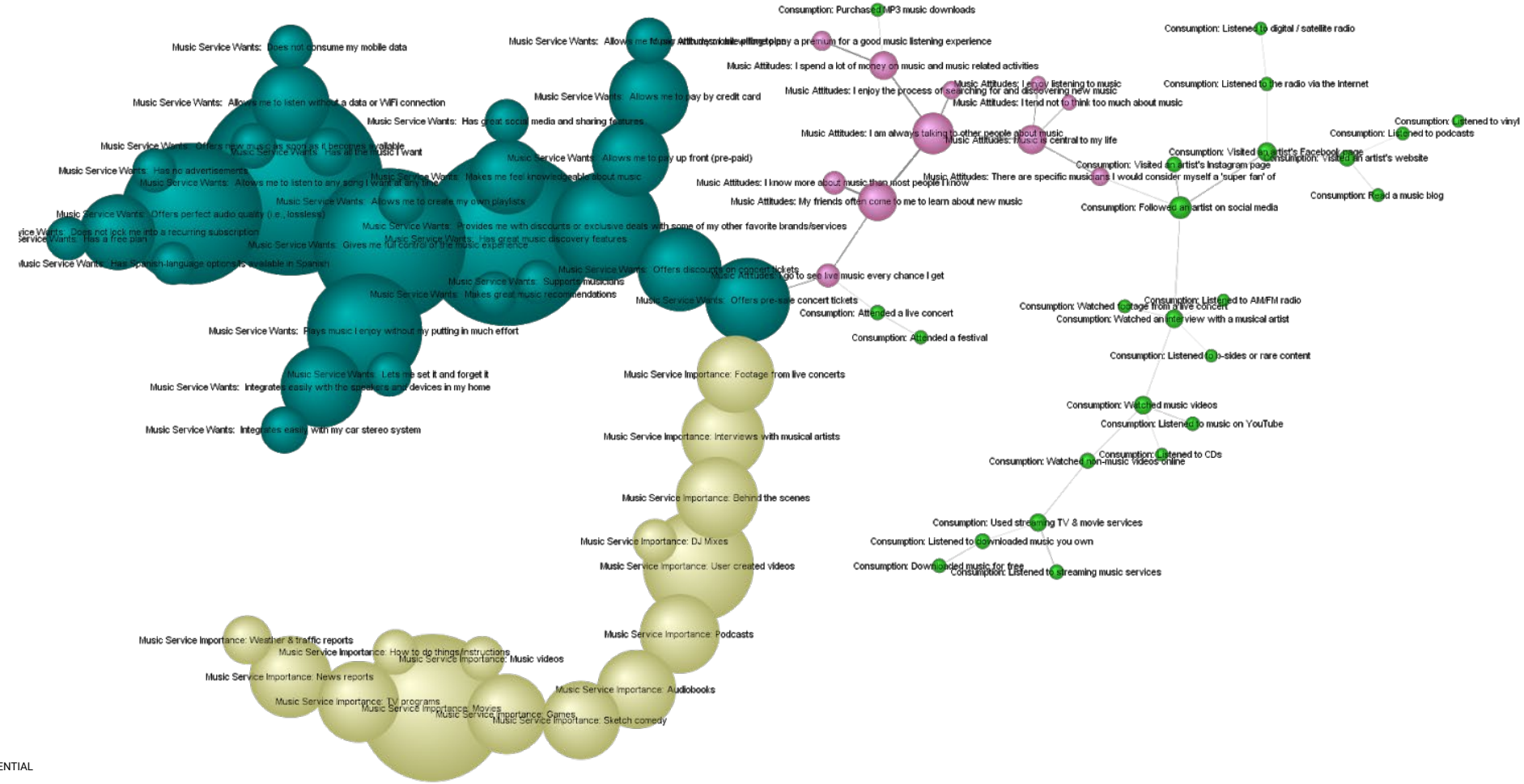
# Bayesian Network: Importance of each node



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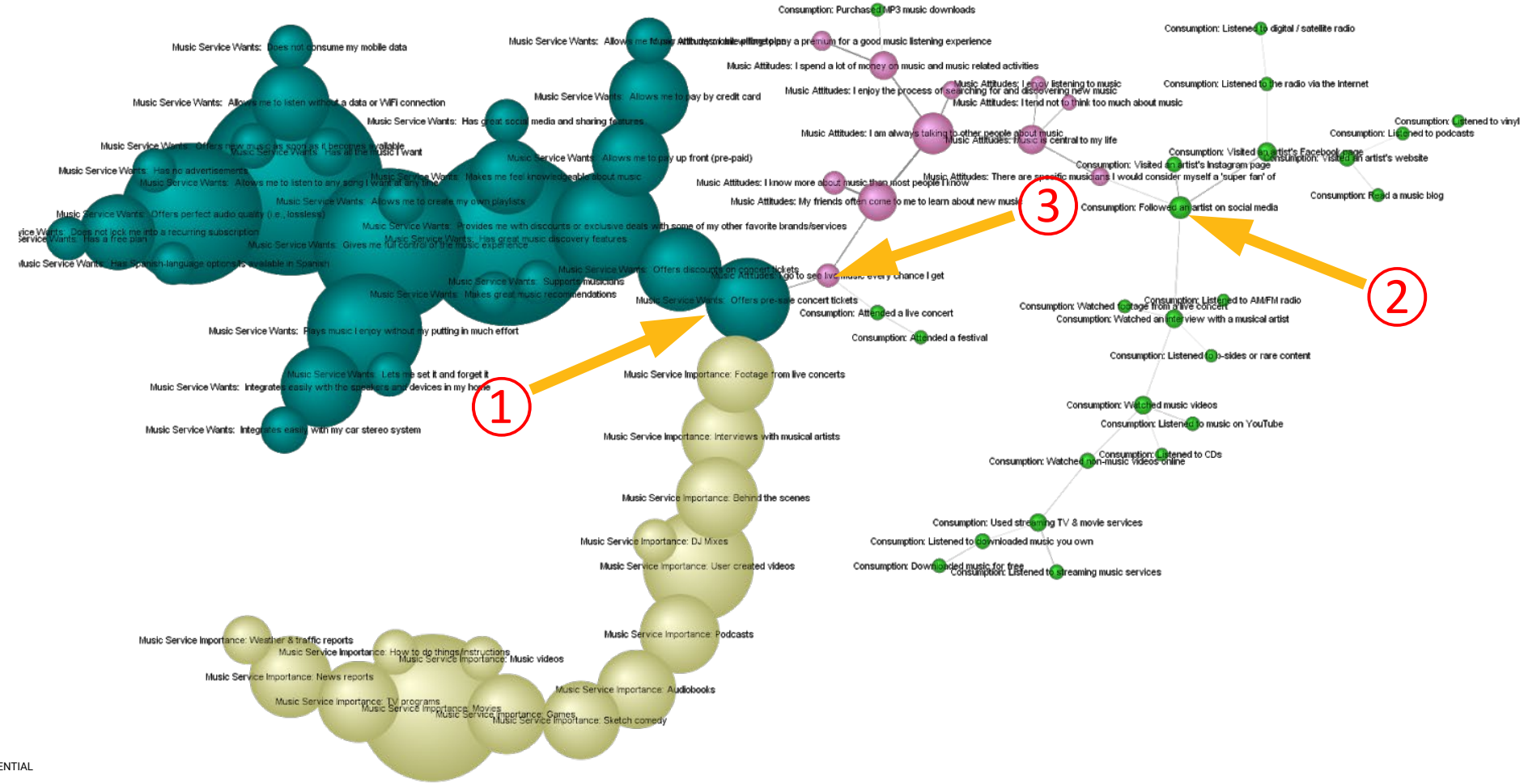
# Bayesian Network: Crux points



# Insights from crux points

Music service attributes: Offers pre-sale concert tickets

Crux point ①

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Music service attributes: Offers pre-sale concert tickets

Crux point ①

Consumption: Followed an artist on social media

Crux point ②

Behaviors: I go to see live music every chance I get

Crux point ③

# Implications

- Pre-sale ticket offers can help unlock demand and increase perceived value of subscription to a music listening service.

- Exclusive “backstage” artist content can help users feel better connected to artists and provide them with an elevated sense of value.

- Ease and relevancy of music discovery can help improve users’ perceptions of the service by continuously introducing them to new content.

# Key strategy takeaways

For music services — The Age of the Internet as Metaphor is **over**.

Consumers want services that are **native** and **unique** to the Internet—that enhance their social connections to the artists and to the music experience itself.

They don’t want a giant jukebox, DJ, radio station, or even a friendly recommendation in a record shop.

# Cheese Market Structure In The US

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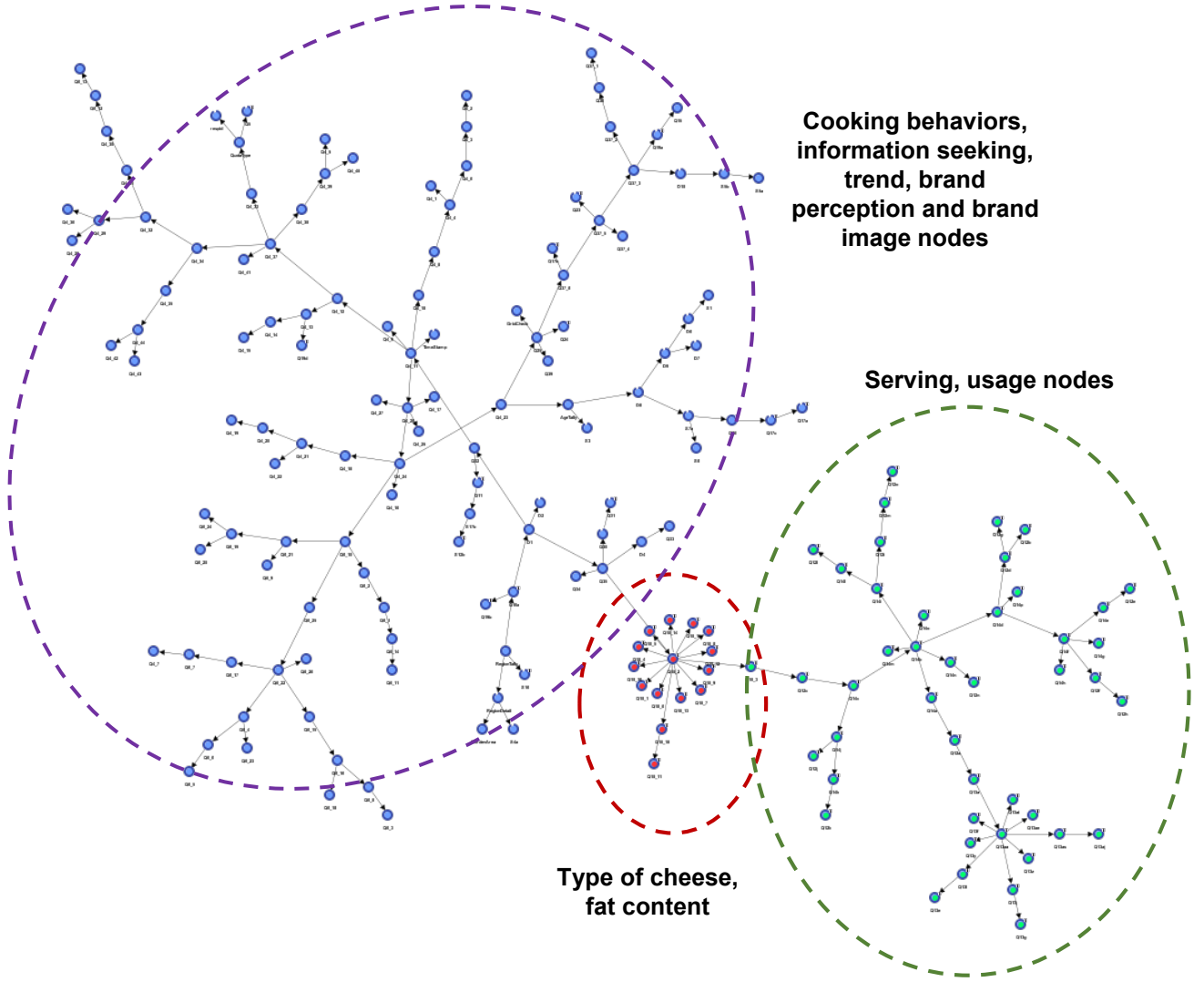
## Situation

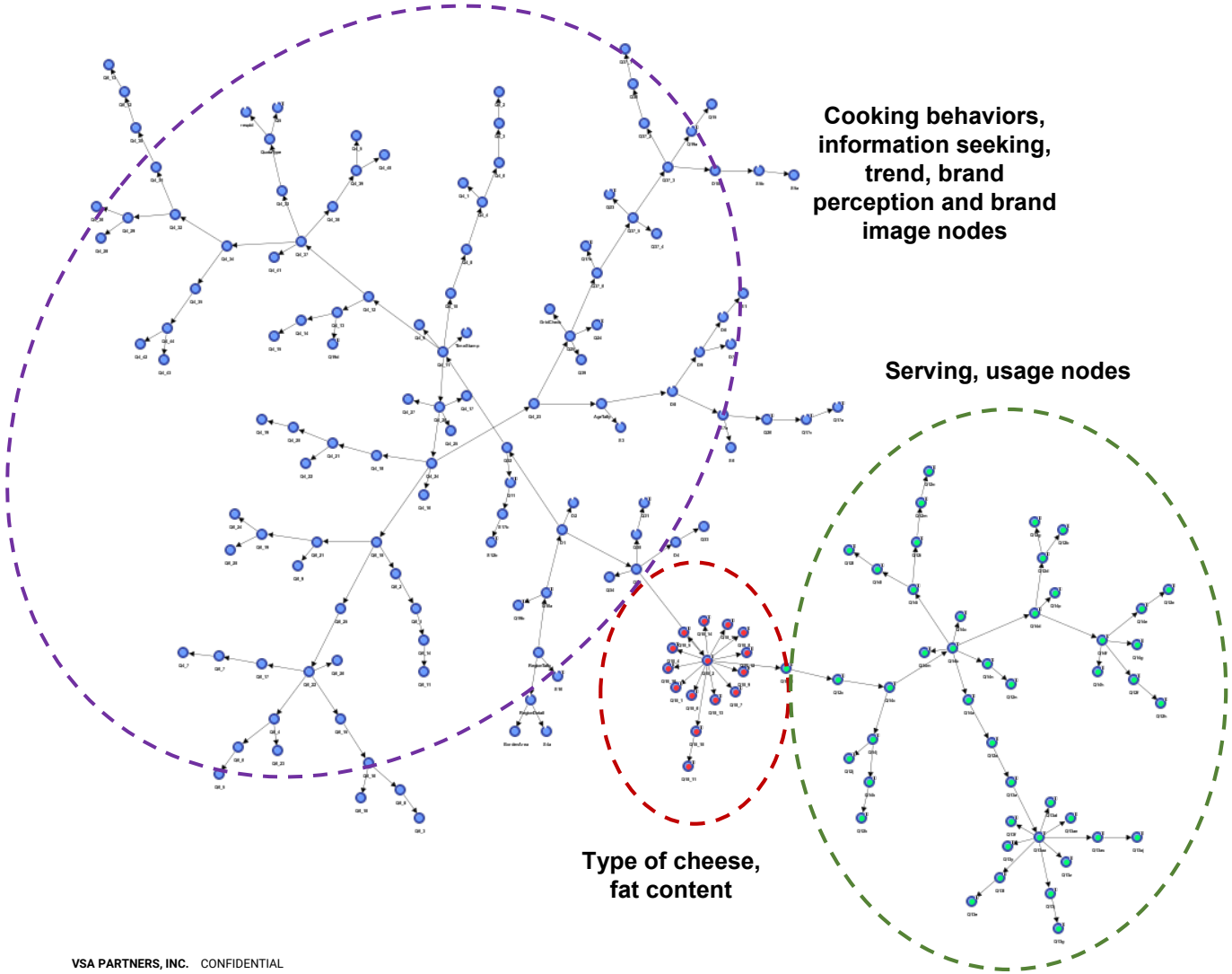
- A premium branded cheese client was interested in discovering competitive advantages of the brand vis-à-vis with regular brands that proliferated the market

## Approach

- Launched a quantitative consumer study among the cheese-consuming population in the past 6 months (at the time of the study) to understand the various drivers of cheese consumption
- With 100 of variables, BBN Unsupervised Learning framework has been leveraged to understand the relationship between and interaction among variables



# Fat content is the primary driver for all other decision-making




**Key Observations:**

- Three distinct networks:
  1. Cooking behaviors, information seeking, trend, brand perception and brand image nodes
  2. Fat content in the type of cheese purchased
  3. Serving and usage
- Fat content in the type of cheese bought most important node
- The fat content node influences to whom they served the cheese (family members)
- Eventually all the above nodes influence the node “trend” (e.g. whether the consumption of cheese has increased, decreased, etc.)
- The trend influences Brand Perceptions and Brand Images nodes

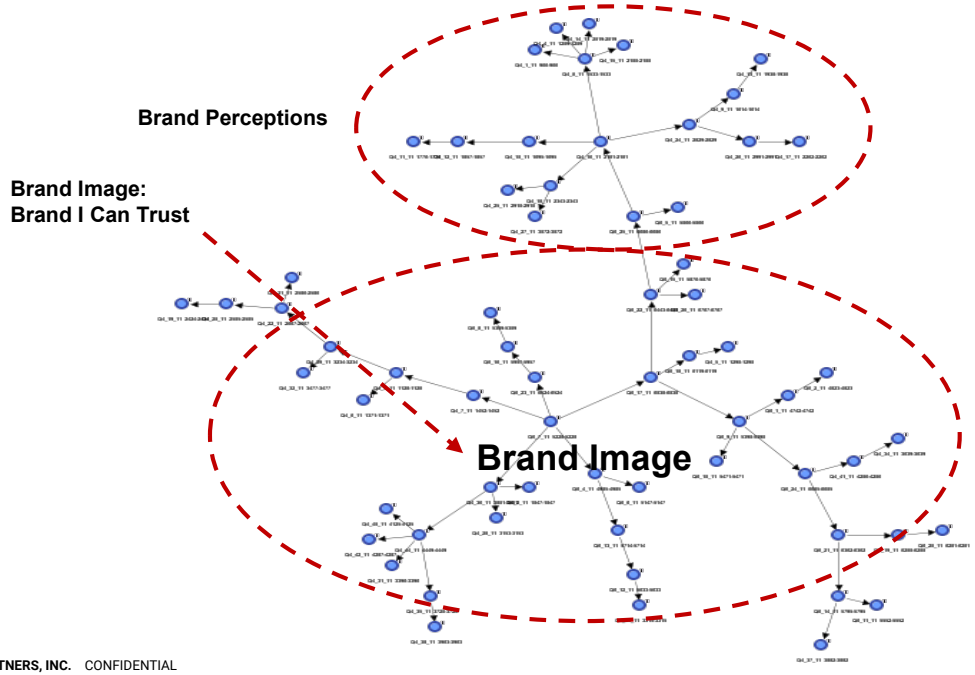
# Exploring image, perceptions, and behavioral nodes

**Key Observations:**

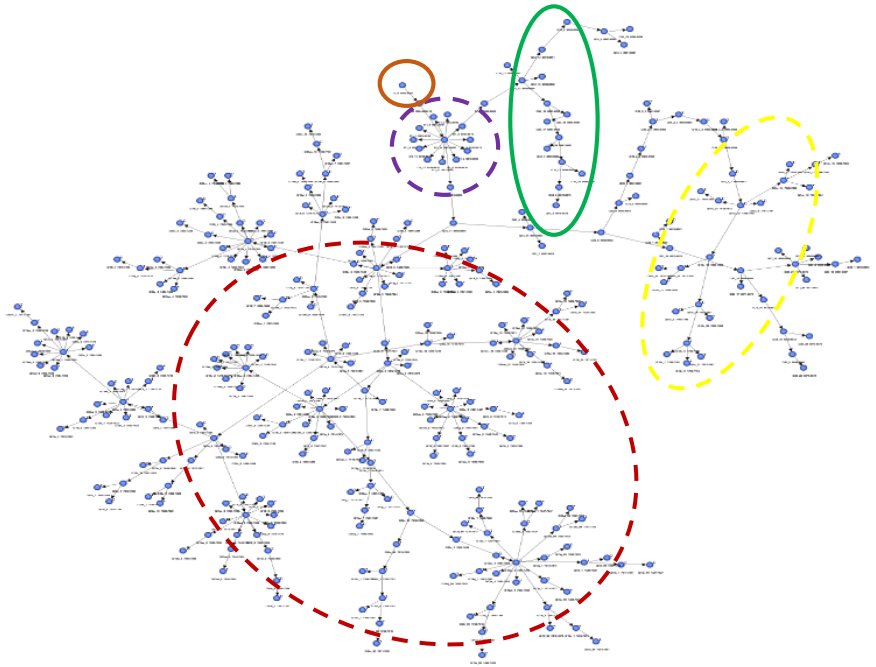
Two distinct networks emerged:

1. Interconnection of Brand Image and Brand Perceptions with “Trust” forming at the core for the client brand.
2. Cheese consumption trend, influencing information gathering nodes and subsequently servings and usage.

**Brand Image and Perceptions:**
**Trust at the Core (Client Brand Cheese)**




**Cheese Network: Type of Cheese, Serve, Usage, Dairy, Media and Consumption Trends**



# The structural analysis suggested exploration with traditional statistical methods

# Finding competitive advantage

**Key Takeaways:**

- Consumers' brand image of "honest" and "meeting expectations" drive client brand's image of brand they can trust
- Competitive weaknesses:
  - Comp Brand B and I: Consumers don't perceive these two brands of cheese are as delicious nor meeting the expectations
  - COMP BRAND B and E: Don't meet expectations and are not considered to be a brand for the entire family
  - COMP BRAND F AND G: Not as delicious, honest or meeting expectations

| | CLIENT BRAND | COMP BRAND A | COMP BRAND B | COMP BRAND C | COMP BRAND D | COMP BRAND E | COMP BRAND F | COMP BRAND G | COMP BRAND H | COMP BRAND I |
|---|---|---|---|---|---|---|---|---|---|---|
| "Tastes Delicious" | 0.14 | 0.09 | 0.18 | 0.14 | 0.07 | 0.12 | 0.07 | 0.11 | 0.15 | 0.07 |
| "Brand I Trust" | 0.14 | 0.27 | 0.17 | 0.15 | 0.10 | 0.25 | 0.25 | 0.14 | 0.13 | 0.17 |
| "Honest" | 0.24 | 0.24 | 0.25 | 0.18 | 0.32 | 0.27 | 0.19 | 0.16 | 0.28 | 0.31 |
| "Meets Expectations" | 0.30 | 0.15 | 0.22 | 0.29 | 0.18 | 0.24 | 0.26 | 0.23 | 0.21 | 0.17 |
| "Brand for the entire family" | 0.16 | 0.17 | 0.08 | 0.16 | 0.23 | 0.10 | 0.19 | 0.27 | 0.19 | 0.36 |

# Implications

- Brand messaging that emphasizes low “fat content” can help unlock demand and increase perceived value premium cheese.

- To compete against the leading competitor, at a retailer level, messaging should be crafted around “better meets expectations.”

# Conclusions

Unsupervised Bayesian Networks facilitate the “That’s funny…” moments of real insight and discovery.

They feed the human mind’s ability to create stories around causality and the hidden structure of reality.

The work above applies to *marketing* strategy, but insight discovery via DAGs applies to numerous domains.

# Thank You