# Proceedings of the 7th ASIS SIG/CR Classification Research Workshop

## Classifying The Questions Of Small Business Owners:
## A Top-Down & Bottom-Up Approach

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## ABSTRACT

A classification scheme of business information needs was developed through question analysis of a set of business requests posed by small business entrepreneurs in the state of Maryland. Existing business classification schemes were examined for use in the project and while an existing scheme could be used for subject/industry analysis, no classification scheme was found to be adequate for the information requirements. This classification of business requests can be used to enhance communication between intermediaries and their clients, provide an understanding of user needs, assist in the develop of search strategies, and provide a basis for correlating information requirements with industry, age of industry and purpose of request.

## INTRODUCTION

This paper will present results of exploratory research on the development of a classification of the information requirements of business requests based on the results of an in-depth question analysis. The purpose of the classification of requests is to provide information professionals with an understanding of information needs, to permit segmentation of the overall user group into smaller homogeneous groups, to enhance communication between intermediaries and entrepreneurs by normalizing vocabulary, and to facilitate the development of search strategies. While existing business classification schemes already exist, none was judged adequate to fulfill the objectives of this project.

## PROJECT BACKGROUND

Through a project funded by the National Institute of Standards and Technology (NIST) and the State of Maryland and managed by the Dingman Center for Entrepreneurship, small business entrepreneurs in the state of Maryland were given access to online searches performed by student searchers in the College of Library & Information Service (CLIS) at the University of Maryland. A major objective of this project was to increase the awareness among entrepreneurs of the importance of information to their success. The searches were performed either free of charge or at a token cost. In all cases the searches were performed within the context of a real-world contractual setting, meeting market standards of timeliness, quality, and overall professionalism. Five types of requests were received from the entrepreneurs: literature on a given topic, lists of companies with their addresses, vendors of projects, patent and trademark information, and identification of experts.

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The data for the classification project consist of 354 real requests made over the course of one year, from October 1, 1994 to September 30, 1995. The requests were made in writing using a request form. During the question analysis phase of the project, several written requests were found to contain more than one conceptual request and were divided into single concept requests, yielding a total of 372 requests. [Example: "Identify: 1) small/regional competitors of UPS, Federal Express, and Airborne Express; 2) courier services all over the U.S.]

## EXISTING CLASSIFICATIONS

The decision to develop a classification for the business requests was made after a review of existing business classifications showed them to be inadequate for the objectives of this project. Four types of business classifications were identified in the literature: classifications for business literature, classifications for end-user interfaces, classifications of business problems, classifications of business requests.

o <u>Business Literature Classifications</u>: The classifications generated for business literature were broad and, thus, inappropriate for the more specific nature of an information request (Harvard University Graduate School of Business Administration, 1960; Vernon & Lang, 1979).

o <u>End-user Interface Classifications</u>: One example of categories developed for use in a front-end information retrieval system was found (Zuca & Corcoran, 1986; O'Leary, 1987). This interface, Business Connection, purports to offer end-users with options of types of data. This categorization was developed on the basis of frequent uses of DIALOG databases. The resulting categories presented are not appropriate for classifying business requests because they represent implemented search strategies and not the requests themselves. For example, a searcher interested in financial information on a company would first select the "Financial Screening" category; then they would select *either* "Screens on balance sheets" or "Screens on income statements." The "Screens on income statements" would then present the user with a list of specific choices, including net sales, cost of goods sold, gross profit, etc. By contrast, of the financial requests received in this project, none requested one specific piece of financial data.

o <u>Classifications of Business Problems</u>: A review of the business literature revealed several classifications of business problems (Dandridge & Sewall, 1978); Terpstra & Olson, 1993). Business problems are of a broader nature than business information requests; that is, one business problem may generate one or more business requests. The request form used in this project requested information on the purpose of the request which in this case is more or less synonymous with business problem. Examples of the broad purposes included marketing, management/planning, product development/modification, etc.

o <u>Classifications of Business Requests</u>: While several classifications have been developed for business requests, those identified were ultimately judged inadequate for one or more of the following reasons:

> their classes fail to be mutually exclusive (Trott, 1986):
marketing information

technical information
company information
*quick reference.*
> they mix topics with data types (Bakewell, 1987):
> they lack major categories (Bakewell, 1987; Trott, 1986):
company information
marketing information
no category for *industry information*
> the categories represent uneven levels of specificity:
marketing data
names, addresses, and telephone numbers for associations and organizations
names, addresses, and telephone numbers for banks and thrift institutions
names, addresses, and telephone numbers for parent or subsidiary companies
names, addresses, and telephone numbers for consultants
names, addresses, and telephone numbers for news-media organizations,
names, addresses, and telephone numbers for U.S. and state government officials.
> the classifications are uni-dimensional, representing either the subject or the function of
a request but not both.

## ANALYSIS OF BUSINESS REQUESTS

A "bottom-up" approach was applied to develop a means of classifying the information requirements expressed in the specific requests. For this purpose, the breakdown of wh- question types as described by Belkin & Vickery (1985) proved useful: who, where, when, how, why, what, which and whose. Each request was broken down into one or more wh- questions. Table 1 contains examples that illustrate the request analysis. The table shows the written request as received and the questions into which the request was broken down. These questions were grouped and analyzed, resulting in a preliminary classification that is shown in Table 2. The classification consists of the facets (who, what, where, when, why, how); a subcategory (identify, perform); an optional specification of the category (e.g. company, person); values (e.g.. Values for perform process: builds, develops, distributes, etc.).

In developing the classification, it was necessary to normalize vocabulary. In the analysis, it became evident that different users often were saying the same thing with different words. That is, the surface structure of the requests varies when in fact their deep structure was the same. To track the normalization of the vocabulary, a table was maintained of the relationship between raw and analyzed questions. (See Table 3.)

During the analysis, it became clear that not all simply stated questions were in fact basic questions. Thus, in addition to tracking raw and analyzed questions, normalization of questions involved breaking down composite questions into basic questions. A set of nine composite questions emerged. The composite questions and their tentative definitions are listed in Table 4. The definitions of the composite questions are based on formal definitions of terminology found in standard business dictionaries, specific detailed requests posed by clients, and experiences with business reference requests.

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To complete the information analysis of the requests, a subject classification was needed. A "top-down" approach using an existing classification scheme was used to determine the general subject area of the request in terms of both the general industry area of the search and the product/service of interest within that industry. [Predicast's systems of Product, Event, and Country Codes produced by Information Access Company, 1994 was selected.] Each request was assigned a single occurrence of a "host industry." Additionally, a request could be assigned an "applied industry", in those cases when the question involved the use of a product originating in one industry but used in another industry. [Example: "Looking for databases on energy efficiency projects implemented in manufacturing companies."]

## CONCLUSIONS

The analysis of the information requirements of a set of business requests posed by small business entrepreneurs has resulted in a classification of business requests. This classification can be used to enhance communication between intermediaries and their clients during question negotiation by normalizing vocabulary and standardizing definitions of composite questions. It can also enhance the understanding of user needs when combined with the subject classification. The classification, which can also be applied to search parameters, will facilitate the development of search strategies. Eventually, the classification will be used to correlate information requirements with subject (industry), age of industry, and purpose of the request.

## REFERENCES

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Table 1. Partial Table of Requests and Analyzed Questions

| | Request | Analyzed Question |
|---|---|---|
| 1 | Suppliers of refined & granulated sugar (A & E grade). | where located |
| 1 | Suppliers of refined & granulated sugar (A & E grade). | who supplies |
| 2 | Mkt. research on high end chocolate box/gift/novelty industry w/size, trends, share, sales volume, etc. | what are trends |
| 3 | Trends in East Coast mini-storage facilities. | what are trends |
| 4 | What database systems are used in and how does one establish a network marketing company. | how to establish |
| 4 | What database systems are used in and how does one establish a network marketing company. | what database systems are used |
| 5 | Market trends for his products: micromachining & micro EDM equipment. | what are market trends |
| 6 | Market trends on propeller reconditioning methods, particularly digital scanning. | what are trends |
| 7 | Demographics of St. Mary's county by zip code to learn what people might spend on dry cleaning. | what are demographics |
| 8 | Recent advancements in flat-panel displays | what are advancements |
| 9 | List of banks which are direct Mastercard/Visa members (perform in-house processing for merchant credit card services). | where located |
| 9 | List of banks which are direct Mastercard/Visa members (perform in-house processing for merchant credit card services). | who performs |
| 10 | Major players in the educational software market, growth potential, and recent developments. | what are recent developments |
| 10 | Major players in the educational software market, growth potential, and recent developments. | what is growth potential |
| 10 | Major players in the educational software market, growth potential, and recent developments. | where located |
| 10 | Major players in the educational software market, growth potential, and recent developments. | who are competitors |

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Table 1. Partial Table of Requests and Analyzed Questions

| | | |
|---|---|---|
| 11 | How to raise and market emus. | how to raise |
| 11 | How to raise and market emus. | how to market |
| 12 | CAD/CAM for dental application (especially crowns) and the prices of those CAD/CAM software packages. | how much is cost: retail |
| 12 | CAD/CAM for dental application (especially crowns) and the prices of those CAD/CAM software packages. | what is application |
| 13 | Production cost, size, and distribution channels of Malaria vaccine industry. | what are distribution channels |
| 13 | Production cost, size, and distribution channels of Malaria vaccine industry. | how much is cost: production |
| 13 | Production cost, size, and distribution channels of Malaria vaccine industry. | how big is market |
| 14 | Companies in MD, VA, WVA, and PA that recycle used carpet and foam rubber. | who performs |
| 15 | Companies in MD, VA, WVA, and PA that recycle used carpet and foam rubber to which he can take material. | where located |
| 15 | Companies in MD, VA, WVA, and PA that recycle used carpet and foam rubber to which he can take material. | who performs |
| 16 | State of the art floor ready merchandise as it relates to automation and MIS systems. | what is state of the art |
| 17 | Floor ready merchandise and how retailers expect to get it. | how to distribute |
| 17 | Floor ready merchandise and how retailers expect to get it. | where located |
| 17 | Floor ready merchandise and how retailers expect to get it. | who distributes |
| 18 | Trends in bridal shop industry (whether customer will buy or rent). | what are trends |
| 19 | Companies and technology used in the mobile x-ray business. | what technology is used |
| 19 | Companies and technology used in the mobile x-ray business. | who manufactures |
| 20 | Vendors for motor wheel unit and micro controller. | where located |
| 20 | Vendors for motor wheel unit and micro controller. | who sells |

Table 2: Preliminary Classification of Requests

All Questions: Grand Total = 744

1. Who       = 226 (30%)
2. What      = 232 (31%)
3. Where     = 155 ( 21%)
4. When      =    0 (0%)
5. Why       =    6 ( 1%)
6. How       = 125 (17%)


I.       Who: Who (person or company) fills given condition?
         Total = 226

    1.1    Who is/are (Identification):Who (company/person) meets given criteria?
           Subtotal = 27

           1.1.1  Who (company/business) meets given criteria? (9)
                  competitors (6)
                  can be acquired
                  top companies (2)
           1.1.2  Who (specific person/people) meets given criteria? (18)
                  CEO (2)
                  contact (7)
                  contact (implicit)
                  expert (6) [composite question]
                  is author (2)

    1.2    Who performs:  Who performs given process or action?
           Subtotal = 199

           1.2.1  Who (company) performs process or action? (168)
                  brokers offshore
                  builds
                  develops
                  distributes (13)
                  exports (3)
                  franchises
                  funds (2)
                  grows
                  imports (2)
                  lends

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licenses
manufactures (34)
needs (2) [could be person]
owns
performs/provides [service or function] (56)
produces (4)
publishes (3)
researches
sells (27)
     retails (2)
     sells (22)
     wholesales (3)
subsidizes
succeeds
supplies (10)
uses product

1.2.2. Person:  Who (generic person/people/group) performs action? (31)
buys (14)  [PROBLEM -- RELATIONSHIP TO WHAT IS MARKET]
holds patent  [person or company] (14)
lives in
uses service [could be company]
works for

2.     What:  What property or condition does entity have?
Total =232

    2.1    What is/are industry/service ?
          Subtotal = 65

          analysis [composite question]
          industry (18)
          service (5)
          failures
          projections
          statistics
          trends [composite question] (38)

    2.2    What is company ?
          Subtotal =9

          analysis [composite question]
          profile [composite question] (8)

2.3    What is product ?
Subtotal = 6

nature of product                            |
[product] analysis [composite question]  |
product (2)                                 |     **PROBLEM**
product development                 |
produced                                |

2.4.    What is market ?
Subtotal = 44

analysis [composite question] (3)
[composite] (23)
market:  future
market: potential (3)
market: segment
trends [composite question]? (13)

2.5    What are finances ?
Subtotal = 12

financial analysis [composite question] (2)
economic indicator
financial implications
financial status
financial trends [composite question]
investments
sales
spending habits
valuations
values (2)

2.6    What is legal status and/or procedure?
Subtotal:  13

legal aspects (2)
patent (3) [composite question]
[patents] held (2)
procedure
protocol
regulations (2)
rules
standards

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2.7     What is/are ? (identification other than person or company)
         Subtotal = 67

advancements [composite question]
administrative aspects
air quality
application(s) (2)
background (13) [compostie question]
commodities
composition
databases
demographics (7) [composite question]
distribution analysis [composite question]
distribution channels (2) [composite question]
effects
fashion trends [composite question]
health issues
information: technical
information: trade show
initiative (2)
opportunities
patent (3)
[patents] held (2)
pitfalls
popular languages
problems (3)
process
profile
program
prospects [as a business venture]
qualifications [implicit] (4)
recent developments
requirements (2)
solutions
state of the art (2)
status (2)
technologies
training courses/videos

2.8     What is? (recipient of action?) (16)

needed
offered
provided

sold
used (9)
visited
written(2)

3.      When:  When did given entity take place or exist?
Total = 0

4.      Where:  Where is given entity located?
Total = 155

Where Located? = 155
company[implicit] (154)
service

5.      Why:  Why does given event occur?
Total = 6

[company] fails
is [something] done
is [something] negligent
[company] succeed (3)

6.      How: How is given entity quantified?
Total = 125

6.1      How is given entity assessed?
Subtotal = 4

ranked (3)
accepted

6.2      How large is given entity?
Subtotal = 83

6.2.1  How Many = 21
businesses [comprise industry]
children enrolled
commercial buildings
condominiums
employees (2)
franchises
garden apartments
hours [used daily]

immigrants
people (7)
      people [do something]    PROBLEM
      buy (5)
      might buy
[businesses] provide
responses
stores
units sold

### 6.2.2  How Much (60)

capacity
cost [any] (27)
      charge: product
      charge: admission
      cost: delivery
      cost: equipment
      cost: forecasted
      cost: membership fees
      cost: operating
      cost: per BTU
      cost: production (2)
      cost: retail (13)
      cost: start up (4)
earned
exists
exported
growth (3)
      growth: potential
      growth: rate
      growth: forecasted
imported
market share (2)
profit(s) (2)
residue
revenue (2)
      revenue
      revenue:  annual
salaries
sales (10)
spent (5)
time
value

6.2.3  How often does given event occur?
Subtotal = 2

[businesses] fail
[cities] visited

6.3    How is given process performed?
Subtotal = 38

advertise
apply
become [a lender]
contact (3)
contract
control
distribute
establish
franchise
manufacture
market (3)
market internationally
measure productivity
operate
organize
perform (7)
produce
provide
raise
run [a business]
sell direct
share space
start (3)
structure
use (2)

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## Table 3.  Partial Listing of Raw and Analyzed Questions

| Raw Question | Analyzed Question |
| --- | --- |
| Recent Developments | what are trends |
| Who supplies | who supplies<br>where located (implicit) |
| what are prices | how much is (retail) cost |
| who recycles | who performs<br>where located (implicit) |
| how gets$_1$ | how distributed<br>who distrubtes |
| how gets$_2$ | who sells |
| how survive | what are financial trends |
| any articles on | background |
| description | company profile |
| market information | what is market analysis |
| customer demographics | who buys |
| any details | company profile |
| what is background | any information on |
| what is pricing | how much cost |
| who are customers | who buys |
| business aspects of | how performed |
| how to create | how start |
| players | competitors |

| customer segment | market segment |
|---|---|
| who requires | who needs |
| who pays for | who is market |
| market data | what is market |
| market information | what are market trends or what is market analysis (depending on temporal qualifiers) |
| company background | company profile |
| all information on company | company profile |
| recent advancements | advancements |
| financial position in recent years | financial trends |
| size of industry | how much consumed |
| all information on industry or service | industry or service analysis |
| information process | how performed |
| examine success | why successful |
| willingness to pay | how much paid |
| retailers | who sells |
| industry information | industry analysis |
| information on problems | what are problems |
| information on business prospect | what are prospects as a business venture |
| industry trends | what are trends |
| statistics | how much |
| what is demand | what is market |

| | |
|---|---|
| process | how performed |
| all information available | what is background |
| all statistics to produce profit | how to produce profit |
| possibility of providing | how to provide |
| revenue statistics | how much earned |
| industry reports | what is industry analysis |
| acceptance | how widely accepted |
| builders | manufactures |
| what are factors leading to failure | how fail |
| what are factors leading to success | how succeed |
| what areas are hot | what is state of the art |
| literature "on" | what is background |
| what are membership fees | how much is cost: membership fees |
| what is demand | what is market |
| what is market size | how big is market |

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Table 4. Composite Questions

1. WHAT ARE TRENDS (recent past, present & future)

    What are MARKET TRENDS
        How big is market
            How big is potential market
            Who is potential market
                Who are potential buyers
                Who are potential sellers
        What is market
            Who buys/uses
            Where are buyers
            How much consumed
            What are market segments

    What are FINANCIAL TRENDS
        How much cost
        How much earned
        How much sales/rental
        How much lost

    What are SALES TRENDS
        How many sold (units)
        How much sold ($$$)

    Who SELLS/PROVIDES/MANUFACTURES
        Who are competitors
            How much is market share
            What are prices
        Where located

    What are TECHNOLOGICAL TRENDS

    How RUN (OPERATED)
        How much charged

    What are INNOVATIONS

    What are RESEARCH & DEVELOPMENT TRENDS?

    What is STATE OF THE ART

    What is FUTURE FORECAST

    What services offered/What products sold

## 2. WHAT ARE DEMOGRAPHICS

What is gender
what is race
what is profession
what is education
how old
how much earn

## 3. WHAT ARE ADVANCEMENTS

What is design

How made

## 4. WHAT ARE DISTRIBUTION CHANNELS

Who distributes
How distributed

Where distributed

## 5. WHAT IS COMPANY PROFILE

where located
    how many branches/locations
what is financial status:
    how much earned
    how much market share
    what sales
what is produced/provided
who are officers/contact
what are legal activities
what are plans
what is relationship to other companies
what is private/public status
how many employees

## 6. WHAT IS BACKGROUND INFORMATION

how much charge
how done
what is

## 7. WHAT IS PRODUCT/INDUSTRY/SERVICE/MARKET/FINANCIAL ANALYSIS

what are problems/concerns
what is future growth
what are success/failures
what are risks/opportunities
what is market
      Who buys/uses
      Where are buyers
      How much consumed
      What are market segments
      who sells/provides/manufactures
what are costs

## 8. WHAT IS PATENT

what is number
who holds patent
when was patent issued
what is design/process

## 9. WHO IS EXPERT

how to contact
what are qualifications?