EXHIBIT 14

[54] INTELLIGENT AGENTS FOR ELECTRONIC COMMERCE

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Related U.S. Application Data

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[58] Field of Search 705/10, 14, 26, 705/27

[56] References Cited

U.S. PATENT DOCUMENTS

4,817,080	3/1989	Soha	370/17
4,984,155	1/1991	Geier et al.	364/401
4,992,940	2/1991	Dworkin	364/401
4,999,806	3/1991	Chernow et al.	364/900
4,999,833	3/1991	Lee	370/94.1
5,131,039	7/1992	Chaum	380/23
5,202,921	4/1993	Herzberg et al.	380/23
5,239,617	8/1993	Gardner et al.	395/12
5,283,731	2/1994	Lalonde et al.	364/401
5,299,115	3/1994	Fields et al.	705/10
5,299,125	3/1994	Baker et al.	364/419.08
5,317,677	5/1994	Dolan et al.	395/77
5,319,542	6/1994	King, Jr. et al.	364/401
5,321,620	6/1994	Tanaka et al.	364/468
5,355,327	10/1994	Stent ert al.	702/187
5,369,577	11/1994	Kadashevich et al.	364/419.13
5,379,420	1/1995	Ullner	395/600
5,390,281	2/1995	Luciw et al.	395/12
5,414,838	5/1995	Kolton et al.	395/600
5,434,777	7/1995	Luciw	364/419.13
5,440,634	8/1995	Jones et al.	380/24
5,444,823	8/1995	Nguyen	395/51

5,473,732	12/1995	Chang	395/77
5,557,518	9/1996	Rosen	364/408
5,603,031	2/1997	White et al.	395/683
5,664,115	9/1997	Fraser	705/37
5,696,965	12/1997	Dedrick	707/10
5,717,866	2/1998	Naftzger	705/14
5,721,831	2/1998	Waits et al.	705/10
5,721,832	2/1998	Westrope et al.	705/27
5,724,521	3/1998	Dedrick	705/26
5,740,549	4/1998	Reilly et al.	705/14
5,745,882	4/1998	Bixler et al.	705/26

OTHER PUBLICATIONS

Connolly, Daniel W., "Proposals for Gathering Consumer Demographics", http://www.w3.org/pub/WWW/Demographics/ Proposals.html, pp. 1–6, Nov. 06, 1995.

(List continued on next page.)

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[57] ABSTRACT

A system for electronic commerce (10) having personal agents (12 and 13) that represent consumers and providers in a virtual marketplace (28). Consumer personal agents conceal the identity of the consumer and are capable of creating decision agents (14) that shop for products and assist consumers in comparing and ranking products. Provider personal agents are capable of creating demand agents (16) that quantify demand and target specific consumers without learning the identity of the consumers. Based on data generated by the activities of the decision agents and on preference data maintained by consumer personal agents, provider personal agents can quantify current, historical, and future demand, simulate demand, and target specific consumers for advertising and other messages. Provider personal agents can cooperate with consumer personal agents to collect data about reasons for sales and lost sales and to offer consideration payments to consumers. Consumer personal agents can automatically reject unsolicited messages that do not satisfy the consumer's preferences.

57 Claims, 46 Drawing Sheets
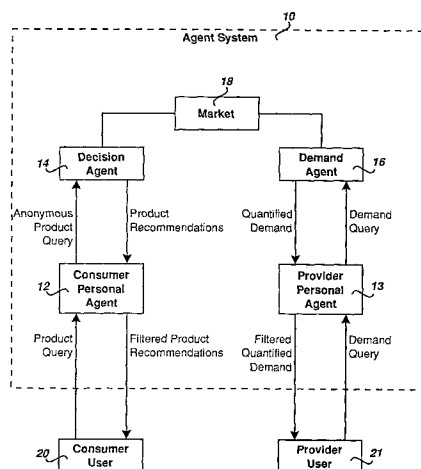
OTHER PUBLICATIONS

Streams Online Media Development, "Streams Readies Release of Breakthrough Internet Media Planning and Assessment", http://streams.com/press _release.html, pp. 1–2, Aug. 31, 1995.

Tassone, Dominic , "The Lilypad White Paper", http://www.lilypad.net/paper.html,pp. 1–9 & 1–5 Feb. 1, 1997.

Chaum, D. "Achieving Electronic Privacy", Scientific American, Aug. 1992, pp. 96–101, copy supplied printed from world wide web site "http://digicash.support.n1/publish/sciam.html" on Apr. 3,1997 (8 pages).

Chaum, D. "Security Without Identification: Card Computers to make Big Brother Obsolete", Communications of the ACM, vol. 28, pp. 1030–1044, Oct. 1985, copy supplied printed from world wide web site "http://digicash.support.n1/publish/bigbro.html" on Apr. 3, 1997 (24 pages).

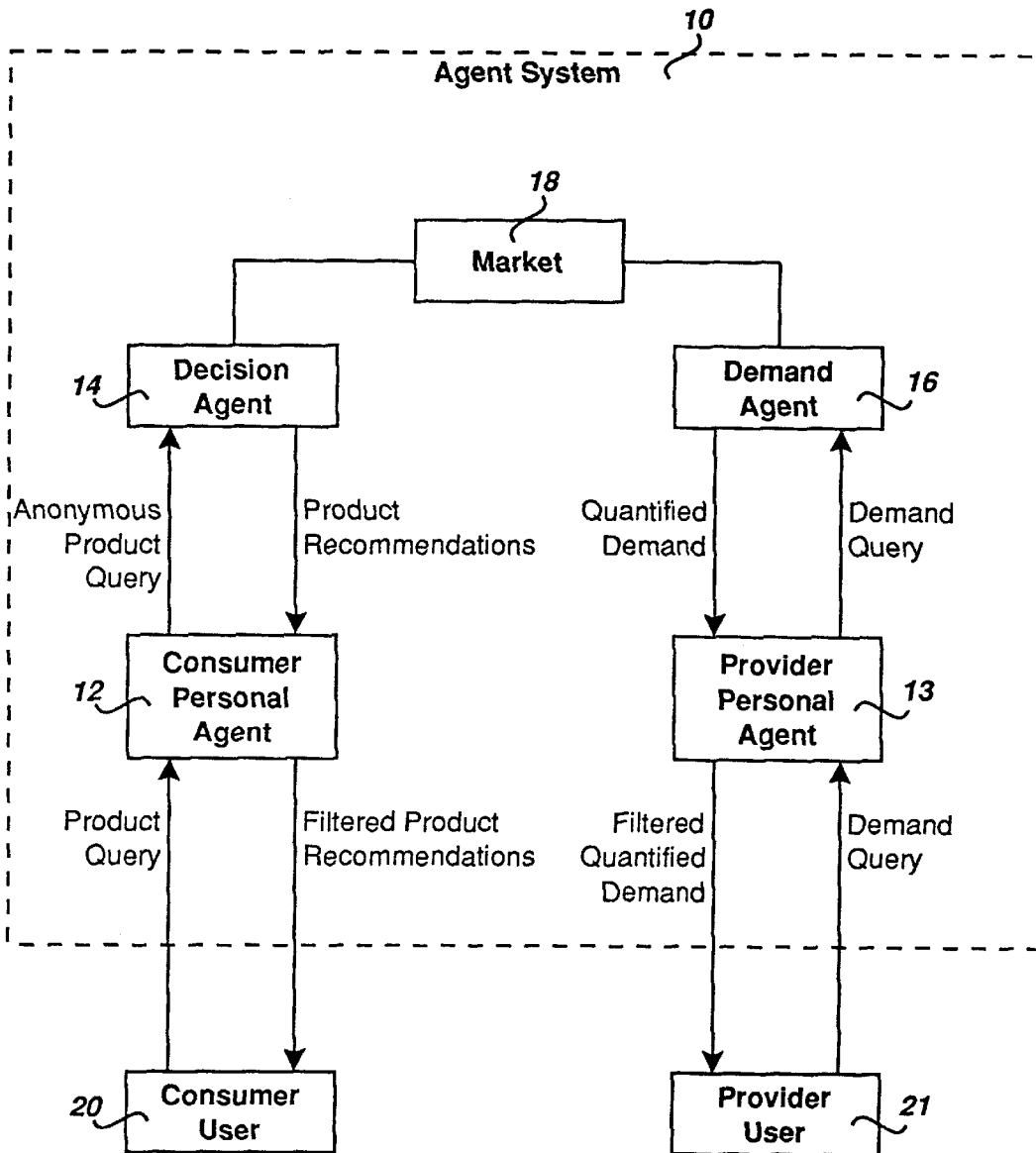International Preliminary Examination Report dated Jan. 13, 1998 (PCT/US97/01057, filed Jan. 17, 1997), 6 pages.

Fig. 1

Fig. 2

10

Agent System

Processor   38

38   Processor   Processor   38

38   Processor   Processor   38

38   Processor   Processor   38

38   Processor

38   Processor   Processor   38

Fig. 3A

Processor   38

Object Server   40

Communications   42

Human/Machine Interface   44

Messaging   46

Persistence   48

Fig. 3B

Personal Agent *12*

Unique ID	*50*
Owner Manager	*52*
Preference Manager	*54*
Delivery Manager	*56*
Individual Firewall	*58*
Decision Agent Manager	*60*
Demand Agent Manager	*62*
Ad Manager	*64*
Target Manager	*66*
Consideration Account	*67*

Fig. 4A

60

Decision Agent Manager

Decision Composer	*74*
Decision Agent Factory	*76*
Decision Agent Tracker	*78*
Decision Agent Archive	*80*

Fig. 4B

62

Demand Agent Manager

Demand Composer	*82*
Demand Agent Factory	*84*
Demand Agent Tracker	*86*
Demand Agent Archive	*88*

Fig. 4C

64

Ad Manager

Ad Composer	*90*
Ad Delivery	*92*
Ad Tracker	*94*
Ad Archive	*96*

Fig. 4D

68

| Preference Datum | |
| Key | Value |

70   72

Fig. 5A

Key	Value
Age	34
Homeowner	Yes
Gender	Male
Cats	interested
brand name 1	like
brand name 2	dislike
brand name 3	neutral
brand name 4	like > *brand name 3*
brand name 5	a favorite
email Consideration Fee	greater than $1.00
alpine skiing	dislike
cross country skiing	like
MSG in food	dislike
delivered pizza	No
phone solicitation	never
favorite color	blue, red
health and fitness	interested
weight lifting	rank 1 in 10
stair climbing	rank 3 in 10
swimming	rank 10 in 10

Fig. 5B

14

Decision Agent

Unique ID	*98*
Personal Agent Reference	*100*
Market Reference	*102*
Expiry	*104*
Query	*106*
Response Manager	*108*
Log	*110*

Fig. 6

16

Demand Agent

Unique ID *112*
Personal Agent Reference *114*
Market Reference *116*
Datetime Range *118*
Demand Query *120*
Log *122*

Fig. 7

Fig. 8A

Market ~18

Product Listing	124
Xref Manager	126
Sell Ad Manager	128
Buy Ad Manager	130
Active Demand Agent Manager	132
Template Dispenser	134
Query Logger	136
Historical Demand Search Engine	138
Remote Database Adaptors	140
Authorization	142

118

Ad Manager

Ad Indexing	144
Active Ads	146
Future Ads	148
Expired Ads	150
Active Decision Agent Manager	152
Expired Decision Agent Manager	154

Fig. 8B

152

Active Decision Agent Manager

Immediate Agents	156
Basic Search Engine	158
Pending Agents	160
Incremental Search Engine	162
Current Demand Search Engine	164

Fig. 8C

Fig. 9A

Product Database   *32*

Database Administration	*166*
Product Data Storage	*168*
Product Template Manager	*170*
Remote Database Adaptors	*172*

174

Product Template   *176*

| Template Entry 1 | Template Entry 2 | ... | Template Entry N |

(Instructions for Use)   *178*

Fig. 9B

176

Product Template Entry   *176*

| Keyword | Specification | Use Flags |
| *180* | *182* | *184* |

Fig. 9C

Keyword	Specification	Use Flags	Value
Product	enumeration	search,ad	Television Set
Brief Description	text	ad	27 " TV
Brand	enumeration	search,ad	*brand name*
Model	text	search,ad	392-43
Mfr Sug Retail Price	money	search,ad	$500.00
Screen Size	number	search,ad	27
Remote Control	boolean	search,ad	yes
Cable Ready	boolean	search,ad	yes
Stereo Sound	boolean	search,ad	yes
Cabinet Color	enumeration	search,ad	black
Expanded Info	text	ad	Futuristic design...
Image	image	ad	(picture of product)
rating guide Rating	rank	search	3 of 14
Endorser	text	search	*endorser*

Fig. 9D

186

		Ad		

Unique ID	Buy/Sell Flag	Reference to Placer	Reference to Market	Reference to Product Listing
Template Values	Description	Price	Start Datetime	Expiry Datetime

188   *190*   *192*   *194*   *196*

198   *200*   *202*   *204*   *206*

Fig. 10

Product Search Method

Fig. 11

```
┌─────────────────────────┐
│  consumer decides to    │  222
│  search for a product   │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│  consumer establishes   │
│  session with Personal  │  224
│  Agent                  │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│  consumer selects       │  226
│  Decision Agent Manager │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│  Decision Composer      │
├─────────────────────────┤
│  Compose Decision       │  228
│  Query                  │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│  Decision Agent Factory │
├─────────────────────────┤
│  Create Decision Agent  │  230
│  with Decision Query    │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│  Decision Agent Factory │
├─────────────────────────┤
│  Deliver new agent to   │  232
│  Market                 │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│  Market                 │
├─────────────────────────┤
│  Accept New Decision    │  234
│  Agent                  │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│  Decision Agent         │
├─────────────────────────┤
│  Perform                │  236
│  DecisionSearch         │
└─────────────────────────┘
            │
            ▼
         (  End  )  238
```

220

Compose Decision Query Subroutine ⤹ *228*

Fig. 12A

YES ← ⟨ *242* start from similar ? ⟩ → NO

252 → consumer selects Market

Decision Agent Archive

244 display old agent queries

↓

246 consumer selects similar agent

↓

Decision Composer

248 get Template and instructions

↓

Decision Composer

250 initialize values in Template from old agent

NO ← ⟨ *254* restricted Market ? ⟩

↓ YES

NO ← ⟨ *256* consumer authorized ? ⟩

258 → display error to consumer

↓

260 (End)

YES ↓

262 consumer selects product from Market

↓

Decision Composer

264 get Template and instructions

Decision Composer

266 format, display Template & instructions

↓

268 consumer fills in

↓

▽ 1

Fig. 12B

1

270 — extended search ?

NO

YES

274 — immediate search is marked

272 — consumer enters search expiry for extended search

276 — consumer selects delivery media & time ?

YES

NO

279 — consumer selection marked

280 — default delivery media & time marked

282 — consumer selects done

284 — Return

Create Decision Agent Subroutine

Fig. 13

230

| **Decision Agent Factory** |
| create new agent with unique id |

288

| **Decision Agent Factory** |
| store PA, Market, Expiry, Query in new agent |

290

| **Decision Agent Factory** |
| log agent creation in agent's Log |

292

(Return) 294

Accept New Decision Agent Subroutine

Fig. 14

234

| Active Decision Agent Manager |
| accept new Decision Agent |

298

| Active Decision Agent Manager |
| log query from Decision Agent to Market's Query Logger |

300

| Active Decision Agent Manager |
| deliver Decision Agent to Immediate Agents |

302

(Return) *304*

Perform Decision Search Subroutine

Fig. 15

⌐ *236*

```
┌─────────────────────────┐
│     Decision Agent      │
├─────────────────────────┤
│   Perform Immediate     │  308
│        Search           │
└─────────────────────────┘
            │
            ▼
         ╱─────╲          310
   YES  ╱ extended ╲  NO
  ◄────╱  search ?  ╲────►
        ╲           ╱
         ╲─────────╱
    │                    │
    ▼                    ▼
┌──────────────────────┐  ┌──────────────────────┐
│Active Decision Agent │  │                      │
│      Manager         │  │  End Decision Search │ 314
├──────────────────────┤  │                      │
│deliver Decision Agent│  └──────────────────────┘
│  to queue of Pending │ 312
│       Agents         │
└──────────────────────┘
    │                    │
    └──────────┬─────────┘
               ▼
            ╭────────╮
            │ Return │ 316
            ╰────────╯
```

Perform Immediate Search Subroutine

Fig. 16

⌐ 308

Immediate Agents
select next Decision Agent from queue

320

↓

Immediate Agents
deliver query from agent to Basic Search Engine

322

↓

Basic Search Engine
match query against Active Ads

324

↓

Response Manager
collect matching ads, respond to placer

326

↓

Immediate Agents
give Decision Agent back to Active Decision Agent Manager

328

↓

(Return)   330

End Decision Search Subroutine

Fig. 17

314

Immediate Agents or Pending Agents
remove Decision Agent from queue and deliver back to Decision Agent Manager

334

Decision Agent Tracker
log end of search

336

End 338

Extended Search Subroutine

Fig. 18

340

```
┌──────────────────────────────┐
│      Pending Agents          │
├──────────────────────────────┤        342
│  notified that new ad has    │
│    arrived in market         │
└──────────────────────────────┘
```

```
        agents in        344    NO    ┌──────────┐   346
        queue ?          ──────────►  │  Return  │
                                       └──────────┘
              │ YES
              ▼
┌──────────────────────────────┐
│  select next Decision Agent  │   348
│        from queue            │
└──────────────────────────────┘
```

```
        agent expiry     350    YES   ┌──────────────────┐
        past ?           ──────────►  │  End Decision    │
                                      │     Search       │
              │ NO                    └──────────────────┘
              ▼                              352
```

```
┌──────────────────────────────┐
│   Incremental Search Engine  │
├──────────────────────────────┤   354
│  match agent's query against │
│          new ad              │
└──────────────────────────────┘
```

```
        ad satisfies     356    NO
        query ?          ─────────┐
              │ YES                │
              ▼                    │
┌──────────────────────────────┐  │
│      Response Manager        │  │
├──────────────────────────────┤  │   358
│  collect matching ads, respond│ │
│        to placer             │  │
└──────────────────────────────┘  │
```

Deliver Search Results Subroutine

Fig. 19

360

delivery time is reached *362*

Preference Manager

organize results according to consumer preferences *364*

Delivery Manager

format results for delivery media *366*

Delivery Manager

deliver results to user *368*

370

search complete ?   NO

YES

Expire Decision Agent *372*

Return *374*

Expire Decision Agent Subroutine

Fig. 20

_— 372_

Expired Decision Agent Manager
log Decision Agent   _378_

Decision Agent Tracker
logs expiration   _380_

Decision Agent Archive
archive expired Decision Agent   _382_

Return   _384_

Quantify Demand Method

Fig. 21

```
                            ┌──────────────────────┐
                            │   provider decides to │  388
                            │    quantify demand    │
                            └──────────────────────┘
                                       │
                                       ▼
                            ┌──────────────────────┐
                            │  provider establishes │  390
                            │  session with Personal │
                            │         Agent          │
                            └──────────────────────┘
                                       │
                                       ▼
                            ┌──────────────────────┐
                            │ provider selects Demand│  392
                            │      Agent Manager     │
                            └──────────────────────┘
                                       │
                                       ▼
                            ┌──────────────────────┐
                            │    Demand Composer    │
                            ├──────────────────────┤  394
                            │    Compose Demand     │
                            │        Query          │
                            └──────────────────────┘
                                       │
                                       ▼
                            ┌──────────────────────┐
                            │  Demand Agent Factory │
                            ├──────────────────────┤  396
                            │   Create Demand Agent │
                            │    with Demand Query  │
                            └──────────────────────┘
                                       │
                                       ▼
                            ┌──────────────────────┐
                            │  Demand Agent Factory │
                            ├──────────────────────┤  398
                            │   Deliver new agent to │
                            │        Market          │
                            └──────────────────────┘
                                       │
                                       ▼
                            ┌──────────────────────┐
                            │        Market         │
                            ├──────────────────────┤  400
                            │   Accept New Demand   │
                            │         Agent          │
                            └──────────────────────┘
                                       │
                                       ▼
                            ┌──────────────────────┐
                            │     Demand Agent      │
                            ├──────────────────────┤  402
                            │   Perform Demand      │
                            │       Search          │
                            └──────────────────────┘
                                       │
                                       ▼
                                  (  End  )  404
```

386

Compose Demand Query Subroutine

Fig. 22A

Fig. 22B

①

provider selects kind of demand to quantify   *436*

438

current demand ? —— YES ——

Demand Composer

indicates current datetime of "now"   *440*

NO

442

historical demand ? —— YES ——

user enters datetime range   *444*

NO

446

provider selects delivery media & time ? —— YES ——

provider selection marked   *448*

NO

default delivery media & time marked   *450*

provider selects done   *452*

Return   *454*

Create Demand Agent Subroutine

Fig. 23

396

Accept New Demand Agent Subroutine

Fig. 24

400

Active Demand Agent Manager

accept new Demand Agent   468

Active Demand Agent Manager

log query from Demand Agent to Market's Query Logger   470

Return   472

Perform Demand Search Subroutine

Fig. 25   ↙ *402*

Current   *476*   Historical
Demand   ⟨ type of ⟩   Demand
                    demand ?

```
Demand Agent                          Demand Agent

Perform Current        478      480     Perform Historical
Demand                                  Demand
```

```
Active Demand Agent Manager

deliver Demand Agent back to      482
Demand Agent Manager
```

```
Demand Agent Tracker

log end of search                 484
```

(Return) *486*

Perform Current Demand Subroutine

Fig. 26   478

Demand Agent
deliver query to Current Demand Search Engine

490

Current Demand Search Engine
match query against Decision Agents in Immediate Agents and Pending Agents

492

Current Demand Search Engine
deliver matching Decision Agents refs to Demand Agent

494

Demand Agent
notify Active Demand Agent Manager that search done

496

(Return) 498

Perform Historical Demand Subroutine

Fig. 27

_480_

Demand Agent
deliver query to Historical Demand Search Engine

_502_

Historical Demand Search Engine
match query against old queries in Query Logger

_504_

Historical Demand Search Engine
deliver matching Decision Agents refs to Demand Agent

_506_

Demand Agent
notify Active Demand Agent Manager that search done

_508_

(Return) _510_

Deliver Demand Results Subroutine

Fig. 28

512

delivery time is reached — 514

↓

Preference Manager

organize results according to provider preferences — 516

↓

Delivery Manager

format results for delivery media — 518

↓

Delivery Manager

deliver results at delivery time — 520

↓

Expire Demand Agent — 522

↓

Return — 524

Expire Demand Agent Subroutine

Fig. 29   _522_

| **Demand Agent Tracker** |
| logs expiration   _528_ |

| **Demand Agent Archive** |
| archive expired Demand Agent   _530_ |

(Return _532_)

Place Ad Method

Fig. 30

534

```
┌─────────────────────────┐
│  User decides to place ad │  536
│      for a product        │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│  User establishes session │  538
│   with Personal Agent     │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│   User selects Ad Manager │  540
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│      Ad Composer          │
├─────────────────────────┤  542
│      Compose Ad           │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│      Ad Delivery          │
├─────────────────────────┤  544
│   deliver ad to Market    │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│      Ad Manager           │
├─────────────────────────┤  546
│    Accept New Ad          │
└─────────────────────────┘
            │
            ▼
          ( End )  548
```

Compose Ad Subroutine

Fig. 31A

_542_

User selects Sell or Buy _552_

_554_
start from similar ?

YES

NO

Ad Archive

display old agent queries _556_

User selects similar ad _558_

Ad Composer

get Template and instructions _560_

Ad Composer

initialize values in Template from old ad _562_

User selects Market _564_

_566_
restricted Market ?

NO

YES

_568_
User authorized ?

NO

display error to User _570_

End _572_

YES

User selects product or generic from Market _574_

Ad Composer

get product or generic Template and instructions

_576_

Ad Composer

format, display Template & instructions _578_

User fills in Template _580_

1

Fig. 31B

(1)

↓

User enters price to sell, or price range to buy   *582*

↓

User selects start and expiry datetime   *584*

↓

User selects response delivery media & time ?   *586*

YES ←   NO →

user selection marked   *588*

default delivery media & time marked   *590*

↓

User selects done   *592*

↓

Ad Composer

Create Ad   *594*

↓

Return   *596*

Create Ad Subroutine

Fig. 32

594

Ad Composer

create new sell or buy ad
with unique id
600

Ad Composer

store refs, template
values, description,
price, start & expiry
datetime in new ad
602

Ad Tracker

log ad creation
604

Return 608

Accept New Ad Subroutine

Fig. 33

546

```
┌──────────────────────┐
│      Ad Manager      │
├──────────────────────┤
│    accept new ad     │  612
└──────────────────────┘
           │
           ▼
       ╱────────╲          614
      ╱ start time ╲    NO
     ◄  for ad ?    ►──────────┐
      ╲            ╱            │
       ╲────────╱              ▼
           │           ┌──────────────────────┐
          YES          │      Future Ads      │  616
           │           ├──────────────────────┤
           │           │ hold new ad till start time │
           │           └──────────────────────┘
           │                    │
           ▼◄───────────────────┘
┌──────────────────────┐
│      Active Ads      │
├──────────────────────┤
│      accept ad       │  618
└──────────────────────┘
           │
           ▼
┌──────────────────────┐
│      Ad Indexing     │
├──────────────────────┤
│  index ad for searching  │  620
└──────────────────────┘
           │
           ▼
┌──────────────────────┐
│      Active Ads      │
├──────────────────────┤
│  notify Active Decision  │  622
│  Agent Manager that new  │
│      ad has arrived      │
└──────────────────────┘
           │
           ▼
       ╱────────╲
      (  Return  )  624
       ╲────────╱
```

Expire Ad Subroutine

Fig. 34

626

Ad Manager
remove Ad from Active Ads

628

Expired Ads
receive indexes for ad

630

Ad Tracker
logs Ad expiration

632

Ad Archive
archive expired Ad

634

Return *636*

Target Consumers Method

Fig. 35

638

```
┌─────────────────────────────┐
│  Provider decides to target │
│  messages to a set of        │  640
│  consumers                   │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│  Provider establishes session│  642
│  with Personal Agent         │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│      Target Manager          │
├─────────────────────────────┤  644
│    Target Personal Agents    │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐  646
│  provider composes message   │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│  message is delivered to     │  648
│  targeted Personal Agents    │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│  consumers receive, reply to │  650
│  messages                    │
└─────────────────────────────┘
              │
              ▼
            652
    ╱─────────────────╲
NO ╱  consideration    ╲
◄──   specified          
    ╲  for message ?    ╱
     ╲─────────────────╱
              │ YES
              ▼
┌─────────────────────────────┐
│      Target Manager          │
├─────────────────────────────┤  654
│  send consideration notice to│
│  consumers that replied      │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│   Consideration Account      │
├─────────────────────────────┤  656
│  credit consideration to     │
│  account                     │
└─────────────────────────────┘
              │
              ▼
           ╭───────╮
           │  End  │  658
           ╰───────╯
```

Target Personal Agents Subroutine

Fig. 36

Reject Unsolicited Message Method

674

Fig. 37

Delivery Manager
receive unsolicited message from provider

676

Delivery Manager
compare unsolicited message to preferences

678

unsolicited message satisfies prefs? *680*

YES

NO

Delivery Manager
deliver message to user

682

Delivery Manager
compose rejection message indicating reason

684

Delivery Manager
send rejection message to provider

686

End *688*
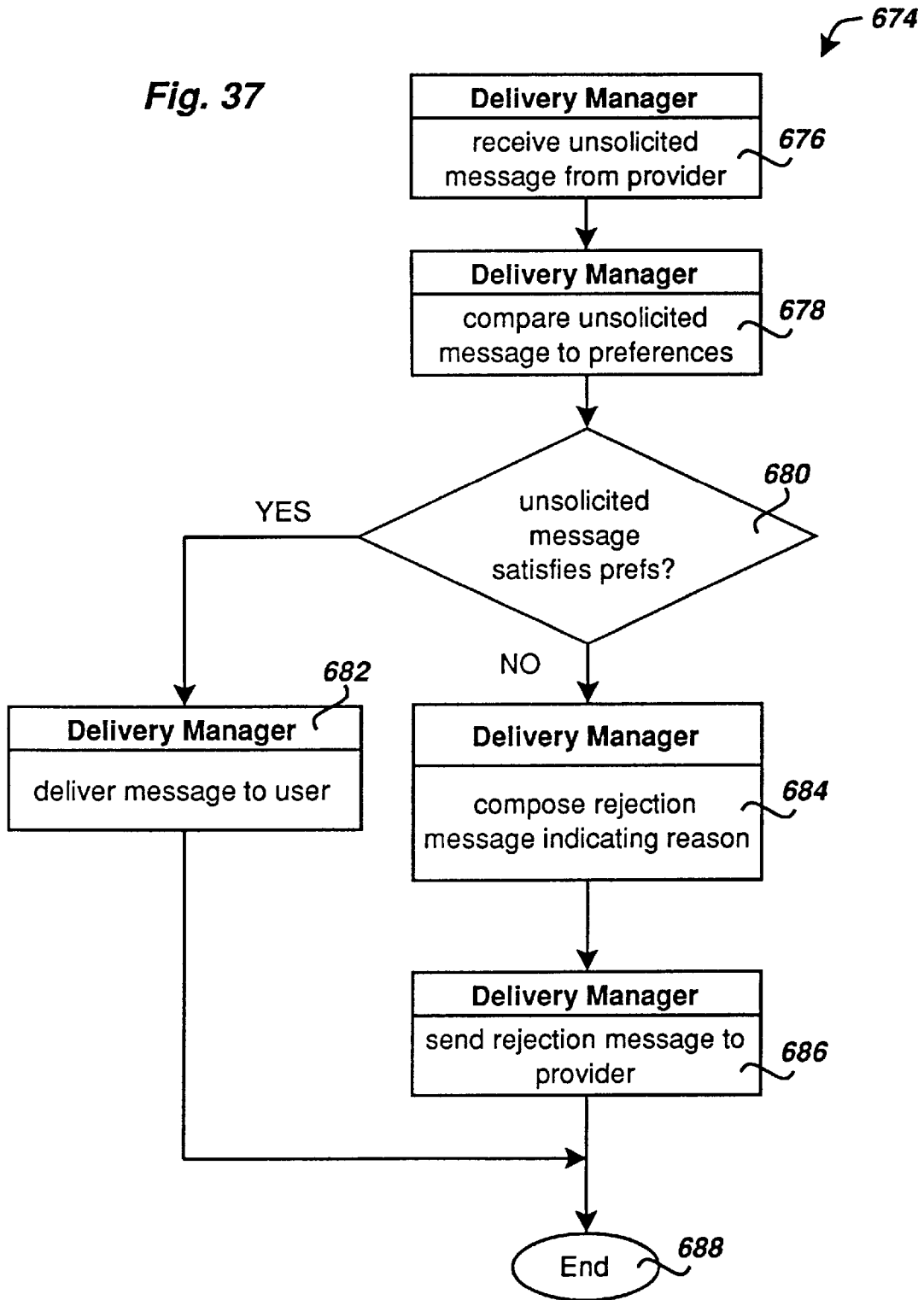
Simulate Demand Method

Fig. 38A

690

| provider decides to simulate demand | 692 |

| provider places invisible ad in market | 694 |

| **Response Manager** receives invisible ad as part of other decision search results | 696 |

| **Preference Manager** ranks invisible ad as part of other decision search results | 698 |

| **Response Manager** returns rank info to provider | 700 |

| **Delivery Manager** does not deliver invisible ad | 702 |

End 704

Replay Demand Method

Fig. 38B *706*

```
┌─────────────────────────────┐
│   provider decides to simulate   │  708
│           demand                │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│  provider submits invisible ad to │  710
│   selected Expired Decision     │
│            Agents               │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│      Response Manager          │
├─────────────────────────────┤
│   receives invisible ad as part of │  712
│  other decision search results   │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│     Preference Manager         │
├─────────────────────────────┤
│   ranks invisible ad as part of   │  714
│  other decision search results   │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│      Response Manager          │
├─────────────────────────────┤
│  returns rank info to provider    │  716
└─────────────────────────────┘
              │
              ▼
          ⬭ End ⬭  718
```
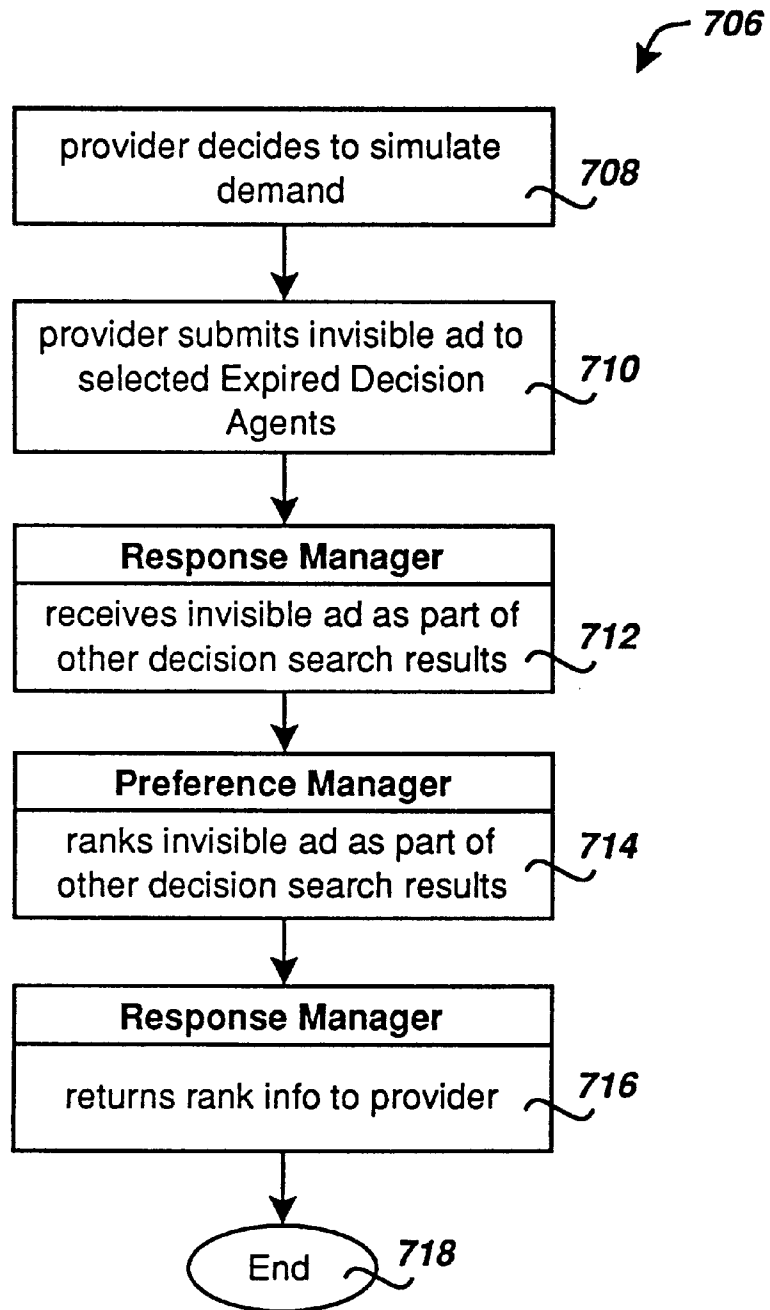
Login to Agent System

Agent Logo *Agent System Name*

Welcome to Agent System

<u>What is a Personal Agent?</u> Create your own for FREE!

If you already have a Personal Agent,

enter your **Agent Id**: [   ]

and **Password**: [   ]

then Click here to enter the system

Fig. 39

Search the Consumer Electronics Market

Need detailed instructions? <u>*Click here*</u>

(icon)   **Search for Consumer Electronics**

Tell us what you're looking for, and let your Personal Agent immediately search for you!

Category

☐ TV	☐ VCR	☐ Laser Disk Player
☐ Cassette Player	☐ Cassette Recorder	☐ Compact Disc Player
☐ Complete Stereo System	☐ Speakers	
☐ Receiver	☐ Amplifier	☐ Tuner
☐ Game Systems	☐ Clock Radio	☐ Radio
☐ Accessories		
☐ Component	☐ Portable	☐ Console

Product	Brand:		Model:	
Location	Merchant:		City:	
Price Range	From:		Up to:	

Click here to specify additional features	*Click here to start looking*

Fig. 40

Search the Automobile Market

Need detailed instructions? <u>*Click here*</u>

(*icon*)　**Search for Automobiles**

Tell us what you're looking for, and let your Personal Agent immediately search for you!

☐ Sedan　　　　　　☐ Mini Van　　　　☐ Full size Van
☐ Sport Utility　　　☐ Mini Pickup　　　☐ Full size Pickup
☐ High Performance　☐ Luxury　　　　　☐ Convertible
☐ 2 door　　　　　　☐ 4 door　　　　　☐ Hatch back
☐ 4 wheel drive　　　☐ Front wheel drive☐ Rear wheel drive
☐ Compact　　　　　☐ Midsize　　　　 ☐ Fullsize
☐ New　　　　　　　☐ Used

Vehicle	Make:	*select* ▭	Model:	
Location	Dealer:		City:	
Age	From Year:		Thru Year:	
Price Range	From:		Up to:	
Maximum mileage:				

Click here to specify additional features　　*Click here to start looking*

Fig. 41

Compose Ad

Need detailed instructions? <u>*Click here*</u>

(icon) **Compose a Sell Ad for Television Set**

Details from Product Database are automatically included in ad.

Brand name:		Model number:	

UPC code:	

☐ Identify seller in ad
☐ Buyer responses to Personal Agent
If neither box is checked,
responses will go to Personal Agent only

Price:	

Start date & time:		Run through:	

Enter additional text for ad. Delivered to searchers who request more info.

o

Click here to continue to next step

Fig. 42

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INTELLIGENT AGENTS FOR ELECTRONIC COMMERCE

CROSS-REFERENCES TO RELATED APPLICATIONS

This application is related to Provisional Patent Application Ser. No. 60/010,087, Filed Jan. 17, 1996. This application is also related to Provisional Patent Application Ser. No. 60/034,395, Filed Dec. 30, 1996.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to the gathering and analysis of market transaction data, where such transactions are contemplated or completed by electronic means, and specifically to the use of software agents to represent and to assist the activities of consumers and providers within an electronic "virtual marketplace".

2. Description of Related Art

The trading of goods and services is one of the basic human activities. From the first meeting of pre-historic men to trade animal skins for berries, to country fairs, to the most intricate computer-based trading of international financial instruments, the marketplace supports the survival and flourishing of our lives.

Every era has established a marketplace based on the technology of its time. Early marketplaces were locations for face-to-face meetings between people offering items for trade. The development of printed material and postal correspondence made it possible for people to trade without ever meeting in person. In modern times, a sophisticated division of labor system involving producers, suppliers, distributors, advertisers, market researchers, payment clearinghouses, customers, and many others, supports our economic lives.

The flow of goods and services, however, is not the whole story. The people and organizations on the production, distribution, sales, and marketing side of trade ("providers") need to understand what goods and services are desired by buyers. The people and organizations who purchase or acquire offered items ("consumers") need to learn what goods and services are available. The flow of this market information is critical to the successful operation of a market.

A brief consideration of modern methods of commerce shows us that consumers have many ways to gather information about available goods and services. Some of these are: visiting stores; browsing catalogs; viewing advertisements on television, on billboards, and in magazines and newspapers; soliciting recommendations from friends; and receiving unsolicited mail advertisements.

We also observe that vendors and other providers use many avenues to disseminate information about available goods and services. These include: broadcast and direct advertisements; in-store displays; telephone solicitations; and so on.

Providers also try to collect information about consumers' desires and buying habits so that they can better serve their current customers and gain new ones, thereby enhancing profits. Current market research methods include: keeping current customer purchase data on file; buying or renting mailing lists of other vendors; listening to focus groups; running pilot sales in test markets; and so on.

However, even with so many pathways for information exchange, there are many disadvantages inherent in the current methods of commerce.

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Disadvantages of Current Methods of Commerce

Although consumers clearly reap many benefits in today's marketplace, there are still many disadvantages that lead to consumer frustration. Here are some obvious disadvantages for consumers:

Just collecting basic information about available goods and services, their features, and their prices is tedious and time-consuming. To find a particular product or verify availability, price, and features, the consumer typically may need to visit several stores across a wide area. Another consumer may choose to spend hours on the telephone, perhaps incurring various communication charges, navigating irritating automated attendants, trying to reach a human who can answer questions. Yet another consumer will peruse stacks of catalogs and accumulated direct mail advertisements. This process wastes the consumer's valuable time, especially when the search fails.

Information isn't always available when it's needed. Consumers frequently rely on ephemeral television and radio advertisements to learn of products and special promotions. But these ads seldom arrive when the consumer is ready to make a selection. Even with print ads, the information is soon lost as the stack of newspapers is carried away for recycling.

It is very difficult for consumers to pick out items of interest from the daily bombardment of advertising. Television and radio spots, billboards, street corner kiosks, the daily newspaper, direct mail coupon packages, in-store merchandise displays, magazine advertisements and inserts, posters on and in mass transportation vehicles, storefront banners—these advertisements and a host of others vie for the consumer's attention daily. Marketing research firms use the term "impression" to denote one occurrence of a person perceiving an advertisement. Some authorities claim that an urban consumer in New York City receives up to 15,000 impressions per day! It is no wonder that consumers become desensitized to the advertising around them, and fail to see the items that are truly of interest.

Consumers have little or no control over the timing or presentation of advertising. They can't arrange to receive information at a convenient time. Telephone solicitors always seem to interrupt dinner. The radio advertisement for an anticipated concert is on the air during "drive time"—when the consumer is driving and can't write down the phone number of the ticket agency. Consumers can't even choose a preferred format for receiving advertisements. If the merchant advertises only in broadcast media, the consumer won't be able to find the information in today's newspaper. Sorting through the barrage of direct mail may require more time than the consumer can allocate to this task, and so the consumer discards a potentially useful notice.

A consumer usually receives no direct benefit for inspecting a provider's advertisements, except for the information itself if the advertisement is relevant. Occasionally, providers and marketing research firms give consumers a small fee or gift in return for participating in a survey. This is called "paying a consideration." However, there are few opportunities for consumers to receive considerations, and no way for consumers to seek out providers that are willing to pay considerations.

When a consumer has an immediate need for product or service information, it may be nearly impossible to

gather the information quickly. This is especially true when the consumer doesn't know where to look for the information, or doesn't have quick and convenient access to sources of information.

Many consumers rely on the recommendations or evaluations of third parties to help them make buying decisions. Consumer rating guides and endorsers provide this kind of information, but the information is not always available at the time or place of the consumer's purchase decision.

Providers, too, have their share of frustrating difficulties using the current methods of commerce. Some of the disadvantages for providers are:

Much of the demographic data from traditional sources is out-of-date or incorrect. Providers frequently buy or rent magazine subscription lists and other providers' customer lists. However, a name on a list is not necessarily removed when the individual no longer subscribes or is no longer a customer. It is expensive to examine lists for data entry errors, duplicates, minor spelling variations, and so on. When a provider exchanges a list with another provider, who exchanges with a third provider, who exchanges with yet another provider, a provider can easily end up with a list that contains a high proportion of names of consumers who are not at all interested in the provider's goods.

It is expensive to target advertisements to specific customers. As mentioned above, mailing lists frequently contain a high percentage of names of uninterested customers, yet buying or renting mailing lists is costly. Controlled circulation magazines, where potential subscribers complete a qualification form to receive a (usually complimentary) subscription, don't always yield truly qualified names, since there typically is no mechanism to verify the information that the potential subscribers report.

It is difficult for a provider to deliver information directly to a consumer who is ready to buy. Even if providers could easily identify those consumers, there is a time lag for the delivery of pertinent information. For example, direct mail requires planning weeks in advance. An in-store salesperson can assist the consumer, but only if the consumer has previously learned that the store carries suitable products. Providers need a mechanism for delivering information to consumers precisely at the moment when it is most helpful.

It is difficult and costly to personalize information to a consumer. Most consumers are unimpressed by feeble attempts at personalization such as form letters that read "Dear MR. JONES JOHN, The JOHN FAMILY may have already won . . . "

It is especially difficult to determine what specific interests a particular consumer has. Most data of this nature must be inferred from subscription lists, member lists, spotty purchase history, etc. It is rare that a consumer directly informs a provider of a particular interest.

Providers have little control over the timing of the delivery of their printed advertising messages. The use of special mailing classes for bulk mail to reduce mailing costs results in erratic delivery times. In the United States, providers using Third Class mail cannot pinpoint even the week that the mail will be delivered. For example, sometimes consumers don't receive a special sale notice until after the sale date. Also, mailed notices must be prepared well in advance to take advantage of

bulk mail, so the provider's quick response to market conditions is impeded.

It is difficult for providers to verify delivery of their messages. Did the direct mail piece get read by the consumer? Was it even delivered? Did interested consumers view the television advertisement? How many consumers noticed the billboard? How many consumers read the newspaper or magazine notice? Market survey and research firms attempt to measure delivery, but their methods are necessarily statistical since they can't survey every household in the target area. Even with their limited usefulness and contested accuracy, these services are expensive.

The low success rates of direct mail (typically 2% to 4%) wastes much of the natural resources for printing and distributing the mailing, as well as wasting the money for preparation of the direct mail. Huge amounts of unsolicited mail end up in the wastebasket. Some authorities estimate that up to 70% of unsolicited mail is never opened.

It is expensive and cumbersome for providers to offer "considerations" to consumers. A consideration is a payment or award of some value to a consumer in return for a consumer viewing an advertisement or participating in a marketing survey. Sometimes considerations are given to encourage the consumer to an action, as when marketing research firms include a dollar bill in an unsolicited direct mail survey. Not only is there the cost of the consideration itself, there are the additional costs to the provider of identifying potential consumer recipients and preparing some means of delivery such as direct mail.

Providers have no practical way to get real-time (immediate) feedback on the success of their promotions. Marketing research on a particular product typically requires at least several weeks or months and is very costly. This leads marketers to test only large product groups and discourages them from gathering data about individual products.

Providers typically have no way to collect information about why a consumer purchased an item. Providers run special promotions, and consumers buy things, but it is arduous, tedious, and error-prone to draw the connection. It is difficult to judge the effects of promotions targeted to different sets of consumers, because providers don't know which promotion persuaded the consumer to buy.

Providers have few ways to collect information about "lost sales", or why a consumer did not purchase an item. If lost sale data could be determined, a provider could better tailor offers to the consumer's needs and desires.

Providers attempt to measure and predict "consumer demand" to help determine the number and mix of products and services to offer and the prices to charge. Consumer demand is a measure of the number of consumers who want to purchase a product or service. It is typically calculated on a large scale with statistical models using historical purchase data. Demand can only be calculated based on purchases that have already occurred, since providers have few mechanisms to determine what new items consumers might want, or at what price consumers would buy. Demand information would be much more useful if it could guide providers into new territory, or if it could warn providers that a planned product would likely have few buyers or is

being offered at an unsuitable price. With more accurate demand information, providers could plan inventories that are better matched to consumer desires, resulting in fewer markdowns.

Providers have no mechanism for using actual demand data to simulate consumer demand under varying conditions. It would be useful if providers could run "what if" scenarios to see the effects on demand of different prices, varying packaging, special discounts, etc. Using actual historical and current data to calculate this "theoretical demand" would be more accurate than using estimated or aggregate data.

The Promise of Electronic Commerce

The unexpected and explosive growth and popularity of the Internet in recent years has opened a new avenue for commerce—"electronic commerce". Electronic mail ("e-mail"), the delivery of messages via electronic communication networks, has become a major notification mechanism, especially for point-to-point communications. Numerous "bulletin board" systems and the USENET newsgroup distribution network are popular broadcast notification systems. But it is the advent of the World Wide Web, frequently referred to as "the Web", that has excited the imagination of thousands of consumers, providers, and entrepreneurs. The Web conveniently delivers text, images, and audio clips to individual users. In fact, the Web can be used to distribute any sort of information that can be represented in a computer data file.

The popularity of the Web has encouraged the establishment of many Internet Access Providers (IAPs), who provide communication access to the Internet for individuals and organizations; and Internet Service Providers (ISPs), who provide various services via the Internet, such as e-mail delivery, Web site hosting, search engines, and "chat" areas. This communications and information infrastructure continues to grow at a prodigious rate. With so many individuals and organizations now having convenient and inexpensive communications access, the Internet offers a promising base for a new mode of commerce.

Electronic commerce addresses many of the disadvantages of traditional commerce. It is convenient and inexpensive to prepare and deliver e-mail to specific persons or groups of persons. Many computer systems are repositories for immense databases that are useful for commerce, and the global communication network provides a means for accessing that data. Personal computer systems and specialized software are now enabling consumers to view online product catalogs and other information that providers publish on the Web. A multitude of researchers and organizations are working out the details of payment mechanisms to allow secure monetary transactions across the Internet.

The Disadvantages of Today's Electronic Commerce

Even with the colossal potential of the Internet, there are still a number of problems to be solved to support the establishment of a viable virtual marketplace, especially regarding the collection and exchange of market information. The electronic form of commerce doesn't address all of the problems of traditional commerce, and it raises a number of new difficulties.

Here are some of the disadvantages, from the consumer's point of view, of the electronic form of commerce:

Most search engines (Web sites that implement a capabilty for searching a database of information) are generic. They use general words as search keys, whereas consumers would benefit from information that is categorized by brands, product names, product category, store names, etc. Even though search engines

are much faster than physical store visits, the search process is still tedious and prone to error.

Using search engines for comparative shopping is very slow. Search engines return pointers to information sites, not the actual information. Search engines frequently return thousands of "hits", or items that partially match the search request. Consumers must sift through these hits, determine which ones are likely to be truly of interest, and contact the individual Web sites to collect the product information.

Consumers find comparative shopping tedious because every Web site has its own format for information. It is difficult to automate comparative shopping because of the inconsistent and non-standardized data formats.

It is difficult for consumers to find independent opinions about product quality, comparative features, and how a provider treats other consumers.

Every search starts from scratch. Even though some search engines now have the capability to narrow a search during an episode of use, each episode of searching starts anew requiring the searcher to enter all of the relevant keywords again. The preferences of the consumer are not retained between uses of the search engine.

Consumer searching is not private. The search engine can collect data about who is searching and the keywords of their search. Many Web sites maintain "cookies" or "passports", that is, files that contain information about the consumer who is searching. In effect, the consumer's searching and decision making is exposed to public view.

Dealing directly with the provider exposes the consumer's identify and other data to the provider. When the consumer orders or purchases a product from a provider's Web site, the consumer must reveal name, delivery address, credit card data, etc. Even if the consumer is merely inspecting the information available on a Web site, the site's owner can still collect data about the consumer from the consumer's browser software.

Non-technical consumers may experience frustration in trying to construct appropriate queries for search engines. The syntax rules for queries commonly use Boolean logic and special separator characters. Even when the use of one search engine is mastered, the consumer must learn yet another set of rules for constructing queries for another engine, since the various engines use different syntax rules for their queries.

Once a search engine successfully delivers a promising Web address (known as a "URL" for Uniform Resource Locator), the consumer may be disappointed to find that the URL is no longer valid. Thousands of Web pages are published and withdrawn daily, and the search engines are not always informed of the changes. Web pages customarily contain references to other Web pages ("links"), and a link is not always updated when the target URL changes, especially if the target URL names a page that is published by another entity. These "broken URLs" refer to Web pages that no longer exist or have moved to another address, so the consumer can no longer reach the information.

The style of presentation is still controlled by the provider. The consumer has no useful mechanism to request, for example, only summary information about products. The avenue of presentation is also fixed. If the data is available on the Web, it must be accessed via the Web;

the consumer typically cannot arrange to have the data delivered, for example, via pager, facsimile, or cell phone display.

Usually there is no direct benefit to a consumer (a "consideration") for viewing an electronic advertisement, although some companies have proposed paying consumers for reading advertisements via e-mail or other electronic delivery.

Consumers have few means for publishing their own electronic advertisements for buying or selling. Most newsgroups do not accept advertisements. Even in the special newsgroups that do accept advertisements, it wastes bandwidth since most readers of the newsgroups won't be interested in a specific advertisement.

Electronic commerce also presents a number of difficulties for providers, especially in the areas of deploying advertising and gathering "market intelligence." Some of these disadvantages are:

Many providers are reluctant to advertise on the Internet because of software agents that make recommendations based on price alone. For example, the BargainFinder service, a research project of Andersen Consulting, that gathers pricing data on audio compact disks has been blocked from many providers' Web sites. Without the opportunity to present other features that justify a higher price, higher-priced providers would lose sales or be forced to lower their prices (and erode their retail margins).

Consumers may not be aware of a provider's Web site. A provider typically advertises the existence of a Web site via traditional means, driving up the cost of maintaining a Web presence.

Very few tools have emerged to help providers judge the effectiveness of their Web sites. For example, providers cannot gather enough information to calculate market share, since the statistics associated with competitor's Web sites are not publicly available.

Providers have little control over the search engines that consumers use to locate products, beyond carefully choosing a few keywords. They can't choose to emphasize different aspects of their products depending on the origin of the request.

It is impossible to collect useful demographic data about many online consumers, because consumers frequently use pseudonyms to disguise identity.

Due the lack of useful demographic data about online consumers, there is little guidance in targeting advertisements to potential customers.

Even though it is easier to personalize e-mail, how does the provider determine the target audience? Many online users summarily reject unsolicited e-mail advertising, disparagingly called "spam".

Many Web sites now have the capability to generate Web pages ("content") on the fly, but it is difficult for the Web server to obtain enough data about the requestor to personalize the content in a useful way.

"Banner" advertisements placed on popular Web sites have not been particularly successful. Many online users don't "click-through" the banner to the more extensive advertiser information, because the placement of such banners is not finely targeted. Some Web activity statistics indicate that only one and one-half to three and one-half percent of users click-through.

Providers lose the goodwill of potential customers when they place advertisements in regular newsgroups.

Providers still have few ways to gather real-time feedback on special promotions or specific products.

Perhaps most critically, providers still have no method to derive useful market intelligence from the vast activity online. Providers still can't determine why consumers accept or reject offers, they can't calculate consumer demand, and they can't simulate demand based on actual demand data.

Other Electronic Commerce Systems

Much of the research relating to electronic commerce has been directed towards designing and implementing secure online money transactions. For example, U.S. Pat. No. 5,557,518 entitled "Trusted Agents for Open Electronic Commerce" issued Sep. 17, 1996 describes a system wherein a customer and a merchant can exchange electronic merchandise and electronic money by using trusted electronic agents. Even when this crucial aspect of electronic commerce is satisfactorily resolved, there remains the challenge of establishing a mechanism for the presentation, gathering, and exchange of market information in a way that encourages and supports broad participation in the online market. Of the current mechanisms related to online market information, most tend to fall into two categories: search engines, and various kinds of software or electronic agents.

Various problems with search engines have already been mentioned. Each engine has a different syntax and operation, making them error-prone and tedious to use. The information that engines return may be out of date or just plain incorrect. Search engines don't generally categorize information in a format that is handy for consumers, since they cater to general information seekers. Searches cannot make use of personal information about users, since the search engine has access only to the specific query data entered by the user.

A software agent is a software entity that is capable of performing certain delegated electronic actions (including holding information) on behalf of a user or another agent. An IBM white paper, "The Role of Intelligent Agents in the Information Infrastructure" (Gilbert, et. al., IBM Corporation, undated; also published on the Web at URL http://www.networking.ibm.com/iag/iagptc2.html; also hyperlinked from http://www.raleigh.ibm.com/iag/iaghome.html) describes three dimensions along which intelligent agents may be measured: agency, intelligence, and mobility. "Agency is the degree of autonomy and authority vested in the agent . . . Intelligence is the degree of reasoning and learned behavior . . . Mobility is the degree to which agents themselves travel through the network . . . "(IBM, italics author's). Software agents can be futher classified along the dimension of mobility into three broad categories according to their location of execution and location of data reference: mobile agents, "wandering" agents, and local or static agents.

True mobile agents are software entities that can electronically move from one computer system to another. The software program of a mobile agent actually executes on the target computer system. Although some technology to support mobile agents is available (for example, Sun's Java and General Magic's Telescript), they have not been successful, partly because many computer "firewalls" block the entry of mobile agents for security reasons, and because the agents must be capable of operating on a number of specific kinds of computers.

A wandering agent is a software entity that resides within a single computer system and "visits" or communicates with other computer systems, frequently via the Internet. Wandering agents are being used successfully to map the Web,

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gathering the data that is used in the internal indexes of search engines. However, these agents are very slow in operation, especially when there are thousands of sites to visit, and some wandering agents may be blocked from accessing some sites (as the BargainFinder agent has been). As described in "Internet Agents: Spiders, Wanderers, Brokers, and 'Bots" (Cheong, Fah-Chun, New Riders Publishing, 1996), wandering agents are also used for various Web maintenance tasks and for Web mirroring. Cheong lists and describes many instances of wandering agents. The following list of wandering agents was compiled on Dec. 26, 1995 from Appendix G of Cheong. The purpose of each agent is excerpted by the inventor from short descriptions in Cheong.

Name	Purpose
ASpider (Associative Spider)	searches for keywords
Arachnophilia	collect documents
Aretha	(none given)
CS-HKUST WWW Index Server	Resource Discovery, Validate HTML
ChURL	URL checking
Checkbot	(none given)
EIT Link Verifier Robot	verify links
Emacs W3 Search Engine	Resource Discovery
Fish Search	Resource Discovery
GetURL	validate links, mirroring
HTML Analyzer	check validity of Web servers
HTMLgobble	mirroring
Harvest	Resource
InfoSeek Robot	collect information for database
JumpStation Robot	Resource Discovery
Katipo	look for changed documents
Lycos	information retrieval and discovery
MOMspider	maintenance of distributed hypertext
Mac WWWWorm	keyword searching
NHSE Web Forager	Resource Discovery
NIKOS	Resource Discovery
NorthStar Robot	textual analysis, indexing
Open Text Corporation Robot	(none given)
Peregrinator	indexing
Python Robot	(none given)
RBSE Spider	Resource Discovery
SG-Scout	Resource Discovery
Scooter	Resource Discovery
Spry Wizard Robot	Resource Discovery
TITAL	Resource Discovery
Tarspider	mirroring
Tcl W3 Robot	validate links
TkWWW Robot	find logically related pages
W4 (World Wide Web Wanderer)	measure growth in Web
WM32 Robot	Resource Discovery, validate links
WWWW - World Wide Web Worm	indexing
WebCopy	mirroring
WebCrawler	Resource Discovery
WebLinker	traverses Web converting URN→URL
WebWatch	validate HTML
Webfoot Robot	(none given)
Weblayers	validate, cache, maintain links
Websnarf	mirroring
Webwalk	Resource Discovery, validate links, mirroring

A local or static agent is a software entity that operates within a single logical computer system, accessing data local to that system. Clearly this kind of agent is of limited usefulness for the electronic marketplace, since, a local agent would not have access to the variety of data that is necessary for a thriving marketplace. However, if there were a mechanism to incorporate data from many sources and to provide access to a broad base of users, local agents could be extremely useful.

These technologies have not been used to collect market information that providers can use to quantify consumer

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demand or to help gain customers at reduced cost. Consumers are hesitant to use some of these technologies because of privacy concerns. There isn't a practical mechanism for the user to instruct an agent to "keep looking" if the immediate search fails or is only partially successful. Although these technologies may be useful for the electronic marketplace, additional mechanisms are required for practical, ubiquitous electronic commerce.

The Fundamental Problems to be Solved to Enable Electronic Commerce

An electronic marketplace, just like a traditional marketplace, must support the basic process of commerce: offers to sell or buy are made, offers are accepted, and considerations (payments) are paid. If the basic process does not work, there is no marketplace. A viable marketplace must also address side-effects of commerce such as issues of security, privacy, and confidence or trust; otherwise, even if the basic process works, consumers and providers will not feel comfortable enough to participate in the marketplace.

A practical and viable electronic marketplace involves the exchange of market information, as well as the more obvious trading for goods and services. From a consumer's point of view, shopping is a means of gathering data about goods and services offered. This data is used by the consumer to compare and rank offerings and to make decisions about purchases. From a provider's point of view, consumer shopping is an opportunity to gather data about consumer needs and interests. This data is used by the provider to improve product and service offerings.

For consumer, the fundamental problems relating to the flow of market information in electronic commerce, still to be solved, are:

Consumers need help in gathering information about available goods and services, quickly and with a minimum of fuss;

Consumer privacy needs to be assured while gathering information about available goods and services; and

Consumers need a mechanism for ongoing, autonomous searches for information about available goods and services, searches that continue even when the consumer is not "on-line".

For providers, the fundamental problems relating to the flow of market information in electronic commerce, still to be solved, are:

Providers need to target advertising information to truly interested consumers without disturbing the privacy of those consumers;

Providers need to be able to quantify consumer demand, both offline and in real-time, using historical and current data;

Providers need to be able to determine reasons for sales and lost sales; and

Providers need a source of more accurate market data to serve as input to present and yet-to-be-developed market analysis methods.

Solutions to these problems for providers must be cost-effective.

OBJECTS AND ADVANTAGES

The principal object of the present invention is to provide a system that facilitates the gathering and exchange of market information in support of electronic commerce. The attainment of this object has many advantages for both consumers and providers.

Several objects and advantages of the invention for consumers are the following.

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A consumer's identifying and private information is protected from disclosure as the consumer gathers information about available products.

Consumers can identify suitable products more easily, with less expenditure of effort, because the product information is presented in a consistent manner.

Consumers can identify suitable products more quickly.

Consumers can use advocate recommendations and evaluations in deciding between competing products.

Consumers have more control over the presentation of advertising information. They can control what information is permitted to be delivered, when the information is delivered, and what devices are used for delivery.

Consumers have a standardized mechanism for receiving considerations from advertisers in exchange for allowing delivery of advertisements and other provider information.

Consumers can launch ongoing searches for products, and the searches can continue even when the consumer is not online.

Consumers use search engines that have data that is more up-to-date.

Consumers access search engines that are easier to use, especially for non-technical users.

Consumers can place their own want-to-buy and want-to-sell advertisements.

Several objects and advantages of the invention for providers are the following.

A provider's privacy is protected while searching for potential customers or surveying competitor's offerings.

Providers can use demographic and preference data that is more up-to-date.

Providers own and control the information about the products they offer, even when the information resides within the system contemplated by the invention.

Providers can directly contact more consumers that are ready to buy.

Providers can target consumers more economically.

Advertising may have higher success rates since the targeted consumers have expressed an interest in the product.

Providers can personalize special offers based on previous buying habits and future intent of the consumer.

Providers have a mechanism for quantifying consumer demand.

The mechanism for quantifying consumer demand is based on actual consumer buying data, both historical and current.

The mechanism for quantifying consumer demand uses data based on individual buying decisions, not merely aggregate or estimated data.

Providers can quantify demand in real-time.

Providers have a mechanism for discovering the reasons for lost sales.

Providers can provide a consideration to consumers for viewing advertisements and other notices.

Providers can receive feedback in real-time about the success of promotions.

Providers have access to market data based on individual consumer needs that can be used to simulate demand in various scenarios.

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Several objects and advantages of the invention for all participants in the system are the following.

A robust and thriving electronic marketplace may lower the amount of wasted paper and energy for the delivery of printed matter.

The system provides results faster than mobile or wandering agents.

Many industries and providers can participate in the system.

Information used by both consumers and providers is more up-to-date.

Referring to the fundamental problems of the flow of market information in electronic commerce, the fundamental objects of the system for consumers are:

to assist consumers in gathering market information quickly and easily;

to protect consumer identity and private information while gathering market information; and

to assist consumers in performing ongoing searches.

Referring to the fundamental problems of the flow of market information in electronic commerce, the fundamental objects of the system for providers are:

to assist providers in targeting information delivery to interested consumers;

to assist providers in quantifying consumer demand, both offline and in real-time, using historical and current data;

to assist providers in determining reasons for sales and lost sales; and

to assist providers by furnishing a huge base of accurate market data based on actual consumer activity to serve as input to present and future market analysis methods; and

to assist providers in gathering and analyzing market information in a cost effective way.

Further objects and advantages of this invention will become apparent from a consideration of the drawing and ensuing description.

BRIEF DESCRIPTION OF THE DRAWING

The invention is described in greater detail below with reference to the attached drawing. In the drawing, closely related figures have the same number but different alphabetic suffixes.

FIG. **1** is a schematic diagram showing the basic interaction of several kinds of agents within an agent system.

FIG. **2** is a schematic diagram of an agent system and its major components.

FIG. **3A** is a topological diagram showing an example arrangement of processors in an agent system.

FIG. **3B** illustrates the functional components of a processor.

FIGS. **4A–4D** illustrate the functional components of Personal Agents.

FIG. **5A** illustrates the data components of a Preference Datum.

FIG. **5B** shows example Preference Data.

FIG. **6** illustrates the functional components of Decision Agents.

FIG. **7** illustrates the functional components of Demand Agents.

FIGS. **8A–8C** illustrate the functional components of Markets.

FIGS. 9A–9C illustrate the functional and data components of a Product Database.

FIG. 9D shows example Product Template Entries with example values.

FIG. 10 illustrates the data components of an Ad.

FIG. 11 is a flow diagram representation of an overall method for searching for products.

FIGS. 12A–12B comprise a flow diagram representation of a method for composing a Decision (product search) query.

FIG. 13 is a flow diagram representation of a method for creating a Decision Agent.

FIG. 14 is a flow diagram representation of a method for accepting a new Decision Agent into a Market.

FIG. 15 is a flow diagram representation of a method for performing a Decision search.

FIG. 16 is a flow diagram representation of a method for performing an Immediate search portion of a Decision search.

FIG. 17 is a flow diagram representation of a method for completing a Decision search.

FIG. 18 is a flow diagram representation of a method for performing an Extended search portion of a Decision search.

FIG. 19 is a flow diagram representation of a method for delivering Decision search results to the consumer.

FIG. 20 is a flow diagram representation of a method for expiring a Decision Agent that has completed its task.

FIG. 21 is a flow diagram representation of an overall method for quantifying demand.

FIGS. 22A–22B comprise a flow diagram representation of a method for composing a Demand query.

FIG. 23 is a flow diagram representation of a method for creating a Demand Agent.

FIG. 24 is a flow diagram representation of a method for accepting a new Demand Agent into a Market.

FIG. 25 is a flow diagram representation of a method for performing a Demand search.

FIG. 26 is a flow diagram representation of a method for performing a search for current demand.

FIG. 27 is a flow diagram representation of a method for performing a search for historical demand.

FIG. 28 is a flow diagram representation of a method for delivering Demand search results to a provider.

FIG. 29 is a flow diagram representation of a method for expiring a Demand Agent that has completed its task.

FIG. 30 is a flow diagram representation of an overall method for placing an Ad in a Market.

FIGS. 31A–31B comprise a flow diagram representation of a method for composing an Ad.

FIG. 32 is a flow diagram representation of a method for creating an Ad.

FIG. 33 is a flow diagram representation of a method for accepting a new Ad into a Market.

FIG. 34 is a flow diagram representation of a method for expiring an Ad that has reached its expiry time.

FIG. 35 is a flow diagram representation of an overall method for targeting a group of consumers.

FIG. 36 is a flow diagram representation of a method for selecting Personal Agents that represent targeted consumers.

FIG. 37 is a flow diagram representation of an overall method for rejecting unsolicited messages.

FIGS. 38A–B is a flow diagram representation of an overall method for simulating demand and for replaying demand.

FIG. 39 is a schematic representation of a Web page used to "login" to a agent system.

FIG. 40 is a schematic representation of an example Web page used to specify search criteria when composing a Decision query in an example consumer electronics Market.

FIG. 41 is a schematic representation of an example Web page used to specify search criteria when composing a Decision query in an example automobile Market.

FIG. 42 is a schematic representation of an example Web page used when composing an advertisement for a television set.

SUMMARY OF THE INVENTION

The present invention contemplates a system for enabling the collection of market information, especially data needed to quantify various kinds of consumer demand, while protecting the particular identity and privacy of consumers. Consumers, because their identity is protected, feel secure in using the system, thereby generating market data as a by-product of their shopping activities. Providers can query and analyze this market data in many ways, including the calculation of actual instantaneous and historical consumer demand for products and product categories. This kind of market data is not available by any other means.

The system comprises a "virtual marketplace" in which various kinds of agents represent human owners. Although the system has access to data outside its boundaries, the system behaves as a logically single system. The agents of the system need not travel outside the system to perform their tasks.

Consumers and providers both may place sell and buy advertisements (ads) in the marketplace. Providers can target groups of consumers to receive special messages such as special offer ads.

Consumers and providers are each represented in the system by Personal Agents. A Personal Agent stores and learns the preferences of its human owner and arranges for delivery of messages to the owner according to the owner's desired delivery times and desired delivery devices. The Personal Agent ensures that private or identifying data about the owner is never revealed without authorization to other agents in the system.

Consumers use Decision Agents to gather the information that helps consumers make purchasing and usage decisions. Decision Agents can search for ads meeting various criteria, and order the matching ads according to the consumer's preferences.

Providers use Demand Agents to assist with market analysis of various kinds of demand and to target consumers. Demand Agents can target consumers based on consumer preferences, demographics, and shopping activity.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Within this description, the term "product" is understood to include all kinds of merchandise, tangible and intangible goods, services, intellectual property, information, electronic merchandise, etc. whether offered for a price, offered for barter, or offered for free.

The term "consumer" is understood to mean a user of the system who is acting to find information about or purchase products offered by other users of the system. A consumer is typically an individual. The term "provider" is understood to mean a user of the system who is acting to present information about products and/or sales offers to other users of

the system. The term "provider" includes manufacturers, retailers, wholesalers, distributors, etc. When the term "consumer" is used in this description, it is understood to mean a user of the system acting in the role of a consumer. When the term "provider" is used, it similarly is understood to mean a user of the system acting in the role of a provider. The term "user" is understood to apply in a context where the particular role is unimportant.

Agent Interaction

Referring now to the drawing, and in particular to FIG. **1**, an Agent System **10** is shown schematically, together with some of its internal components, in order to illustrate the basic interaction between several system components in a preferred embodiment of the system. Two users, a Consumer **20** and a Provider **21**, who are not part of the invention, are shown to illustrate their relationship to Agent System **10**. Many components of the system are not illustrated in this figure, in order to focus attention on the basic interaction, which enables the generation and the retrieval of market data.

Referring to the left side of the figure, actions of Consumer **20** generate market data. Consumer **20** controls a Consumer Personal Agent **12** that represents the Consumer to the system. The Consumer Personal Agent is capable of creating a Decision Agent **14** to carry out a search, within a Market **18**, for products that satisfy certain constraints and preferences. For example, a Consumer might query for the local retailers that carry a certain brand of sports shoes. Decision Agent **14** gathers data without knowing, and therefore without revealing, the identity of the Consumer **20**. Both Decision Agent **14** and Market **18** store data about the search. Decision Agent **14** returns a set of product recommendations, which Consumer Personal Agent **12** further filters and orders according to Consumer preferences before presenting to Consumer **20**.

Referring to the right side of the figure, actions of Provider **21** retrieve and analyze market data. Provider **21** (merchant, service provider, etc.) controls a Provider Personal Agent **13** that represents the Provider to the system. The Provider Personal Agent is capable of creating a Demand Agent **16** to collect data, from a Market **18**, about consumer demand. For example, the Provider might query for the number of consumers that are currently searching, or have searched within the past **24** hours, for a certain brand of sports shoes. Demand Agent **16** accesses data stored in the Market **18** and in active and expired Decision Agents **14**. Demand Agent **16** returns a response for the query to the Provider Personal Agent **13**, which uses the Provider's preferences to determine how to present the retrieved data to the Provider **21**.

Agent System **10** contains different Markets **18** for various categories of products and services. The various kinds of agents and the markets are software components. These components are more fully described in conjunction with other figures. In a preferred embodiment, the software components utilize but are not limited to conventional object-oriented technology, distributed object-oriented technology, object-oriented database technology, relational database technology, general Internet communication technology, World Wide Web (WWW or Web) technology, and electronic mail (e-mail) technology.

Agent System Schematic

Referring to FIG. **2**, there is shown a more detailed schematic diagram of a preferred embodiment of the inven-

tion. Agent System **10** is a combination of hardware and software components; the components, taken together, are considered to be a single, logical system, regardless of the physical topology of the hardware components. It is expected that the physical topology of Agent System will change over time, especially for the addition of processing units to distribute the load as more users participate in the system.

Two users of Agent System **10** (not part of the invention) are shown schematically, a User **21** (a Provider) and another User **20** (a Consumer), to indicate their relationship to the Agent System. When a User **20** or **21** uses Agent System **10** to present information about products and/or sales offers to other users of the system, that User is referred to as a Provider. For example, merchants, distributors, retailers, wholesalers, etc. fall in this category. When a User **20** or **21** uses Agent System **10** to find information about or purchase products offered by other users of the system, that User is referred to as a Consumer. In this document; the term "products" comprises products, services, tangible goods, intellectual property, etc. Persons and organizations are registered to become users of Agent System **10**, and each user is authorized to perform certain functions. Not all functions of Agent System **10** are permitted to every user.

Each User of Agent System **10** has a means of communicating with the system, as indicated by Communication Device **22** or **23** of each User **20** or **21** respectively, and may have multiple means and devices. These communication devices can be any device capable of communicating over the Internet (such as personal computers with Web browser and/or e-mail software), other devices capable of operating with computer control (such as facsimile machines and pagers), and other means of transferring data and commands between the User and the Agent System. A User may also store data on various devices outside Agent System **10**, as indicated by Provider Remote Data **25** and Consumer Remote Data **24**, provided that such data can be accessed by the system via (at least one of) the User's Communication Device(s). In this context, "remote" means located outside the direct control of Agent System **10**.

Agent System **10** contains software agents representing both consumers and providers. Each User controls a Personal Agent **12** or **13** (PA) that coordinates the communication of the User with the other parts of Agent System **10**. A User establishes a communication session with User's PA using conventional authentication means appropriate to the Communication Device **22** or **23**.

A Personal Agent Search Engine **26** maintains indexes over preference data and demographic data of all Personal Agents, so that users may query to identify a set of Personal Agents whose users have certain characteristics or preferences. However, private data about the user (name, address, etc.) is not maintained in Personal Agent Search Engine **26**.

Continuing to refer to FIG. **2**, an Agent Marketplace **28** within Agent System **10** provides a means for various agents to interact on behalf of their owners. Consumer's Decision Agents **14** and Provider's Demand Agents **16** are "launched" into the marketplace to perform their delegated tasks. Agent Marketplace **28** comprises a number of Markets **18**, which may be either General Markets **18***a,* in which all Users may launch specialized agents or place advertisements, or Restricted Markets **18***b,* in which only authorized Users may launch specialized agents (such as Decision Agents **14** or Demand Agents **16**) or place advertisements. General Markets **18***a* correspond to conventional broad product categories; some examples are: Home Appliances, Office Supplies,

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Groceries, Consumer Electronics, Residential Real Estate, Commercial Real Estate, etc. Restricted Markets are used, for example, by wholesalers to restrict access to special prices to distributors. The basic structure of both General Markets **18***a* and Restricted Markets **18***b* is the same, and is described in conjunction with FIG. **8A** below. Various specialized agents are described in conjunction with other Figures. Agents and other components operating in Agent Marketplace **28** have access to a Product Database (Product DB or PDB) **32**.

Agent Marketplace **28** contains a number of Market Navigation Aids **34** to help users find the appropriate Market **18** in which to search or place ads. These aids might include keyword searches, word alias searches, hierarchical browsers of market layouts, etc.

Agents and other components of Agent System **10** record and access system history data (records of searches, transactions, etc.) in System History Data **36** component. Most of the system history is more conveniently accessed through logs and archives located within various functional components, but System History Data **36** maintains the "master" copy.

System Administrator users (not shown) perform or supervise various conventional maintenance functions for Agent System **10**, such as performing backups, adding new product data, redistributing functions between processors for load balancing, etc.

Agent System Topology

Referring to FIG. **3A**, there are shown hardware components of Agent System **10** from a topological point of view. Agent System **10** may have any convenient hardware topology; FIG. **3A** is intended as an example. The hardware of Agent System **10** comprises a number of Processors **38**, each capable of communicating with other Processors. As illustrated, normally a group of Processors is clustered together, with one or more Processors in a group configured to communicate with one or more Processors in other clusters. The clusters may be geographically dispersed, and Processors within a cluster may be geographically dispersed. The actual number of Processors and their topology will change over time, to support additional capacity, load balancing, and ease of administration.

The various functional components of Agent System **10**, described in conjunction with several Figures, reside on one or more Processors **38**, and may be duplicated to reside on one or more Processors **38** simultaneously. The distribution of the functional components across the various Processors **38** will change over time, to support additional capacity, load balancing, and ease of administration.

Referring to FIG. **3B**, a Processor **38** comprises the functional components of:

an Object Server function **40**,
a Communications function **42**,
a Human/Machine Interface function **44**,
a Messaging function **46**,
and a Persistence function **48**.

These functional components of Processor **38** are available for use by any software component of Agent System **10** that resides on Processor **38**.

A Object Server function **40** executes the software objects that comprise the various software functional components of Agent System **10**, for example, the various agents, the markets, the data repositories, and lower level utility software objects (not shown). A particular Object Server **40** need

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not execute every kind of object; for example, some Object Servers **40** may contain only Personal Agents **12** or **13** and their related data repositories, but will not contain any Market **18** objects.

A Communications function **42** supports communications between Processor **38** and the outside world. Such communications may be wired or wireless, broad or narrow band, so long as the Processors **38** use compatible communications. Communications function **42** sets up the connection between two Processors **38**, or connects a Processor **38** to a network for indirect connection to another Processor **38** or to a User's Communication Device **22** or **23**.

A Human/Machine Interface function **44** provides the look and feel of Processor **38**. It could include a keyboard, mouse, pen, voice, touch screen, icons, menus, etc. Human/Machine Interface function **44** communicates with other functions in Processor **38**. In some situations, a Human/Machine Interface function may not be necessary, for example, when a Processor **38** communicates only with other Processors **38** but not with a User's Communication Device **22** or **23**.

A Messaging function **46** routes messages between software objects executing on various Processors **38**.

A Persistence function **48** manages storage of data belonging to the various software objects that reside on the Processor **38**. The actual data is stored on conventional storage devices (not shown), such as computer disks.

Personal Agent

Personal Agent **12** or **13** is the point of contact between a user and the Agent System **10**. Personal Agent **12** or **13** acts as an electronic "butler" or assistant, accepting requests from the user, delegating tasks to other agents in the system, and arranging for responses from various agents to the user to be delivered at a time and in a manner that is convenient for the user. Consumer Personal Agent **12**, via its internal functions, maintains the user's preferences and other data about the user, some of which is protected from unauthorized access.

Referring to FIG. **4A**, a Personal Agent **12** or **13** comprises the functional components of:

a Unique identification (ID) **50**,
an Owner Manager **52**,
a Preference Manager **54**,
a Delivery Manager **56**,
an Individual Firewall **58**,
a Decision Agent Manager **60**,
a Demand Agent Manager **62**,
an Ad Manager **64**,
a Target Manager **66**, and
a Consideration Account **67**.

A Unique ID function **50** maintains an identifier that uniquely identifies this agent within Agent System **10**. Unique ID **50** is generated automatically when the agent is created, and is never reused to identify a different agent, even if the original agent ceases to exist within the Agent System. Unique ID **50** carries no information that reveals the human "owner" of this agent. Unique ID **50** is used to address messages to the agent.

An Owner Manager function **52** maintains data about the human "owner" of the agent, i.e. the user that controls this Personal Agent **12**. This data includes the user's name, postal addresses, e-mail addresses, telephone and fax numbers, etc. This data is always protected by an Individual Firewall **58**; it is never revealed to other agents, and is used

only by components of Personal Agent **12** to deliver messages, for system invoicing, etc.

A Preference Manager function **54** maintains data about the preferences of the user. Preferences indicate items of interest to the user, such as favorite brands, interest in sports, etc. Within Agent System **10**, preference data also includes "demographic" data. Demographic data indicates facts about the user, such as whether the user is a homeowner, the user's gender, the user's age group, etc. Although marketing industry usage of the term "demographics" may include a person's name, address, or other identifying data, a Preference Manager's demographic data does not include data that identifies the particular user. Preference data may be entered manually by the user using, for example, a form on a Web page, or data may be loaded by a System Administrator. Preferences may also be updated automatically by the system as, for example, when the user instructs the system to "remember" a product brand name from a product search. Preference Manager **54** uses preference data to order search results, so that items that are more likely to be preferred by the user will be displayed first when the results are delivered to the user. Referring now to FIG. **5A**, each preference datum **68** comprises not only a value **72**, but also a key **70** for ease of searching. Referring to FIG. **5B**, a small sample of preference data illustrates the kind of data that might be used. A particular user typically will have much more preference data. Some values are shown as "rank m in n" to illustrate that ranking data may also be stored. The specific keys of any particular set of preference data depends on what the user has entered, etc. Only keys that are relevant to a particular user are included in that user's preferences, and the specific data maintained will change over time.

Referring again to FIG. **4A**, a Delivery Manager function **56** accepts all messages, generated by agents or other components of the system, that are directed to the user, and delivers those messages according to the user's desired delivery time and delivery media. Default delivery time and delivery media are specified as part of the user's preferences (maintained by Preference Manager **54**). Individual messages may also have a specified delivery time and delivery media that overrides the defaults. Delivery Manager **56** establishes communication with the user's Communication Device **22** or **23** to effect delivery. Messages may be sent to multiple devices if the user so desires. Delivery Manager **56** queues messages that are to be delivered at a future time.

Delivery Manager **56** also rejects unsolicited messages, unless the message meets the user's preferred criteria as maintained by Preference Manager **54**. Delivery Manager **56** sends a rejection message in reply to the original sender of a rejected message. The rejection message indicates why the original message was rejected, so that the sender may gather quantifiable feedback.

An Individual Firewall function **58** mediates all access to the data that is maintained by the various internal functions, ensuring that only authenticated and authorized agents and users can access private data.

A Decision Agent Manager **60** assists the user with the creation and management of Decision Agents **14**. Referring now to FIG. **4B**, a Decision Agent Manager **60** comprises the functional components:

a Decision Composer **74**,

a Decision Agent Factory **76**,

a Decision Agent Tracker **78**,

and a Decision Agent Archive **80**.

Continuing to refer to FIG. **4B**, a Decision Composer **74** assists the user in composing queries to be executed by Decision Agents. Decision Composer **74** retrieves a Product

Template **174** (described later in conjunction with FIG. **9B**) for a particular product from a Market **18** in which the user wishes to search, present instructions to the user for completing Product Template **174** to describe the object of the search, and produces the appropriate query.

A Decision Agent Factory **76** creates a new Decision Agent **14** to carry out a query.

A Decision Agent Tracker **78** enables the user to monitor the activities of Decision Agents **14** that are active, i.e., agents that have not completed their tasks. Decision Agent Tracker **78** also enables the user to cancel an active Decision Agent **14** before its scheduled expiry time.

A Decision Agent Archive **80** stores and accesses Decision Agents **14** that are expired, i.e., agents that have completed their tasks, whether successfully or not. For example, if a Demand Agent **16** needs more detailed data about a query than is stored in a Query Logger **136** of a Market **18**, it can access the details of the related Decision Agent **14** through Decision Agent Archive **80**.

Referring back to FIG. **4A**, a Demand Agent Manager function **62** assists the user with the creation and management of Demand Agents **16**. Only users of Agent System **10** who are authorized to launch Demand Agents will have a Demand Agent Manager **62** as part of their Personal Agent. Referring now to FIG. **4C**, a Demand Agent Manager **62** comprises the functional components:

a Demand Composer **82**,

a Demand Agent Factory **84**,

a Demand Agent Tracker **86**,

and a Demand Agent Archive **88**.

These components provide functions similar to the analogously-named functional components of Decision Agent Manager **60** (described above), except that Demand Agent Manager **62** components work with Demand Agents **16** instead of Decision Agents **14**.

Referring back to FIG. **4A**, an Ad Manager function **64** assists the user in placing advertisements. Referring now to FIG. **4D**, an Ad Manager **64** comprises the functional components of:

an Ad Composer function **90**,

an Ad Delivery function **92**,

an Ad Tracker function **94**,

and an Ad Archive function **96**.

An Ad Composer function **90** retrieves a Product Template **174** (described later in conjunction with FIG. **9B**) for a particular product from a Market **18** in which the user wishes to advertise, presents instructions to the user for completing Product Template **174** to describe the product, and produces a new Ad **186** (see FIG. **10**).

An Ad Delivery function **92** delivers Ad **186** to the desired destination. For consumer users, Ad **186** is delivered to Market **18**, where it is accessible to other agents in the system. For provider users, Ad **186** may be delivered to Market **18** (just like a consumer ad); or Ad **186** may be delivered (as a special offer) to a set, determined by a Demand Agent **16**, of consumer Personal Agents **12**.

An Ad Tracker function **94** monitors the activity of Ad **186**, including any messages received in response to the Ad, until Ad **186** expires or is canceled by the user. Ad Tracker function **94** enables the user to cancel an Ad **186** before its scheduled expiry time.

An Ad Archive function **96** stores and access Ads **186** that are expired.

Referring again to FIG. **4A**, a Target Manager function **66** assists the user in identifying Personal Agents to which targeted ads may be delivered. Target Manager **66** can

identify Personal Agents based on preferences, demographic characteristics, and Decision Agent activity. Target Manager **66** does not have access to private data of consumer Personal Agents **12** such as name, address, etc.

A Consideration Account function **67** maintains a "consideration" account for the user. When the user earns a consideration by, for example, viewing a directly delivered advertisement or message, or completing a marketing survey, the consideration amount is credited to Consideration Account **67**. The account is denominated in a convertible exchange media such as electronic cash tokens.

Decision Agent

Referring to FIG. **6**, a Decision Agent **14** comprises the functional components of:

a Unique ID **98**,

a Personal Agent Reference **100**,

a Market Reference **102**,

an Expiry function **104**,

a Query **106**,

a Response Manager **108**,

and a Log function **110**.

A Decision Agent **14** acts on behalf of a consumer user, as instructed by the consumer's Personal Agent **12**, to search out and collect information from Agent System **10** that helps the consumer make purchasing and usage decisions. A consumer may have multiple Decision Agents **14** active within the Agent System at any time. For example, a consumer may have one Decision Agent **14** searching for a good buy on a certain sports shoe, and have another Decision Agent **14** searching for a television set with special features.

A Unique ID function **98** maintains an identifier that uniquely identifies this agent within Agent System **10**. Unique ID **98** is generated automatically when the agent is created, and is never reused to identify a different agent, even if the original agent ceases to exist within Agent System **10**. Unique ID **98** carries no information that reveals the human "owner" of this agent. Unique ID **98** is used to address messages to the agent.

A Personal Agent Reference **100** holds a copy of the Unique ID **50** of consumer Personal Agent **12** that controls this Decision Agent **14**. Personal Agent Reference **100** is used to address messages to the controlling Personal Agent **12**.

A Market Reference **102** indicates in which Market **18** that Decision Agent **14** should search.

An Expiry function **104** indicates how long Decision Agent **14** should continue searching. Expiry **104** may indicate either that the search should be performed and the responses returned immediately (an "immediate search"), or that the search should continue for a specific period of time, for example, one week, with responses being returned periodically during that time (an "extended search").

A Query **106** describes the product or product category for which to search. Query **106** includes data from Product Template **174** completed by the consumer and relevant data from the consumer's preferences, as assembled by Decision Agent Factory **76** of the consumer's Personal Agent **12**.

A Response Manager **108** receives search results and returns them to the consumer's Personal Agent **12**.

A Log function **110** stores records of the activities of Decision Agent **14**. These records may be consulted later, for example, by a Demand Agent **16** that is calculating historical demand for a product.

Demand Agent

Referring to FIG. **7**, a Demand Agent **16** comprises the functional components of:

a Unique ID **112**,

a Personal Agent Reference **114**,

a Market Reference **116**,

a Datetime Range function **118**,

a Demand Query **120**,

and a Log function **122**.

A Demand Agent **16** acts on behalf of a provider user, as instructed by the provider's Personal Agent **13**, to search out and collect information from the Agent System **10** that helps the provider quantify consumer demand and helps target specialized advertisements to a group of consumers. A provider may have multiple Demand Agents **16** active within Agent System **10** at any time. For example, a provider may have one Demand Agent **16** calculating historical demand over the past month for a certain model of sports shoe, and have another Demand Agent **16** searching for consumers who have purchased sports shoes in the past month to receive ads for sports socks.

A Unique ID function **112** maintains an identifier that uniquely identifies this agent within Agent System **10**. Unique ID **112** is generated automatically when the agent is created, and is never reused to identify a different agent, even if the original agent ceases to exist within Agent System **10**. Unique ID **112** carries no information that reveals the human "owner" of this agent. Unique ID **112** is used to address messages to the agent.

A Personal Agent Reference **114** holds a copy of the Unique ID **50** of provider Personal Agent **13** that controls this Demand Agent **16**. Personal Agent Reference **114** is used to address messages to the controlling Personal Agent **13**.

A Market Reference **116** indicates in which Market **18** or Markets **18** that Demand Agent **16** should search.

A Datetime Range function **118** indicates that demand should be quantified over the date/time range specified; i.e., only Decision Agents **14** that were (or are) active during the datetime range specified should be searched when quantifying demand.

A Demand Query **120** describes a product or product category query that can be matched against the Queries **106** of Decision Agents. Demand Query **120** is similar to a Decision Agent's Query **106**, except that a Demand Query **120** is matched against other queries (Decision Agent Queries **106**), whereas a Decision Agent's Query **106** is matched against product advertisements. Demand Query **120** causes the selection of Decision Agents **14** whose queries are searching for certain products or product categories.

A Log function **122** stores records of the activities of Demand Agent **16** for later consultation by other components of Agent System **10**.

Market

Referring back briefly to FIG. **2**, recall that there are a variable number of Markets **18** within Agent System **10**. The Markets **18** are of two basic kinds, General Markets and Restricted Markets, which have similar structure. Referring now to FIG. **8A**, a Market **18**, of either the General or Restricted kind, is comprised of various functional components:

a Product Listing function **124**,

a Cross Reference (Xref) Manager function **126**,

a Sell Ad Manager function **128**,

a Buy Ad Manager function **130**,

an Active Demand Agent Manager function **132**,

a Template Dispenser function **134**,

a Query Logger function **136**,

an Historical Demand Search Engine function **138**,

some number of Remote Database Adaptors **140**,

and an Authorization function **142**.

Market **18** corresponds to a traditional broad product category, such as Home Appliances, Office Supplies, Groceries, Consumer Electronics, Residential Real Estate, Commercial Real Estate, etc. The major purposes of a Market **18** are to maintain the advertisements (ads) for products of that market, to provide the capability for specialized agents to search the advertisements, and to collect data about searches for later demand calculations.

A Product Listing function **124** maintains a list of the products that can be advertised in this market. Each product references detailed product data that is kept in a Product Database (PDB) **32** described in conjunction with FIG. **9A**.

Referring again to FIG. **8A**, a Cross Reference (Xref) Manager function **126** maintains, upon command from a System Administrator, cross references to other Markets **18** that carry similar products.

A Sell Ad Manager function **128** accepts advertisements of offers to sell that are submitted by users' Personal Agents **12**. A Buy Ad Manager function **130** accepts advertisements of offers to buy that are submitted by users' Personal Agents **12**. Both consumers and providers may place ads for selling or buying in a Market **18**.

The structure of both Sell Ad Manager **128** and Buy Ad Manager **130** are similar, the difference being the kind of advertisements that are accepted. Referring to FIG. **8B**, either kind of Ad Manager comprises the functional components:

an Ad Indexing function **144**,

an Active Ads function **146**,

a Future Ads function **148**,

an Expired Ads function **150**,

an Active Decision Agent Manager function **152**,

and an Expired Decision Agent Manager function **154**.

Continuing to refer to FIG. **8B**, an Ad Indexing function **144** maintains indexes for quick searching of the ads by, for example, brand name, UPC code, product name, vendor name, etc.

An Active Ads function **146** maintains the ads that are currently active. As each new add is accepted by Active Ads function **146**, an Active Decision Agent Manager **152** (see below) is notified so that pending searches can be matched against the new advertisement.

A Future Ads function **148** maintains ads that have been submitted to the Market, but are not yet active because their effective datetime has not yet been reached. These ads are moved to Active Ads when their starting datetime is reached.

An Expired Ads function **150** maintains an archive of ads that have expired, for later analysis by other components.

An Active Decision Agent Manager function **152** maintains a list of all Decision Agents **14** that are currently searching this Market **18** for products. Provider's Demand Agents **16** refer to Active Decision Agent Manager **152** while calculating current (or instantaneous) demand.

Referring to FIG. **8C**, Active Decision Agent Manager **152** comprises a number of functional components:

an Immediate Agents function **156**,

a Basic Search Engine function **158**,

a Pending Agents function **160**,

an Incremental Search Engine **162**,

and a Current Demand Search Engine **164**.

An Immediate Agents function **156** keeps track of Decision Agents **14** that are performing an immediate search. An immediate search is a search that is to be performed and results returned as soon as practical. Immediate Agents function **156** uses a Basic Search Engine function **158** to execute the query associated with each incoming Decision Agent **14**. For example, a Decision Agent **14** might present a query to find a certain brand of sports shoe within a certain price range. Basic Search Engine **158** consults Active Ads **146** to match the query against all active ads. After the immediate search is complete, if there will not be an extended search, Active Decision Agent Manager **152** moves the Decision Agent **14** to Expired Decision Agent Manager **154** (see below). If there will be an extended search, Active Decision Agent Manager **152** delivers the Decision Agent **14** to Pending Agents **160**.

Continuing to refer to FIG. **8C**, a Pending Agents function **160** keeps track of Decision Agents **14** that are performing an extended search. An extended search is a search that remains active for an extended but specific period of time. Results from an extended search may be returned periodically during the time that the search remains active. Pending Agents **160** is notified by Active Ads **146** when a new advertisement enters the market, and uses an Incremental Search Engine **162** to match each new advertisement against the queries of the pending extended Decision Agents **14**. In this way pending Decision Agents **14** are matched against ads, especially limited time special offer ads of providers, that enter the system later than the Decision Agent. Pending Agents **160** also arranges to expire Decision Agents **14** at the end of their expiry time, and to move them to Expired Decision Agent Manager **154** (see below).

A Current Demand Search Engine **164** matches demand queries of Demand Agents **16** against the queries of Decision Agents **14** that are residing in Immediate Agents **156** or Pending Agents **160**, to identify active Decision Agents **14** that are searching for a certain product or product category.

Referring back to FIG. **8B**, an Expired Decision Agent Manager function **154** maintains a list of Decision Agents **14** that are expired, that is, Decision Agents **14** that have completed their searches, whether successfully or not. The expired Decision Agents themselves are archived under the control of the consumer Personal Agent **12** that created them. Expired Decision Agent Manager **154** maintains indexes on the expired agents for quick searching by Producer's Demand Agents **16** that are, for example, calculating historical demand for a product.

Referring again to FIG. **8A**, an Active Demand Agent Manager function **132** maintains a list of all Demand Agents **16** that are currently calculating demand in this Market **18**.

A Template Dispenser function **134** retrieves the Product Template **174** for a particular product. Product Template **174** describes the data that is available within the system about the particular product. Personal Agents **12** or **13** use the Template Dispenser **134** when consumers or providers are constructing ads or product search queries. Template Dispenser **134** consults the Product Template Manager **170** in a Product Database **32** (described in conjunction with FIG. **9A**) to collect the template data.

A Query Logger function **136** archives summary information about queries performed by Basic Search Engine **158** or Incremental Search Engine **162**, so that historical data about queries may be quickly accessed without having to access the detailed data archived by the searching agent. For example, summary information about queries launched by

Decision Agents **14** are logged so that Demand Agents **16** can perform routine demand calculations without having to access the archived Decision Agents **14**.

An Historical Demand Search Engine **138** matches demand queries of Demand Agents **16** against the queries that have been previously logged by Query Logger **136**, to identify Decision Agents **14** that previously, during a specified datetime range, had searched for a certain product or product category.

A Rembte Database Adaptor **140** provides communication and session management services to connect to a database (a "remote database", not shown) belonging to a manufacturer or a provider. Remote Database Adaptor **140** also provides translation services to translate between the data formats used by a remote database and the data formats used by PDB **32**. Remote Database Adaptor **140** allows a provider to submit ads directly from the provider's remote database into Market **18**. Remote Database Adaptor **140** also allows access "by reference" to advertisement data that remains stored in a remote database; that is, the data is not copied into Agent System **10**, but is accessed as needed. Market **18** includes a Remote Database Adaptor **140** for each provider that chooses to supply ads in this manner; alternatively, a provider uses various functional components accessed via provider's Personal Agent **13** to place ads manually.

An Authorization function **142** restricts the placement and searching of ads in the Market **18** to authorized users only. General Markets **18a** allow any authorized user of the system to place and search ads. A Restricted Market **18b** allows market access only to certain authorized users of the system. For example, a Restricted Market might be used by wholesalers marketing exclusively to distributors.

Product Database

Referring to FIG. **9A**, a Product Database **32** (PDB) comprises functional components:

a Database Administration function **166**,

a Product Data Storage function **168**,

a Product Template Manager function **170**,

and, (optionally) some number of Remote Database Adaptors **172**.

PDB **32** maintains generic data about products, to be referenced by ads placed by providers. Although PDB **32** is illustrated here as a single database (with several internal components) for ease of understanding, the contemplated PDB **32** will be split across several processors **38**, as illustrated previously in FIG. **3A**.

Referring to FIG. **9A**, a Database Administration function **166** provides conventional add, delete, update, query, and backup access for a System Administrator user to the other components of PDB **32**.

A Product Data Storage function **168** stores data about different products, for example, product name, product model number, manufacturer's suggested retail price for product, etc.

A Product Template Manager function **170** maintains a set of Product Templates **174**, one for each product listed in PDB **32**. Product Template **174** describes the kinds of data that is kept in PDB **32** for a product. PDB **32** makes Product Templates **174** available to other components, for example, a Template Dispenser **134** as illustrated in FIG. **8A**. Referring now to FIG. **9B**, Product Template **174** is comprised of a number of Product Template Entries **176** and, optionally, some Instructions for Use **178**. Instructions for Use **178**, if any, may be presented to the user when the user is supplying

values for Product Template **174**, to help the user decide what values to choose. A Product Template Entry **176** describes one property of a product. Referring to FIG. **9C**, Product Template Entry **176** comprises several data components. A Keyword **180** names the property, for example, "Model Number" or "Brand Name". A Specification **182** indicates how values may be specified for the property, for example, as an integer number, as a text string, as one item from an enumeration, etc. A set of Use Flags **184** indicate where the property is used, for example, when entering an ad, or when composing a search query. Product Template Manager **170** consults Use Flags **184** when collecting a set of Product Template Entries **176** to satisfy a request from Template Dispenser **134**. Referring to FIG. **9D**, there is shown an example of some Product Template Entries **176** for a hypothetical television set product, including sample values that would be stored in PDB **32**. As illustrated, some products will contain advocate information. Some advocate information may be a ranking done by an independent rating organization. Another kind of advocate information is an endorsement by a person or organization.

Referring again to FIG. **9A**, a Remote Database Adaptor **172** provides communication and session management services to connect to a product database (a "remote database", not shown) belonging to a manufacturer or a provider. Remote Database Adaptor **172** also provides translation services to translate between the data formats used by a remote database and the data formats used by PDB **32**. Remote Database Adaptor **172** is used to provide product data in real-time for manufacturers or providers that choose not to maintain product data directly in PDB **32** of Agent System **10**, or to periodically update product data that is maintained directly in PDB **32**. PDB **32** includes a Remote Database Adaptor **172** for each manufacturer or provider that chooses to supply product data in this manner; alternatively, a System Administrator may use Database Administration function **166** to maintain the data based on instructions from a manufacturer or provider.

Advertisement (Ad)

An advertisement (ad) is an offer to sell or buy a product. A placer is the user (person or organization) who is selling or buying.

Referring to FIG. **10**, a preferred embodiment of Ad **186** comprises various data components:

a Unique ID **188**,

a Buy/Sell Flag **190**,

a Reference to Placer component **192**,

a Reference to Market component **194**,

a Reference to Product Listing component **196**,

a Product Template Value component **198**,

a Description component **200**,

a Price component **202**,

a Start Datetime component **204**,

and an Expiry Datetime component **206**.

A Unique ID component **188** uniquely identifies this advertisement within Agent System **10**. Unique ID **188** is generated automatically when the advertisement is created, and is never reused to identify a different ad, even after the advertisement is expired.

A Buy/Sell Flag **190** indicates that this advertisement is either an offer to buy or an offer to sell a product.

A Reference to Placer component **192** identifies the provider Personal Agent **13** of the user placing Ad **186**.

A Reference to Market component **194** identifies a Market **18** in which Ad **186** is placed.

A Reference to Product Listing component **196** refers to standard data about the product in Product Listing **124** of Market **18**. Brand name, manufacturer, manufacturer's suggested retail price, etc. are examples of standard data.

A Product Template Values component **198** holds values, corresponding to the Product Template **174**, that the placer specified when composing the advertisement. Offering price and locations of stores that carry the product are examples of values.

A Description component **200** holds additional data, not in Product Listing **124** nor in Product Template Values **198**, that the placer wishes to make known about the product.

A Price component **202** states the price at which the product is offered (for selling) or requested (for buying). Price **202** may also be a price range, especially for buy ads.

A Start Datetime component **204** states the date and time at which the advertisement becomes effective, that is, the point at which the advertisement will be visible to Decision Agents **14** that are searching the market for products.

An Expiry Datetime component **206** states the date and time at which the advertisement expires, that is, the point at which the advertisement will no longer be visible to Decision Agents **14** that are searching the market for products. However, even after expiry, the advertisement is accessible through an Ad Archive **96**.

Flow Charts

The flow charts indicate the functional component primarily responsible for carrying out a given task. For example, "Decision Composer" listed in the top part of a step means that the recited task is carried out by Decision Composer function **74** (see FIG. **11**). The flow charts also use subroutines to make it easier to follow high-level flows.

All communication between a user (either a consumer user or a provider user) and Agent System **10** is mediated by user's Personal Agent **12** or **13**. The flow charts and descriptions sometimes illustrate or state that a component receives input from the user or directs output to the user. These statements should be understood to mean that the component carries out the communication with the help of user's Personal Agent **12** or **13**.

Some Figures illustrate example screen layout for input and output using a Web browser interface. Underlined text represents hyperlinks.

Simple, conventional processes are not illustrated by flow charts. For example, the process whereby a user invokes Ad Tracker **94** to view the status of active ads placed by the user is not shown, since this type of process is well-known to practitioners.

Product Search

One of the major consumer uses of Agent System **10** is to assist a consumer in locating information about a product that is advertised for sale. It need not be possible for the consumer to carry out the actual purchase within Agent System **10**; it is is only necessary that products be advertised within the system. However, when secure electronic transactions are available, it is anticipated that consumers will make actual purchases through the system. The product search process, while directly helping consumers, also generates consumer market data that is so crucial to providers. This data tells providers the products for which consumers are searching, the criteria that are important to those consumers, and how many consumers are searching the various markets.

Referring to FIG. **11**, an overall method according to the present invention for searching for a product is referred to

generally by reference numeral **220**. When a user acting as a consumer decides to search within Agent System **10** for a product or product category, the consumer establishes a communications session with consumer's Personal Agent **12** (steps **222–224**). Typically the consumer, using a personal computer, connects to consumer's Internet access provider, directs consumer's Web browser software to Agent System's electronic address (known as a URL), and enters a login name and password. A sample login screen is illustrated in FIG. **39**.

Referring again to FIG. **11**, the consumer specifies that a product search is desired, which invokes Decision Agent Manager **60** (step **226**) to supervise the subsequent steps. A Compose Decision Query subroutine of Decision Composer **74** is called to assist the consumer in composing the query for the desired product (step **228**).

Referring now to FIG. **12A**, there is shown a method for a Compose Decision Query subroutine, referred to generally by reference numeral **228**. If the consumer wishes to specify a search that is similar to a previously performed search, Decision Agent Archive **80** displays a list of search queries from expired Decision Agents from which the consumer may select (steps **242–246**). Decision Composer retrieves the Product Template mentioned in the selected Decision Agent, and also the current instructions, from the Market mentioned in the selected Decision Agent (step **248**). The search criteria (values) from the expired Decision Agent are used to initialize the new search criteria (step **250**).

Still referring to FIG. **12A**, if the consumer alternatively wishes to specify an entirely new search, the consumer selects a Market **18** in which to search (step **252**). If the selected Market is a Restricted Market for which the consumer is not authorized, an error message is displayed to the consumer, and the consumer is returned to the initial menu where another action may be selected (steps **254–260**). If the consumer is authorized for the restricted Market, or if the Market is not restricted, the consumer selects a product for which to search (step **262**). Decision Composer **74** retrieves Product Template and instructions from the Market's Template Dispenser **134** (step **264**).

At this point Decision Composer **74** arranges to format and display the Product Template and the instructions (step **266**). The consumer, following the instructions, completes the search criteria in the Product Template (step **268**). When the consumer's interface is a Web browser, the Product Template is typically displayed as a combination of fill-in fields, selection lists, radio buttons, etc. as illustrated in the sample screens of FIG. **40** (searching for consumer electronics) and FIG. **41** (searching for automobiles).

Referring to FIG. **12B**, if the consumer wishes to perform an extended search, that is, a search that will continue for a period of time, the consumer enters a period of time for the search to continue (step **272**). The extended search continues even when the consumer is not "on-line", that is, even when the consumer is not participating in a communication session with the Agent System. Search results are collected, as described below, for later delivery to the consumer. Alternatively, the consumer may instead choose an immediate search, that is, a search that will return results as soon as possible (step **274**). The consumer need not be on-line to receive results from an immediate search; the results may be delivered later. The consumer may select a delivery media (e-mail, Web page display, etc.) and a delivery time and period (e.g., 6:00 p.m. daily, Monday noon weekly, etc.), or default media and time is noted (steps **276–280**). At this point the Decision Query composition is complete (step **282**).

Referring briefly to FIG. **11**, Decision Agent Factory **76** invokes a Create Decision Agent subroutine to create a new Decision Agent **14**. Referring now to FIG. **13**, a Create Decision Agent subroutine is referred to generally by reference numeral **230**. Decision Agent Factory **76** creates a new Decision Agent **14** possesing a unique identifier (step **288**). This unique identifier can be used to send messages to the agent even after the agent has expired (completed its task). Decision Agent Factory **76** also initializes the other data components of the new agent by storing a reference to the Personal Agent of the consumer, a reference to the Market that is to be searched, the search expiry time, the delivery media, time, and period, and the query (search criteria) (step **290**). Decision Agent Factory **76** logs the creation of the new agent with the new agent's Log function (step **292**). Now the new Decision Agent **14** is ready to be launched.

Referring again to FIG. **11**, Decision Agent Factory **76** delivers the new Decision Agent to the specified Market (step **232**), where an Accept New Decision Agent subroutine is invoked (step **234**) Referring now to FIG. **14**, an Accept New Decision Agent subroutine is referred to generally by reference numeral **234**. Active Decision Agent Manager **152** of the Sell Ad Manager **128** or Buy Ad Manager **130**, as appropriate, accepts the new agent, logs the query from the agent to the Market's Query Logger function, and adds the agent to a queue of Immediate Agents **156** (steps **298–302**).

Referring back to FIG. **11**, Decision Agent **14** is now ready to perform the search for a product according to the consumer's criteria, so it invokes a Perform Decision Search subroutine (step **236**). Referring to FIG. **15**, a Perform Decision Search subroutine is referred to generally by reference numeral **236**. Decision Agent **14** performs an immediate search by invoking a Perform Immediate Search subroutine (step **308**). Even if an extended search is chosen by the consumer, an immediate search is done first to get initial results. Because the data to be searched resides within Agent System **10** or is easily and directly accessible to Agent System **10**, the search process can be faster than a search that employs agents which visit multiple Web sites or databases over the Internet.

Referring now to FIG. **16**, a Perform Immediate Search subroutine is referred to generally by reference numeral **308**. An immediate search begins when Immediate Agents selects the next Decision Agent from its internal queue (step **320**). Immediate Agents delivers the query from the chosen Decision Agent to Basic Search Engine **158** (step **322**). Basic Search Engine **158** uses conventional database techniques to match the query against the ads in Active Ads, noting the ads that satisfy the query (step **324**). The Decision Agent's Response Manager **108** collects references (step **326**) to the matching ads found by Basic Search Engine. The Response Manager also sends a response to the Personal Agent that placed the advertisement (if the placer so desired and marked in the ad), providing real-time feedback to the placer. Immediate Agents then removes the Decision Agent from its internal queue and gives the Decision Agent back to Active Decision Agent Manager **152** (step **328**).

Referring back to FIG. **15**, if an extended search was chosen by the consumer, Active Decision Agent Manager delivers the Decision Agent to Pending Agents (step **312**), so that the query of the Decision Agent will continue to be matched against incoming ads until the Decision Agent's expiry time is reached. If the consumer chose only an immediate search, an End Decision Search subroutine is called to end the search (step **314**).

Referring to FIG. **17**, an End Decision Search subroutine is referred to generally by reference numeral **314**. The Decision Agent is removed from the queue of Immediate Agents (if the agent was performing an immediate search) or Pending Agents (if the agent was performing an extended search), and is delivered back to Personal Agent's Decision Agent Manager (step **334**). Decision Agent Tracker **78** logs the end of the search (step **336**). Decision Agent's Response Manager **108** may still have undelivered search results. The results are held by the Response Manager until the consumer's specified delivery time arrives.

Referring now to FIG. **18**, an Extended Search subroutine is generally referred to by reference numeral **340**. An episode of extended search begins each time a new advertisement arrives in a Market **18** (step **342**). If there are no Decision Agents in Pending Agents (steps **344–346**), there is no work to be done. However, if there are one or more Decision Agents pending for an extended search, the next agent is selected from the queue (step **348**). If the agent's expiry time has been reached since the last sweep through the queue, the agent's search is stopped (step **352**) with the End Decision Search subroutine previously illustrated. There is also a process (not shown) that periodically sweeps the queue and ends agents' searches, in case there is not enough advertisement activity in this market to activate Pending Agents on a regular basis. If the selected agent is not expired, Incremental Search Engine matches the agent's query against the data in the new advertisement (step **354**). If the advertisement satisfies the query, Response Manager includes this advertisement in its list of results (steps **356–358**), and notifies (if the advertisement so indicates) the placer of the advertisement that the advertisement was selected. This search process is repeated for each agent in Pending Agents.

Referring now to FIG. **19**, a Deliver Search Results subroutine is referred to generally by reference numeral **360**. Immediate search results are delivered to the consumer when the consumer's desired delivery time is reached (which may be immediately if the consumer has so requested). Intermediate results from extended searched are delivered periodically according to the consumer's desired delivery period. When the desired delivery time is reached (step **362**), Preference Manager **54** organizes the not-yet-delivered results according to the consumer's preferences (step **364**). For example, results that mention favored brands are ordered before results with less favored brands. Delivery Manager **56** formats the responses according to the consumer's desired delivery media (step **366**). For example, if the consumer's desired delivery media is the Web, a Web page in HTML is generated. For another example, if the consumer desires e-mail delivery, a suitable representation is generated. When formatting is complete, Delivery Manager **56** arranges the actual delivery of the search results (step **368**). If the Decision Agent has completed its search, no more results will be forthcoming, so a subroutine Expire Decision Agent expires the Decision Agent (steps **370–372**).

Referring to FIG. **20**, an Expire Decision Agent subroutine is referred to generally by reference numeral **372**. When a Decision Agent is expired, Expired Decision Agent Manager **154** logs the expired Decision Agent (step **378**) so that Demand Agents can easily search through the expired Decision Agents of this market when calculating historical demand. The Decision Agent Tracker **78** notes that the agent is now expired (step **380**), and the agent is permanently archived in Decision Agent Archive **80** (step **382**).

Quantify Demand

Quantifying demand is a major activity of Agent System **10**. Demand is a measure of the number of consumers

interested in purchasing a product or interested in products in a category. Providers may quantify current demand or historical demand. Current demand measures the count of consumers that are currently searching for a product or searching within a product category. Historical demand measures the count of consumers that have searched for a product, or searched within a product category, during a previous time period. Agent System **10** can not only calculate demand, it can also deliver a means of contacting those consumers (without revealing the actual identity of those consumers). The demand search uses data that is generated by consumers as they search for products in the system.

Referring to FIG. **21**, an overall method according to the present invention for quantifying demand is referred to generally by reference numeral **386**. When a user acting as a provider decides to quantify demand (perform a demand search) within Agent System **10** for a product or product category, the provider establishes a communication session with provider's Personal Agent **13** (steps **388–390**). Typically the provider, using a personal computer, connects to provider's Internet access provider, directs provider's Web browser software to Agent System's electronic address (known as a URL), and enters a login name and password. A sample login screen has already been illustrated in FIG. **39**.

Referring to still to FIG. **21**, the provider specifies that a quantify demand function is desired, which invokes Demand Agent Manager **62** (step **392**) to supervise the subsequent steps. A Compose Demand Query subroutine of Demand Composer **82** is called to assist the provider in composing the query that will gather the demand data (step **394**).

Referring now to FIG. **22**, a Compose Demand Query subroutine is referred to generally by reference numeral **394**. If the provider wishes to specify a demand search that is similar to a previously performed search, Demand Agent Archive **88** displays a list of search queries from expired Demand Agents from which the provider may select (steps **408–412**). Demand Composer **82** retrieves the Product Template mentioned in the selected Demand Agent, and also the current instructions, from the Market mentioned in the selected Demand Agent (step **414**). The search criteria (values) from the expired Demand Agent are used to initialize the new search criteria (step **416**).

Still referring to FIG. **22A**, if the provider alternatively wishes to specify an entirely new search, the provider selects a Market **18** in which to search (step **418**). If the selected Market is a Restricted Market for which the provider is not authorized, an error message is displayed to the provider, and the provider is returned to the initial menu where another action may be selected (steps **422–426**). If the provider is authorized for the restricted Market, or if the Market is not restricted, the provider selects a product for which to search (steps **428**). Demand Composer **82** retrieves Product Template and instructions from the Market's Template Dispenser **134** (step **430**).

At this point Demand Composer **82** arranges to format and display the Product Template and the instructions (step **432**). The provider, following the instructions, completes the search criteria in the Product Template (step **434**). When the provider's interface is a Web browser, the Product Template is typically displayed as a combination of fill-in fields, selection lists, radio buttons, etc. For example, the provider might use screens similar to the sample consumer screens previously illustrated in FIGS. **40** and **41**.

Referring to FIG. **22B**, the provider selects the type of demand to quantify (step **436**). If the provider chooses to quantify current demand, Demand Composer fills in the datetime range to indicate that only currently active Decision Agents should be searched (steps **438–440**). If the provider chooses to quantify historical demand, the provider selects a datetime range (steps **442–444**) to indicate that only Decision Agents that were active during that datetime range should be searched. The provider may select a delivery media (e-mail, Web page display, etc.) and a delivery time and period (e.g., 6:00 p.m. daily, Monday noon weekly, etc.), or default media and time is noted (steps **446–450**). At this point the Demand Query composition is complete (step **452**).

Referring briefly to FIG. **21**, Demand Agent Factory **84** invokes a Create Demand Agent subroutine to create a new Demand Agent **16** (step **396**). Referring now to FIG. **23**, a Create Demand Agent subroutine is referred to generally by reference numeral **396**. Demand Agent Factory **84** creates a new Demand Agent **16** possessing a unique identifier (step **458**). This unique identifier can be used to send messages to the agent even after the agent has expired (completed its task). Demand Agent Factory **84** also initializes the other data components of the new agent by storing a reference to the Personal Agent of the provider, a reference to the Market that is to be searched, a datetime range indicating that only Decision Agents that were (are) active during that datetime range should be searched, the delivery media, time, and period, and the query (search criteria) (step **460**). Demand Agent Factory **84** logs the creation of the new agent with the new agent's Log function (step **462**). Now the new Demand Agent **16** is ready to be launched.

Referring again to FIG. **21**, Demand Agent Factory **84** delivers the new Demand Agent to the specified Market (step **398**), where an Accept New Demand Agent subroutine is invoked (step **400**). Referring now to FIG. **24**, an Accept New Demand Agent subroutine is referred to generally by reference numeral **400**. Active Demand Agent Manager **132** of the Market accepts the new agent, and logs the query from the agent to the Market's Query Logger **136** function (steps **468–470**).

Referring back to FIG. **21**, Demand Agent **16** is now ready to perform the search for Decision Agents **14** that satisfy the provider's criteria, so it invokes a Perform Demand Search subroutine (step **402**). Referring to FIG. **25**, a Perform Demand Search subroutine is referred to generally by reference numeral **402**. Demand Agent **16** determines if the search is for current or historical demand, and invokes an appropriate subroutine, either a Perform Current Demand subroutine, or a Perform Historical Demand subroutine (steps **476–480**).

Referring now to FIG. **26**, a Perform Current Demand subroutine is referred to generally by reference numeral **478**. Demand Agent **16** delivers its query to a Current Demand Search Engine **164** (step **490**). Current Demand Search Engine **164** matches the query, using conventional database techniques, against the Decision Agents that are listed in Immediate Agents **156** and Pending Agents **160** (step **492**), as these Decision Agents are the ones that are currently searching for products. During the search, Current Demand Search Engine **164** collects references to Decision Agents **14** whose queries satisfy the query of the Demand Agent **16**. For example, if the Demand Agent is looking for consumers who are currently looking for sports shoes, the Current Demand Search Engine will collect references to Decision Agents that are searching for sports shoes. Current Demand Search Engine **164** delivers the collected list of references to the Demand Agent (step **494**). When the search is complete, Demand Agent notifies Active Demand Agent Manager **132** that the search is complete (step **496**).

Referring now to FIG. 27, a Perform Historical Demand subroutine is referred to generally by reference numeral **480**. Demand Agent **16** delivers its query to an Historical Demand Search Engine **138** (step **502**). Historical Demand Search Engine **138** matches the query, using conventional database techniques, against the expired queries that are kept in Query Logger **136** (step **504**). During the search, Historical Demand Search Engine **138** collects references to expired queries, and the Decision Agents to which they belong, that were active during the specified datetime range of the Demand Agent's query and that otherwise satisfy the Demand Agent's query. Historical Demand Search Engine **138** delivers the collected list of references to the Demand Agent (step **506**). When the search is complete, Demand Agent notifies Active Demand Agent Manager **132** that the search is complete (step **508**).

Referring back to FIG. 25, the search is complete, so Active Demand Agent Manager **132** delivers the Demand Agent back to Personal Agent's Demand Agent Manager **62** (step **482**), and Personal Agent's Demand Agent Tracker **86** logs the search completion (step **484**). The demand search results are held by the Demand Agent **16** until the provider's desired delivery time (which may be immediately if the provider has so requested).

The search has now ended. It remains for Demand Agent **16** to deliver the demand search results to the provider. Referring to FIG. 28, a Deliver Demand Results subroutine is referred to generally by reference numeral **512**. When the desired delivery time is reached (step **514**), Preference Manager **54** organizes the not-yet-delivered results according to the provider's preferences (step **516**). For example, the provider may prefer to see only numeric totals, or the provider may prefer to see a detailed listing of all the Decision Agent queries that satisfied the demand search. Delivery Manager **56** formats the responses according to the provider's desired delivery media (step **518**). For example, if the provider's desired delivery media is the Web, a Web page in HTML is generated. If the provider desires e-mail delivery, a suitable representation is generated. When formatting is complete, Delivery Manager **56** arranges the actual delivery of the search results (step **520**). The Demand Agent has completed its task, so it can be expired (step **522**).

Referring to FIG. 29, an Expire Demand Agent subroutine is generally referred to by reference numeral **522**. The Demand Agent Tracker **86** notes that the agent is now expired (step **528**), and the agent is permanently archived in Demand Agent Archive **88** (step **530**).

Place Ad

Both providers and consumers may place ads in Agent System **10**. An advertisement may be an offer to sell or an offer to buy. A placed advertisement becomes effective at a particular time and expires at a particular time, and searching Decision Agents consider an advertisement only during the ad's effective time. Even after ads expire, they may be accessed for historical reasons. Users may place ads manually, or they may cause ads to be loaded from or referenced from remote systems via a remote database adapter. Referring to FIG. 30, an overall method according to the present invention for placing a sell or buy advertisement is referred to generally by reference numeral **534**. When a provider (a user acting in the role of a provider) desires to place an advertisement manually within Agent System **10** for a product, the provider establishes a communication session with provider's Personal Agent **13** (steps **536**–**538**). Typically the provider, using a personal computer, connects to provider's Internet access provider, directs provider's Web browser software to Agent System's electronic address (known as a URL), and enters a login name and password. A sample login screen has already been illustrated in FIG. **39**.

Referring to FIG. **30**, the provider invokes Sell Ad Manager **128** or Buy Ad Manager **130** as appropriate (step **540**) to supervise the subsequent steps of placing the advertisement. A Compose Ad subroutine of Ad Composer **90** is called to assist the provider in composing the advertisement (step **542**).

Referring now to FIG. **31**, a Compose Ad subroutine is referred to generally by reference numeral **542**. The provider selects the type of ad: a sell advertisement (an offer to sell) or a buy advertisement (an offer to buy) (step **552**). If the provider wishes to compose an advertisement that is similar to a previously placed ad, Ad Archive **96** displays a list of expired ads from Ad Archive **96** from which the provider may select (steps **554**–**558**). Ad Composer **90** retrieves the Product Template mentioned in the selected ad, and also the current instructions, from the Market mentioned in the selected advertisement (step **560**). The values from the selected advertisement are used to initialize the new advertisement (step **562**).

Still referring to FIG. **31A**, if the provider alternatively wishes to specify an entirely new ad, the provider selects a Market **18** in which the advertisement will be placed (step **564**). If the selected Market is a Restricted Market for which the provider is not authorized, an error message is displayed to the provider, and the provider is returned to the initial menu where another action may be selected (steps **566**–**570**). If the provider is authorized for the restricted Market, or if the Market is not restricted, the provider selects a product for which to search (steps **568**–**574**). Ad Composer **90** retrieves Product Template and instructions from the Market's Template Dispenser **134** (step **576**). If the particular product is not listed in the Market, the provider instead indicates .a "generic" ad, and Template Dispenser **134** supplies a generic template that can be used for any product suitable for the Market.

Ad Composer **90** arranges to format and display the Product Template and the instructions (step **578**). The provider, following the instructions, selects and enters values describing the product in the Product Template (step **580**), adding additional description if desired. When the provider's interface is a Web browser, the Product Template is typically displayed as a combination of fill-in fields, selection lists, radio buttons, etc. as illustrated in the sample screen of FIG. **42**.

Referring again to FIG. **31B**, the provider enters the price for the product (step **582**). Generally, a sell advertisement will contain a specific price for the product, while a buy advertisement will contain a price range. The provider specifies the datetime that the advertisement should become effective and the datetime that the advertisement should expire (step **584**). This allows providers to compose batches of ads ahead of time, for example with lower prices during a sale, and arrange for the ads to become affective when the sale starts. For receiving responses to the ad, the provider may select a delivery media (e-mail, Web page display, etc.) and a delivery time and period (e.g., immediately, 6:00 p.m. daily, Monday noon weekly, etc.), or default media and time is noted (steps **586**–**590**). At this point the advertisement composition is complete (step **592**), and Ad Composer **90** can create the actual advertisement with a Create Ad subroutine (step **594**).

Referring now to FIG. **32**, a Create Ad subroutine is referred to generally by reference numeral **594**. Ad Composer **90** creates a new Ad **186** possessing a unique identifier (step **600**). This unique identifier can be used to access Ad **186** even after the advertisement has expired. Ad Composer **90** indicates that this is a buy advertisement or sell advertisement. Ad Composer **90** also inserts values (step **602**) for the other data components as specified by the provider in previous steps: Template Values, Description, Price, Start and Expiry Datetime. Ad Composer **90** inserts references to the Personal Agent **12** or **13** that is controlling the advertisement creation, and to the Personal Agent **12** or **13** of the principal (buyer or seller). Ad Composer **90** notes in which Market **18** the advertisement is to be placed, and inserts a reference to the standard data about the product from the Product Listing **124**. Ad Tracker **94** logs the creation of the new Ad **186** (step **604**). Now the new Ad is ready to be delivered.

Referring again briefly to FIG. **30**, Ad Delivery function **92** delivers the newly created Ad **186** to the Sell Ad Manager **128** or Buy Ad Manager **130**, as appropriate, of the provider's chosen Market (step **544**), and the Ad Manager invokes an Accept New Ad subroutine to incorporate the new advertisement (step **546**).

Referring now to FIG. **33**, an Accept New Ad subroutine is referred to generally by reference numeral **546**. Sell Ad Manager **128** or Buy Ad Manager **130**, as appropriate, accepts the Ad **186** and checks the ad's Start Datetime to see if the advertisement should become active (effective) now. (steps **612–614**). If it is not time for the advertisement to become effective, the advertisement is passed to Future Ads **148**, which holds the advertisement until the appropriate future time (step **616**). Future Ads arranges to give the advertisement back to the appropriate Ad Manager for activation at the appropriate time.

If it is time for the advertisement to become active, Active Ads **146** inserts the advertisement into its internal queue and Ad Indexing **144** indexes the advertisement for searching (steps **618–620**). Active Ads notifies Active Decision Agent Manager **152** that a new advertisement has arrived (step **622**), so that ongoing extended searches may be matched against the new advertisement.

Once Ad **186** is in Active Ads **146**, the advertisement is available for **1 0** searching by Decision Agents **14** that are looking for products. The advertisement remains available for searching until its Expiry Datetime is reached, when Ad Manager invokes an Expire Ad subroutine.

Referring now to FIG. **34**, an Expire Ad subroutine is referred to generally by reference numeral **626**. Sell Ad Manager **128** or Buy Ad Manager **130**, as appropriate, removes the Ad **186** from Active Ads **146** so that the advertisement is no longer visible to searching Decision Agents **14** (step **628**). The indexes for the advertisement are transferred to Expired Ads **150** (step **630**) to make historical searches easier. Ad Tracker **94** logs the expiration of the advertisement (step **632**). Ad Archive **96** permanently archives the advertisement (step **634**). Even though the advertisement is expired, it can still be referenced out of the Ad Archive for historical searches.

Target Consumers

To "target" a message is to select message recipients according to certain criteria intended to yield recipients that are interested in receiving the information, as opposed to delivering the message to a wider audience where fewer recipients are truly interested in the information. Within

Agent System **10**, targeting consumers is a process of targeting Personal Agents **12** that represent consumers that satisfy the desired criteria. Providers use the targeting process, for example, to send ads to consumers that have previously searched in a particular Market **18** or for a particular product. Providers may also use targeting to offer a product at a different price to a different groups of consumers. Providers might also send market surveys, brand name awareness notices, etc.

Providers can also target consumers who have recently searched a Market **18** to deliver a "reason for sale" or "lost sales" questionnaire. The questionnaire inquires if the consumer actually bought a product, and if the purchased product was the one offered by the inquiring provider or some other provider. The questionnaire typically includes a list of sales reasons, that is, reasons why the consumer purchased the product or purchased from the inquiring provider. For example, some sales reasons are: price suitable, available in desired color, a particular special feature, etc. The questionnaire also typically includes a list of lost sales reasons, that is, reasons why the consumer purchased a competing product or purchased from another provider. For example, some lost sales reasons are: price too high, prefer another brand, store location not convenient, etc. The questionnaire may also include a place for general comments from the consumer. By analyzing returned questionnaires, the provider gains valuable information about why a sale was gained or why a competitor got the sale.

Referring to FIG. **35**, an overall method according to the present invention for targeting consumers is referred to generally by reference numeral **638**. When a provider (a user acting in the role of a provider) desires to target a message to a select group of consumers, the provider establishes a communication session with provider's Personal Agent **13** (steps **640–642**). Typically the provider, using a personal computer, connects to provider's Internet access provider, directs provider's Web browser software to Agent System's electronic address (known as a URL), and enters a login name and password. A sample login screen has already been illustrated in FIG. **39**.

Referring again to FIG. **35**, Target Manager **66** assists the provider in identifying the target set of Personal Agents that will receive the message by invoking a Target Personal Agents subroutine. Referring to FIG. **36**, a Target Personal Agents subroutine is referred to generally by reference numeral **644**. The provider executes a process of refinement (steps **662–670**) to collect references to appropriate Personal Agents.

The provider may start by quantifying demand, previously described in conjunction with FIG. **21**, and use the set of consumer Personal Agents **12** thereby identified. For example, the provider may quantify current demand for sports shoes, and collect the Personal Agents that currently have Decision Agents that are looking for sports shoes.

Alternatively, the provider may select, from Demand Agent Archive **88**, a Demand Agent **16** that previously identified an appropriate set of consumer Personal Agents **12**.

As yet another alternative, the provider may use Personal Agent Search Engine **26** to collect references to a set of consumer Personal Agents **12** that have certain preferences or demographic characteristics. For example, the provider may search for Personal Agents that list a preference for a certain favorite brand, or for Personal Agents whose owners are males between the ages of 25 and 40. Personal Agent

Search Engine **26** also identifies Personal Agents that are willing to accept unsolicited notices only if accompanied by a consideration. In this context, Personal Agent Search Engine **26** automatically filters out Personal Agents that belong to persons or organizations that are no longer users of the system.

The provider may keep applying search criteria to filter the set of consumer Personal Agents **12** at will, until the provider is satisfied that an appropriate set has been identified. By choosing suitable search criteria, the provider may also select a set of consumers to quantify anticipated or future demand. For example, the provider may select consumers that have recently searched a real estate market, and anticipate that those consumers will soon desire mortgage lending information.

Referring again to FIG. **35**, the provider composes the actual message to be sent (step **646**). For example, if the provider wants to send an ad, the provider may use the Ad Composer **90** to assist in the composition, using a Compose Ad subroutine previously described. Other notices, messages, consumer surveys, etc. could also be composed (not shown) for delivery.

The message is delivered to each consumer Personal Agent **12** that was identified with the help of Target Manager **66** (step **648**). For example, if the message is an ad, Ad Delivery **92** arranges the delivery.

Consumers receive the messages via their Personal Agents **12** and compose replies if they wish (step **650**). This may involve filling out an online form presented by the provider. The replies are sent back to the originating provider.

The provider may have specified a consideration amount to be paid to consumers that reply to the message (step **652**). If so, Target Manager **66** arranges to send a consideration notice to the consumer Personal Agent **12** of each consumer that replies (step **654**). Consideration Account **67** of each consumer receiving a consideration notice credits the consideration account with the amount of the consideration (step **656**).

Reject Unsolicited Message

Even unsolicited advertisements and other unsolicited messages that are rejected by a consumer's Personal Agent **12** become sources of market data to a provider, if the rejection generates a rejection reason back to the provider.

Referring to FIG. **37**, an overall method according to the present invention for rejecting an unsolicited message is referred to generally by reference numeral **674**. When a consumer's Delivery Manager **56** receives an ad, market survey, notice, or other message that is unsolicited, Delivery Manager **56** matches the data in the message against the preferences maintained by Preference Manager **54** (steps **676–678**). If the message content does not violate any of the consumer's preferences, the message is delivered by Delivery Manager **56** in the usual fashion according to the delivery media and delivery time preferences of the consumer (step **682**).

If, however, the message content violates the consumer's preference in some way, Delivery Manager **56** composes a rejection message indicating the reason for rejection, and sends the rejection message back to the Personal Agent **13** of the provider that originated the unsolicited message (steps **684–686**).

For example, if a provider sends, to Personal Agent **13**, an unsolicited advertisement about sports shoes, specifying a

consideration amount of fifty cents, and the user has previously specified a consideration preference of seventy-five cents, Delivery Manager **56** will reject the advertisement and reply with a rejection message indicating that the consideration amount must be at least seventy-five cents.

As another example, perhaps a provider sends an unsolicited advertisement about a Chinese food dinner, and the advertisement does not specify the MSG content of the food. If the user has specified a preference for "no MSG", Delivery Manager **56** will reject the advertisement and reply with a rejection message indicating that the consumer prefers food without MSG.

The provider has gained valuable market information about consumer preferences, even though the provider's message was not successfully delivered.

Simulate Demand

Providers may also simulate demand using current market data. To simulate demand is to determine the demand for a hypothetical product or service, or for an actual product or service with different features or pricing.

Referring to FIG. **38A**, when a provider decides to simulate demand for a product, the provider composes and places an Ad **186** in a Market **18** in the regular fashion, but the provider additionally marks the Ad as "invisible" (step **694**). The provider composes the Ad to represent the hypothetical product, or the product with different features or pricing. The Ad is (during its effective datetime) available to be matched by consumers' Decision Agents **14** performing decision searches.

When a searching Decision Agent **14** matches the invisible Ad **186**, the Ad is referred to the Response Manager **108** and the Preference Manager **54** ranks the Ad in the normal fashion (steps **696–698**). However, because the Ad is marked invisible, the Response Manager additionally sends a reply to the provider indicating that the invisible Ad was matched by a Decision Agent **14**, and indicating the ranking of the invisible Ad (step **700**). The Ad **186** reference is not removed from the Decision Agent **14**, but remains with the other Ad references of the Decision Agent in the normal fashion. When Delivery Manager **56** is preparing search results for delivery to the consumer, it does not include the invisible Ad (step **702**), so that the consumer remains unaware that the invisible Ad existed. The provider has collected valuable market data without annoying the consumers who generated the data.

Referring to FIG. **38B**, a variation of this process allows providers to "replay" a product offering, that is, to estimate what effect an advertisement would have had if, for example, the price had been lower. This process variation matches the invisible advertisement against expired Decision Agents **14** over a datetime range.

OTHER EMBODIMENTS

The foregoing description is of a preferred embodiment of the invention. Other embodiments are anticipated. For example, it is expected that future embodiments of the invention will use a variety of communication devices, such as, but not limited to, facsimile machines, pagers, Personal Digital Assistants (PDAs), Network Computers (NCs), postal mail, telephone voice recognition, satellite links, video cable, etc.

It is also anticipated that, in the future, the system will further comprise actual purchase transactions.

It is also anticipated that additional kinds of data will be collected by the system, and additional methods of analysis of such data will be developed.

CONCLUSION

From the foregoing it will be seen that this invention is well adapted to attain all of the ends and objectives hereinabove set forth, together with other advantages which are inherent to the apparatus.

It will be understood that certain features and sub-combinations are of utility and may be employed without reference to other features and sub-combinations. This is contemplated by and is within the scope of the claims.

The foregoing description of the preferred embodiment of the invention has been presented for the purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed. Many modifications and variations are possible in light of the above teaching.

I claim:

1. A computer network agent system for providing communication between an anonymous potential consumer of products which can be goods or services and a provider of such products, comprising in combination:

a consumer personal agent for receiving product queries from the potential consumer and transmitting product recommendations to the potential consumer;

a decision agent for receiving anonymous product queries from the consumer personal agent and transmitting product recommendations to the consumer personal agent;

a provider personal agent for receiving demand queries from the provider and transmitting quantified demand information to the provider;

a demand agent for receiving demand queries from the provider personal agent and transmitting quantified demand information to the provider personal agent; and

a market for gathering information from the agents, organizing the information and distributing organized information to the agents.

2. A computer network agent system according to claim 1 wherein the consumer personal agent comprises, in combination:

a unique identifier function for maintaining an identifier that uniquely identifies the consumer personal agent within the agent system;

an owner manager function for maintaining data about the consumer;

an individual firewall for protecting the data about the consumer from other agents, controlling all access to data that is maintained by the various internal functions, ensuring that only authenticated and authorized agents and users can access private data;

a preference manager for maintaining data about the preferences of the consumer;

a delivery manager for accepting messages generated by other agents or other components of the system, that are directed to the consumer and delivers those messages according to the consumer's desired delivery time and delivery media and rejecting unsolicited messages, unless an unsolicited message meets the consumer's preferred criteria as maintained by the preference manager; and

a decision agent manager for assisting the consumer with the creation and management of decision agent.

3. A computer network agent system according to claim 2 wherein the decision agent manager comprises, in combination:

a decision composer for assisting the consumer in composing queries to be executed by decision agents;

a decision agent factory for creating a new decision agent to carry out a query; and

a decision agent tracker for enabling the consumer to monitor the activities of decision agents that have not completed their tasks.

4. A computer network agent system according to claim 3 wherein the decision agent manager further comprises a decision agent archive for storing and accessing decision agents that have completed their tasks.

5. A computer network agent system according to claim 1 wherein the consumer personal agent further comprises a consideration account.

6. A computer network agent system according to claim 1 wherein the provider personal agent comprises, in combination:

a unique identifier function for maintaining an identifier that uniquely identifies the provider personal agent within the agent system;

an owner manager function for maintaining data about the provider;

an individual firewall for protecting the data about the provider from other agents, controlling all access to data that is maintained by the various internal functions, ensuring that only authenticated and authorized agents and users can access private data;

a preference manager for maintaining data about the preferences of the provider;

a delivery manager for accepting messages generated by other agents or other components of the system, that are directed to the provider and delivers those messages according to the provider's desired delivery time and delivery media and rejecting unsolicited messages, unless an unsolicited message meets the provider's preferred criteria as maintained by the preference manager; and

a demand agent manager for assisting the provider with the creation and management of demand agents.

7. A computer network agent system according to claim 6 wherein the demand agent manager comprises, in combination:

a demand composer for assisting the provider in composing queries to be executed by demand agents;

a demand agent factory for creating a new demand agent to carry out a query; and

a demand agent tracker for enabling the provider to monitor the activities of demand agents that have not completed their tasks.

8. A computer network agent system according to claim 7 wherein the demand agent manager further comprises a demand agent archive for storing and accessing demand agents that have completed their tasks.

9. A computer network agent system according to claim 6 further comprising

an advertisement manager for assisting the provider in placing advertisements.

10. A computer network agent system according to claim 9 wherein the advertisement manager comprises, in combination:

an advertisement composer for retrieving product information;

an advertisement delivery function for delivering an advertisement to a desired destination;

an advertisement tracker for monitoring the activity of the advertisement, including any messages received in

response to the advertisement, until the advertisement expires or is canceled by the user.

11. A computer network agent system according to claim **10** wherein the advertisement manager further comprises an advertisement archive for storing and accessing advertisements that are expired.

12. A computer network agent system according to claim **6** wherein the provider personal agent further comprises a target manager for assisting the provider in identifying consumer personal agents to which targeted messages may be delivered.

13. A computer network agent system according to claim **1** wherein the decision agent comprises, in combination:

a unique identifier function for maintaining an identifier that uniquely identifies this decision agent within the agent system;

a personal agent reference for holding a copy of the unique identifier of the consumer personal agent that controls this decision agent;

a market reference for indicating in which market the decision agent should search;

an expiry function for indicating how long the decision agent should continue searching;

a query for describing the product or product category for which to search;

a response manager for receiving search results and returning the search results to the consumer personal agent; and

a log function for storing records of the activities of the decision agent.

14. A computer network agent system according to claim **1** wherein the demand agent comprises, in combination:

a unique identifier function for maintaining an identifier that uniquely identifies this demand agent within the agent system;

a personal agent reference for holding a copy of the unique identifier of the provider personal agent that controls this demand agent;

a market reference for indicating in which market or markets the demand agent should search;

a datetime range function for indicating that demand should be quantified over the date/time range specified;

a demand query for describing a product or product category query that can be matched against the queries of decision agents; and

a log function for storing records of the activities of the demand agent for later consultation by other components of the agent system.

15. A computer network agent system according to claim **1** wherein the market comprises, in combination:

a product listing function for maintaining a list of the products that can be advertised in this market;

a cross reference manager for maintaining cross references to other markets that carry similar products;

a sell advertisement manager for accepting advertisements of offers to sell that are submitted by consumer personal agents;

a buy advertisement manager for accepting advertisements of offers to buy that are submitted by consumer personal agents;

an active demand agent manager for maintaining a list of all demand agents that are currently calculating demand in this market;

a template dispenser for retrieving data that is available within the agent system about a particular product;

a query logger for archiving summary information about queries so that historical data about queries may be quickly accessed without having to access the detailed data which has been archived; and

an historical demand search engine for matching demand queries of demand agents against the queries that have been previously logged by the query logger to identify decision agents that previously, during a specified datetime range, had searched for a certain product or product category.

16. A computer network agent system according to claim **15** wherein the market further comprises a remote database adaptor for providing communication and session management services to connect to a remote database belonging to a manufacturer or a provider and translating between the data formats used by the remote database and the data formats used by the market.

17. A computer network agent system according to claim **15** wherein the market further comprises an authorization function for restricting the placement and searching of advertisements in the market to authorized consumers and providers only.

18. A computer network agent system according to claim **15** wherein the buy advertisement manager further comprises, in combination:

an advertisement indexer for maintaining indexes for quick searching of the advertisements by product and vendor characteristics;

an active advertisements function for maintaining information about advertisements that are currently active, wherein an active decision agent manager is notified as each new advertisement is accepted by the active advertisements function so that pending searches can be matched against the new advertisement;

a future advertisements function for maintaining advertisements that have been submitted to the market, but are not yet active because their effective datetime has not yet been reached;

an expired advertisements function for maintaining an archive of advertisements that have expired, for later analysis;

an active decision agent manager for maintaining a list of all decision agents that are currently searching this market for products; and

an expired decision agent manager for maintaining a list of decision agents that have completed their searches, whether successfully or not.

19. A computer network agent system according to claim **18** wherein the active decision agent manager comprises, in combination:

an immediate agents function for keeping track of decision agents that are performing searches that are to be performed and results returned as soon as practical;

a basic search engine for executing queries associated with each incoming decision agent by consulting active advertisements to match the query against all active advertisements;

a pending agents function for keeping track of decision agents that are performing extended searches;

an incremental search engine for matching each new advertisement against the queries of the pending decision agents; and

a current demand search engine for matching demand queries of demand agents against the queries of decision agents that are residing in immediate agents or

pending agents, to identify active decision agents that are searching for a certain product or product category.

20. A computer network agent system according to claim 15 wherein the sell advertisement manager further comprises, in combination:

an advertisement indexer for maintaining indexes for quick searching of the advertisements by product and vendor characteristics;

an active advertisements function for maintaining information about advertisements that are currently active, wherein an active decision agent manager is notified as each new advertisement is accepted by the active advertisements function so that pending searches can be matched against the new advertisement;

a future advertisements function for maintaining advertisements that have been submitted to the market, but are not yet active because their effective datetime has not yet been reached;

an expired advertisements function for maintaining an archive of advertisements that have expired, for later analysis;

an active decision agent manager for maintaining a list of all decision agents that are currently searching this market for products; and

an expired decision agent manager for maintaining a list of decision agents that have completed their searches, whether successfully or not.

21. A computer network agent system according to claim 20 wherein the active decision agent manager comprises, in combination:

an immediate agents function for keeping track of decision agents that are performing searches that are to be performed and results returned as soon as practical;

a basic search engine for executing queries associated with each incoming decision agent by consulting active advertisements to match the query against all active advertisements;

a pending agents function for keeping track of decision agents that are performing extended searches;

an incremental search engine for matching each new advertisement against the queries of the pending decision agents; and

a current demand search engine for matching demand queries of demand agents against the queries of decision agents that are residing in immediate agents or pending agents, to identify active decision agents that are searching for a certain product or product category.

22. A method for searching for a product by a consumer, comprising in combination the steps of:

selecting a decision agent manager to supervise the subsequent steps;

composing a decision query;

creating a decision agent;

delivering the decision agent to a specified market;

accepting the decision agent by the market; and searching for the product.

23. A method for searching for a product according to claim 22 wherein the step of composing a decision query comprises, in combination, the steps of:

if specifying an entirely new search, selecting a market in which to search;

if the selected market is a restricted market for which the consumer is not authorized, displaying an error message to the consumer, and returning to the initial menu where another action may be selected;

if the consumer is authorized for the restricted market, or if the market is not restricted, selecting the product for which to search;

retrieving a product template and instructions from a market template dispenser;

formatting and displaying the product template and the instructions;

completing the search criteria in the product template;

if performing a search that will continue for a period of time, entering a period of time for the search to continue;

if performing a search that will return results as soon as possible, indicating such; and

selecting a delivery media and a delivery time and period.

24. A method for searching for a product according to claim 22 wherein the step of creating a decision agent comprises, in combination, the steps of:

creating a decision agent with a unique identifier;

storing a reference to a personal agent of the consumer, a reference to the market that is to be searched, the search expiry time, the delivery media, time, and period, and the query; and

logging the creation of the decision agent with the decision agent's log function.

25. A method for searching for a product according to claim 22 wherein the step of accepting the decision agent comprises, in combination, the steps of:

accepting the new decision agent by an active decision agent manager;

logging the query from the decision agent to the market's query logger function; and

adding the decision agent to a queue of immediate agents.

26. A method for searching for a product according to claim 22 wherein the step of searching for the product comprises, in combination, the steps of:

searching for the product as soon as possible;

if performing a search that will continue for a period of time, delivering the decision agent to queue of pending agents; and

if performing a search that will return results as soon as possible, ending the decision search.

27. A method for searching for a product according to claim 26 wherein the step of searching for the product as soon as possible comprises, in combination, the steps of:

selecting the next decision agent from the queue;

delivering the query from the decision agent to a search engine;

matching the query against active advertisements;

collecting matching advertisements;

responding to each placer of an advertisement to indicate that the advertisement was collected; and

giving the decision agent back to the active decision agent manager.

28. A method for quantifying demand by a provider for a product, comprising in combination the steps of:

selecting a demand agent manager to supervise the subsequent steps;

composing a demand query;

creating a demand agent;

delivering the demand agent to a market;

accepting the demand agent by the market; and

searching demand.

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29. A method for quantifying demand according to claim **28**, wherein the step of composing a demand query comprises, in combination, the steps of:

if specifying an entirely new search, selecting a market in which to search;

if the selected market is a restricted market for which the provider is not authorized, displaying an error message to the provider, and returning to the initial menu where another action may be selected;

if the provider is authorized for the restricted market, or if the market is not restricted, selecting the product for which to search;

retrieving a product template and instructions from a market template dispenser;

formatting and displaying the product template and the instructions;

completing the search criteria in the product template;

if performing a search for historical demand, entering a date and time range;

if performing a search for current demand, indicating such; and

selecting a delivery media and a delivery time.

30. A method for quantifying demand according to claim **28**, wherein the step of creating a demand agent comprises, in combination, the steps of:

creating a decision agent with a unique identifier;

storing a reference to a personal agent of the provider, a reference to the market that is to be searched, the search expiry time, the delivery media, time, and period, and the query; and

logging the creation of the new decision agent with the decision agent's log function.

31. A method for quantifying demand according to claim **28**, wherein the step of accepting the demand agent comprises, in combination, the steps of:

accepting the agent by an active demand agent manager; and

logging the query from the demand agent to the market's query logger function.

32. A system for electronic commerce wherein market data can be collected and analyzed comprising:

a plurality of consumer agents, each associated with and capable of communicating with a consumer;

a consumer data base comprising consumer preference data associated with each said consumer;

a plurality of provider agents, each associated with and capable of communicating with a provider; and

a data base of offers to sell and offers to buy;

wherein said consumer agents conceal the identity of the associated consumer from agents not associated with said consumer in said system;

wherein said consumer agents are capable of searching said data base of offers to sell and offers to buy;

wherein said consumer agent searching generates persistent market data;

wherein said provider agents are capable of searching said consumer database and said persistent market data; and

wherein said provider agents analyze said consumer database and said persistent market data to quantify consumer demand.

33. The system of claim **32** wherein said consumer data base furthers comprises non-identifying demographic data.

34. A computer network agent system according to claim **32** wherein each consumer agent comprises, in combination:

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a unique identifier function for maintaining an identifier that uniquely identifies the consumer agent within the agent system;

an owner manager function for maintaining data about the consumer;

an individual firewall for protecting the data about the consumer from other agents, controlling all access to data that is maintained by the various internal functions, ensuring that only authenticated and authorized agents and users can access private data;

a preference manager for maintaining data about the preferences of the consumer;

a delivery manager for accepting messages generated by other agents or other components of the system, that are directed to the consumer and delivers those messages according to the consumer's desired delivery time and delivery media and rejecting unsolicited messages, unless an unsolicited message meets the consumer's preferred criteria as maintained by the preference manager; and

a decision agent manager for assisting the consumer with the creation and management of decision agent.

35. A computer network agent system according to claim **32** wherein each provider agent comprises, in combination:

a unique identifier function for maintaining an identifier that uniquely identifies the provider agent within the agent system;

an owner manager function for maintaining data about the provider;

an individual firewall for protecting the data about the provider from other agents, controlling all access to data that is maintained by the various internal functions, ensuring that only authenticated and authorized agents and users can access private data;

a preference manager for maintaining data about the preferences of the provider;

a delivery manager for accepting messages generated by other agents or other components of the system, that are directed to the provider and delivers those messages according to the provider's desired delivery time and delivery media and rejecting unsolicited messages, unless an unsolicited message meets the provider's preferred criteria as maintained by the preference manager; and

a demand agent manager for assisting the provider with the creation and management of demand agents.

36. A method for searching for product offers, comprising:

providing a computer system adapted to operation of agents;

providing a consumer agent, each associated with and capable of communicating with a consumer;

providing a consumer data base of consumer preference data associated with each said consumer;

providing a data base of offers to sell and offers to buy;

concealing the identity of said consumer from agents not associated with said consumer;

said consumer agent assisting said consumer in composing a query for a product or product category;

said consumer agent searching said data base of offers to sell and offers to buy, wherein said searching generates persistent market data;

said consumer agent retaining search results of said searching until the associated consumer's preferred delivery time;

said consumer agent automatically filtering out any of said search results that violate any of said consumer preference data;

said consumer agent ordering or ranking said search results according to said consumer preference data;

said consumer agent formatting said search results for delivery to said associated consumer's preferred communication device; and

said consumer agent delivering said search results to said communication device;

whereby said consumer can gather product data that is automatically filtered and ranked according to said consumer preferences.

37. The method of claim **36** further comprising:

providing a data base of advocate evaluation and recommendation data;

said consumer selecting data from said data base of advocate evaluation and recommendation data to include in said consumer's said consumer data base of consumer preference data;

said consumer agent thereby further automatically filtering out any of said results that violate consumer's selected advocate evaluation and recommendation data;

whereby said consumer has a convenient way to use advocate evaluation and recommendation data to automatically filter and rank said search results.

38. A method for collecting and analyzing market data, comprising:

providing a computer system adapted to operation of agents;

providing a plurality of consumer agents, each associated with and capable of communicating with a consumer;

providing a consumer data base of consumer preference data associated with each said consumer;

providing a plurality of provider agents, each associated with and capable of communicating with a provider;

providing a data base of offers to sell and offers to buy;

concealing the identity of said consumer from agents not associated with said consumer;

searching by said consumer agents of said data base of offers to sell and offers to buy, wherein said searching generates persistent market data;

searching by said provider agents of said consumer data base and of said persistent market data to discover which of said consumer agents possess certain preferences and generated certain records within said persistent market data;

analyzing the results of said searching by said provider agents to quantify consumer demand;

whereby consumers are encouraged to utilize said system because the identity of each said consumer is concealed from said agents not associated with said consumer in said system; and

whereby providers can gain access to valuable said persistent market data without imposing on or invading the privacy of said consumers.

39. The method of claim **38** wherein said searching by said provider agents is restricted to current data within said persistent market data, and said analyzing quantifies current consumer demand.

40. The method of claim **38** wherein said searching by said provider agents is restricted to historical data within said persistent market data, and said analyzing quantifies historical consumer demand.

41. A method for quantifying future demand for a certain product or a certain product category, utilizing persistent market data generated by consumer agents that conceal the identity of said consumer agent's associated consumer, while searching a data base of offers to sell and offers to buy, and utilizing a consumer data base of consumer preference data, comprising:

searching said consumer data base to discover which of said consumer agents possess certain preferences;

searching said persistent market data to discover which of said consumer agents, while searching for products related to said certain product or certain product category, generated certain records within said persistent market data;

whereby a provider can select specific consumers that may be interested in said certain product or certain product category.

42. A method for targeting specific consumers, each of whose identity remains concealed, according to their on-line shopping activities and preferences, utilizing persistent market data generated by consumer agents that conceal said identity while searching a data base of offers to sell and offers to buy, and utilizing a consumer data base of consumer preference data, comprising:

searching said consumer data base to discover which of said consumer agents possess certain preferences;

searching said persistent market data to discover which of said consumer agents generated certain records within said persistent market data;

whereby a provider can select specific consumers to receive messages.

43. The method of claim **42** wherein said certain records pertain to said consumer agents searching for specific products.

44. The method of claim **42** wherein said certain records pertain to said consumer agents searching within a product category.

45. A method of extending a consideration payment to a consumer, whose identity remains concealed, in return for said consumer providing useful market data to a provider, comprising:

said provider selecting consumer agents to receive a message;

said provider causing said message to be delivered to said consumer agents;

each of said consumer agents displaying said message to said consumer agent's associated consumer;

each of said associated consumers generating a response to said message;

said provider's associated provider agent generating, for each said response received, a consideration notice addressed to the consumer agent associated with the consumer that generated the response;

said associated provider agent causing each said consideration notice to be delivered to said associated consumer agent;

each said consumer agent crediting said associated consumer's consideration account;

whereby said consumer can receive a consideration payment for divulging useful market data to said provider; and

whereby said provider can solicit valuable market data without imposing on or invading the privacy of said consumers.

46. The method of claim **45** wherein said message is an advertisement.

47. The method of claim **45** wherein said message is a marketing survey.

48. The method of claim **45** wherein said message is a questionnaire about the reason for a sale.

49. The method of claim **45** wherein said message is a questionnaire about the reason for a lost sale.

50. A method of a consumer automatically rejecting certain unsolicited messages from a provider, comprising:

said provider causing a message to be delivered to a consumer agent;

said consumer agent comparing aspects of said message to a consumer data base of consumer preference data;

if said message satisfies said consumer preference data, said consumer agent allowing said message to complete delivery to said consumer;

if said message violates said consumer preference data, said consumer agent rejecting said message by:

automatically generating a rejection message including an indication of the violated consumer preferences;

causing said rejection message to be delivered to said provider;

whereby said provider can gain valuable market data even from messages that are blocked from delivery.

51. A method of a provider simulating demand, comprising:

providing a data base of offers to sell and offers to buy;

providing a provider agent associated with and capable of communicating with a provider;

providing a plurality of consumer agents, each associated with and capable of communicating with a consumer;

said provider places an invisible advertisement in said data base of offers to sell and offers to buy;

a consumer agent, when ordering or ranking search results, if said search results include a reference to said invisible advertisement, ranks said invisible advertisement along with other said search results;

said consumer agent, when ranking said invisible advertisement, generates a message indicating the ranking of the invisible advertisement;

said consumer agent sends said message to the associated provider agent;

said consumer agent, when delivering said search results to the preferred communication device of the associated consumer, omits said invisible ad;

whereby said provider can determine simulated demand for the product described by said invisible ad.

52. A method of a provider replaying demand, comprising:

providing a plurality of consumer agents, each associated with and capable of communicating with a consumer;

providing a data base of offers to sell and offers to buy;

consumer agents searching said data base of offers to sell and offers to buy, whereby said consumer agent searching generates persistent market data;

a provider composes an invisible advertisement;

said provider selects at least one said consumer agent that has completed said searching;

said consumer agent is instructed to rank said invisible advertisement;

said consumer agent ranks said invisible advertisement along with other said search results;

said consumer agent, when ranking said invisible advertisement, generates a message indicating the ranking of the invisible advertisement;

said consumer agent sends said message to the associated provider agent;

whereby said provider can determine simulated demand in historical time for the product described by said invisible ad.

53. In a computer network agent system for providing communication between an anonymous potential consumer of products which can be goods or services and a provider of such products, the combination comprising:

a decision agent for receiving anonymous product queries from the consumer and transmitting product recommendations to the consumer;

a demand agent for receiving demand queries from the provider and transmitting quantified demand information to the provider; and

a market for gathering information from the agents, organizing the information and distributing organized information to the agents.

54. A combination according to claim **53** wherein the decision agent comprises, in combination:

a unique identifier function for maintaining an identifier that uniquely identifies this decision agent within the agent system;

a market reference for indicating in which market the decision agent should search;

an expiry function for indicating how long the decision agent should continue searching;

a query for describing the product or product category for which to search;

a response manager for receiving search results and returning the search results to the consumer; and

a log function for storing records of the activities of the decision agent.

55. A combination according to claim **53** wherein the demand agent comprises, in combination:

a unique identifier function for maintaining an identifier that uniquely identifies this demand agent within the agent system;

a market reference for indicating in which market or markets the demand agent should search;

a datetime range function for indicating that demand should be quantified over the date/time range specified;

a demand query for describing a product or product category query that can be matched against the queries of decision agents; and

a log function for storing records of the activities of the demand agent for later consultation by other components of the agent system.

56. A combination according to claim **53** wherein the market comprises, in combination:

a product listing function for maintaining a list of the products that can be advertised in this market;

a cross reference manager for maintaining cross references to other markets that carry similar products;

a sell advertisement manager for accepting advertisements of offers to sell that are submitted by consumers;

a buy advertisement manager for accepting advertisements of offers to buy that are submitted by consumers;

an active demand agent manager for maintaining a list of all demand agents that are currently calculating demand in this market;

a template dispenser for retrieving data that is available within the agent system about a particular product;

a query logger for archiving summary information about queries so that historical data about queries may be quickly accessed without having to access the detailed data which has been archived; and

an historical demand search engine for matching demand queries of demand agents against the queries that have been previously logged by the query logger to identify decision agents that previously, during a specified

datetime range, had searched for a certain product or product category.

57. A combination according to claim **56** wherein the market further comprises a remote database adaptor for providing communication and session management services to connect to a remote database belonging to a manufacturer or a provider and translating between the data formats used by the remote database and the data formats used by the market.

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UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO.   : 6,119,101   Page 1 of 1
APPLICATION NO. : 08/784829
DATED   : September 12, 2000
INVENTOR(S)   : Douglas L. Peckover

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

<u>Title Page:</u>

At Related U.S. Application Data Item (60), before "Provisional application No. 60/010,087, filed Jan. 17, 1996" please insert -- Provisional application No. 60/034,395, filed December 30, 1996 --.

Signed and Sealed this

Sixth Day of November, 2007

JON W. DUDAS
Director of the United States Patent and Trademark Office