



ADVANCED IP SERVICES – ANALYTICS BASED CONSULTING

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- **Corporations are demanding greater alignment with business strategy**
- **IP Firms are being asked to help address these challenges**
- **We have that capability in-house, and firms are turning to us to help them**

CLIENT INNOVATION

Topics of Interest shared by a MNC Electronics company

- Sensor fusion for improved accuracy (camera + other sensors like IMU or LiDAR)
- Dense depth from stereo in real-time
- Object-type Recognition in 3D scenes
- Registering a body model to 3D data points
- Capturing dense accurate 3D geometry in real-time is difficult (Dependence on object surface, shiny or reflective objects, dark objects, transparent objects, dependence on lighting conditions)
- Capturing dynamic/non-rigid objects is difficult
- Obtaining semantically meaningful reconstructions (e.g. identify surfaces, include prior knowledge, find objects)
- Obtaining good outputs when the input image quality is low

Based on these topics, a concise list of following topics of interest was created. These topics were selected and defined so as to cover the above mentioned topics as well as other topics identified from web articles and forums.

Topics of Interest shared by a MNC Electronics company

Topic	Concepts Covered
Object Detection in bad weather	Object detection in heavy rains, snow, or sunlight. Shiny, dark, transparent or reflective surfaces were also covered.
Object-type Recognition in 3D scenes	The concept of object recognition (and type of object) in 3D scenes is addressed.
Dense depth from stereo in real-time	Depth Maps, Dense Scene Stereo Reconstruction, Cloud Maps, 3D Body Models and Registration, 3D Mesh.
Capturing moving objects in real time in 3D	Concepts for capturing dynamic or non-static objects. Efforts were made to capture patents that talk about differentiating between permanently or temporarily stationary objects.
Multiple sensors for improved accuracy	Concepts where inputs from multiple sensors are combined to determine automatic driving conditions.
Gesture recognition for pedestrians	The concept of recognizing gestures (hand or body) of pedestrians, or drivers of other vehicles is addressed. 3D Body Models and Registration, 3D Mesh.

HELPING YOUR CLIENTS INNOVATE

	Techniques				Applications								Output/Action Taken				
	Multiple Cameras	Single Camera	Laser	3D Modeling Techniques	Collision Detection	Object Recognition	Road Features	Navigation	Lane Control	Parking	Vision Enhancement	Localization	Steering Control	Brake Control	Drive Force Control	Information Display	Alarm Triggering
Top Companies																	
Bosch	30	27	40	7	32	6	11	18	8	8	5	5	31	16	38	14	21
Toyota Motor	6	24	12	1	37	4	9	15	8	10	1	3	26	32	28	9	9
Daimler Ag	19	18	25	3	31	6	5	9	9	0	4	5	15	16	10	13	25
Denso Corp	4	22	16	2	13	5	5	10	9	2	2	0	14	27	16	21	13
Honda Motors	11	16	10	6	13	15	8	10	6	2	0	4	20	14	23	9	15
Aisin	8	25	2	4	7	7	10	21	1	21	1	1	14	14	7	44	5
Honeywell	5	7	53	45	0	35	37	21	0	0	1	1	4	0	3	5	1
Fuji Heavy Ind	20	2	3	2	14	13	3	8	10	0	0	0	21	36	37	6	18
Nissan Motor	5	11	5	0	14	1	3	9	8	4	0	0	25	41	37	11	7
Continental AG	14	16	19	3	15	5	9	2	8	4	0	2	9	14	16	9	4
American Vehicular Sciences LLC	0	3	23	0	11	1	0	1	0	0	1	1	4	4	8	3	12
Volkswagen	10	3	18	1	16	1	3	8	3	2	0	0	13	8	10	8	4
Panasonic	4	5	3	5	7	2	4	13	1	3	0	0	0	2	0	24	5
Hitachi	10	7	6	1	10	6	8	10	6	1	0	1	10	17	20	6	2
Google	5	1	26	13	2	1	1	5	5	0	0	0	9	9	11	4	1
Valeo	9	14	8	2	6	2	1	6	6	8	1	0	5	1	3	11	1
General Motors	10	6	18	7	11	2	3	8	10	1	5	2	11	8	7	7	6
BMW	7	6	1	2	10	0	2	3	1	1	1	2	3	4	3	5	2
Ford Motor	4	1	10	0	11	1	0	6	1	1	2	0	15	16	11	4	7
Siemens	3	7	12	2	0	0	4	2	0	0	0	4	0	1	1	3	1
Fujitsu	5	6	0	3	2	2	4	4	0	2	0	0	1	2	3	12	1
Ricoh	9	1	2	0	1	6	7	1	0	1	0	0	2	0	1	0	0
Boeing	4	3	4	3	0	3	1	1	0	0	0	2	0	0	1	4	0
Magna	5	1	1	0	4	1	3	15	6	0	3	2	6	4	4	10	3
Audi	4	3	6	0	2	1	2	1	2	1	0	0	2	3	5	2	1
Mitsubishi	3	2	4	3	2	2	1	5	0	2	0	0	2	8	3	7	3

1. Object Detection in bad weather

There has been considerable research in this field. However, detection of obstacles in heavy rains, snowy roads, and wet road surfaces is still considered very complex.

Some research papers on this topic:

- Paper Title: Stix-Fusion: A Probabilistic Stixel Integration Technique

Affiliations: Daimler

Source:

http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=6816819&queryText=autonomous+driving+bad+weather&refinements%5B%5D=&ranges%5B%5D=2002_2014_Year&sortType=desc_p_Publication_Year&searchField=Search_All

- Paper Title: Weather detection in vehicles by means of camera and LIDAR systems

Affiliations: Objective Software GmbH, Fern University, Auckland University

Source:

<http://www.engineeringvillage.com/search/doc/abstract.url?&pageType=quickSearch&searchtype=Quick&SEARCHID=f22aec43M0a4fM4c98Mbec0M6ec228a89d71&DOCINDEX=9&database=135&format=quickSearchAbstractFormat&tagscope=&displayPagination=yes>

Opportunity for Research:
Medium

2. Object-type Recognition in 3D scenes

There are many research papers and patents that discuss recognition of obstacles (two wheelers and 4 wheelers, pedestrians and mail boxes). However, research is still needed to further differentiate between specific type of obstacles, such as ambulances from other vehicles, normal pedestrians from a man with a wheelchair.

Some research papers on this topic:

- Paper Title: An approach to model-based 3-D recognition of vehicles in real time by machine vision

Affiliations: Bundeswehr University Munich

Source:

http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=407580&queryText=object+recognition+autonomous+vehicles+classification&newsearch=true&searchField=Search_All

Opportunity for Research:
High

Adopt

- Sensor Fusion for improved Accuracy

Improve

- Object Recognition in bad weather
- Object Detection for complex surface
- Identifying obstacles as permanently static, temporarily static, or moving

Compete

- Dense-depth Stereo Reconstruction

Create

- Gesture Recognition
- Recognition of Object types

Alignment

- Align IP strategy with the business unit's goals and technology focus

Analysis

- Value chain mapping
- Gap analysis
- Focus areas for idea generation

Innovation

- Innovation workshop
- Vet invention disclosures
- Increase filings

Drivers:

- Product road-map
- Offerings driven by consumer needs
- Offerings driven by competitors' offerings

Business/Marketing Strategy

Technology Solutions Strategy

Drivers:

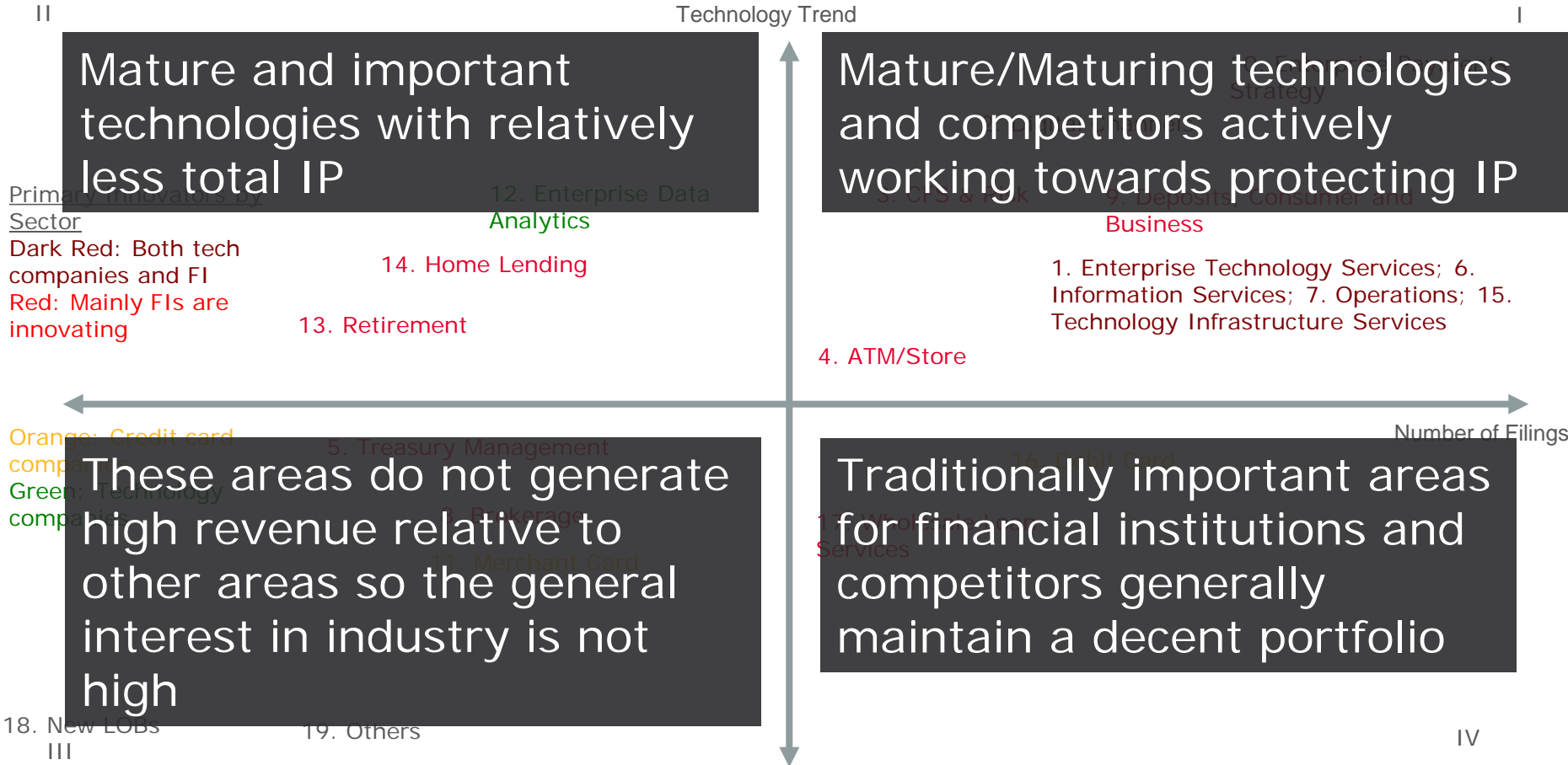
- Front office ↑
- Middle office ↑
- Back office? ↓

IP Strategy

Drivers:

- Posture with respect to competitors
- Long term monetization strategy

Filing Strategy



AMSO (RFC6252) US Patent Portfolio Coverage

Total (combined)		Covers 100%			
Disclosed		Covers 100%			
Claimed		Covers 50%			

No.	Patent #	Req. 1	Req. 2	Req. 3	Req. 4	Req. 5	Req. 6
1	US 20	Dark Blue			Blue		Dark Blue
2	US 20	Dark Blue		Blue	Blue		
3	US 20	Dark Blue		Blue	Blue		
4	US 20	Dark Blue		Blue	Blue		
5	US 20	Blue					Blue
6	US 20	Dark Blue	Dark Blue		Blue		Dark Blue
7	US 20						
8	US 20	Dark Blue	Blue	Blue	Blue	Blue	Blue
9	US 20	Blue	Blue	Blue	Blue	Blue	Blue
10	US 20	Blue	Blue	Blue	Blue	Blue	Blue
11	US 20	Blue	Blue	Blue	Blue	Blue	Blue
12	US 20	Dark Blue			Blue		
13	US 20						
14	US 20	Blue					
15	US 20	Dark Blue			Blue		Blue
16	US 13						

QUALITATIVE ANALYSIS: CISCO SYSTEMS

Corporate Profile

Name: Cisco Systems

Main Business: Network devices

Sales Scale : 46 billion USD

Threat Level : High

Summary of technology conflict

- ◆ Cisco appears to have 6 patents describing, but not claiming, an authentication protocol similar to PANA.
- ◆ Cisco appears to have 20 patents covering a shared key management system.
- ◆ Cisco appears to have 22 patents covering mobile node authentication.

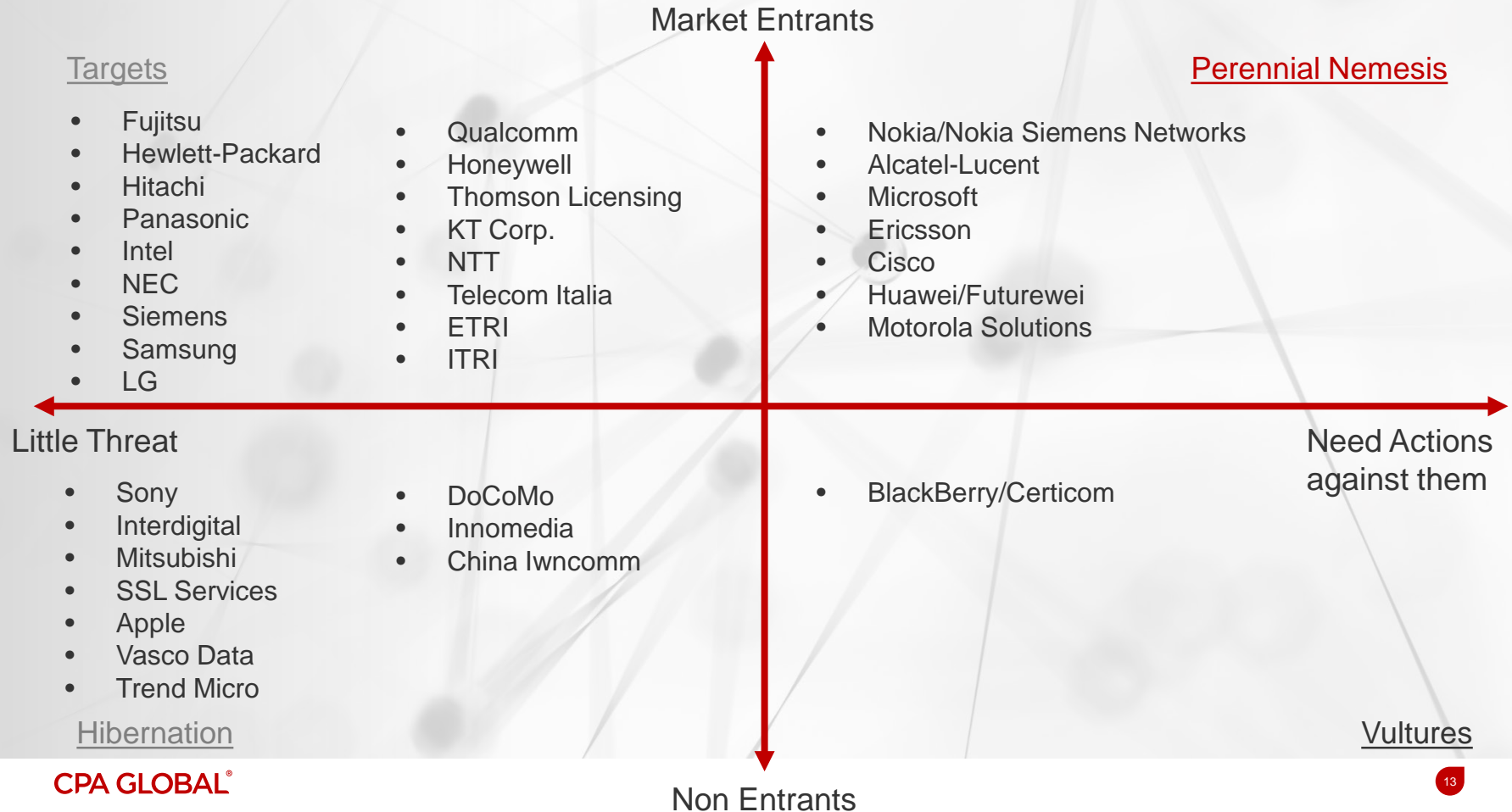
Recent Activity in the Market

- ◆ Cisco had launched a smart grid platform implemented with IPv-6 based communications architecture in corporate with Iron in 2012.
- ◆ Cisco designs the node authentication with a set of IEEE802.1x, EAP and RADIUS.
- ◆ Cisco Systems was assigned from RPX corporation US7246232 and US7403980.
- ◆ Cisco, along with Microsoft, appear to be establishing a smart grid operating system. which could potentially affect every part of the smart grid.

Possible Action of Client

- ◆ Like Microsoft, Cisco has experience shaping standards and integrating them into their products. Client may wish to monitor Cisco closely and stay alert to potential conflicts.
- ◆ Cisco also appears to be actively patenting authentication methods. Client should carefully monitor Cisco's patent filings.

HELPING YOUR CLIENTS WITH THEIR LICENSING STRATEGY





THANK YOU!