Collaboration in the Cloud

Collaboration in the Cloud

Chances Are, You're Already Using the Cloud

Consumers already use cloud-based services for music, storage, and social media

Business users are accessing applications like customer relationship management and other transactional applications

What is collaboration?

- Working together on an activity or project
- Types: Synchronous & Asynchronous
- Need same technological platforms
- Advantages

Collaboration in the Cloud

Collaboration Benefits

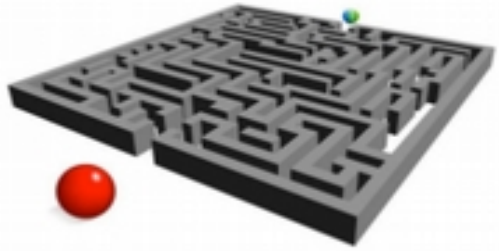
- Increases productivity and spurs innovation
- Improves business agility
- Allows users to connect with people any time, anywhere
- Helps your company to compete effectively and scale globally
- Gives employees the freedom to work in the ways that best meet their objectives and working styles
- Enables applications to be delivered rapidly and people to communicate and connect across corporate boundaries

Future Grid

Collaboration in the Cloud

Challenges of Cloud Collaboration

- Delivering collaboration tools to potentially thousands of global users simultaneously
- Poor audio or video quality
- Limited support for mobile devices
- Security



Collaboration in the Cloud

Evaluating Cloud Collaboration: 8 Areas to Consider

High Availability/Resilience

Scalability

Performance

Security

User Productivity

Offline Productivity

Investment Protection

Vendor Maturity and Vision

Collaboration in the Cloud

Availability & Performance

- High availability/resilience

  Multiple redundancy, account backup, ad hoc availability, IT operations

- Scalability

  Proven in operation, large meetings, global load balancing, efficient routing, core/edge separation

- Performance

  High-speed network, optimized switching, scalable video, minimized bandwidth use, local connection

Collaboration in the Cloud

Security & Productivity

- Security

  Multilayer security model, no realtime data is held, multi-tenant isolation, separation of duties, third-party audits

- User Productivity

  Intuitive interface, full mobile experience, choice of devices, enterprise social networking, minimal imposition on the user

- Offline Productivity

  Shared workspaces, recordings

Collaboration in the Cloud

Risk-free Choice

- Investment Protection

  Open standards support, Voice over IP, Office applications, low cost of entry

- Vendor Maturity and Vision

  A market-leading portfolio of communications and collaboration solutions designed for the new workspace

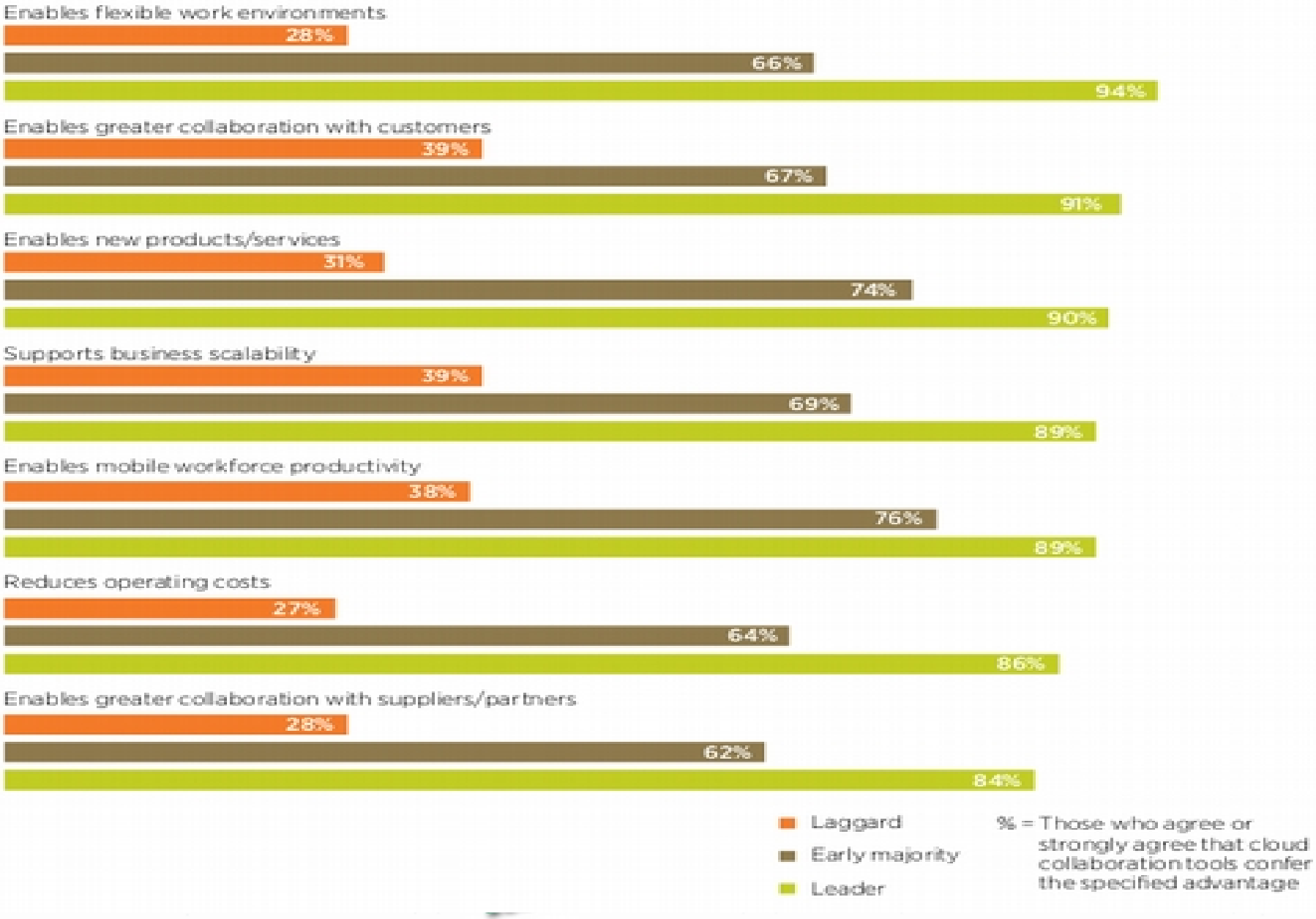
  A consistent productive end-user experience across multiple devices

  Sophisticated network-based protocols

  Integrated enterprise-class social infrastructure

  Proven integrations with Office suite for user productivity

Cloud-based collaboration



Contoh

	Total	Laggard	Late majority	Early majority	Fast follower	Leader
Enable meetings with remote participants' and virtual teams	48%	0%	26%	48%	68%	90%
Incorporate video into meetings	42%	0%	17%	38%	65%	89%
Enable remote workers with access to collaboration capabilities "as if in the office"	32%	0%	6%	22%	58%	89%
Create flexible work areas/ office space	39%	0%	17%	36%	56%	86%
Create internal communities and team workspaces	39%	0%	17%	37%	58%	82%
Collaborate with external organizations	33%	0%	15%	31%	53%	69%
Locate and access remote experts in real time	21%	0%	3%	13%	36%	65%
Enable any device ("bring your own device" or BYOD)	24%	0%	9%	20%	34%	63%

Who plays a role in influencing cloud collaboration decisions?

	Total	Laggard	Leader
Sales	39%	31%	58%
Marketing	37%	28%	57%
Operations/GM	40%	36%	54%
Manufacturing	34%	23%	54%
CFO	50%	46%	53%
Customer service	37%	31%	53%
HR	36%	30%	50%
Engineering/ development	36%	26%	49%
VP IT	36%	21%	49%
CEO	39%	41%	44%
CTO	36%	31%	40%
CIO	31%	16%	39%

Cloud Colloboration

- Use real-time commenting and messaging features to enhance speed of project delivery
- Leverage presence indicators to identify when others are active on documents owned by another person
- Allow users to set permissions and manage other users' activity profiles
- Allow users to set personal activity feeds and email alert profiles to keep abreast of latest activities per file or user
- Allow users to collaborate and share files with users outside the company firewall
- Comply with company security and compliance framework
- Ensure full auditability of files and documents shared within and outside the organization
- Reduce workarounds for sharing and collaboration on large files

A Mobile-Cloud Collaborative

Problem Statement

- Indoor and outdoor navigation is becoming a harder task for blind and visually impaired people in the increasingly complex urban world
- Advances in technology are causing the blind to fall behind, sometimes even putting their lives at risk
- Technology available for context-aware navigation of the blind is not sufficiently accessible; some devices rely heavily on infrastructural requirements

Demographics

- 314 million visually impaired people in the world today
- 45 million blind
- More than 82% of the visually impaired population is age 50 or older
- The old population forms a group with diverse range of abilities
- The disabled are seldom seen using the street alone or public transportation

Goals

- ***Make a difference***

  Bring mobile technology in the daily lives of blind and visually impaired people to help achieve a higher standard of life
- Take a major step in context-aware navigation of the blind and visually impaired
- Bridge the gap between the needs and available technology
- Guide users in a non-overwhelming way
- Protect user privacy

Challenges

- Real-time guidance
- Portability
- Power limitations
- Appropriate interface
- Privacy preservation
- Continuous availability
- No dependence on infrastructure
- Low-cost solution
- Minimal training

Discussions

- Cary Supalo: Founder of Independence Science LLC (http://www.independencescience.com/)
- T.V. Raman: Researcher at Google, leader of Eyes-Free project (speech enabled Android applications)
- American Council of the Blind of Indiana State Convention, 31 October 2009
- Miami Lighthouse Organization

Mobility Requirements

- Being able to avoid obstacles
- Walking in the right direction
- Safely crossing the road
- Knowing when you have reached a destination
- Knowing which is the right bus/train
- Knowing when to get off the bus/train

All require SIGHT as primary sense

Context-Aware Navigation Components

- Outdoor Navigation (finding curbs -including in snow, using public transportation, interpreting traffic patterns/signal lights…)
- Indoor Navigation (finding stairs/elevator, specific offices, restrooms in unfamiliar buildings, finding the cheapest TV at a store…)
- Obstacle Avoidance (both overhanging and low obstacles…)
- Object Recognition (being able to reach objects needed, recognizing people who are in the immediate neighborhood…)

Existing Blind Navigation Aids – Outdoor Navigation

- Loadstone GPS (http://www.loadstone-gps.com/)
- Wayfinder Access (http://www.wayfinderaccess.com/)
- BrailleNote GPS (www.humanware.com)
- Trekker (www.humanware.com)
- StreetTalk (www.freedomscientific.com)
- DRISHTI [1]

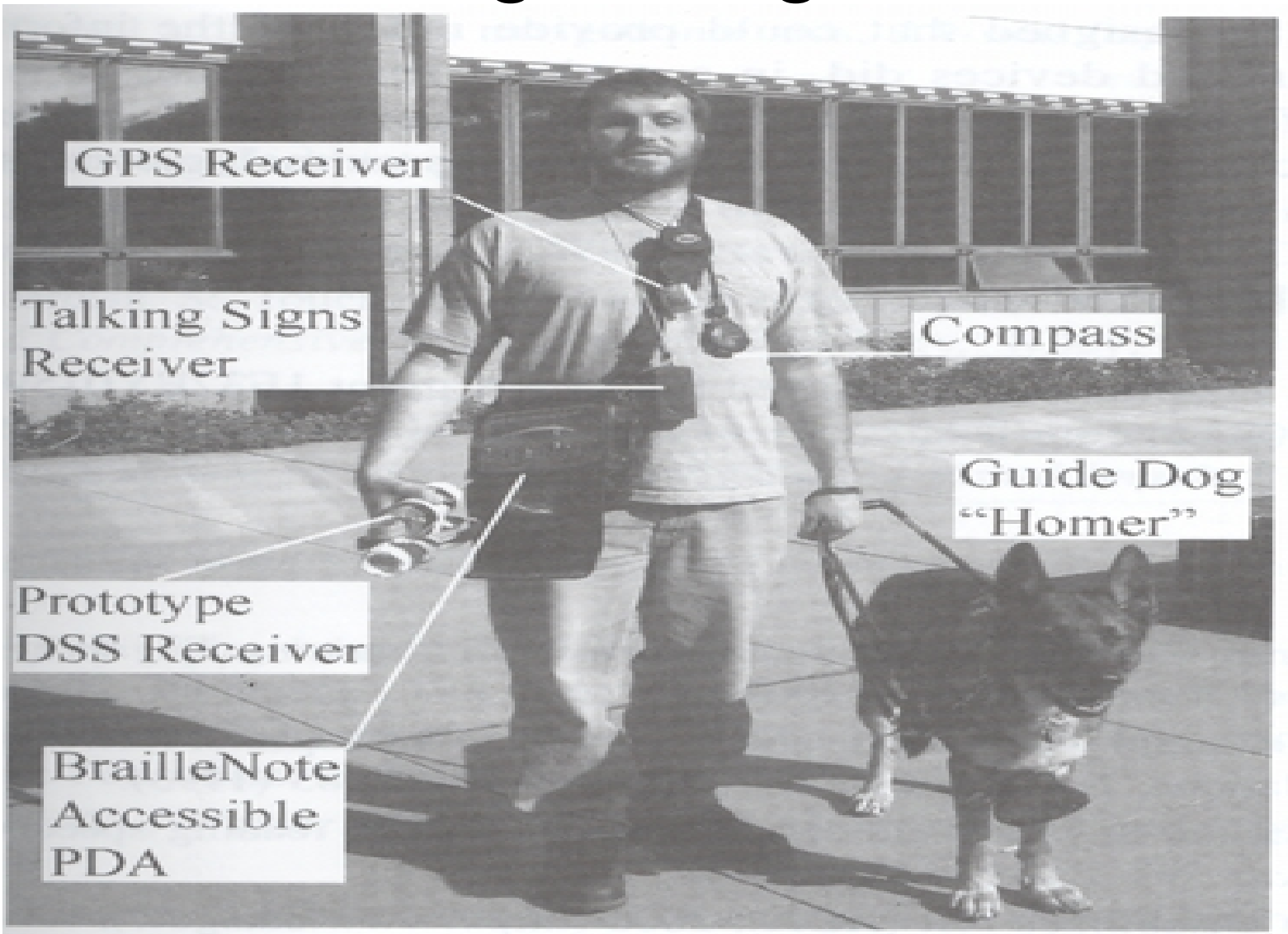
Existing Blind Navigation Aids – Indoor Navigation

- InfoGrid (based on RFID) [2]
- Jerusalem College of Technology system (based on local infrared beams) [3]
- Talking Signs (www.talkingsigns.com) (audio signals sent by invisible infrared light beams)
- SWAN (audio interface guiding user along path, announcing important features) [4]
- ShopTalk (for grocery shopping) [5]

Existing Blind Navigation Aids – Obstacle Avoidance

- RADAR/LIDAR
- Kay's Sonic glasses (audio for 3D representation of environment) (www.batforblind.co.nz)
- Sonic Pathfinder (www.sonicpathfinder.org) (notes of musical scale to warn of obstacles)
- MiniGuide (www.gdp-research.com.au/) (vibration to indicate object distance)
- VOICE (www.seeingwithsound.com) (images into sounds heard from 3D auditory display)
- Tactile tongue display [6]
- …

Putting all together…



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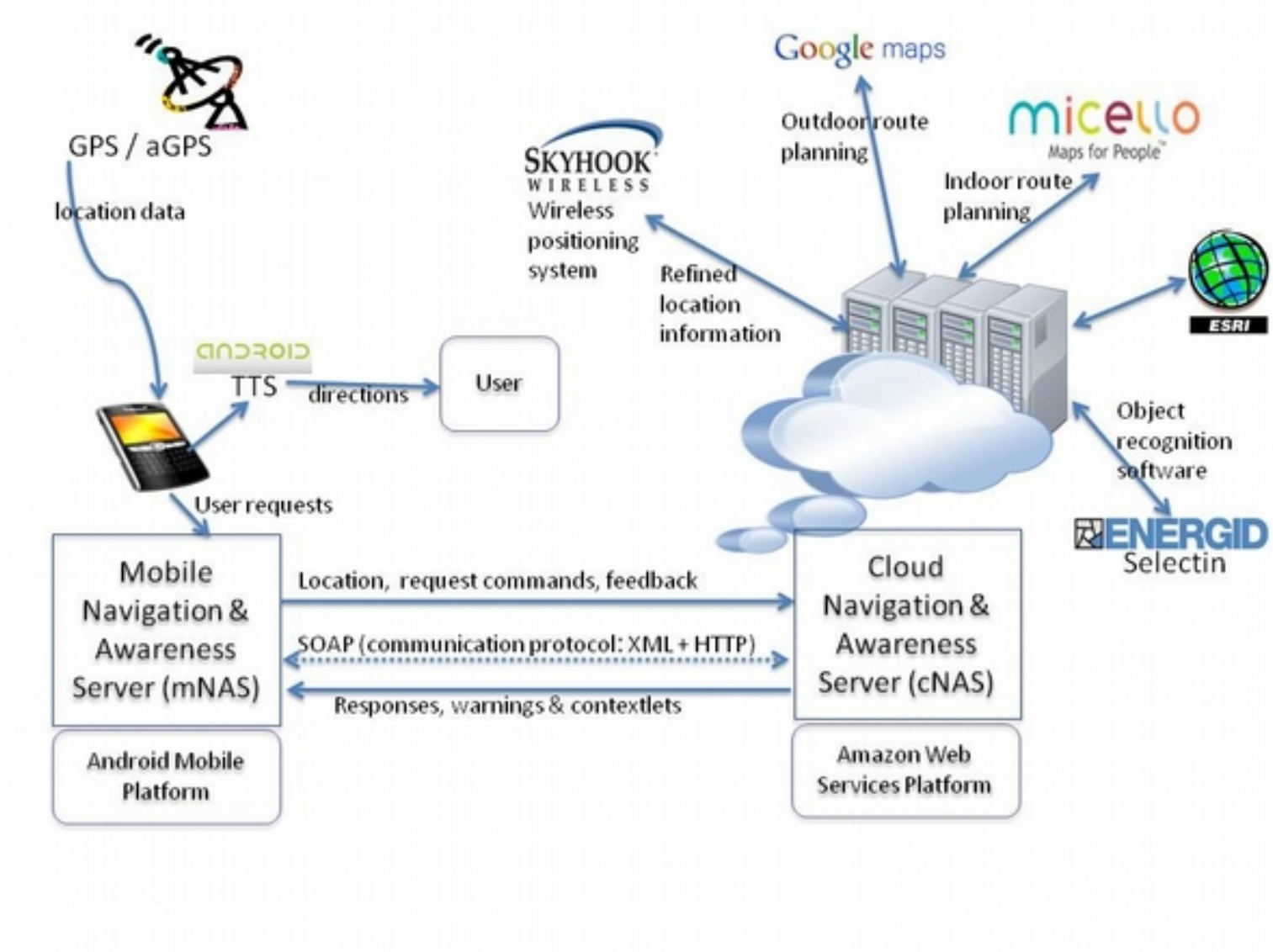
Proposed System Architecture

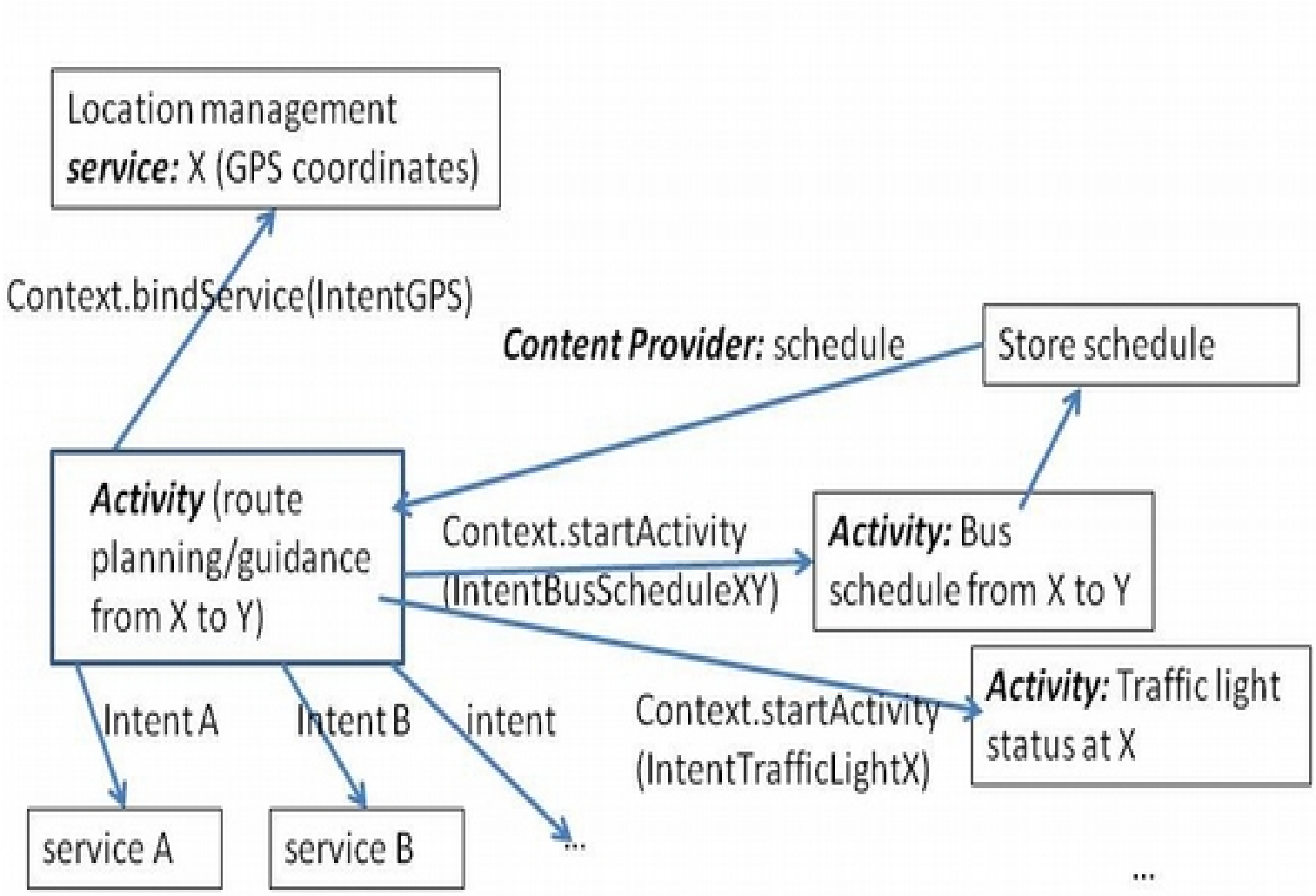


Proposed System Architecture

Services:

- Google Maps (outdoor navigation, pedestrian mode)
- Micello (indoor location-based service for mobile devices)
- Object recognition (Selectin software etc)
- Traffic assistance
- Obstacle avoidance (Time-of-flight camera technology)
- Speech interface (Android text-to-speech + speech recognition servers)
- Remote vision
- Obstacle minimized route planning

Use of the Android Platform



Advantages of a Mobile-Cloud Collaborative Approach

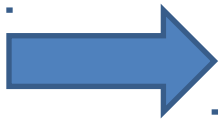
- Open architecture
- Extensibility
- Computational power
- Battery life
- Light weight
- Wealth of context-relevant information resources
- Interface options
- Minimal reliance on infrastructural requirements

Traffic Lights Status Detection Problem

- Ability to detect status of traffic lights accurately is an important aspect of safe navigation
  - Color blind
  - Autonomous ground vehicles
  - Careless drivers
- Inherent difficulty: Fast image processing required for locating and detecting the lights status → demanding in terms of computational resources
- Mobile devices with limited resources fall short alone

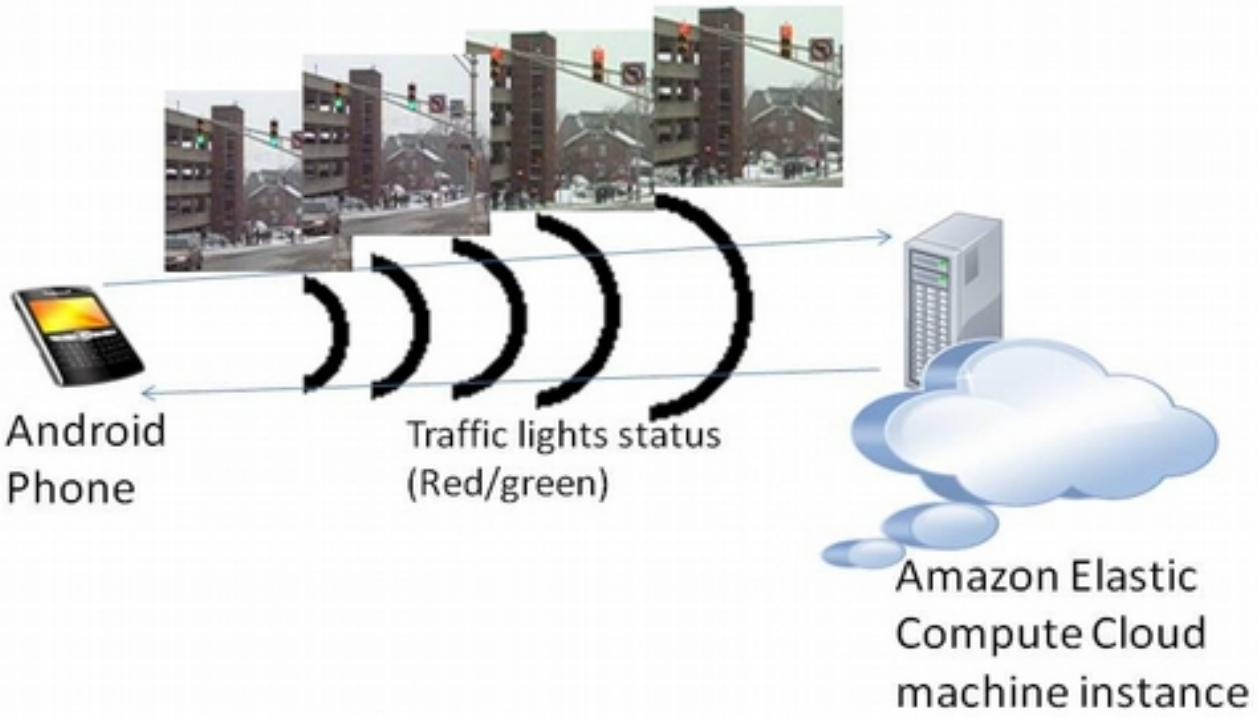
Attempts to Solve the Traffic Lights Detection Problem

- Kim et al: Digital camera + portable PC analyzing video frames captured by the camera [7]
- Charette et al: 2.9 GHz desktop computer to process video frames in real time[8]
- Ess et al: Detect generic moving objects with 400 ms video processing time on dual core 2.66 GHz computer[9]



Sacrifice portability for real-time, accurate detection

Mobile-Cloud Collaborative Traffic Lights Detector

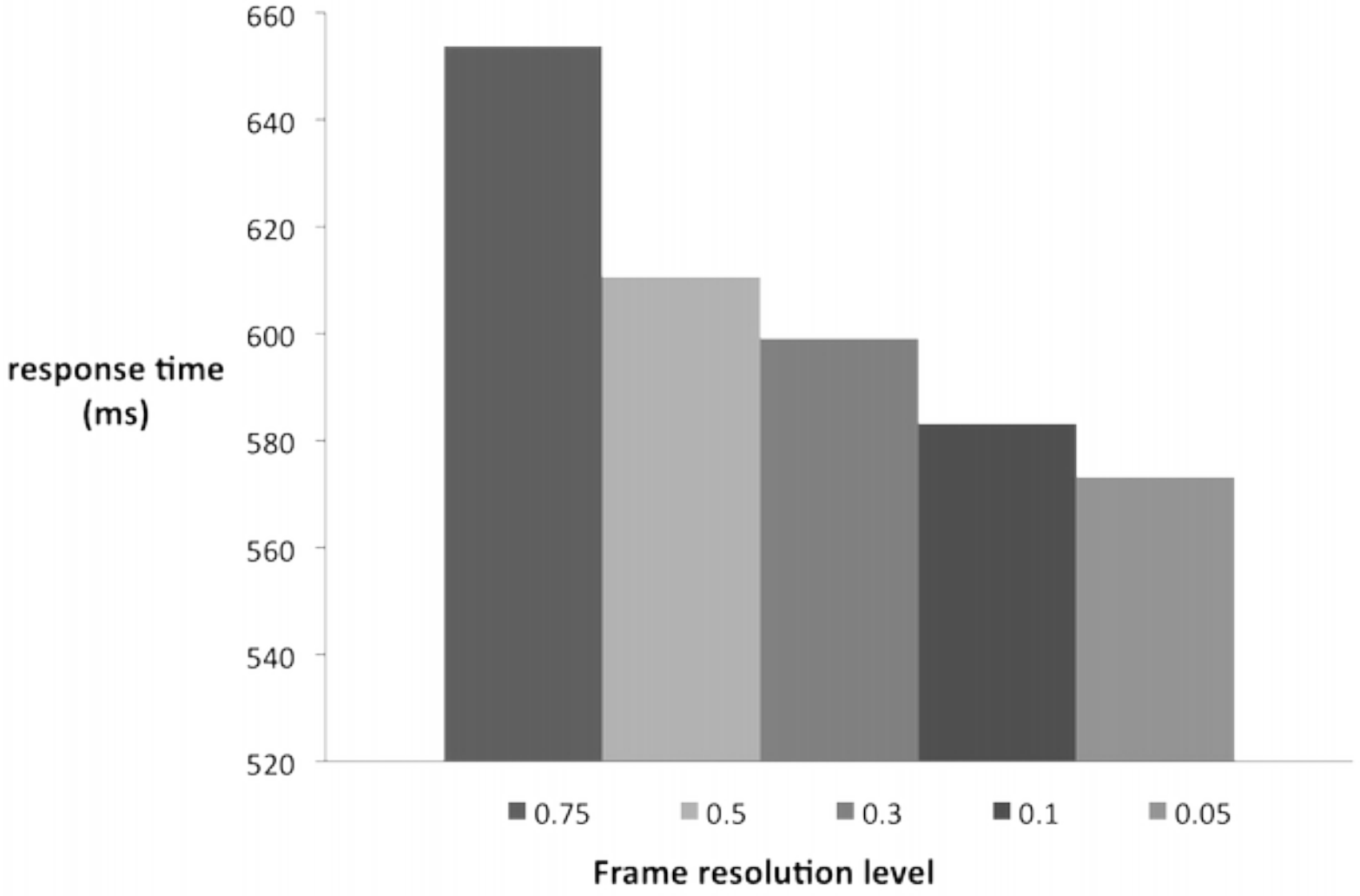


Adaboost Object Detector

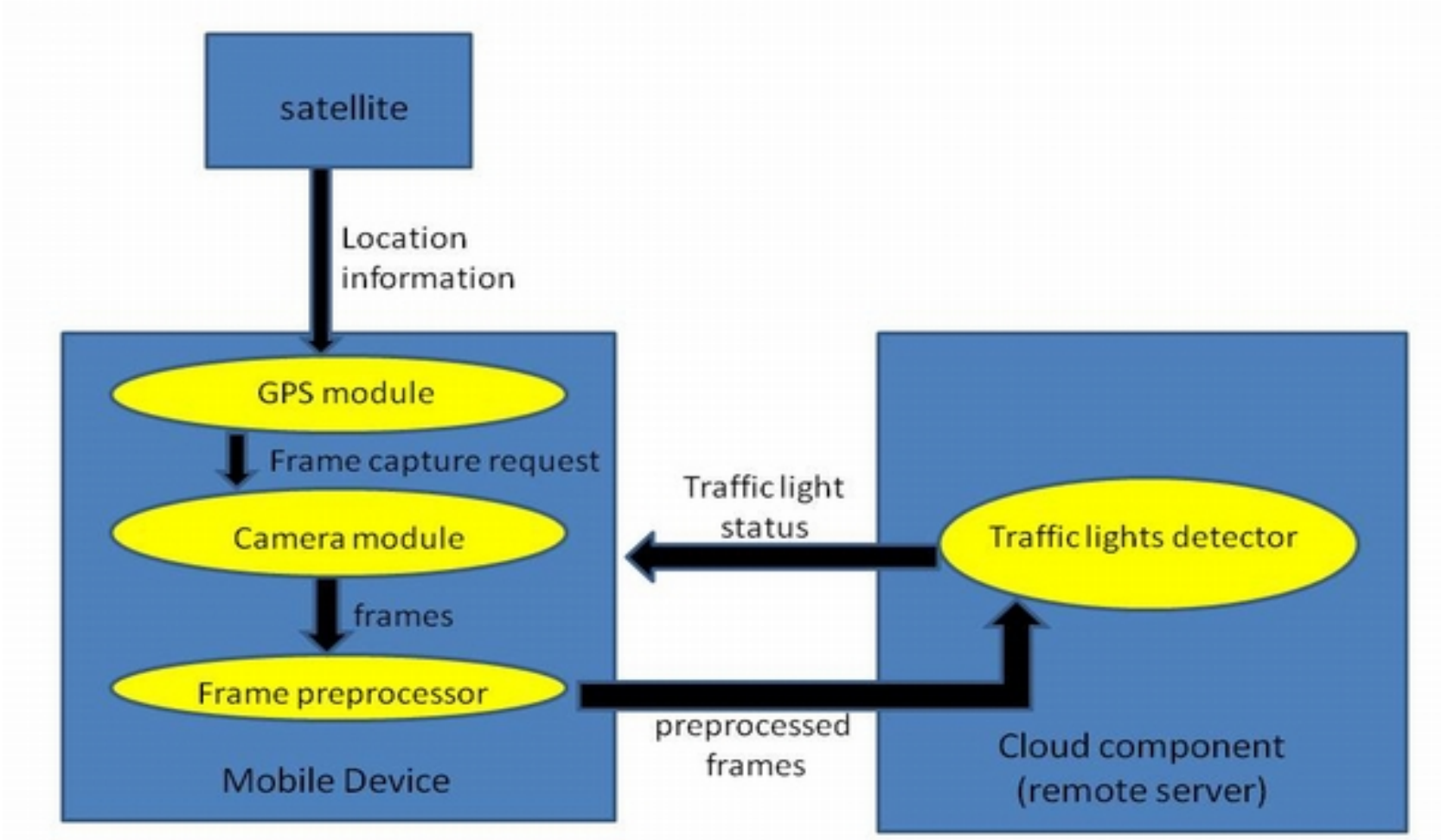
- Adaboost: Adaptive Machine Learning algorithm used commonly in real-time object recognition
- Based on rounds of calls to weak classifiers to focus more on incorrectly classified samples at each stage
- Traffic lights detector: trained on 219 images of traffic lights (Google Images)
- OpenCV library implementation

Experiments: Detector Output

Experiments: Response time



Enhanced Detection Schema



Work In Progress

- Develop fully context-aware navigation system with speech/tactile interface
- Develop robust object/obstacle recognition algorithms
- Investigate mobile-cloud privacy and security issues (minimal data disclosure principle) [10]
- Investigate options for mounting of the camera

Collective Object Classification in Complex Scenes

LabelMe Dataset
(http://labelme.csail.mit.edu)

Relational Learning with Multiple Boosted Detectors for Object Categorization

- Modeling relational dependencies between different object categories
- Multiple detectors running in parallel
- Class label fixing based on confidence
- More accurate classification than AdaBoost alone
- Higher recall than classic collective classification
- Minimal decrease in recall for different classes of objects

Object Classification Experiments

Object category/Model	Boosting Only	Full Joint Collective	Conf. ranked iterative
chair	0.43	0.19	0.25
lamp	0.33	1.00	0.45
table	0.13	0.23	0.19
monitor	0.33	0.97	0.47
keyboard	0.20	1.00	0.40
sink	0.19	0.95	0.36
bed	0.32	1.00	0.52
faucet	0.07	0.92	0.13
cupboard	0.19	0.75	0.32
mouse	0.12	0.89	0.30
plant	0.18	0.88	0.31
vase	0.04	0.00	0.05

Table 1: Precision values for different classification models.

Object category/Model	Boosting Only	Full Joint Collective	Conf. ranked iterative
chair	0.25	0.98	0.58
lamp	0.26	0.06	0.25
table	0.08	0.01	0.08
monitor	0.59	0.08	0.60
keyboard	0.33	0.08	0.38
sink	0.34	0.12	0.30
bed	0.58	0.12	0.51
faucet	0.17	0.05	0.13
cupboard	0.16	0.00	0.40
mouse	0.16	0.02	0.39
plant	0.21	0.04	0.17
vase	0.08	0.00	0.05

Table 2: Recall values for different classification models.

References

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8. R. Charette, and F. Nashashibi, “Real Time Visual Traffic Lights Recognition Based on Spot Light Detection and Adaptive Traffic Lights Templates,” World Congress and Exhibition on Intelligent Transport Systems and Services (ITS 09).
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Higher Education 2020

Computational Thinking

MOOC's are part of C4 Educational V

Modeling & Simulation

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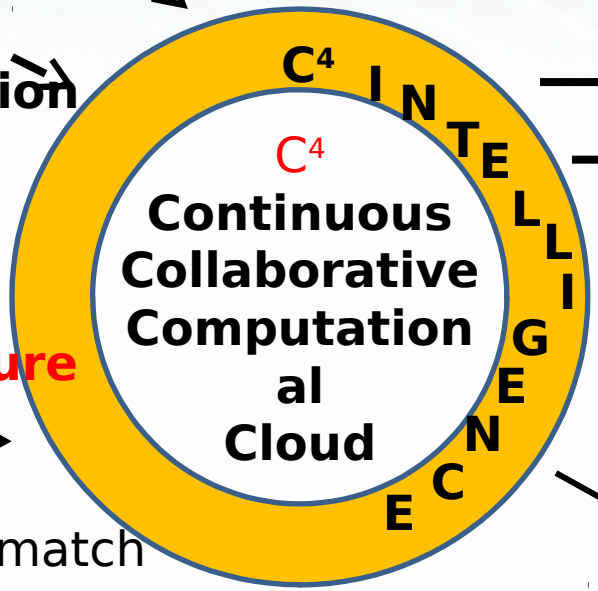

C⁴ Intelligent Society

C⁴ Intelligent Economy

C⁴ Intelligent People

NSF
Educate "Net Generation"
Re-educate pre "Net Generation"
in Science and Engineering
Exploiting and developing C⁴

CDESE is Computational and Data-enabled Science and Engineering

C⁴ Curricula, programs
C⁴ Experiences (delivery mechanism)
C⁴ REUs, Internships, Fellowships

Future Grid

A Cloud Computing Case Study

- Uses free social Web tools to provide professional and personal support to members

- Allows librarians to collaborate on projects

Collaboration 2.0 Tools

- What are they?
- Why do we need to know?

How many people use...

- Online Calendars
- Social Networking Sites
- Social Bookmarking Sites
- Wikis
- Document Sharing
- Blogs

Calendars

- What do they do?
- What should it have?
- Google Calendar, 30 Boxes

Social Networking Sites

- Can I really use Facebook at work and not get in trouble?
- Facebook, Ning, LinkedIn

Social Bookmarking Sites

- Bring your bookmarks any where you go!
- Delicious

Wikis

- Online web pages people can edit and modify
- Wikipedia, Pbwiki, RUasist Wiki

Documents

- Share and Collaborate on Documents, Spread Sheets, and Presentations
- Google Docs, Zoho Office

Blogs

- A communication tool with commenting and discussion components
- Wordpress

Benefits

- Distance
- Ability to work at either the same or different time as collaborators
- Inexpensive
- Can use multiple computers

How Collaboration Tools Are Used

- Blogs
- Wikis
- Training
- Social Networks

Groupware

- External Groupware
  - Grou.ps
- Internal Groupware
  - http://drupal.com