Automotive Middleware Support for Web 2.0 Data Transfers to User Interfaces via Nomadic Devices

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Introduction (1)

FGC1 FGC2

- User demand of in-car information keeps increasing.
  - High end vehicles have in-dash devices (...but they get easily outdated).
  - Too many portable devices!
- The information is alive:

  Maps, routes, music, news...

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FGC1 http://www.ce.org/Press/CurrentNews/press_release_detail.asp?id=11264
Felipe Gil Castiñeira; 2/17/2008

FGC2 http://www.esafetysupport.org/en/esafety_activities/esafety_working_groups/human-machine_interaction_hmi_.htm
Felipe Gil Castiñeira; 2/17/2008

Introduction (2)

- High-end cars "**always on**" solutions:
  - BMW Assist.
  - Mercedes Benz

    Search & Send

- Personal navigation devices require "**local**" connection.

  → uncomfortable

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ESOP Recommendations

HMI Guidelines

- Minimize interaction while driving.
- The device should be securely fitted
  - Embedded in the dashboard or…
  - “Permanently” attached to it.

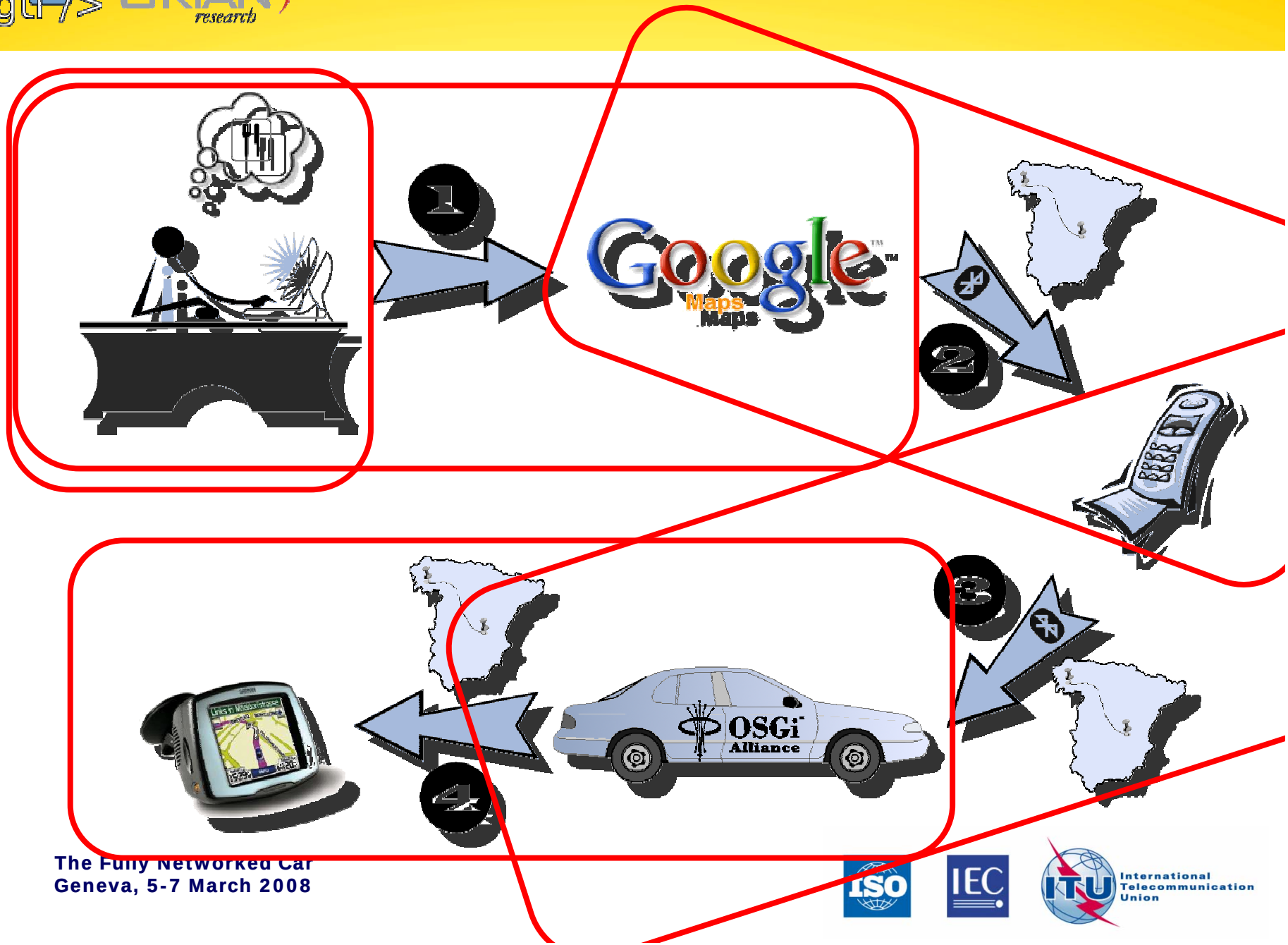
Unlikely to be removed to install new software or to add information.

Our proposal: *data transfer to the vehicle through a nomadic commercial device*

Our solution – navigation case

Problem		Solution
Entering routes in the navigator causes distraction.		The user prepares the route at home.
The navigation system is embedded in the vehicle dashboard.	The user cannot take it home.	Download the information from a remote site.
	The user cannot change the software.	OSGi (or other middleware) support in the device.
Cellular data transfers are expensive.		Mobile phone as an intermediary (nomadic device).

Information flow



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Key component I – OSGi

- OSGi: standardized, component-oriented platform for Java-based software.
  - Dynamic loading, versioning, and lifecycle management support for Java-based services → Middleware.
- Service-oriented programming model.
- Future vehicle API?.
  - New applications for car infotainment computers → Improved navigation software.

Key component II: Google Maps (1)

- GoogleMaps worldwide popularity. FGC3
  - Users are familiar with the interface. It can store personal routes or points.
  - And now… available in iPhone and Symbian devices.
- GoogleMaps offers:
  - Streets maps.
  - Business locator.
  - …and **driving directions**.
- Problem:
  - *Q:* How do we extract the directions from a GoogleMaps answer?

    A: GoogleMaps can return a KML answer with the route and its waypoints.

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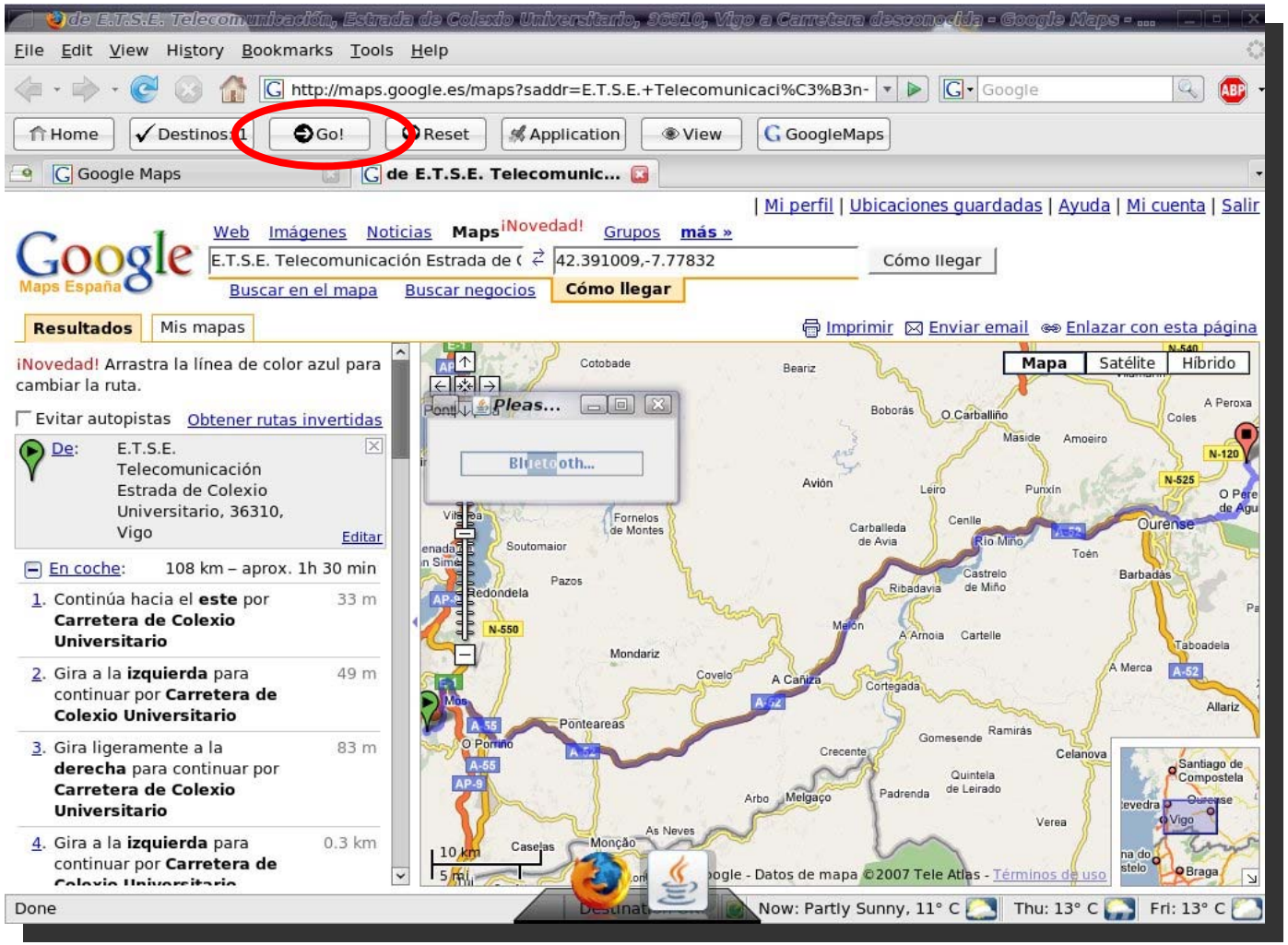
FGC3 http://weblogs.hitwise.com/us-heather-hopkins/2008/01/google_maps_making_inroads_aga.html

Felipe Gil Castiñeira; 2/18/2008

Key component II: GoogleMaps (2)



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Key component III: Firefox

- We need a Firefox extension (or an Explorer Plug-ing).
  - In order to know the user search.
  - In order to query GoogleMaps for the KML answer.
- The DOM tree contains the information we need:

  Id:“link” field.
- The plugin invokes an external Java application to send the data to a mobile phone via a Bluetooth connection.

Key component IV: Mobile phone

- The mobile phone acts as a mere intermediary:
  - Always there: “Part” of the user.
  - New features appear continuously:

    In a close future the mobile phone will “export” its display to the car.
- The route and its waypoints are stored in the phone.
  - Bluetooth and OBEX FTP.

Key component V: Embedded device

- Telematics research group (University of Vigo – Spain).

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  - OSGi-based remote diagnostics.
  - C2C and C2I communications.
  - Delay Tolerant Networs (DTN).
  - Embedded automotive telematics.

- Urian Research is a provider of client side solutions for Telco Operators and embedded systems for industrial solutions.
  http://www.urianresearch.com
  - IP Communications client systems.
  - Embedded systems.
  - Client provisioning systems.