



MindTree Limited

# Infotainment and Telematics for Automotive Segment

June'12



The MindTree Brand

Our Services

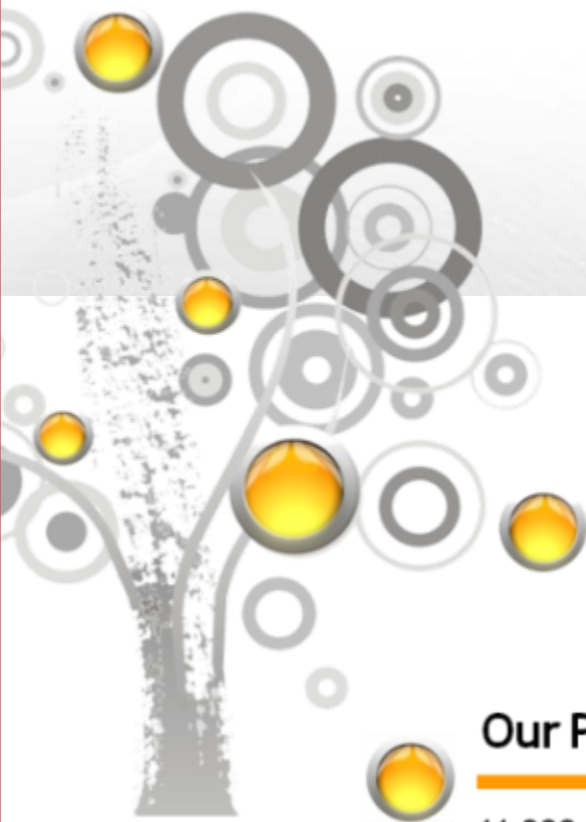
Automotive Infotainment and Telematics

MindTree Automotive IP

Success Stories

A Transformational Case Study

The MindTree Value Proposition



A stylized tree graphic on the left side of the slide. The trunk is a grey, textured vertical line. The branches are composed of various sized grey circles, some of which are filled with a yellow-to-orange gradient. The overall effect is a modern, abstract representation of a tree.

## **Our Growth**

FY 2012 - \$ 402.6M, 13 Straight Years Of Growth

## **Our Global Presence**

24 Offices. Revenue%: 57.3% U.S. / 27.7% Europe / 15% ROW

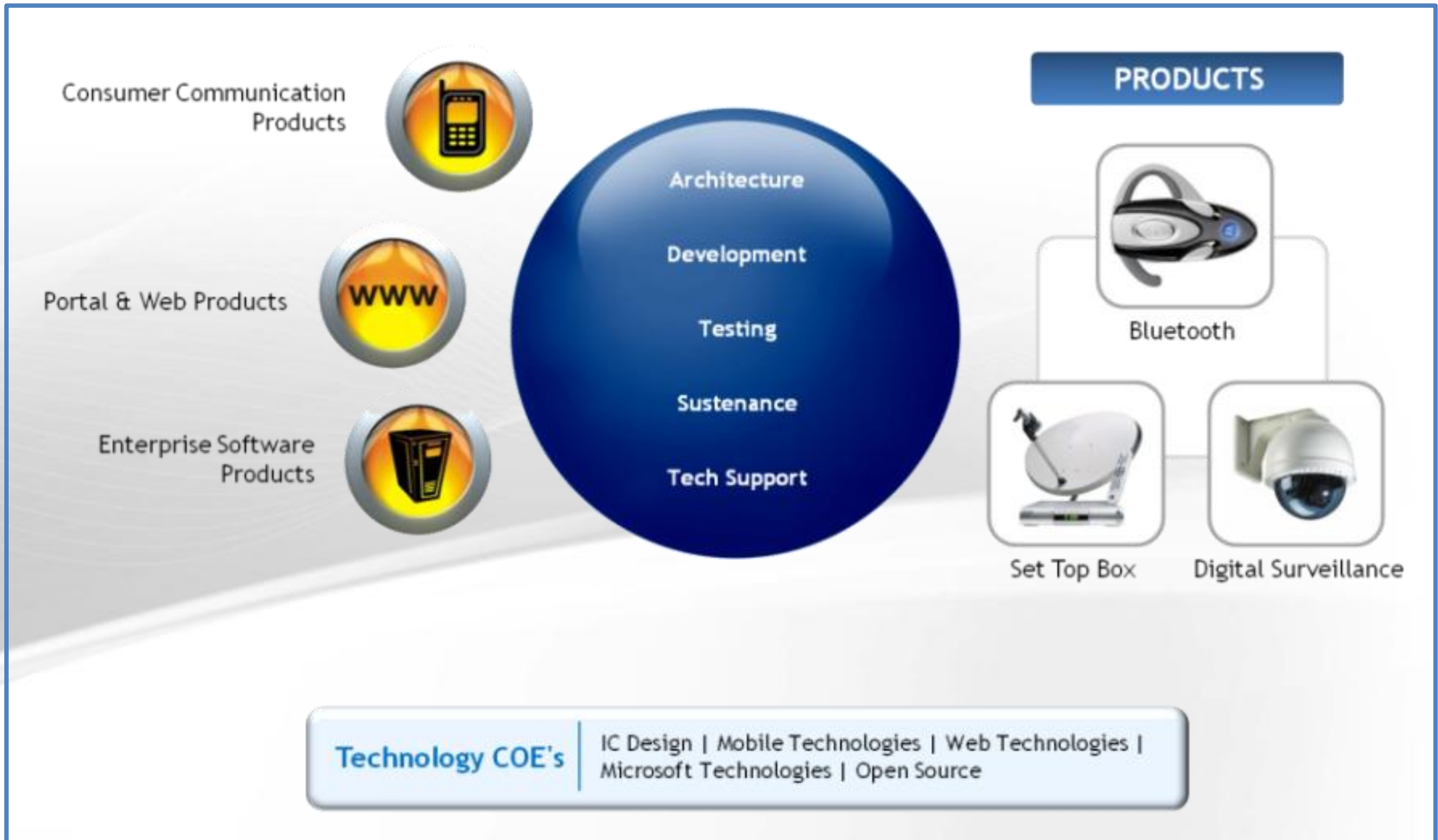
## **Our Customers**

237 Active Customers, including 37 Fortune 500 Companies

## **Our People**

11,000 MindTree Minds. High Satisfaction

# Our Focus Areas: Product Engineering Services



# Our Customers





delivering **PREDICTABLE QUALITY** through **INDEPENDENT TESTING**

## Testing Size & Focus

- Dedicated service with 2300+ test practitioners
- Contributes 25% of the MindTree's global revenues
- Services ranging from quality consulting to managed test services

## Excellence in Service Delivery

- Pillars of excellence - MindTest™, TestLabs, and TestingAcademy
- Domain, technology and process centric testing
- Best of breed test accelerators, point solutions & frameworks

## Quality & Cost Leadership

- Innovative business and engagement models
- Predictable cost models
- MindTest™- Integrated methodology for test quality management

## Thought Leadership

- Part of ISO working group in defining new testing standard - ISO / IEC 29119
- Industry -academia relationships to promote testing as a curriculum

Recognized as a Quality Vendor with offerings in "Test Consulting, TCoE, and Quality Management" by Forrester Research Inc.



## Harnessing the Power of Data

### Analytics

- Predictive Modeling
- KPI Identification
- Exploratory Data Analysis
- Trend Analysis
- Scenario Prototyping

### Business Intelligence

- Advanced Visualization
- Static Reports
- Dashboards
- Package BI Implementations
- BI Centers-of-Excellence

### Information Management

- Data Strategy
- Master Data Management
- Enterprise Data Warehouse
- Data Modeling & Architecture
- Data Cleansing

### Research

- Data Mining
- Information Monetization
- Business Research
- Market Intelligence



## Providing Business Insights



## Infrastructure Management and Technical Support Services

| Consulting Services   | Implementation Services  | Managed Services  | Security Services   | Technical Support  |
|---|--|---|---|--|
| <ul style="list-style-type: none"><li>• Infrastructure Optimization</li><li>• Assessment and Design</li><li>• DC Design and Managed Hosting</li></ul> | <ul style="list-style-type: none"><li>• Migrations and Upgrade (Microsoft Platform)</li><li>• Managed Hosting Services</li></ul> | <ul style="list-style-type: none"><li>• Service Level Driven</li><li>• 24 x 7 Service Support</li><li>• ISO 20000 and ISO 27001 Certified</li><li>• Across Technology Domains</li></ul> | <ul style="list-style-type: none"><li>• Governance, Risk and Compliance</li><li>• Vulnerability and Threat Management</li><li>• Managed Security Services</li></ul> | <ul style="list-style-type: none"><li>• Tiered Support</li><li>• L1/ L2 Enterprise Product Support</li><li>• Managed Proactive Services</li><li>• Multi-Channel Delivery</li></ul> |



Shared Services Delivery

MWatch - Integrated IT Infrastructure Management Platform





## TECHNOLOGIES

### Platforms

- Android
- iOS
- Win Mobile
- Blackberry
- J2ME
- MEAP & MCAP
- HTML 5.x

### Devices

- Smartphones
- Consumer & Industrial Mobile Internet devices

## PEOPLE

**400** member team experienced in:

- Mobile Strategy
- User Experience
- Device design
- Architecture
- Development
- Application & Device Testing
- Integration
- Project & Product Management

## INDUSTRY FOCUS

Domain knowledge and technology solutions for:

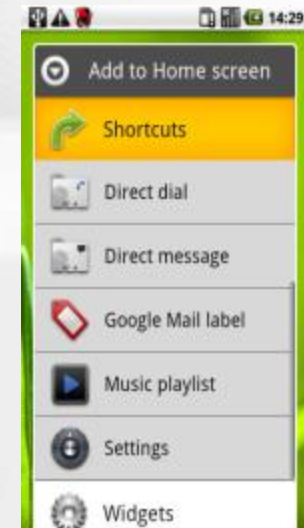
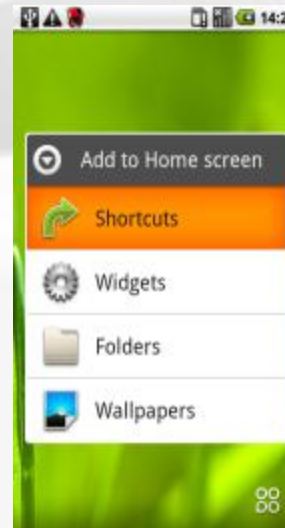
- Smartphone & Consumer device manufacturers
- Independent Software Vendors (ISVs)
- Manufacturing & CPG
- Banking, Insurance & Financial Services
- Travel, Media & Retail Industry

## PARTNERSHIPS

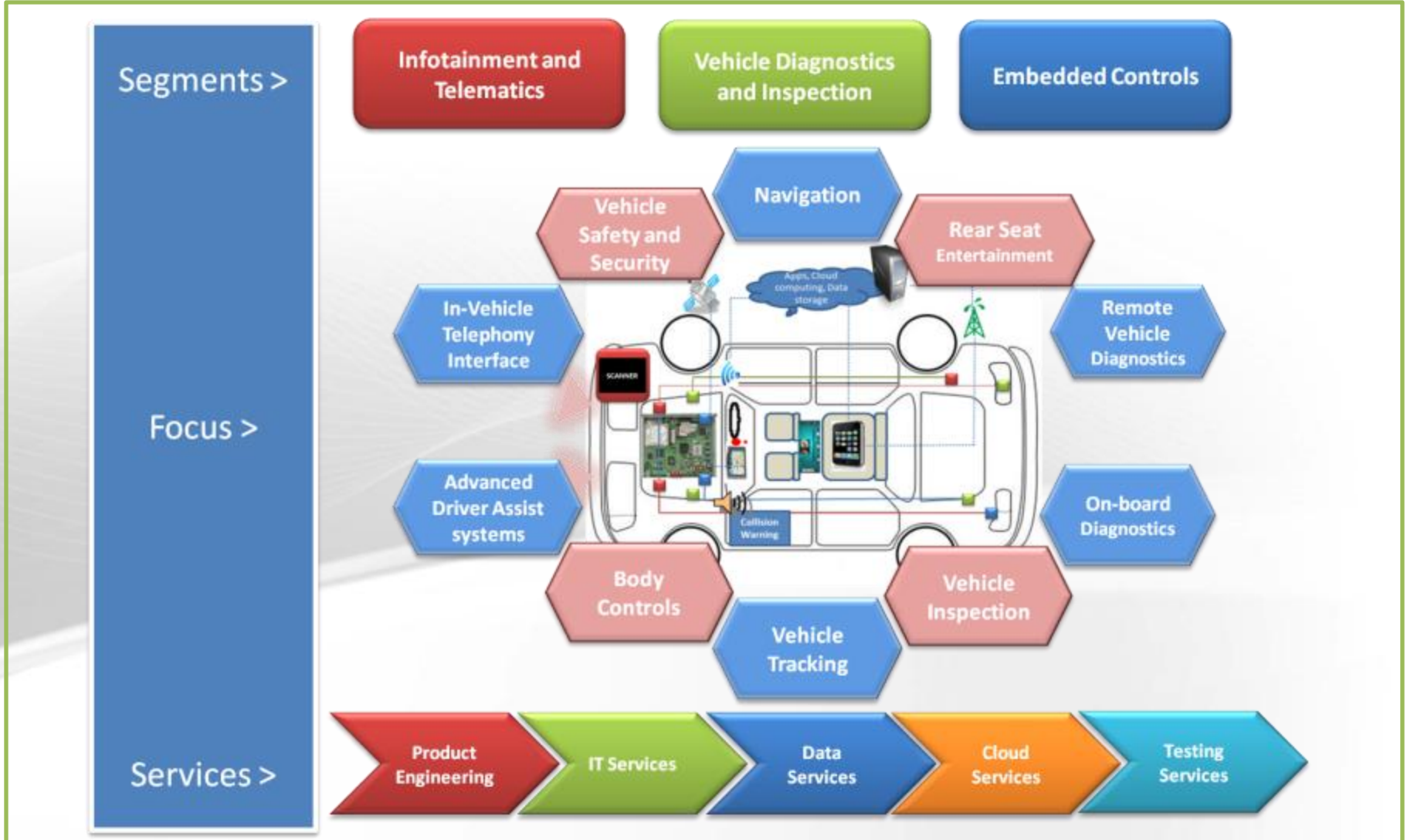
Partners for Solutions & Services:

- Quofore
- Sybase (SAP)
- Microsoft
- IBM
- Oracle
- ARM
- OMAP
- Bluetooth

**We deliver innovative mobile computing solutions and scalable services over mobile technologies**



# Automotive Segment Focus



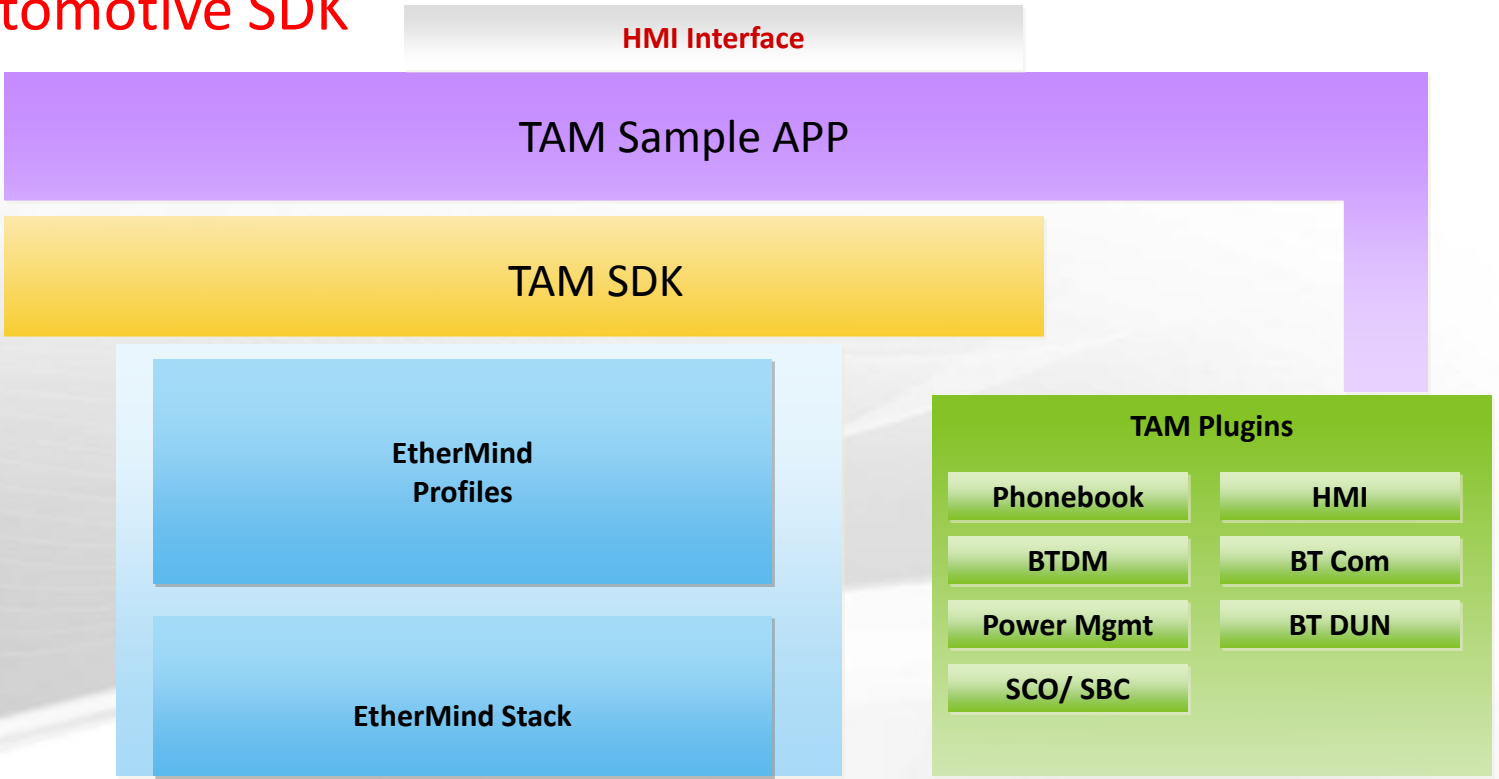


|                                   |   |
|-----------------------------------|---|
|                                   |   |
| <b>Application Domains</b>        | Obstacle detection, Onboard Diagnostics, Navigation, Automotive Vision, Human Detection, Pattern recognition, OCR                   |
| <b>Standards and Technologies</b> | GPS, CAN, LIN, K-Line, Bluetooth, UWB, Wi-Fi, GSM/GPRS, On-board Diagnostic Protocols (J1708, J1850, KWP 2000, VPW, PWM)            |
| <b>Driver Expertise</b>           | Sensors, Actuators USB, Ethernet, MMC/SD/SDIO, I2C, RTC, WLAN, Keypad, SPI, uWIRE, LCD, Flash, Communication drivers                |
| <b>Operating Systems</b>          | Linux, SMX, OSEK, VDK, ultron, uCOS-II, WinCE, VxWorks, Nucleus, eCos   |
| <b>Platforms</b>                  | ARM7, ARM9, XSCALE, Blackfin, OMAP, 8051  |
| <b>Tools</b>                      | LabVIEW 7.1, TestStand 3.1, LabCAR, INCA, APCI SDT, J1587Nav, CANalyzer Pro 5.1, CANcase XL, Rational Clear Quest, MATLAB, Simulink |



GUI

## Automotive SDK



Platform Abstraction    BT\_OS    BT\_file\_ops    HCI Transport    Hardware    Debug

Platform    OS    File System    UART / USB    Codecs    File / UART



## ● Electrical tests

- Functional test (including RF TX/RX Tests) - Four Corner Test
- Performance test (2G, 3G, 4G, WLAN, BT, GPS)
- Temp/Humidity cycling & Thermal shock
- Salt spray

## ● Mechanical Reliability

- Drop test
- Vibration
- Dust ingress
- Cosmetic and labeling
- Special purpose stress test, pull test
- Jigs development for special tests

## ● Antenna Test Facility

- Antenna gain measurement
- Radiation pattern measurement
- TRP/TIS measurement
- SAR test antenna tuning

## ● Audio Test Facility

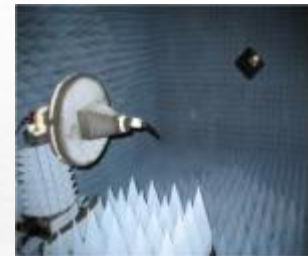
- Gain & frequency response
- Sensitivity, Noise Analysis
- Directivity

## ● Wireless Test Facility

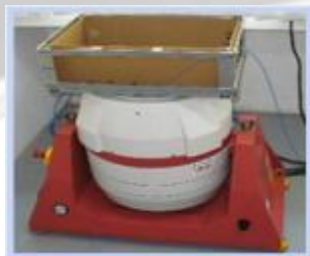
- Product level test for 2G, 3G communication
- Bluetooth pre-qualification
- GPS simulation and testing
- Battery Test-Standby time/ talktime, Gauging test



Audio Test System



Anechoic Chamber



Vibration Chamber



Thermal Shock Chamber



Temp Humidity Chamber



Salt Fog Chamber



RF Chamber



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# SOME SUCCESS STORIES



- Vehicle Tracking and Remote Diagnostic in a single solution
- Design and development of hardware, Onboard Unit (OBU) software, and server-side software
- Onboard Unit (OBU) software porting and device driver development
- Development of on-board telematics applications
- System testing, standard compliance testing, field trials, and production support







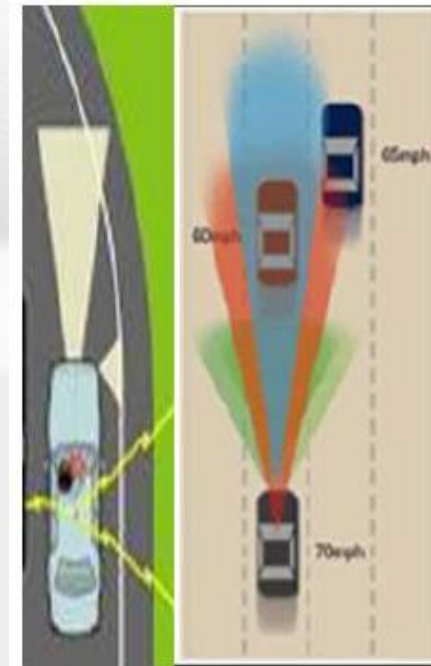
- Complete system design of Truck/Trailer display unit
- Client: US-based Tier-1 HVAC Manufacturer
- High reliability expectations
- Common design for 3 types of displays with different Key/LCD combinations
- Design for Manufacturability for global sourcing
- Stringent cost requirements (<40\$ for 25000 pieces/year)





- Sonar-based Obstacle Detection System
- Client: Japanese Automotive OEM
- Multiple Sonar transceivers with individual signal processing using TI DSP
- CAN Interface
- Configurable via Labview front-end application
- In-house algorithm for detecting distance and velocity of the object in view
  - Within 10 meters vicinity

## Vehicle Obstacle Detection





- Customer: A leading PND manufacturer who wanted Bluetooth connectivity for one of their new product lines
- MindTree Bluetooth IPs were Licensed
  - EtherMind stack and host of profiles ported onto the customer's platform
    - SBC, A2DP, AVRCP, OPP, FTP, OPP, PBAP, SPP
  - Support for pre-qualification of the products
  - First product to be certified by BQB



- Full form-factor portable infotainment unit
- End-to-end design by MindTree
- Memory
  - 128 MB SDRAM, 4MB Flash, 20GB HDD
- Audio
  - On-Board Microphone & Speaker (0.8W)
  - Stereo Line-In/Line-Out and headphone support
  - FM Receiver
  - MS Janus DRM10 compliance
- Video
  - Composite Video In, Out
- User Interface
  - Landscape LCD, QVGA, On-Board 16-keypad, Touch PAD
  - IR Receiver (Remote Control)
- Additional Interfaces
  - USB OTG, GPS, Debug (COM), JTAG, SD Card, Compact Flash

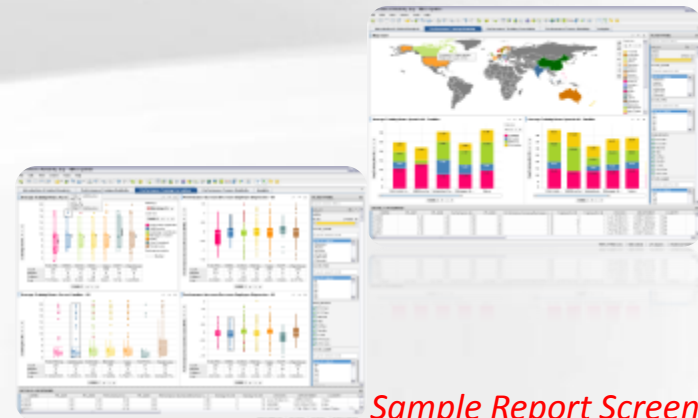
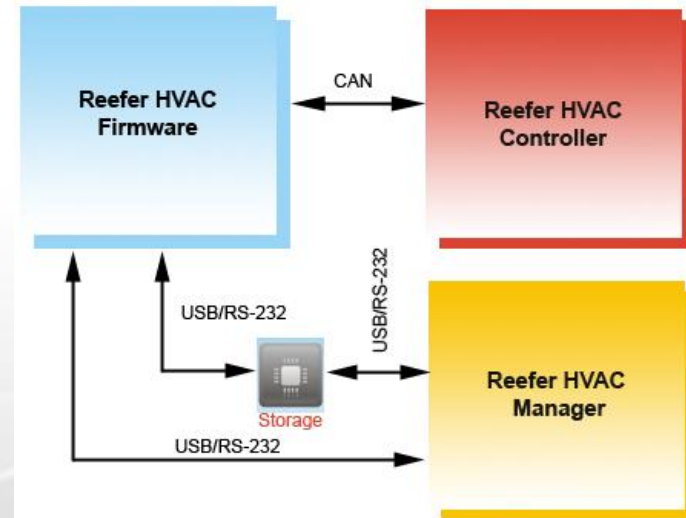


# Applications - Telematics Vehicle Locator





- Monitoring and Diagnostic software for heating/cooling units in Trucks and Trailers
- Client: US-based Tier-1 HVAC Manufacturer
- More than 100 sensors and over 500 configuration parameters supported
- Interface with GPS, GSM/GPRS/CDMA for remote data processing
- Alarm and event management
- Graphical data reporting



Sample Report Screenshots



- Customer
  - A leading US-based manufacturer of mobile communication products
- Objective
  - To develop applications for a GPS navigational device with a 5-inch LCD screen
- MindTree's contribution
  - To port their existing GPS application available on 3.5-inch LCD device onto a new 5-inch LCD device
  - GUI design and development for GPS Navigation application for the new device
  - Design and development of new features
  - Field testing at client location
- Project highlights
  - First GPS navigational device with 5 inch LCD screen
  - Development of product quality user interface compliant to branding guidelines





## ACCOUNT BACKGROUND

- The customer is a leading manufacturer of automotive navigation systems, including both stand-alone units and software for PDAs and mobile telephones
- Customer wanted to engage independent test vendor to achieve high quality and quicker release of new products

## SOLUTION

- MindTree established secure test lab with connectivity to customer's Application, data Servers
- Retain and manage Customer's product knowledge and improve current test processes acquired during the engagement
- Ecommerce and Location Based Services Testing

## CHALLENGES

- Ability to do comprehensive in-house testing
- No Standardized test process and methodologies followed across the projects
- Limited or no metrics to assess the quality of the application and effectiveness of testing
- Absence of knowledge management mechanisms resulting in dependency on people

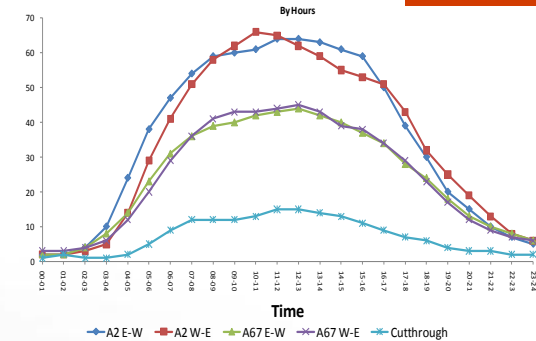
## BUSINESS IMPACT/REALIZED BENEFITS

- Better quality and reliability of releases at faster refresh frequency
- Centralized testing model bringing people and infrastructure into a shared services function
- Common repository for all project artifacts with defined workflows meeting the business needs
- Metrics driven test management
- Predictable quality of deliverables
- Central knowledge management repository for speedy ramp up of team





|                              |  |  |
|------------------------------|--|--|
| <b>Client Challenges</b>     | <ul style="list-style-type: none"> <li>● Better Client Segmentation (Beyond Size &amp; SIC Code)</li> <li>● Aligning Service Models to Customer Segments</li> <li>● Drive Growth &amp; Ability to Cross-sell &amp; Up-sell</li> </ul>  |  |
| <b>Technique &amp; Tools</b> | <ul style="list-style-type: none"> <li>● Customer Definition Through Process Flow Mapping</li> <li>● Customer Segmentation Using Cluster Analysis</li> <li>● Customer Sentiment Analysis Using Text Mining</li> </ul>  | <ul style="list-style-type: none"> <li>● Analyzed over 120 Million Customer Records &amp; Profiles</li> <li>● Analyzed over 110 Million Customer Service Rep Comments</li> </ul> |
| <b>Business Impact</b>       | <ul style="list-style-type: none"> <li>● 360 Degree View-of-the-Customer</li> <li>● Defined Customer Segments Which Will Drive New Product, Pricing, &amp; Service Strategies</li> <li>● Insight Into Customer Sentiment of Brand, Products, &amp; Service</li> <li>● Identified Cross-sell &amp; Up-sell Areas</li> </ul> |  |



|                               |   |  |
|-------------------------------|---|--|
| <b>Client Challenges</b>      | <ul style="list-style-type: none"> <li>● The client is a large GPS provider with dominance in the European market</li> <li>● Need to monetize car data, traffic patterns, etc</li> <li>● Identifying the congestion correlations</li> </ul>   |  |
| <b>Techniques &amp; Tools</b> | <ul style="list-style-type: none"> <li>● Traffic and congestion analysis</li> <li>● Traveler type analysis</li> <li>● Bottleneck analysis</li> </ul>  | <ul style="list-style-type: none"> <li>● Hypothesis testing using chi-square test</li> <li>● Co-relation analysis</li> <li>● Analyzed over 133 million floating car records</li> </ul> |
| <b>Business Impact</b>        | <ul style="list-style-type: none"> <li>● Source traffic of congestion was identified</li> <li>● Key bottlenecks for infrastructural changes were identified</li> <li>● Developed traveler type and origin-destination grid to understand traffic patterns</li> <li>● Created traffic fluctuation charts based on day, time and holiday/non-holiday</li> </ul> |  |



## Client

- The client is one of the world's leading supplier of location & navigation products
- The client needed **Service Delivery Platform** for LBS , Live Services & e-Commerce
- In addition, client required **complete feature, functional & performance testing** of PND

## Engagement

- Experience of working with Services Delivery, Client Technology, Consumer & Automotive Business units
- Development and QA of e-Commerce platforms
- Location Based Services – Route Planning, Geo-coding
- Live Services – Traffic updates, road condition, device information systems
- Development support & Integration of Android Applications
- Complete testing services from test planning, test cases generation to test automation
- Multi layer testing - complete technical, functional & performance testing
- Testing over multiple platforms like Linux and Android, Test Automation



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# A TRANSFORMATIONAL CASE STUDY



One of the well-known brands in the PND industry

In the business for the last two decades



Huge portfolio of products in the space

Revenues in excess of 1B USD



Business Situation: Declining sales of PND, pressure on margins and increasingly fierce competition over the last few years...



Mobile phones were eroding their core market; lack of in house expertise to deal with these new technologies



In-house engineering processes and tools were insufficient to meet the demands of the rapidly changing market



Lack of expertise to scientifically analyze and monetize data related to sales, promotions, demand and competition



Seasonal impacts of PND business was hurting them; they needed support to get into "services" model

MindTree was chosen to partner with this Customer to support them in their transition from a pure-play device company to a service-oriented business



- Active contributions to the design and architectural decisions for the customer's Service Delivery Platform
- Development and QA of software platforms for service delivery
  - Business-critical backend systems that manage and serve content items to subscribers (eg: latest maps)
- Creation of new services on top of the platform, for eg:
  - Location Based Services:
    - **Route planning:** To plan the best possible route
    - **Geo-coding:** Service to find the location based on the coordinates
    - **Reverse Geo-coding:** Service to find the location based on name
  - Live Services:
    - **Services Live Information:** Traffic updates, weather info , safety cams, etc.
    - **Device Information System:** Tracking and managing all the PND devices
    - **Replay Traffic Data:** Historic traffic information



- Engineering support, tools and frameworks to complement the Customer's development and QA teams
  - Test Automation suite to test the Customer's APIs covering areas such as Bluetooth, Audio and Multimedia framework
  - Development of solution for Continuous Integration (CI) of Android Applications
  - Testing applications built for Mobile phone such as iPhones and Android based smart phones
  - Development and QA of Android based location based search application for PND Devices
  - Enhancement of iPhone location based search application
  - Development of Online self provisioning platform
  - Android application development
  - Device Management and Testing
  - Development of User interface on a Windows CE based system
  - Verification of applications on Head Units
  - Platform customization and Third Party Application Verification



**Mobility...**



**Testing...**





**Data Analytics**

- Our DAS (Data Analytics Services) Expertise helped the customer in analyzing and monetizing data collated over a period of time, such as:
  - Traffic and Congestion Analysis
  - Traveler Type Analysis
  - Bottleneck Analysis
  - Hypothesis Testing using chi-square test
  - Co-relation Analysis
- The business benefits of our DAS services included
  - Customer Segmentation
  - Behavior & Sentiment Analysis
  - Loyalty Analysis
  - Price Elasticity
  - Promotions Effectiveness
  - Spend Analytics



**Information Monetization**



**Customer Analysis**



- Truly win-win relationship
- Grown over the last 3 years to a team strength of more than 200 engineers



- Excellent senior management connect between the two companies
- Sponsorship, Commitment and Involvement at executive level



- Experience and Knowledge on customer processes, technologies and domain
- Customer benefiting immensely from the processes and tools used in MindTree for enhanced productivity



- Part of the Core Team of Customer, contributing to architectural decisions
- Ownership of several critical deliverables for the customer



*“It was (a) pleasant (experience) to work together with MindTree folks. They have a good understanding of the tools and the processes it needs to support. They are flexible and adapted well to our working culture. They have an eye for quality...”*

**- Team Manager (Engineering and Support)**



**“I want to thank the <.....> Team for all the hard work they have put in, testing and validating our builds. Their persistence in quality and the great effort has reduced the calls to Customer Care and the NoC. Your hard work has ensured that we are providing a pleasant experience to more customers – internal and external...”**

**- Head (Testing)**



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# WHY MINDTREE

# Industry Recognition



**'Leading Mid-Size Provider'**  
Everest Research Institute



**2011 Global Services Neo Advisory 100 List for ITO and PES**

WORLD FINANCE

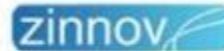
**Best Corporate Governance, India, 2012**" by World Finance magazine



**'Best Among Tier II'**  
Dataquest Top 50



**'MindTree: A Community of Communities'**  
HBR Case Study



**Zinnov Top 5 Global R&D Service Providers 2010 and 2011**









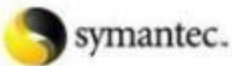

**Ranked #2**  
within IT Services  
Top 25 Best Employers in India



**'Winner 2011'**  
Asian Most Admired  
**Knowledge Enterprise Award**  
for Fourth Consecutive Year

# A Proven Track Record With Global Enterprises



| Client  | Age Of Relationship | What We Do For Them   |
|---|---------------------|---|
|    | 12 years            | App Dev, Maintenance & Independent Testing, Business Process Management |
|    | 11 years            | Product Dev, Independent Testing, Infrastructure Mgmt                   |
|    | 11 years            | App Dev & Maintenance   |
|    | 10 years            | Embedded Software & App Dev, Hardware Dev, Product Engineering          |
|    | 10 years            | App Dev, Maintenance, Mainframe, System Integration                     |
|   | 8 years             | App Dev & Maintenance, Package Implementation, Independent Testing      |
|  | 8 years             | Product Dev & Support, Independent Testing                              |
|  | 7 years             | App Dev & Maintenance, Infrastructure Management                        |

# A Proven Track Record With Global Enterprises



| Client   | Age Of Relationship | What We Do For Them  |
|--|---------------------|--|
|                   | 7 years             | Product Dev, Independent Testing, Tech Support                                     |
|  TEXAS INSTRUMENTS | 7 years             | VLSI and Software  |
|                   | 6 years             | Product Development, Independent Testing, Maintenance                              |
|                   | 6 years             | App Dev, Maintenance & Independent Testing, System Integration                     |
|                    | 6 years             | App Dev, Maintenance & Testing   |
|                 | 5 years             | Consulting, App Dev & Maintenance, System Integration, Business Process Management |
|                 | 2 years             | Product Dev & Testing, Independent Testing   |



- Solution Accelerators driving each phase of life cycle
  - Less grounds-up activities and hence faster Time to Market
- Constant emphasis on reducing costs at every phase of operation
- A bouquet of services to augment and expedite your process of innovation
- Good understanding of the idea-to-sales lifecycle of Infotainment solutions and ability to add value at each stage
- Flexible business models to suite your budgets
- Good familiarity with the standards and technologies driving the Infotainment segment





**Our Mission**

**Successful Customers**

**Happy People**

**Innovative Solutions**

[www.mindtree.com](http://www.mindtree.com)