

Wernher von Braun
centro de pesquisas avançadas

SMART CITY, INTERNET OF EVERYTHING and INTELLIGENT TRANSPORTATION

IOT BRAZIL

IPD-Eletron / ABINEE APR.14

IoT is the next Big Thing

Vodafone's *M2M Barometer 2013* reveals that 12% of businesses in the target markets have already started deploying M2M and 51% expect to deploy within the next two years. According to Telefónica, customers have moved from “hundreds of M2M lines to millions of lines”, while Deutsche Telekom also noted that it is beginning to integrate M2M units in “high volumes” (*From concept to delivery: the M2M market today*, GSMA, Feb 2014)

VISIONS FROM THE INDUSTRY

“The vision of more than 50 billion connected devices will see profound changes in the way people, businesses and society interact”. – Ericsson

“By 2022, there will be 1.8 billion automotive M2M connections ... generating a staggering \$422 billion” – Telefonica

“Today, more than 95 per cent of information in the industrial world is [unseen] or not even stored ... open the door to a variety of benefits for the industrial economy allowing us to remove \$150bn in waste” – Bill Ruth, Vice-President, GE Software and Analytics

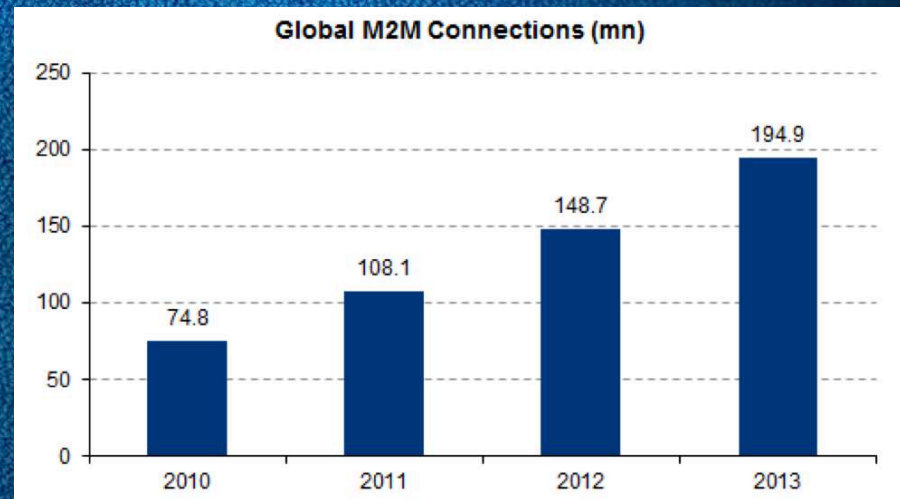
“We in the telecom industry believe M2M is going to surprise the investor community by growing leaps and bounds” – Idea Cellular

“Residential smart meters alone will increase the data processed for billing purposes from 12 meter reads per year to 35,000” – Oracle

SIZING UP THE MARKET

According to GSMA, global M2M connections reached 195mn in 2013, growing at almost 38% annually between 2010 and 2013. GSMA's definition involves only SIM-based connections and excludes consumer devices such as e-readers.

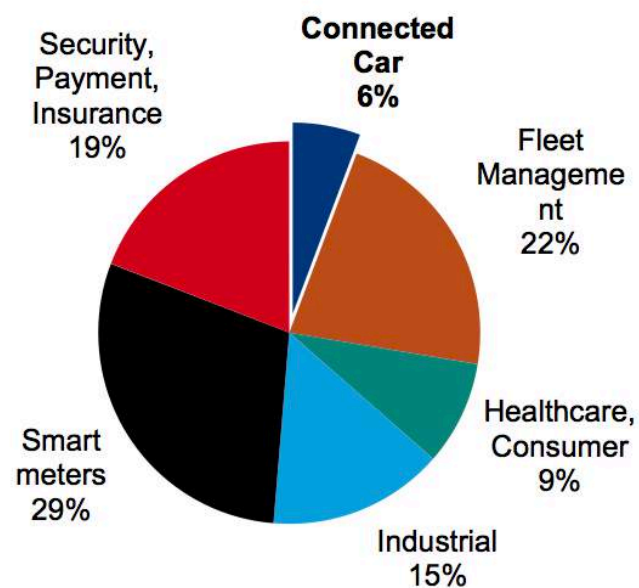
Asia is the largest regional M2M market, accounting for 42% of global M2M connections, followed by Europe (28%), North America (18%), Latin America (8%), Africa (4%) and Oceania (1%).



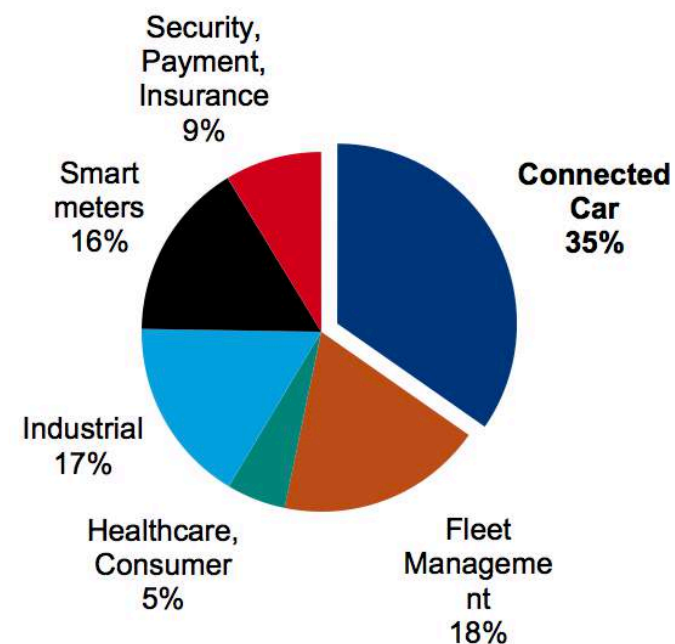
The size of the M2M market is nearly \$10bn globally (as of 2013), of which roughly \$5bn represents revenue to mobile operators

Source: GSMA

SIZING UP THE MARKET



Connectivity revenue by application: 2012



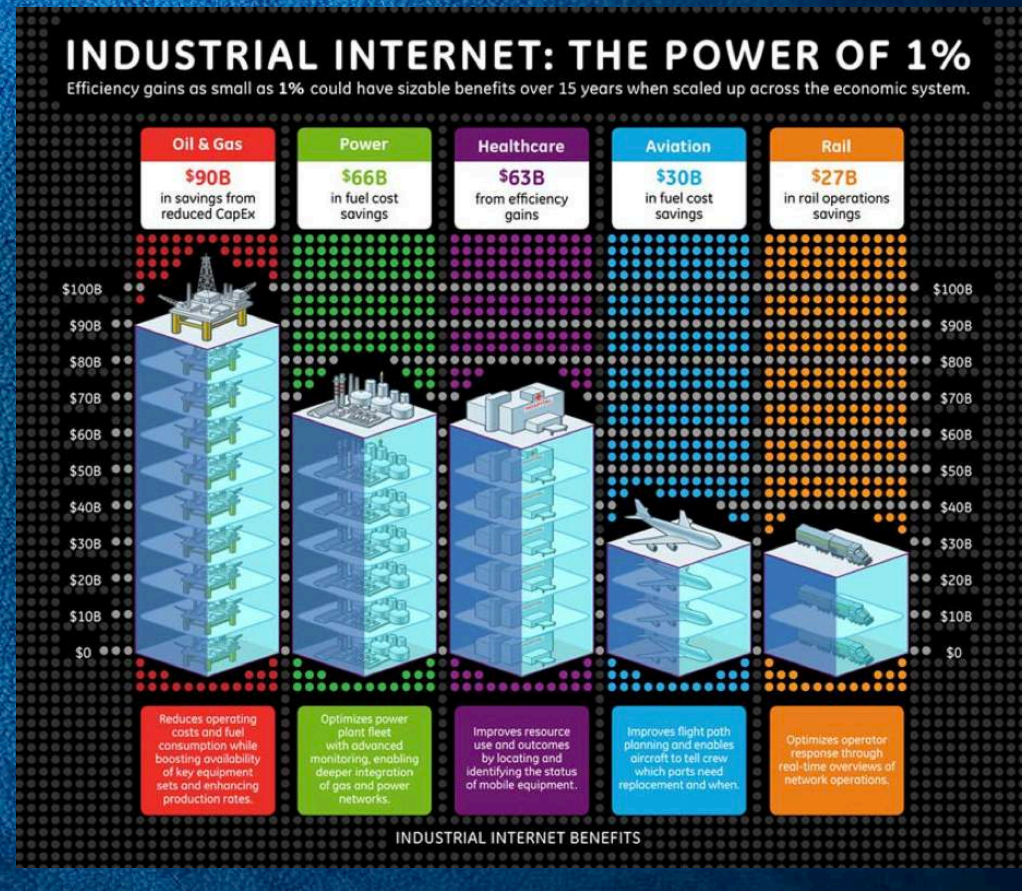
Connectivity revenue by application: 2018

Source: Berg Insight, BofAML Global Research

SIZING UP THE MARKET

Industrial machines such as elevators, fuel pumps, jet engines and industrial parts are increasingly equipped with communication devices to allow tracking and remote monitoring. Technological solutions enable exchange of information between machine sensors and process controllers. One of the sizable benefits of this is cost reduction through predictive maintenance and just-in-time servicing.

SOURCE: GE



SIZING UP THE MARKET

Company	Country	Operator	Description
ABB Robotics	Global	Wyless	Global remote monitoring of robots
Atlas Copco	Global	Vodafone	Monitor compressed air products across global sites for R&D and support teams
East Richland County	USA	KORE	Waste water monitoring
General Electric	Global	AT&T	Remotely track, monitor, record and operate machines
Hitachi Construction Machinery	Global	Telenor	Track and monitor its vehicles
Ice Energy	USA	AT&T	Data on status and performance of energy storage units
Nespresso	Global	Orange	SIMs embedded in B2B coffee machines with worldwide remote machine diagnostics
Phoenix Contact	Germany	Vodafone, T-Mobile, O2	Remote monitoring
Sensile	Global	Swisscom	40,000 fuel tanks across 42 countries
ThyssenKrupp	Global	Vodafone	50,000 M2M cards for monitoring of elevators and emergency intercom systems
Volkswagen	Germany	Vodafone	Supply chain logistics and production

Source: BofAML Global Research, company websites, press reports

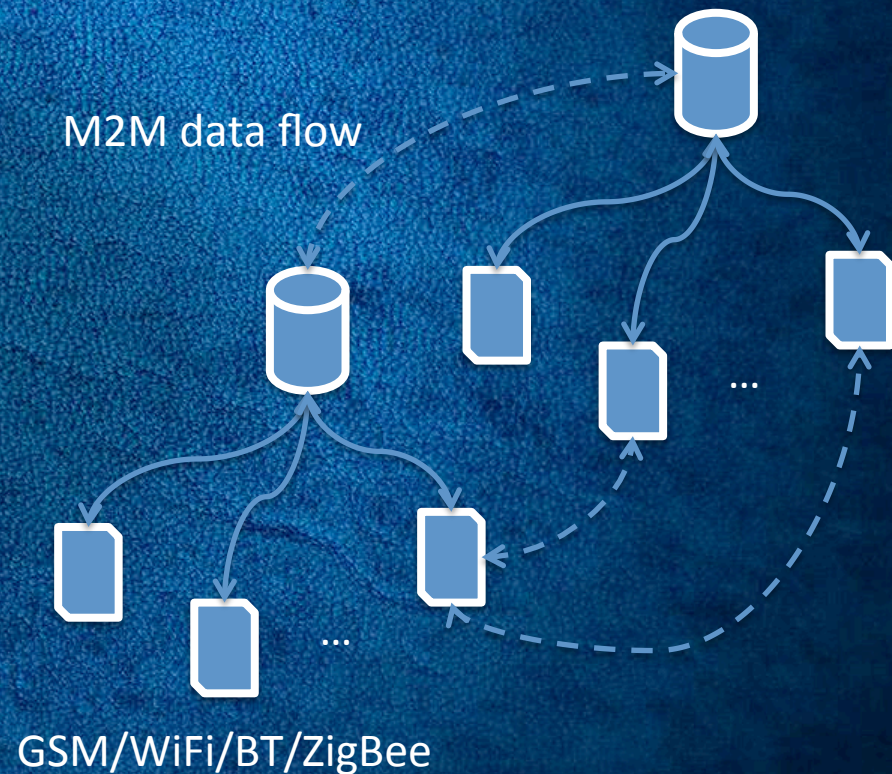
BIG DATA AND DEVICE EXPLOSION

By way of example, according to the Electric Power Research Institute (EPRI), a single smart meter reporting usage data at 15-minute intervals generates roughly 400MB of data per year. Expanded across a million meters, the terabytes worth of information a smart grid project generates can overwhelm utilities with even the most sophisticated internal data management systems.

“Residential smart meters alone will increase the consumption data processed for billing purposes from 12 meter reads per year to 35,000 or more” Source: Oracle

M2M ARCHITECTURE

In this architecture all data must flow up and down to maximize the overall system's intelligence. Huge amounts of data must be exchanged to an optimized operation



M2M ARCHITECTURE

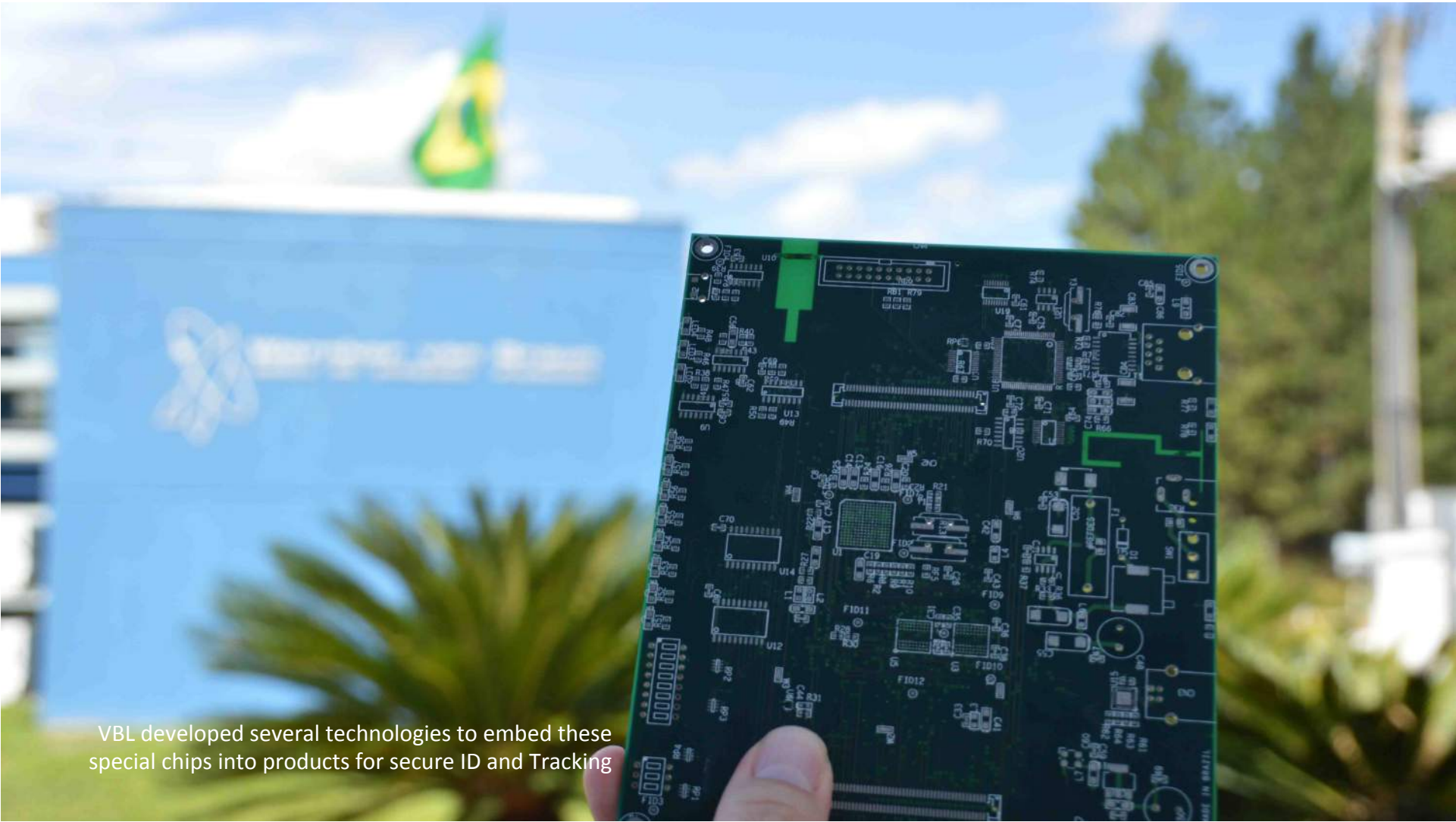
When it comes to vehicles and other high-value items it is already very hard to provide a cost-effective electronic device; what about other items and goods in general?



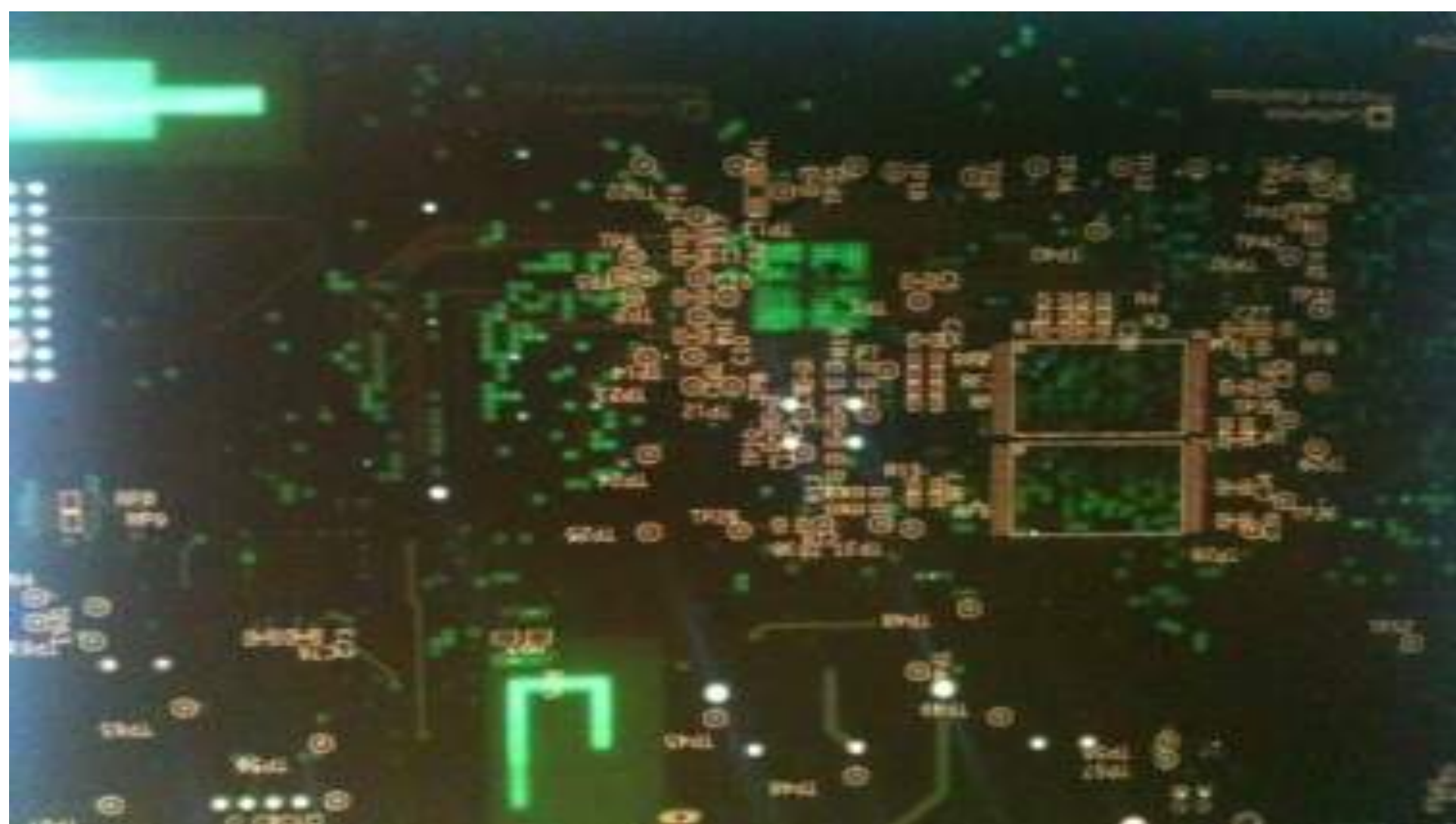
THE ROLE OF RFID IN THE IOT WORLD

RFID chips can be virtually embedded in almost everything: It works with no batteries; it is accessible by smart-phones / low-cost readers and are now capable of hold data / ID with advanced encryption mechanisms





VBL developed several technologies to embed these special chips into products for secure ID and Tracking

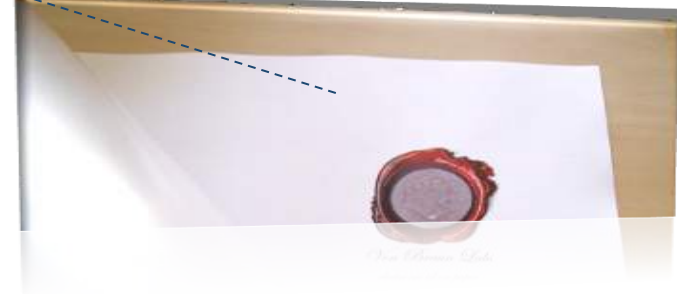


Documents with an unique ID



Brasil-ID concept enables several different configurations to address this application

Besides the information age is maturing, paper production / consumption is growing strong



THE RFID ARCHITECTURE



Readings (of IDs and Sensors) are made as items pass through the infrastructure

THE RFID ARCHITECTURE



Smart-Phones are also part of the of the infrastructure and are able to read RFID's ID and signals from enabled sensors

THE RFID ARCHITECTURE

Smart-Phones are also part of the infrastructure and are able to read RFID's ID and signals from enabled sensors:

An application would enable to sell data when close to the metering device?



The metering owner will program metering data-rate and allowances to data-reading (encrypted) to be directed to a central BackOffice

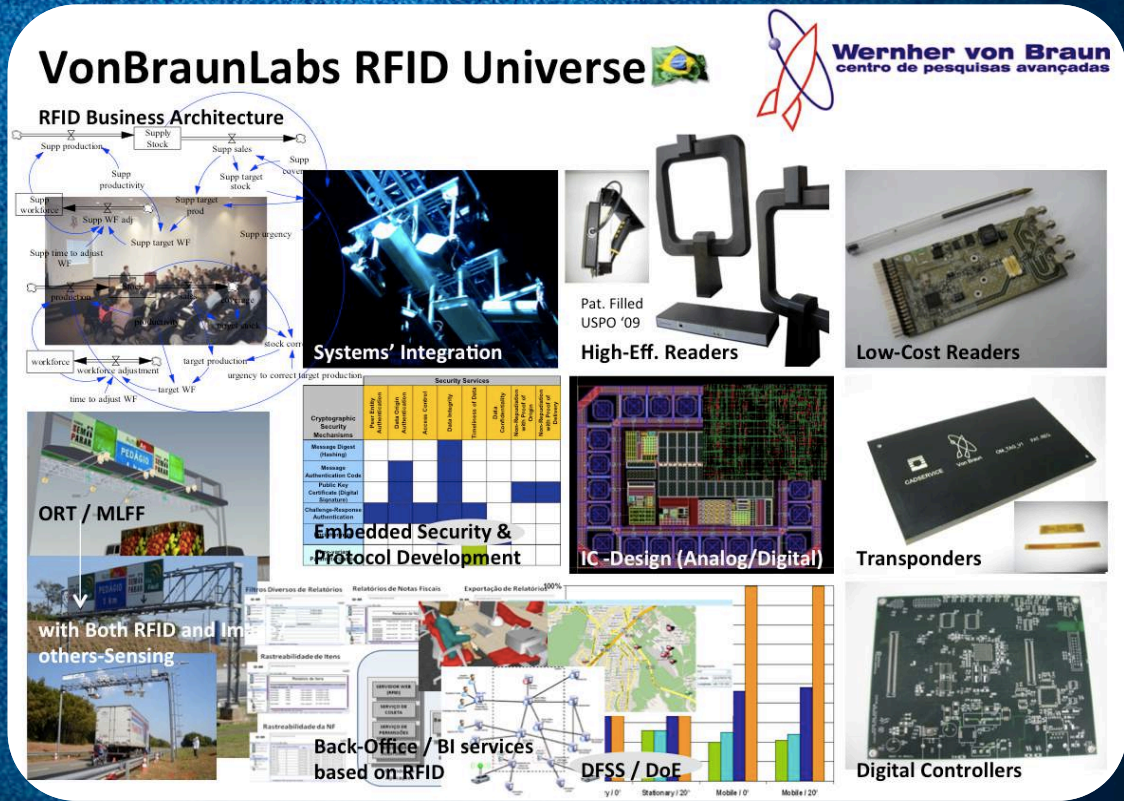
Wernher von Braun Center is a genuine Brazilian independent, private, not-for-profit organization. Its mission is to develop scientific exploration while developing technical innovation for companies and institutions. It started its activities in 1997. Brazilian Government recognizes it as an institution able to participate in projects based on tax-incentives to promote R&D.

The Center has four units: Unit 1 (Alphaville, Campinas-SP), Unit 2 (Sao Carlos-SP) and Unit 3 (Galleria, Campinas-SP) and Unit 4 (North San Jose, California). More than 100 R&D professionals full-time dedicated to the Center develop innovative approaches to concepts and problems companies and also Government brings to the Center seeking for solutions and real implementation.



VonBraunLabs' RFID Universe

The Center developed technologies and systems to massive dissemination and application of RFID: Low-Cost UHF Readers, Intelligent HF Readers, Special Antennas, 13.56MHz and 915MHz RFID Integrated Circuits, Semi-passive and passive secure Transponders for Logistics and AVI, Complete ORT systems and BackOffice/IT solutions for Complex, Scaled Operations based on RFID



Experience in Developing Complex Systems

VBL took special role in the conception, development and implementation of the new AVI systems in Brazil, including the new Sao paulo State's All-Electronic Tolling system

<http://www2.artesp.sp.gov.br/> (which is the system adopted by the National Agency of Terrestrial Transportation (ANTT) for all Highways in Brazil -

<http://www.antt.gov.br/index.php/content/view/28568.html>), the national system for Cargo Identification, Tracking and Authentication, Brasil-ID <http://www.brasil-id.org.br/> and developed all the concepts for the national system for AVI, SINIAV <http://www.denatran.gov.br/siniav.htm>

Besides developing all sub-systems in their most advanced and cheap version possible, VBL implemented pilots in several states in Brazil, helping the Government and over 30 Companies to take part in those programs.



Sao Paulo State Transportation Agency
Economy to end-user is ~\$200 per user in the
first year of operations



SOBRE A
ARTESP

RODOVIAS

TRANSPORTE
COLETIVO

TRANSPARÊNCIA

LEGISLAÇÃO

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Sistema Ponto a Ponto na SP-360 completa 1 ano com economia de R\$ 588 para usuários

Sistema Ponto a Ponto na SP-360
completa 1 ano com economia de R\$
588 para usuários

04/04/2013 - ARTESP



Implementation of the System in Sao Paulo

The Governor inaugurates the system in 2012



SISTEMA PONTO A PONTO

83% of users reduced their costs; 75% of the users are satisfied with the system

DIGITE SUA BUSCA OK

PESQUISA DE OPINIÃO
com usuários do Ponto a Ponto SP 75

83% dos motoristas reduziram despesas

75% dos motoristas estão satisfeitos

Moradores de Jaguariúna terão 50% de desconto no pedágio da SP 340

[SOBRE O PROJETO](#) [PONTO A PONTO SP 75](#) [PONTO A PONTO SP 360](#) [PONTO A PONTO SP 340](#) [MULTIMÍDIA](#) [SALA DE IMPRENSA](#) [CONTATO](#)

[ADESÃO AO PROJETO PONTO A PONTO INDAIATUBA](#)

Início da adesão ao projeto Ponto a Ponto em Indaiatuba

SISTEMA PONTO A PONTO

[clique para agendar a instalação](#)

LOCAL DE INSTALAÇÃO SISTEMA - INDAIATUBA

ASSISTA AO VÍDEO DA ARTESP

Sistema Ponto a Ponto (leia) < 1

REALIZAÇÃO

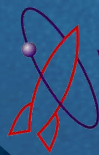
ARTESP
AGÊNCIA DE TRANSPORTE DO ESTADO DE SÃO PAULO

GOVERNO DO ESTADO SÃO PAULO
Secretaria de Logística e Transportes

Some of the Results in Sao Paulo

Investment from private companies in the new system is ~\$200 million in the region of Sao Paulo in the first 15 months of operation.

More than 19 Concessionaries; 150K+ vehicles in operation; 0.5M+ tags manufactured; 750+ RFID lanes in Toll Plazas; 15+ Portals/ORT systems installed, with ~1M transactions per month – operations running with more than 99% efficiency at the certified sites.



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Odebrecht and Ipiranga started a new company called ConectCar



The National AVI System



First pilot-implementation of the National AVI system in Brazil for Seagull Technologies, Rio de Janeiro and Department of Transportation of that State: Tag installation facilities, Transponders, Complete BackOffice (for the private company and the Government)



Seu carro conectado num mundo de facilidades e descontos.

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Você está em: [ConectCar](#) > [Página Inicial](#)

Example of Innovation based on the systems conceived and promoted by VBL: This company was created by Odebrech and Ipiranga groups in Brazil to operate all over Brazil



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http://www.yahoo.com/



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Informações importantes

Pilot-Implementations for the National Agency for Terrestrial Transportation

*Project developed for ANTT:
Nova Dutra Highway (~300k vehicles/
day) – OCR implementation in 5 sites
inviting multinational companies to
demonstrate automation classification
efficiency (VonBraunLabs with the 8-
lanes site and coordinating all data-
analysis) – a definitive statistical result
to define the technology the national
tolling regulation*

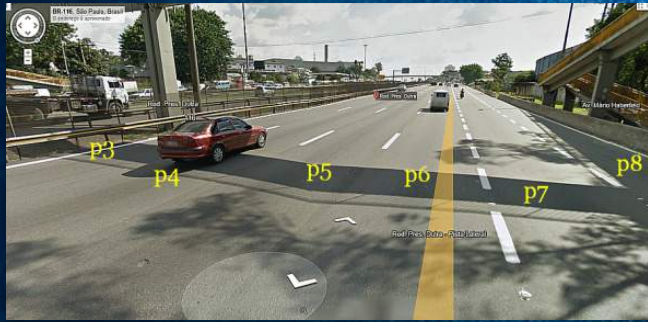


Measuring efficiency in several different testing Conditions



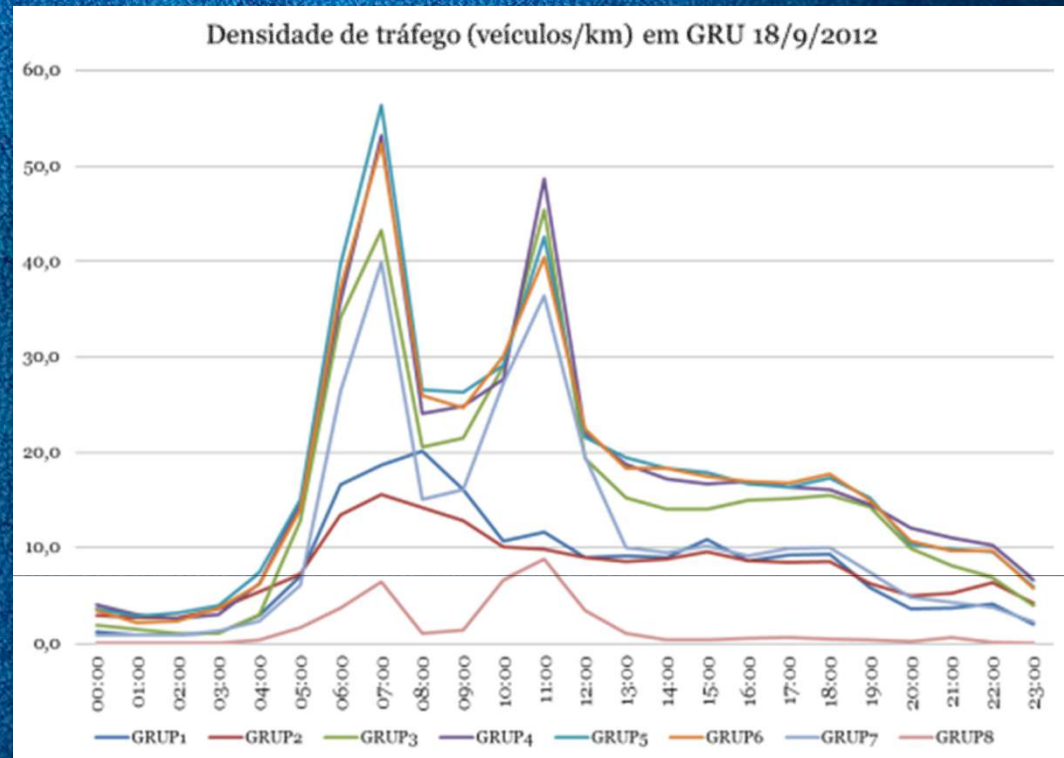
day and night-time images – more than a million of each analyzed per each parameter under study

Sao Paulo – Rio implementation



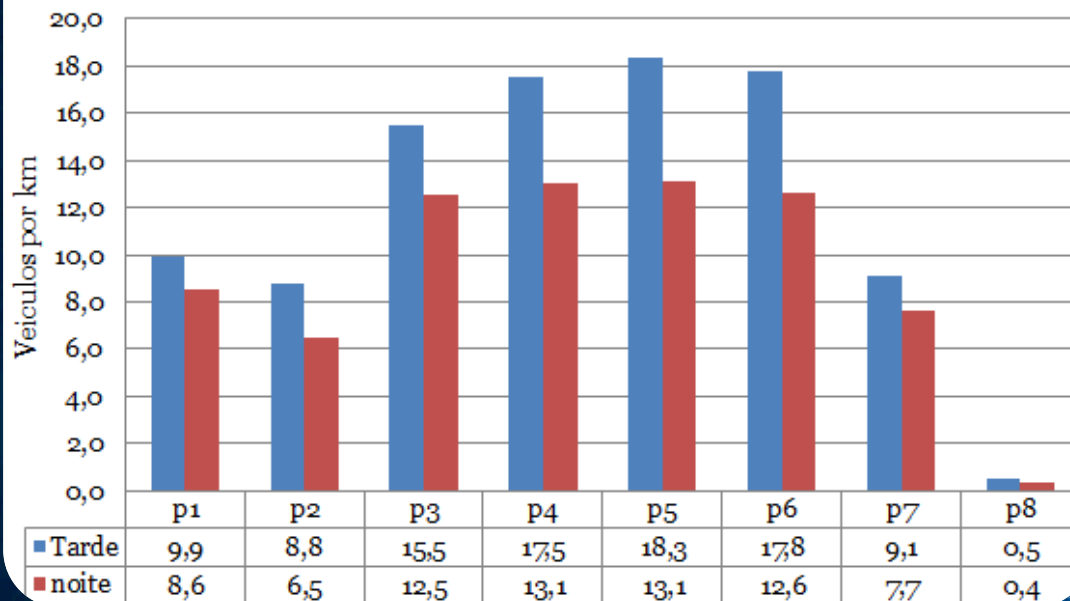
Automated Machine Vision Systems utilized by the Center at a site of 8-lanes: Traffic Density, Type of Vehicle Occupancy, Average Velocity per Type of Vehicle per Lane; integration with RFID

Real-Time Classification

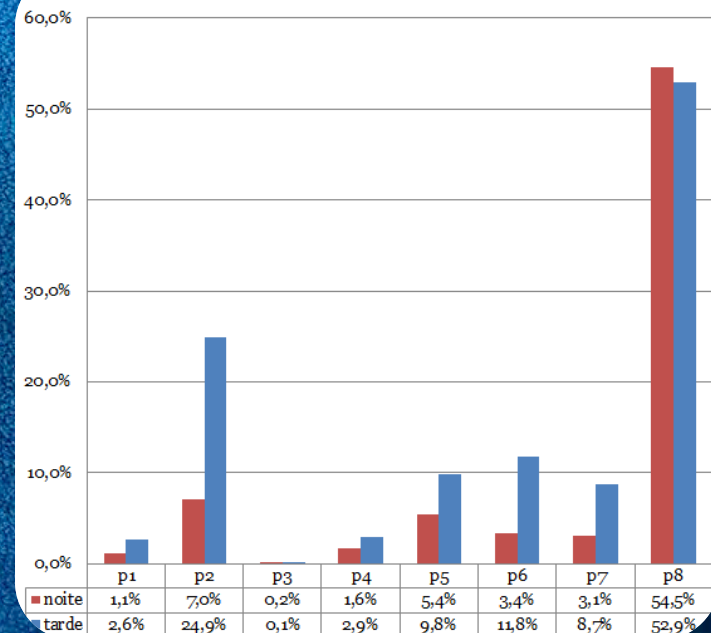


Sao Paulo – Rio implementation

Densidade de tráfego (veículos/km)

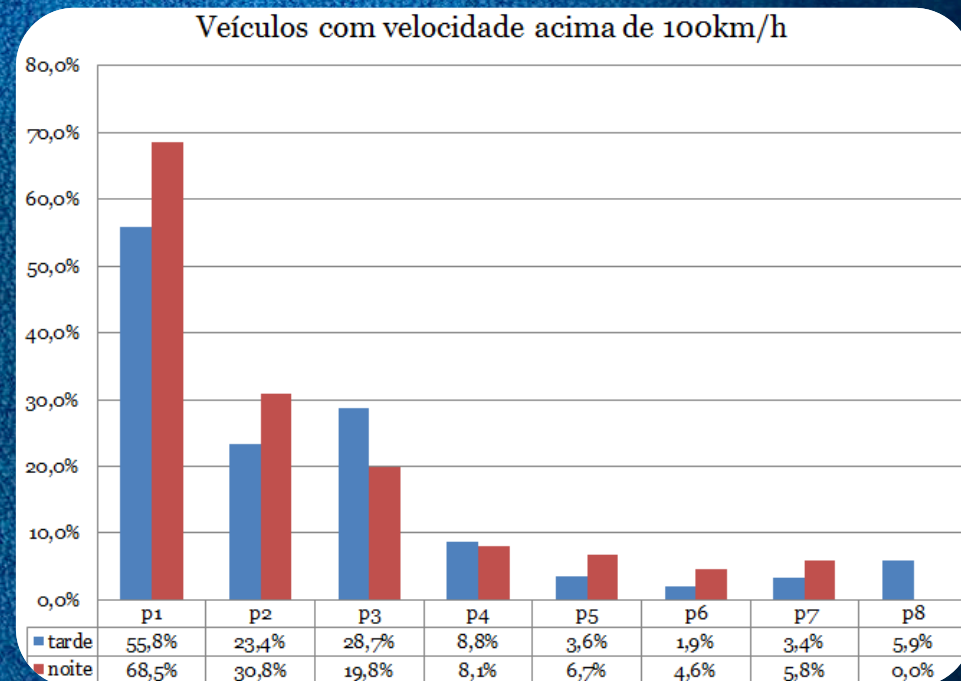
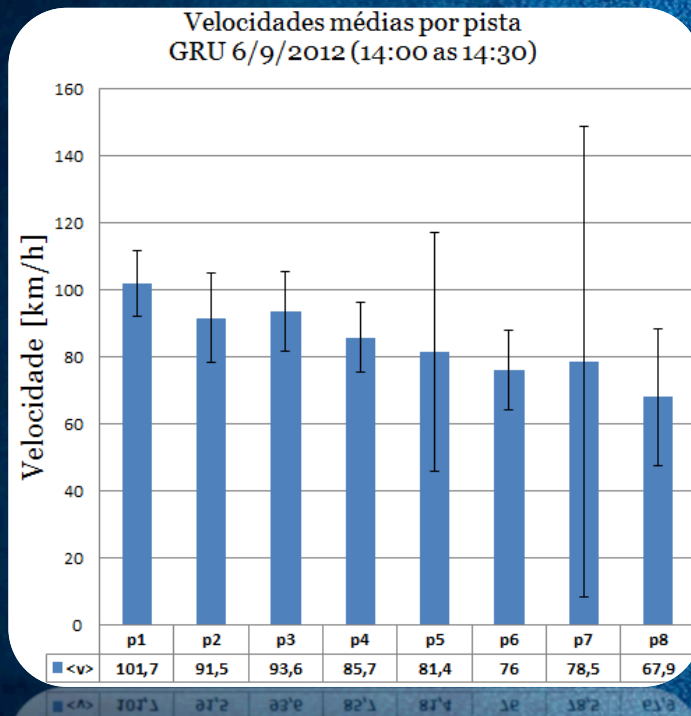


Ocupação de pista por veículos acima de 10 metros



Real-Time measurements on traffic density, lane occupancy, average velocity per type of vehicle, etc – several indicators automatically captured on site to ensure planning and operations of huge track of infrastructure

Sao Paulo – Rio implementation



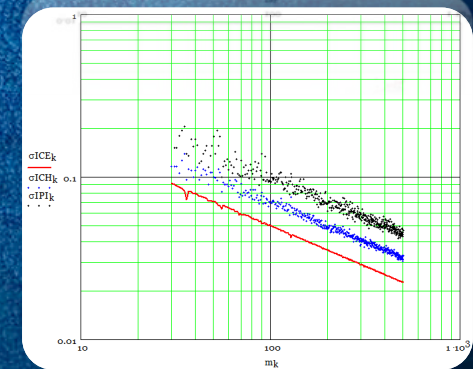
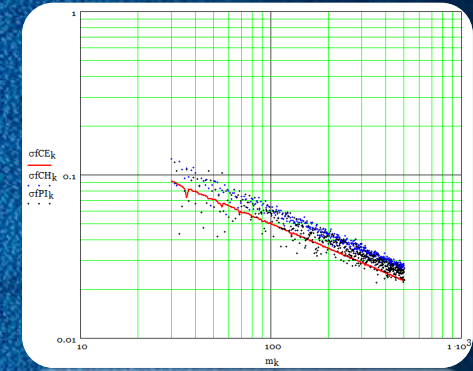
Real-Time measurements on traffic density, lane occupancy, average velocity per type of vehicle, etc – several indicators automatically captured on site to ensure planning and operations of huge track of infrastructure

Sao Paulo – Rio implementation

The pilot demonstrated all possible efficiencies with OCR and Classification Technologies in Brazil. Based on this pilot-implementation ANTT defined the new national regulation for Tolling Operations (dozens of Concessionaries involved)



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1600+ Toll-Plazas; 20+ million vehicles; 100+ Free-Flow Portals Planned

Sao Paulo State has an area bigger than United Kingdom's; the best infrastructure in the country (the City of Campinas [alone] in the State of Sao Paulo has an economy bigger than the Country of Chile);

State of Sao Paulo Automated Tolling System

*Washington Luiz
Anhanguera
Bandeirantes
Ademar de Barros
Santos Dumont
Marechal Rondon*

*Anchieta
Imigrantes
Dom Pedro
Ayrton Senna
Castelo Branco*

SAO PAULO main highways: the new technology is mandatory and must reach 85% of the vehicles

Infrastructure expansion – ANTT/DNIT/SEP



The expanded infrastructure will be present not only in the Federal-Controlled Highways, but in the major Ports and similar Strategic locations

Nova Dutra - BR-116/RJ/SP, trecho Rio de Janeiro - São Paulo
 Ponte Presidente Costa e Silva - BR 101/RJ – Trecho Rio – Niterói
 CONCR - BR 040/MG/RJ - trecho Juiz de Fora/MG - Rio de Janeiro/RJ
 CRT - BR-116/RJ, trecho Além Paraíba - Teresópolis – Entroncamento c/ a BR 040/RJ
 CONCEPA - BR 290/RS - Trecho Osório – Porto Alegre/ Entroncamento BR 116/RS (Guaíba)
 ECOSUL - BR 116/RS, 392/RS e 293/RS
 Autopista Planalto Sul - BR-116/PR/SC – Curitiba – Divisa SC/RS
 Autopista Litoral Sul - BR-116/376/PR e BR-101/SC – Trecho Curitiba – Florianópolis
 Autopista Régis Bittencourt - BR-116/SP/PR – São Paulo – Curitiba
 Autopista Fernão Dias - BR-381/MG/SP - Belo Horizonte - São Paulo
 Autopista Fluminense - BR-101/RJ – Divisa RJ/ES – Ponte Presidente Costa e Silva,... Entre outras.

Additional sites where the infrastructure expands

Von Braun Labs' 3-Lanes Open Road Tolling System for Ponto-a-Ponto System







Transponder Solutions

Transponders: 915MHz with embedded AES128 security mechanism - Semi-passive (wing-shaped) and Passive Solutions)





In partnership with the Fiscal Authorities, other R&D Centers and the Ministry of Science & Technology in Brazil, Von Braun Center developed a complete set of solutions and is operating the system in 13 states in Brazil

MCTI Ministério da Ciência,
Tecnologia e Inovação

CONFAZ
Conselho Nacional de Política Fazendária



The National System for Product Identification, Tracking and Authentication

BRASIL ID SISTEMA NACIONAL DE IDENTIFICAÇÃO, RASTREAMENTO E AUTENTICAÇÃO DE MERCADORIAS.

Sistema baseado na tecnologia de Identificação por Radiofrequência (RFID) e outras de comunicação sem-fio relacionadas, visa estabelecer um padrão único para implementação de Identificação por Radiofrequência a ser utilizado em produtos e documentos fiscais em circulação pelo país, prevê, ainda, a estruturação de serviços de rastreamento e verificação de autenticidade.

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BRASIL-ID E A INDÚSTRIA

A indústria respondeu ao estímulo do Brasil-ID e desenvolveu soluções aderentes ao novo padrão tecnológico



Sistema de Leitura de Dispositivos (SLD)



Equipamento de Configuração de Transponder (ECT)



Lacre de Transporte de Carga Eletrônico (LTC-e)



Chip BrID - Protocolo P63



Cartão de Documentos Fiscais Eletrônico (CDF-e) HF



Identificador de Veículos e Cargas Eletrônico (IVC-e) e CDF-e UHF

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The National System for Product Identification, Tracking and Authentication – Brasil-ID: Read/Write Systems, Equipment for Secure Tag Emission, RFID w/ AES128 Cargo-Container Seal, Secure RFID Chip, 13.56MHz Electronic Fiscal Invoice Card, Semi-passive Transponder

INFRAESTRUTURA IMPLANTADA

A infraestrutura do piloto operacional foi implantada a partir de tecnologias desenvolvidas para atender ao padrão Brasil-ID



IVC-e e CDF-e RFID UHF



Identificação Veicular Automática (IAV)



Integração com o Ambiente Nacional MDF-e



Aplicações de referência para operação de ferramentas



Back Office Nacional Brasil-ID

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Besides Road Side Infrastructure, a BackOffice Management and Control System (with special applications to replace paper in the different processes) is up and running to support Service Operators and multiple Government Agencies

BRASIL-ID EM OPERAÇÃO

O piloto operacional do Brasil-ID atualmente está em plena execução, contando com a participação de Postos Fiscais e empresas de transportes de mercadorias



Pontos Fiscais operacionais



Estados com passagens registradas

- 13 estados instalados
- 2 estados com passagens ativas das transportadoras

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13 Brazilian States already have Brasil-ID RFID systems installed and operated by Von Braun Labs; 2 additional States with the AVI system integrated

Example of an Application for BackOffice operations: not only cargo vehicles, but also cargo-containers, pallets and individual products can be securely tracked along the Supply-Chain

The screenshot displays the Brasil ID web application interface. The top navigation bar includes the 'Brasil id' logo and a phone number: 289.558.740-90. The main content area is divided into a left sidebar and a right map area. The sidebar contains a 'Consulta' section with a 'Resultado da busca' table. The table has two columns: 'Placa' and 'Chave MDF-e'. The first row shows the values 'C125943' and '35130943244631000320580010000031'. The map area shows a map of Brazil with a red dot indicating a location. A tooltip over the dot displays the same 'Placa' and 'Chave MDF-e' values, along with a date and time: '05/10/2013 02:18:38'. A larger tooltip in the bottom right corner shows the 'MDF-e' value '3513094324463100032058001000003137163539872' and the same date and time. The bottom of the page features a footer with the text 'Brasil ID - Todos os direitos reservados'.

Placa	Chave MDF-e
C125943	35130943244631000320580010000031

MDF-e
3513094324463100032058001000003137163539872
05/10/2013 02:18:38

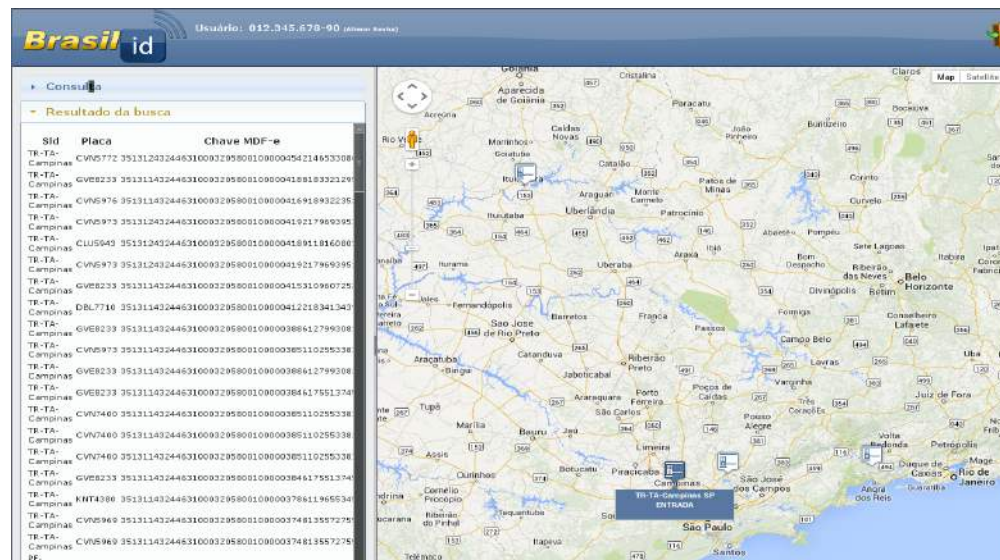
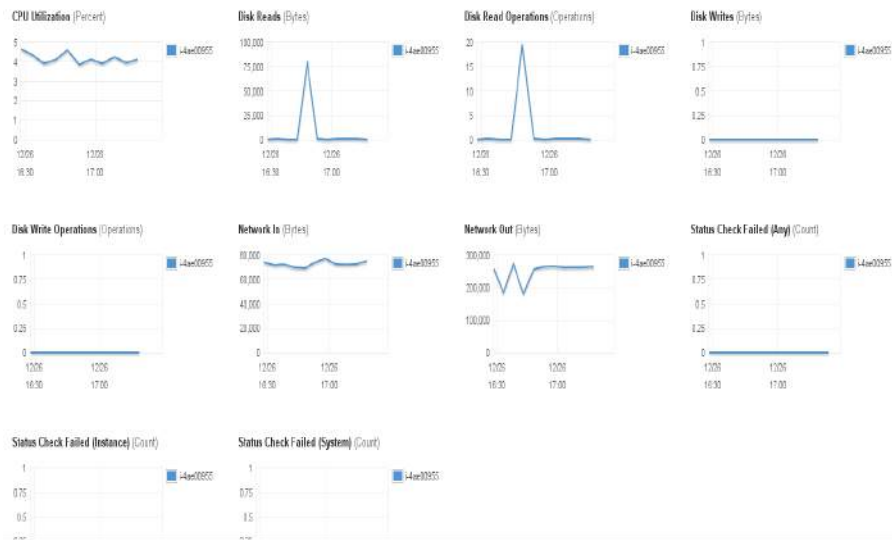
Brasil ID - Todos os direitos reservados



BRASIL-ID EM OPERAÇÃO



All BackOffice IT development and implementation were made and developed by VONBRAUNLABS and being transferred to Government Agencies under Service and other forms of Contract



Gravação CDF-e

Opções Ajuda

Informe a Placa do Veículo * **Brasil id**

AAA0001

Informe a Chave do MDF-e * **Brasil id**

31130704783281000157580010000038101159733834

* Campos Obrigatórios

Gravar Cancelar

Aplicação de Referência de Fiscalização de CDF-e

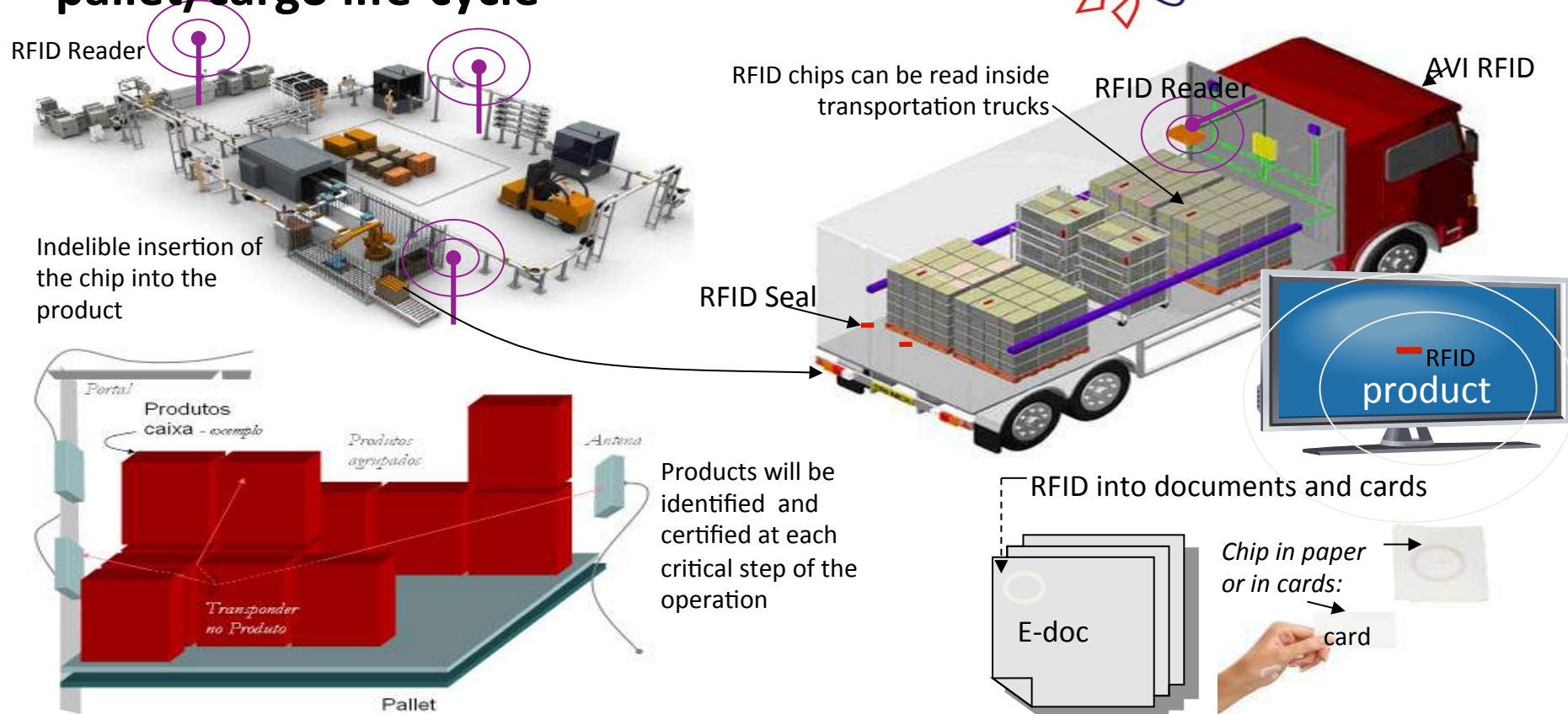
Opções Passagens Ajuda **A**

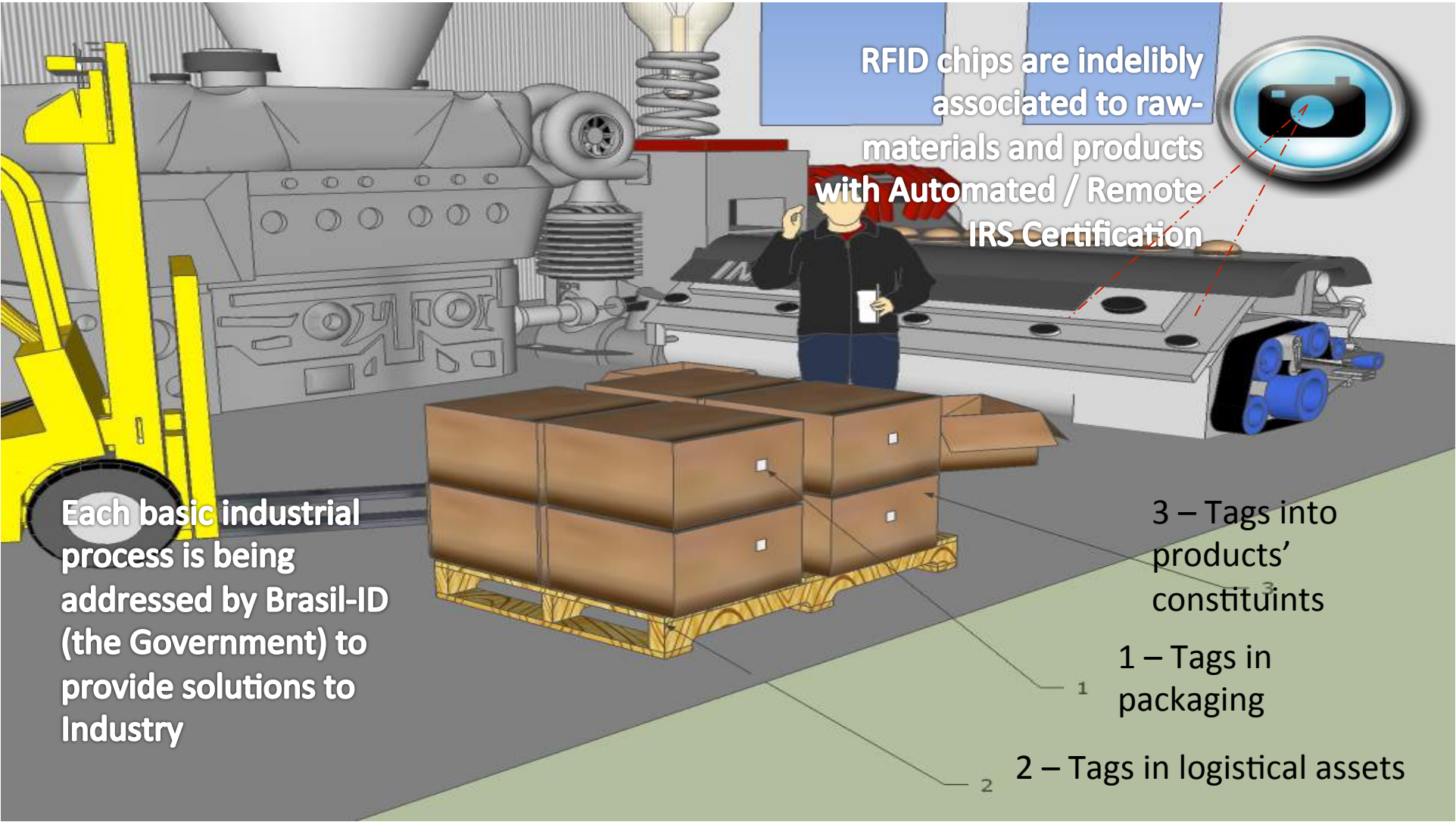
Lista de Passagens **Brasil id**

Id SLD	Placa	Chave MDF-e	Data	Hora
2			09/08/2013	17:10:41.717
2			09/08/2013	17:10:41.717
2			09/08/2013	17:10:41.717
2			09/08/2013	17:12:09.309
2			09/08/2013	17:12:09.309
1	BBB1111	43130793372738000160582220000004561123456786	09/08/2013	17:19:42.865
2	CCC2222	42121109376619000170580010000000201121757819	09/08/2013	17:19:42.865
2	BBB1111	43130793372738000160582220000004561123456786	09/08/2013	17:21:23.014
2			09/08/2013	17:21:23.014
2			09/08/2013	17:24:06.335
2			09/08/2013	17:24:06.335
2			09/08/2013	17:25:51.585
2			09/08/2013	17:25:51.585
1	AAA0001	42121109376619000170580010000000201121757819	14/08/2013	11:35:05.320
1	AAA0001	42121109376619000170580010000000201121757819	14/08/2013	11:49:58.056
1	AAA0001	42121109376619000170580010000000201121757819	14/08/2013	13:20:14.245
1	AAA0001	42121109376619000170580010000000201121757819	14/08/2013	13:32:30.401
1	AAA0001	42121109376619000170580010000000201121757819	14/08/2013	14:56:32.355
1	AAA0001	42121109376619000170580010000000201121757819	14/08/2013	15:06:20.464
1	AAA0001	42121109376619000170580010000000201121757819	14/08/2013	15:24:08.133
1	AAA0001	42121109376619000170580010000000201121757819	14/08/2013	17:55:51.325
1	AAA0001	42121109376619000170580010000000201121757819	19/08/2013	14:25:09.380

Legenda: **C** Passagem Consolidada **D** Visualizar Documentos
C Passagem Recebida do Backoffice **D** Visualizar Documentos
C Passagem Iida localmente

Complete coverage of product/package / pallet/cargo life-cycle





RFID chips are indelibly
associated to raw-
materials and products
with Automated / Remote
IRS Certification

The illustration depicts a factory environment. On the left, a yellow forklift is partially visible. In the center, a worker in a dark jacket and blue pants stands next to a pallet of brown cardboard boxes. Some boxes have small white square tags attached. In the background, there is a large industrial machine with a lightbulb on top. To the right, a blue conveyor belt system is shown. A circular icon with a camera lens and a blue center is in the upper right corner, with red dashed lines pointing from it to the worker and the boxes. Numbered lines (1, 2, 3) point from the text labels at the bottom to the boxes, the worker, and the conveyor belt respectively.

Each basic industrial
process is being
addressed by Brasil-ID
(the Government) to
provide solutions to
Industry

3 – Tags into
products'
constituents

1 – Tags in
packaging

2 – Tags in logistical assets

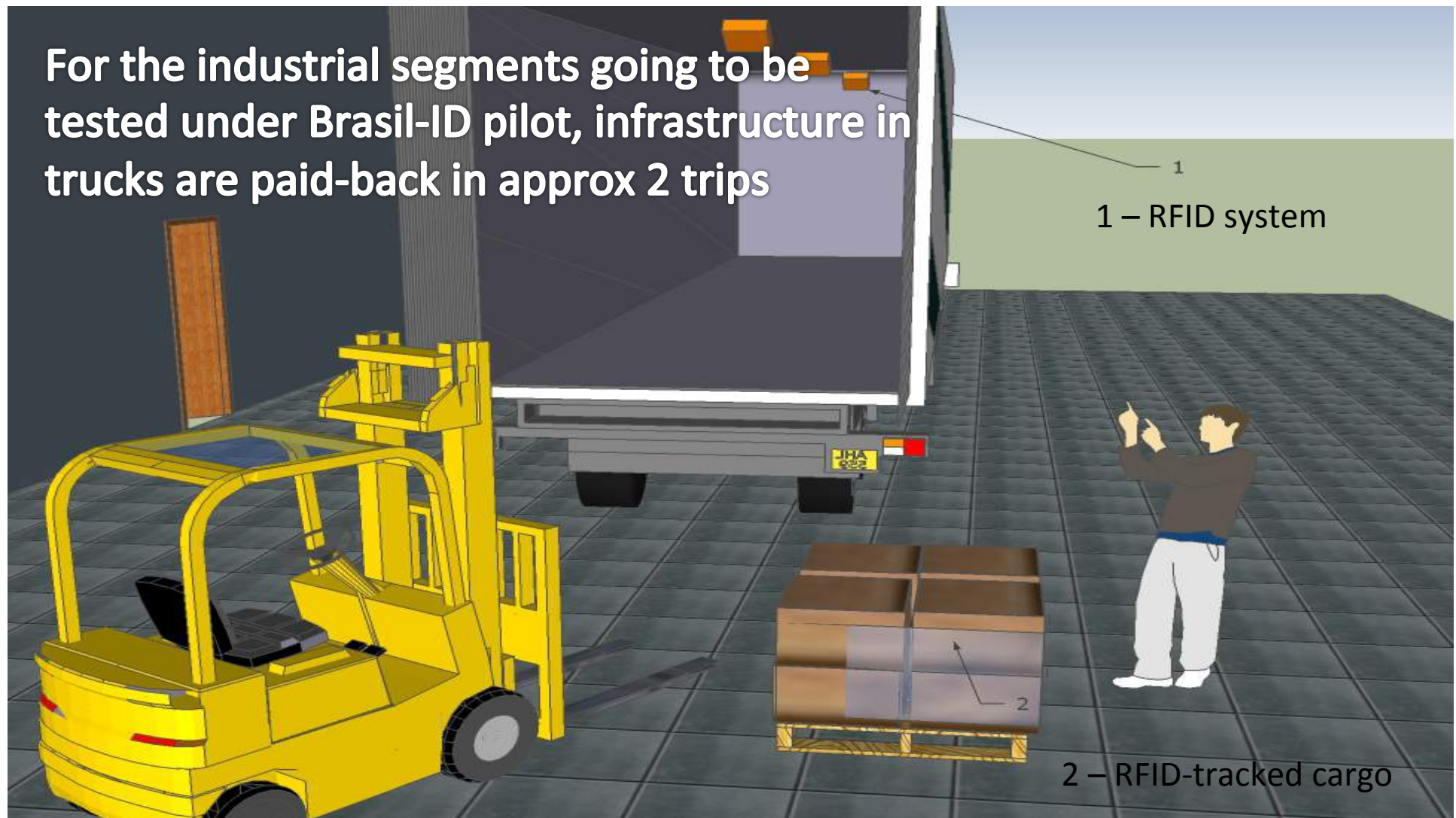
All Fiscal Documents are automated
generated at the moment of cargo/product
movement/transportation

IRS/Treasury procedures are being
migrated to embedded coding to
automate all sub-processes

Brasil-ID system provides a web-based service to all Supply-Chain
participants. Internal and Fiscal procedures are mapped to reduce
fraud and risks / related costs



For the industrial segments going to be tested under Brasil-ID pilot, infrastructure in trucks are paid-back in approx 2 trips



**Capilarity down to the item – huge impact
on logistic bureocracy and insurance costs**

1 – GPS/GPRS/Satellite

2 – SINIAV tag

3 – RFID system

1 – Control & Remote
Communication Unit



Brasil-ID Back-Office is the only interface to the Corporate or End-user

por Centro de Pesquisas Av



Service Operators are integrated in a web-search engine device

Desenvolvido por Centro de Pesquisas Avançadas Wernher von Braun



Planejamento

147	
Latitude:	-23.07973176
Longitude:	-46.1151123





Brasil-ID implementations under deployment
inside private companies' facilities



Tag Initialization Equipment for Field Operations and a Brasil-ID Reading/Writing Systems which is connected to the Central BackOffice for security and Access Keys management

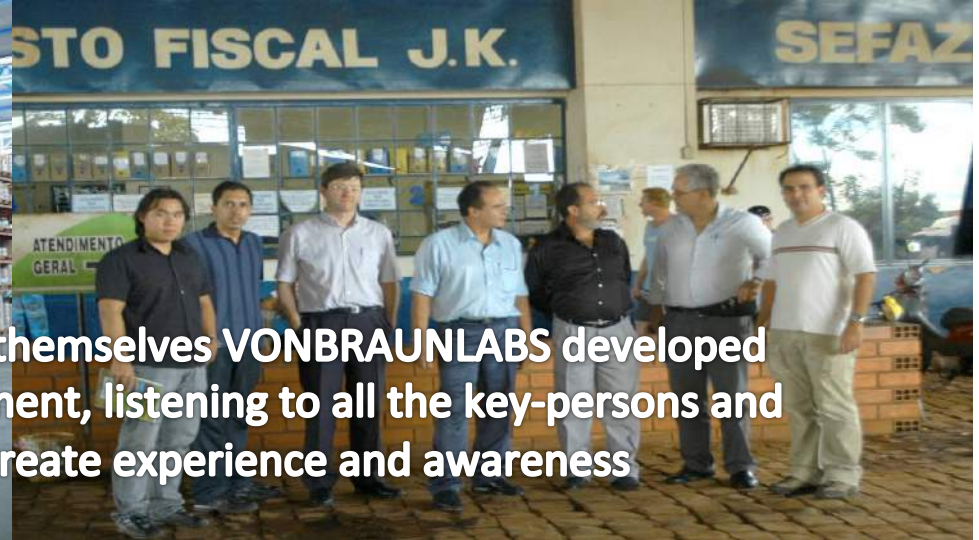


Fiscal Check Points Operating under Brasil-ID System

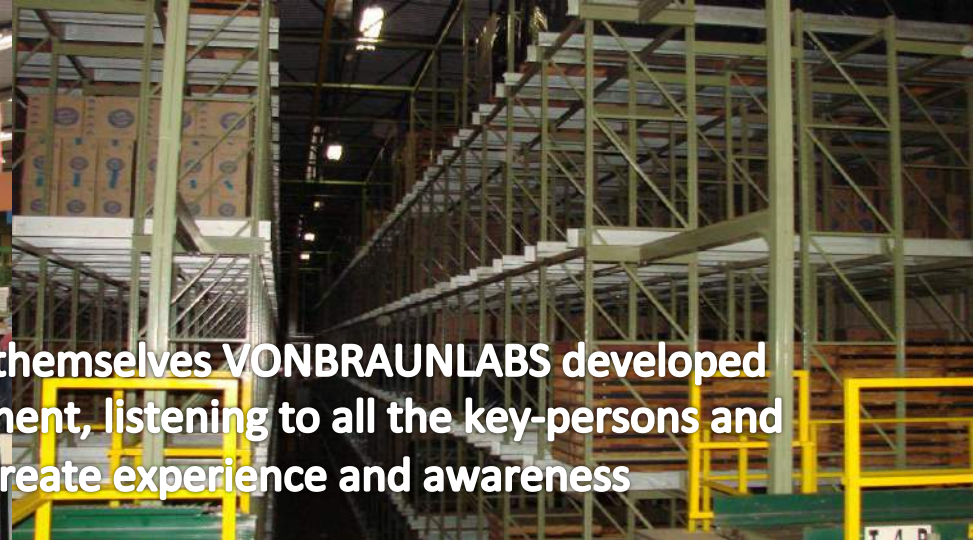
Posto Fiscal	UF	Execução
Extrema	MG	OK
Torres	RS	OK
XV de Novembro	MS	OK
JK	GO	OK
Correntes	MT	OK
Ibepar (Porto)	AM	OK
Estiva	MA	OK
Penaforte	CE	OK
Benito Gama	BA	OK
Xexéu	PE	OK
Antônio Manuel Dantas	SE	OK
PRF em Mipibu	RN	OK
PRF em Lavrinhas	SP	OK



It covers the major part of the Brazilian territory, which is bigger than continental USA



In order to build the concepts and the projects themselves VONBRAUNLABS developed close relationship with Companies and Government, listening to all the key-persons and entities and building pilot-implementations to create experience and awareness



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CONVÊNIO ICMS 12, DE 5 DE ABRIL DE 2013

Dispõe sobre a criação do Sistema Nacional de Identificação, Rastreamento e Autenticação de Mercadorias ou Brasil-ID e institui um conjunto de instrumentos que promovam modernização da fiscalização de mercadorias.

O Conselho Nacional de Política Fazendária - CONFAZ - e o Secretário da Receita Federal do Brasil, na sua 149ª reunião ordinária, realizada em Ipojuca, PE, no dia 5 de abril de 2013, tendo em vista o disposto nos artigos 102 e 199 do Código Tributário Nacional, Lei nº 5.172, de 25 de outubro de 1966.

Considerando o acordo de cooperação técnica firmado em 31 de agosto de 2009 e publicado no DOU nº 211 de 05/11/2009 entre o Ministério da Ciência, Tecnologia e Inovação (MCTI), a Receita Federal, os Estados e o Distrito Federal da União por intermédio de suas Secretarias de Fazenda, Finanças, Tributação ou Receita;

Considerando a necessidade de racionalizar e agilizar, no âmbito do Governo, os procedimentos de auditoria e fiscalização de tributos, mercadorias e prestação de serviços;

Considerando a necessidade de propiciar, no âmbito das empresas, redução significativa de custos e melhoria nos processos de produção, armazenagem, distribuição e logística, com consequente redução do 'Custo Brasil';

Considerando a necessidade de propiciar, no âmbito do Governo, maior controle da industrialização, comercialização, circulação de mercadorias e prestação de serviços, no intuito de reduzir a sonegação fiscal, o contrabando, o descaminho, a falsificação e furto de mercadorias no País, promovendo, portanto, um ambiente de concorrência leal;

Considerando a necessidade de regulamentar para todo território nacional o uso seguro da tecnologia de identificação por radiofrequência - RFID - referente à identificação, o rastreamento e a autenticação de mercadorias, visando atender às demandas do Governo e do setor empresarial;

Considerando o aporte de investimentos que vem sendo realizado pela Financiadora de Estudos e Projetos do Ministério da Ciência, Tecnologia e Inovação - FINEP-MCIT - que prevê o desenvolvimento de soluções tecnológicas voltadas especificamente para o Brasil-ID, por instituições Brasileiras, definidas pelo Ministério da Ciência, Tecnologia e Inovação, e ainda os pilotos de instalação de equipamentos nos estados;

Considerando os investimentos adicionais àqueles do FINEP, realizados por empresas que, seguindo as orientações do projeto Brasil-ID, implementaram as soluções técnicas complementares ao projeto, e

Considerando o cumprimento da missão institucional da Empresa de Planejamento e Logística (empresa de capital 100% público), voltada para o planejamento estratégico da infraestrutura de logística e transportes do Brasil,

resolvem celebrar o seguinte

C O N V Ê N I O

Cláusula primeira Fica instituído o Sistema Nacional de Identificação, Rastreamento e Autenticação de Mercadorias (Brasil-ID), com a finalidade de desenvolver e implantar uma infraestrutura tecnológica que garanta a identificação, o rastreamento e a autenticação de mercadorias em circulação no país, com o intuito de padronizar, unificar, integrar, simplificar, desburocratizar e acelerar o processo de produção, logística e de fiscalização de mercadorias.

§ 1º Os detalhes técnicos referentes ao sistema e aos artefatos nele utilizados serão definidos em Ato COTEPE e divulgados por meio do Manual de Orientação ao Contribuinte Brasil-ID (MOC-BrID).

§ 2º Nota Técnica publicada no PN-BrID poderá esclarecer questões específicas referentes ao MOC-BrID.

Cláusula segunda O sistema Brasil-ID utilizará os seguintes artefatos:

I - o Chip-BrID, dispositivo eletrônico que utiliza a tecnologia de Identificação por Radiofrequência - RFID com requisitos de segurança, para fins de identificação, rastreamento e autenticação de mercadorias;

II - o Leitor-BrID, dispositivo RFID responsável por estabelecer comunicação de gravação e leitura nos chips-BrID;

III - a Aplicação-BrID, assim definido os componentes de software que atuam no contexto do Brasil-ID;

IV - a Operadora-BrID, responsável pelos serviços disponibilizados no âmbito do Brasil-ID.

V - Cartão de Documentos Fiscais Eletrônicos - CDF-e;

VI - Identificador de Veículo de Carga Eletrônico - IVC-e, que será utilizado para identificar um veículo de carga e a vinculação da carga deste veículo aos documentos gravados em um CDF-e;

VII - Lacre de Transporte de Carga Eletrônico - LTC-e, que será utilizado para vincular a carga a um CDF-e e a um IVC-e;

VIII - Identificador de Embalagem de Transporte Eletrônico - IET-e, que será utilizado para fins de identificação eletrônica de embalagens de transporte, retomáveis ou não, e vinculação ao CDF-e, ao IVC-e e, opcionalmente, ao LTC-e;

IX - Identificador de Produto Eletrônico - IP-e, que será utilizado para fins de identificação e autenticação de produtos e mercadorias.

Cláusula terceira Fica instituído o Comitê Certificador Designado do Brasil-ID (CCD Brasil-ID), responsável pela habilitação de empresas, produtos, subprodutos e serviços relacionados às tecnologias e serviços no âmbito do Brasil-ID, em todo o território nacional.

§ 1º Cabe ao CCD Brasil-ID habilitar:

Este documento pode ser verificado no endereço eletrônico <http://www.in.gov.br/autenticidade.html>, pelo código 00012013041200033

Documento assinado digitalmente conforme MP nº 2.200-2 de 24/08/2001, que institui a Infraestrutura de Chaves Públicas Brasileira - ICP-Brasil.

Brasil-ID gained an official status in the Government, with its own structure and regulations



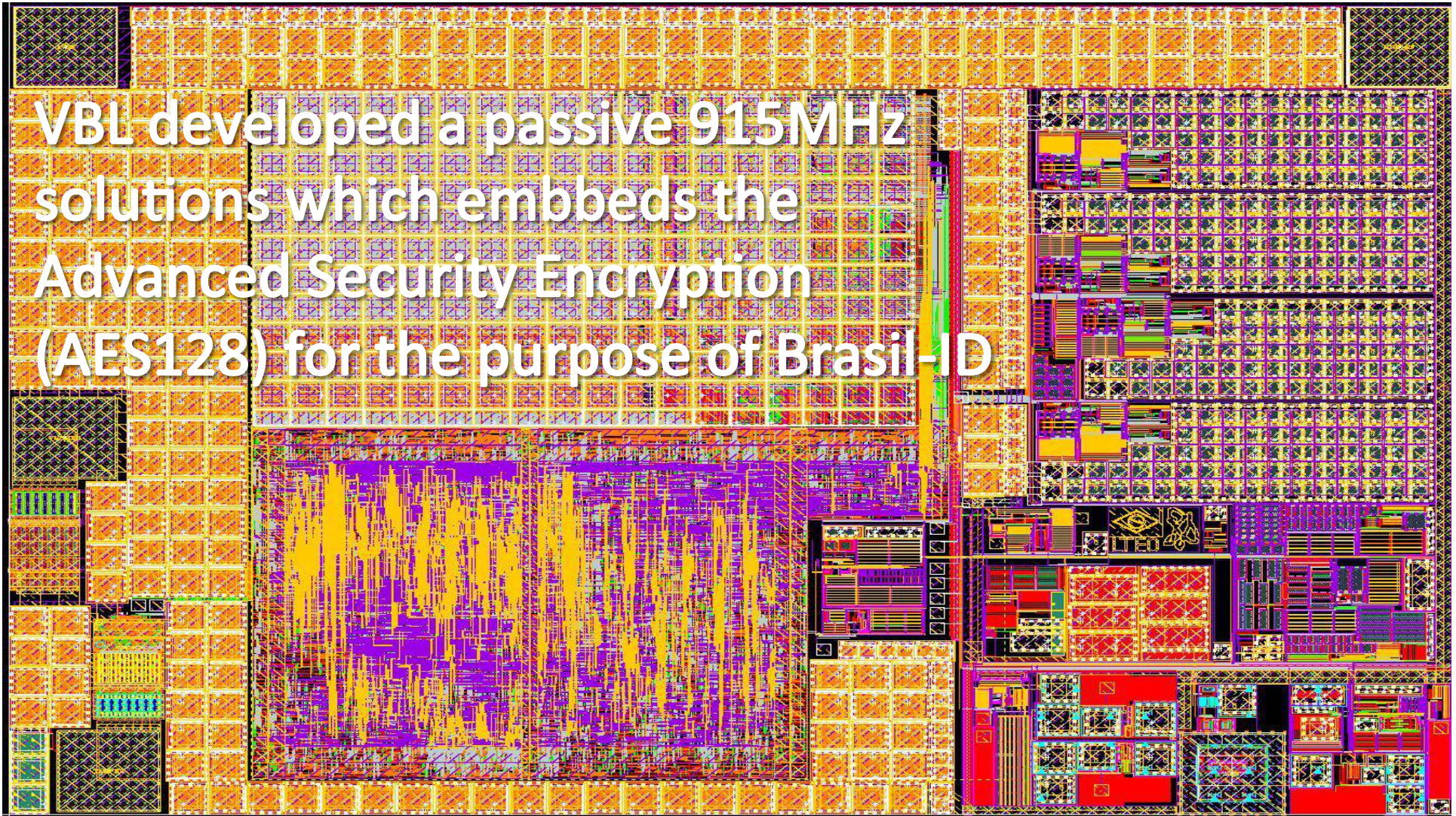
Fazer dos Fabricantes de Equipamentos OPERADORES DE DADOS

Testes em Pilotos Reais

- Utilizar capacidade já instalada nos POSs de Varejo
- Utilizar as plataformas de consumo que já circulam formando uma rede
- Utilizar a rede de leitores fixos para multiplicar serviços



VBL developed a passive 915MHz
solutions which embeds the
Advanced Security Encryption
(AES128) for the purpose of Brasil-ID



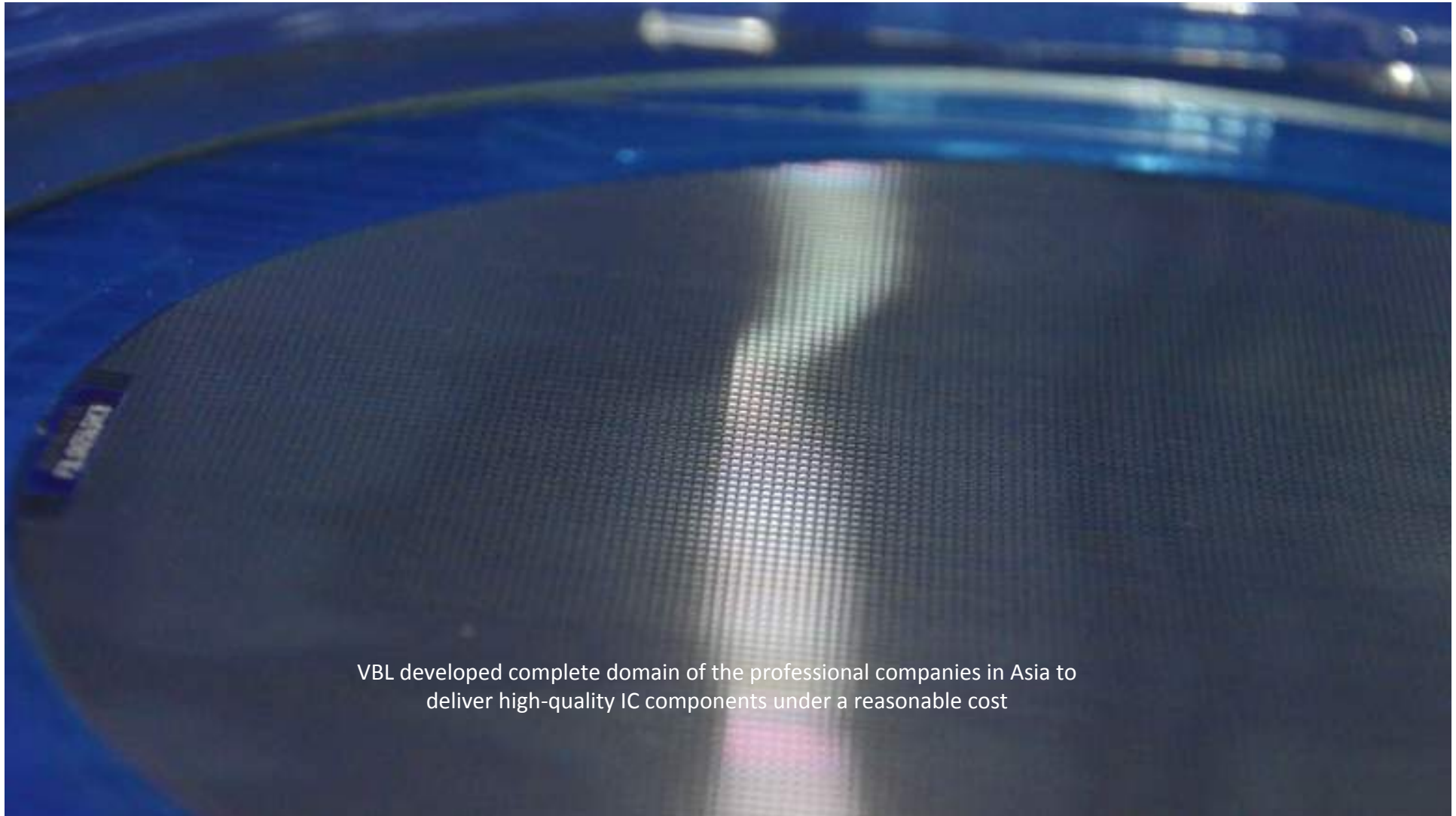


This solutions is fully tested and ready for mass-production

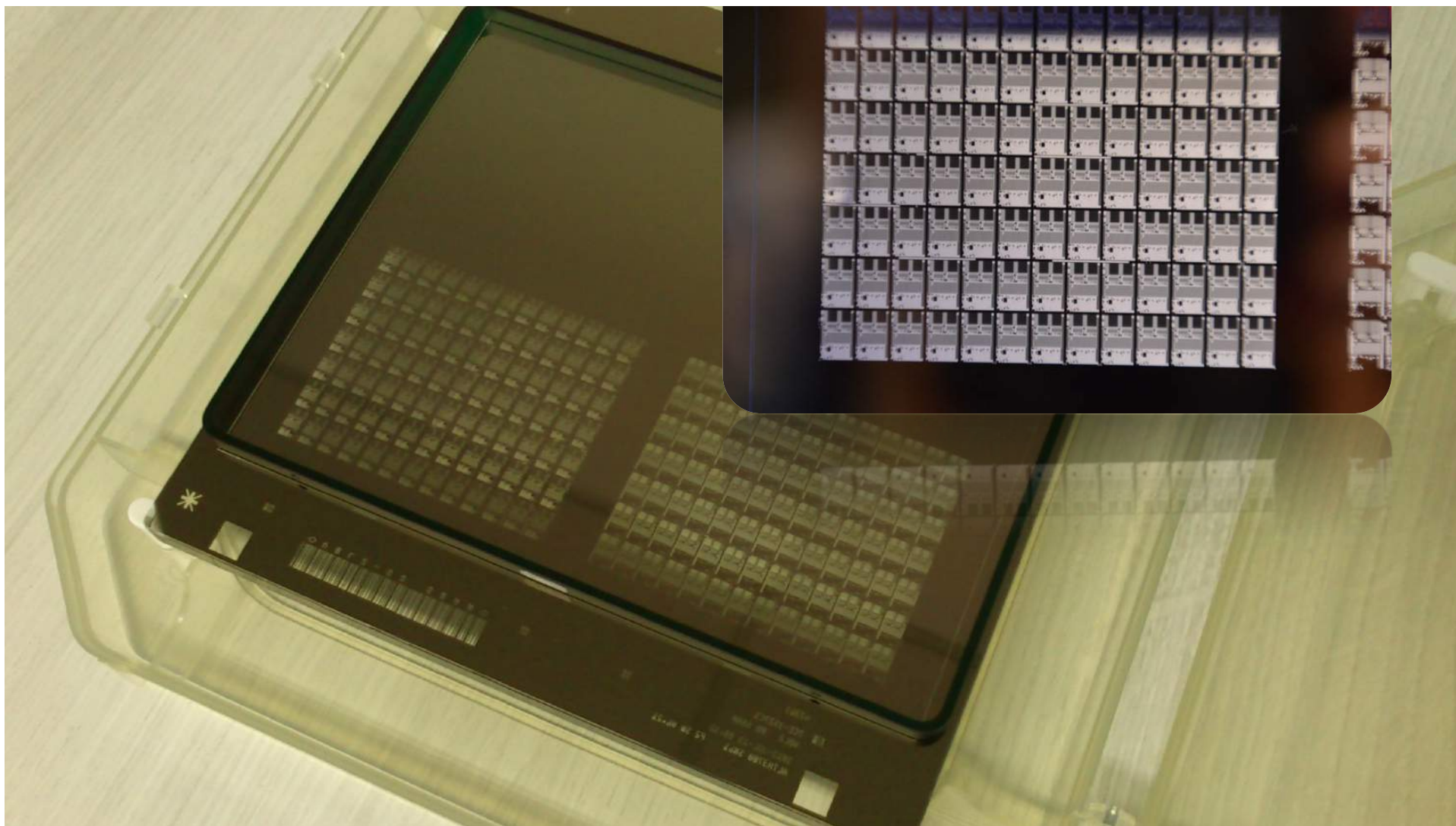


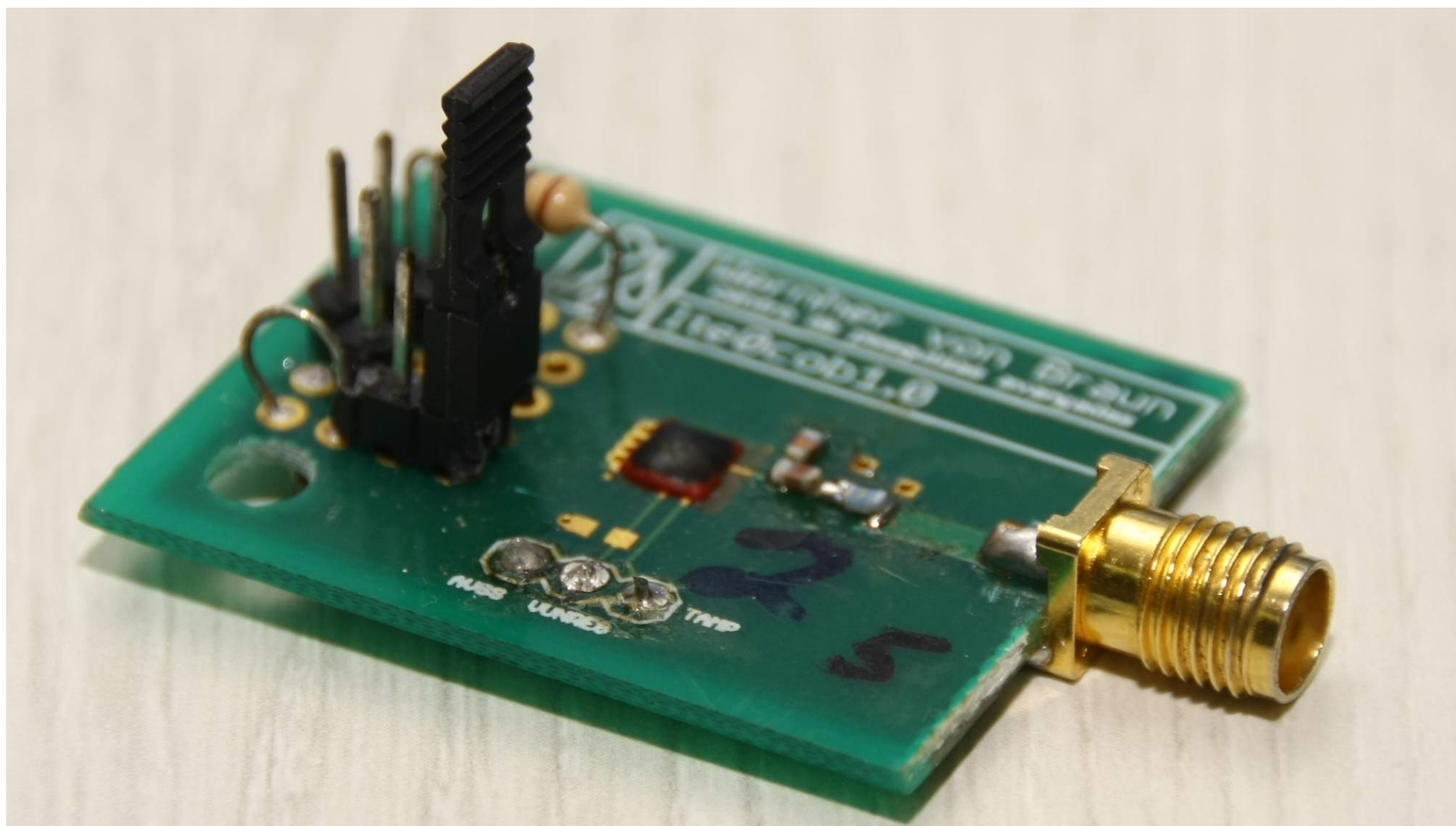
Cargo-container Seal with Tamper-Proof Mechanism with passive 915MHz
with embedded AES mechanism is going to be mass-produced in June





VBL developed complete domain of the professional companies in Asia to deliver high-quality IC components under a reasonable cost







VBL's Road-Side Equip for RFID Read/Write operations plus:
Vehicle Classification (Axle Counting, OCR, Security) and
Local e-Documents processing



VBL's Road-Side Equip being installed at a company's facility



Some segments are more susceptible to Risk



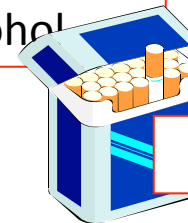
Consumer Electronics



Gasoline and Alcohol



Pharmaceuticals



Cigarettes



Documents

Some product segments are being tested under Brasil-ID concept to reduce logistic risks

Brasil-ID Participants & Segments involved: 223 reps present at Brasil-ID launch in Bahia, Dec 2009



Lab Solutions to Certify Interoperability from different Providers

VONBRAUNLABS developed a full set of testing and certification equipment, software and methodology in support of the new secure technologies – to address operations worldwide.

A private and dedicated company commercializes those products and solutions to Government Agencies and Certification Entities in general



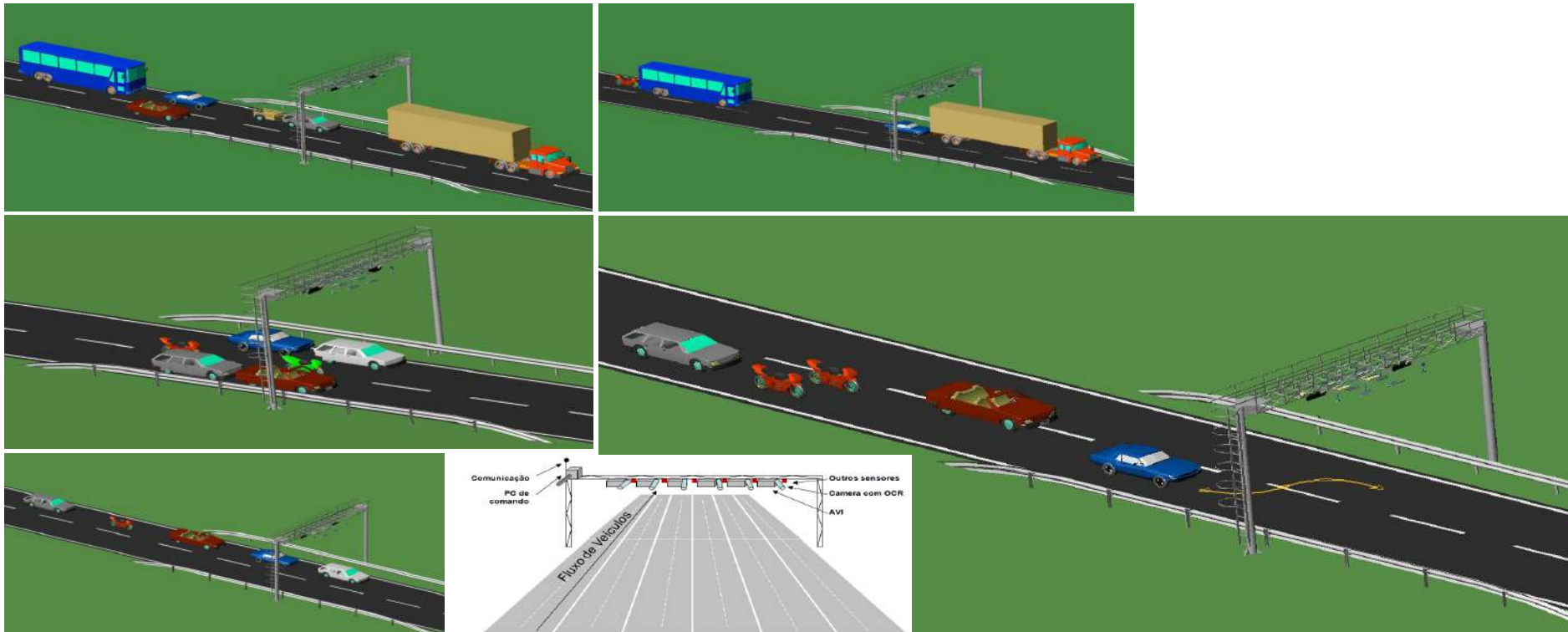
VBL is the official Brazilian Government representative in the GS1/ISO committees for the new 915MHz secure standard (ISO 18000-63 and ISO 29167-10) for which it has demonstrated the new technologies in passive silicon as a reference. These equipment also map the official certifications of the ISO standards in this field.

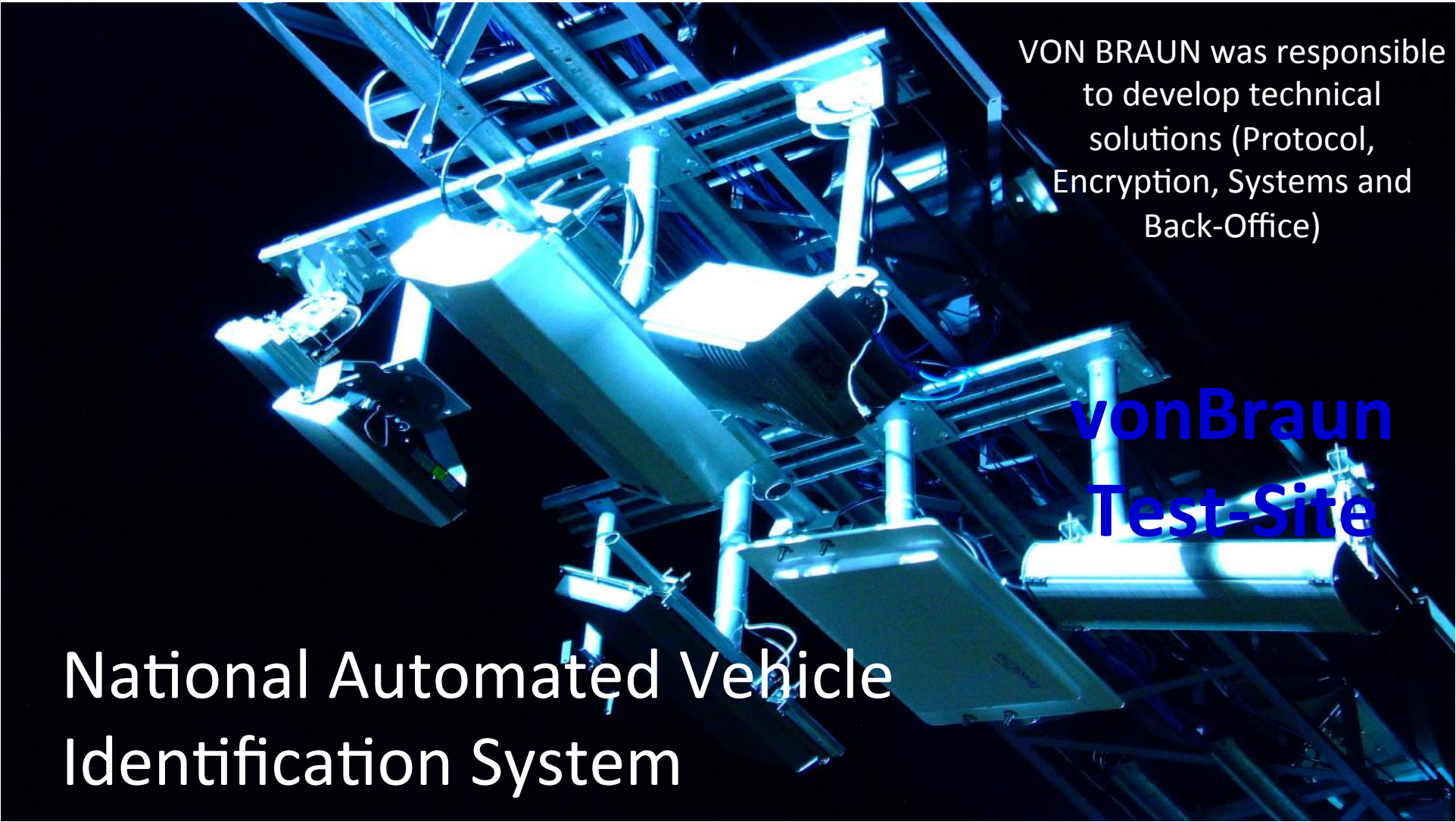
VONBRAUNLABS Full Set for AVI Field Certification and Interoperability Tests Lab

VONBRAUNLABS developed a Full Set for AVI Field Test (up to 200km/h, Several types of Vehicles combined) in a private Test-Track. It provides support to several companies which develop new technical solutions to address implementation of the new systems: Readers, Transponders, ORT Systems, etc – officially recognized by the Government.



Experimentation with AVI: Several situations in the Open-Road Context were tested





VON BRAUN was responsible
to develop technical
solutions (Protocol,
Encryption, Systems and
Back-Office)

**vonBraun
Test-Site**

National Automated Vehicle
Identification System

The AVI system in Brazil: RF & Systems' efficiency tests



VONBRAUNLABS test-site



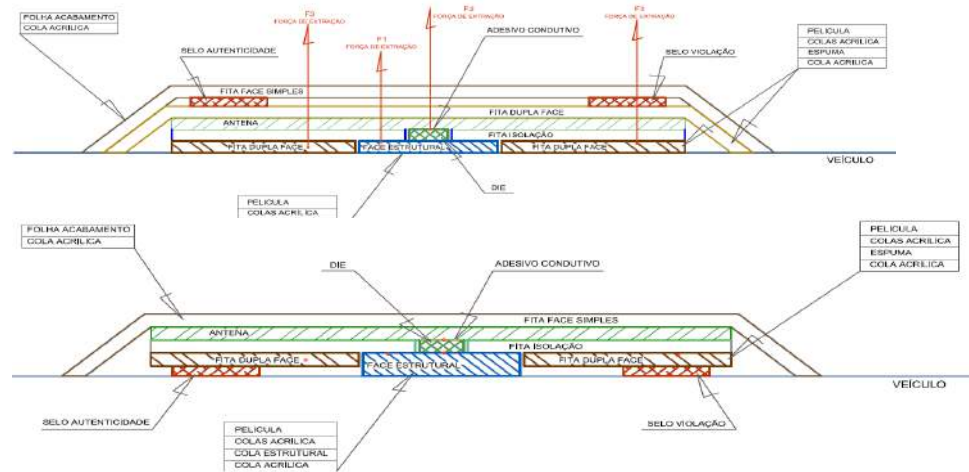
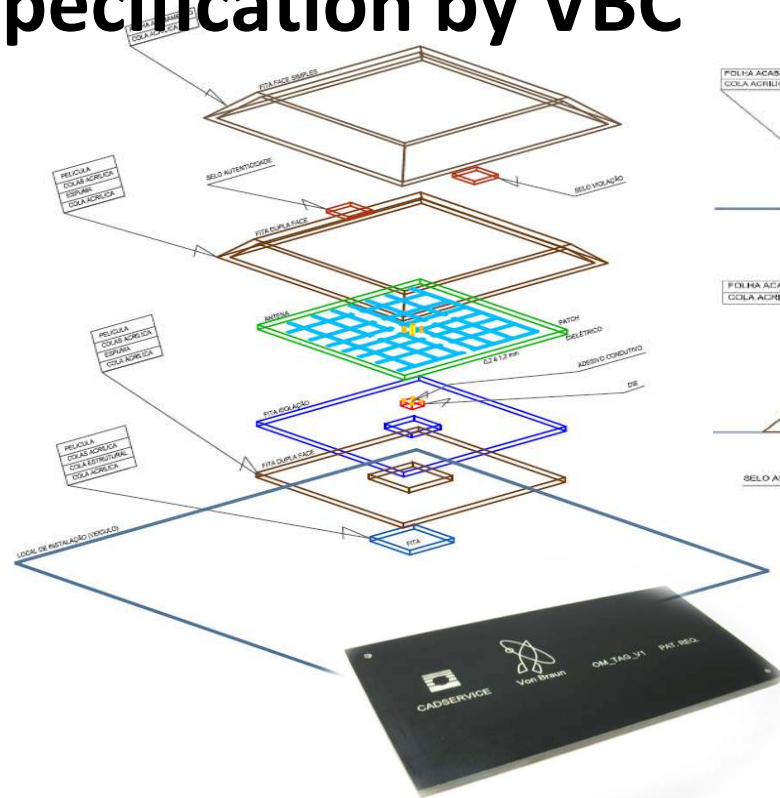
Tag fixation on the vehicle: Physical tampering tests



Tag fixation on the vehicle: Physical tampering tests



Tag structure design and specification by VBC



All sub-systems developed by VBC to ensure indelible association with the vehicle under a Scientific Methodology



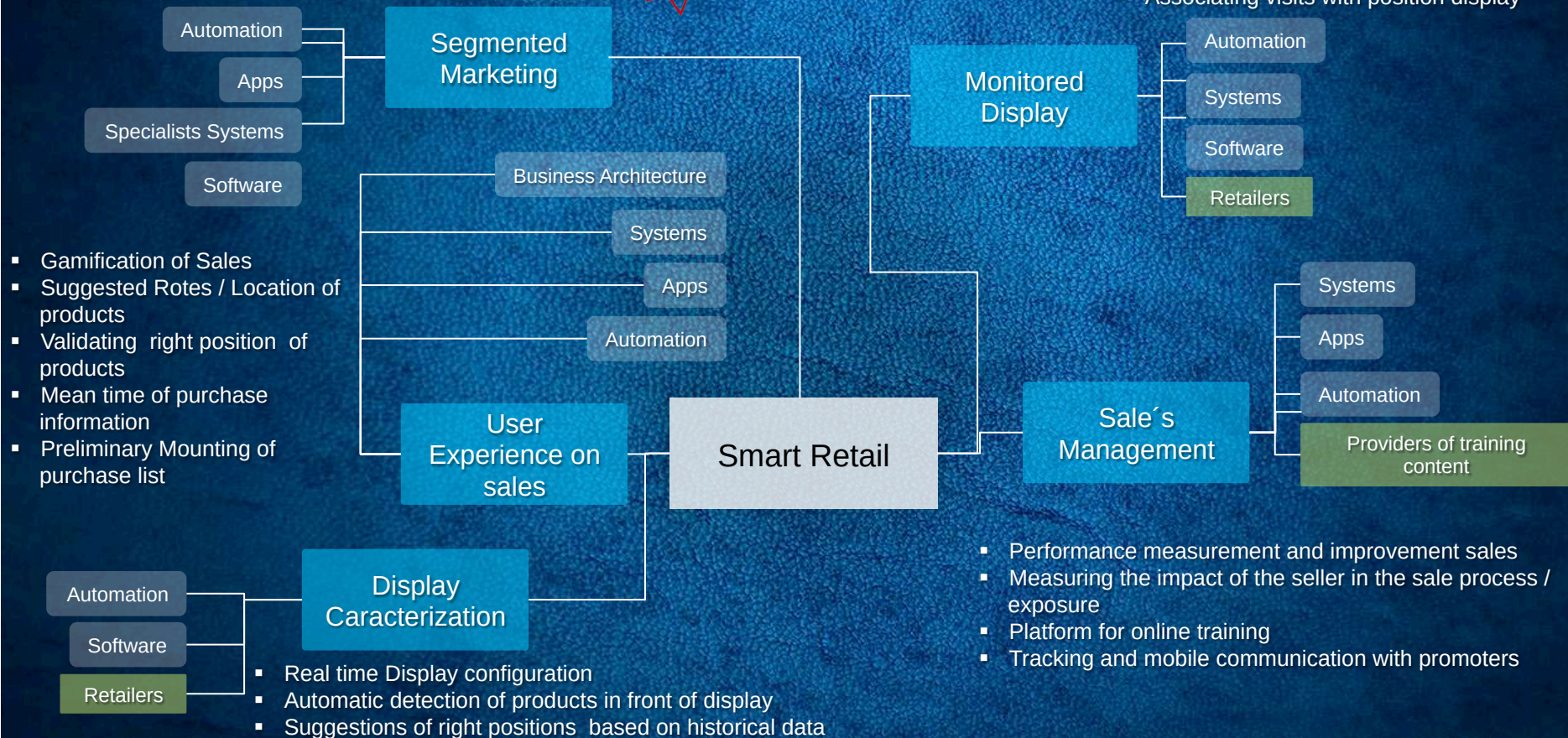
Structures available to Von
Braun Center's Customers to
develop strategic, proprietary
solutions →



Wernher von Braun
centro de pesquisas avançadas

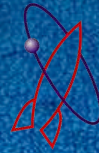
- Real time advertising according to user profile
- Location-aware Marketing (by GPS)
- impactful approach (with metrics) on social networks

- Check-in / out of sectors shop
- Heatmap visitation
- Time observation per products
- Associating visits with position display



- Gamification of Sales
- Suggested Rotes / Location of products
- Validating right position of products
- Mean time of purchase information
- Preliminary Mounting of purchase list

- Performance measurement and improvement sales
- Measuring the impact of the seller in the sale process / exposure
- Platform for online training
- Tracking and mobile communication with promoters



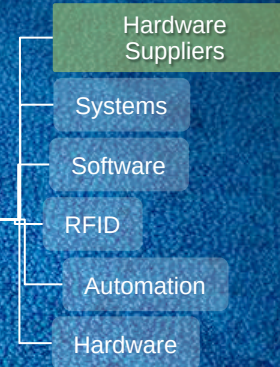
Wernher von Braun
centro de pesquisas avançadas

- Embedded tag
- Installation process
- Validation process



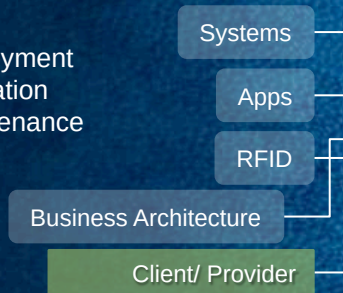
Vehicle

Road Systems



- Vehicle sensors
- Automatic Vehicle Identification (AVI)
- Transponder Reader System
- Automatic Lane Control

- Deployment
- Operation
- Maintenance



System Operation

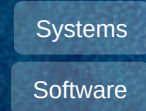
ITS (Intelligent Transportation Systems)

Manufacturing and customization



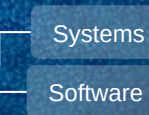
- Transponders Configuration Equipment

- Events Detection
- Billing Management
- Access keys Management
- Credit Management

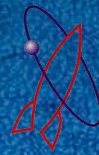


Back Office

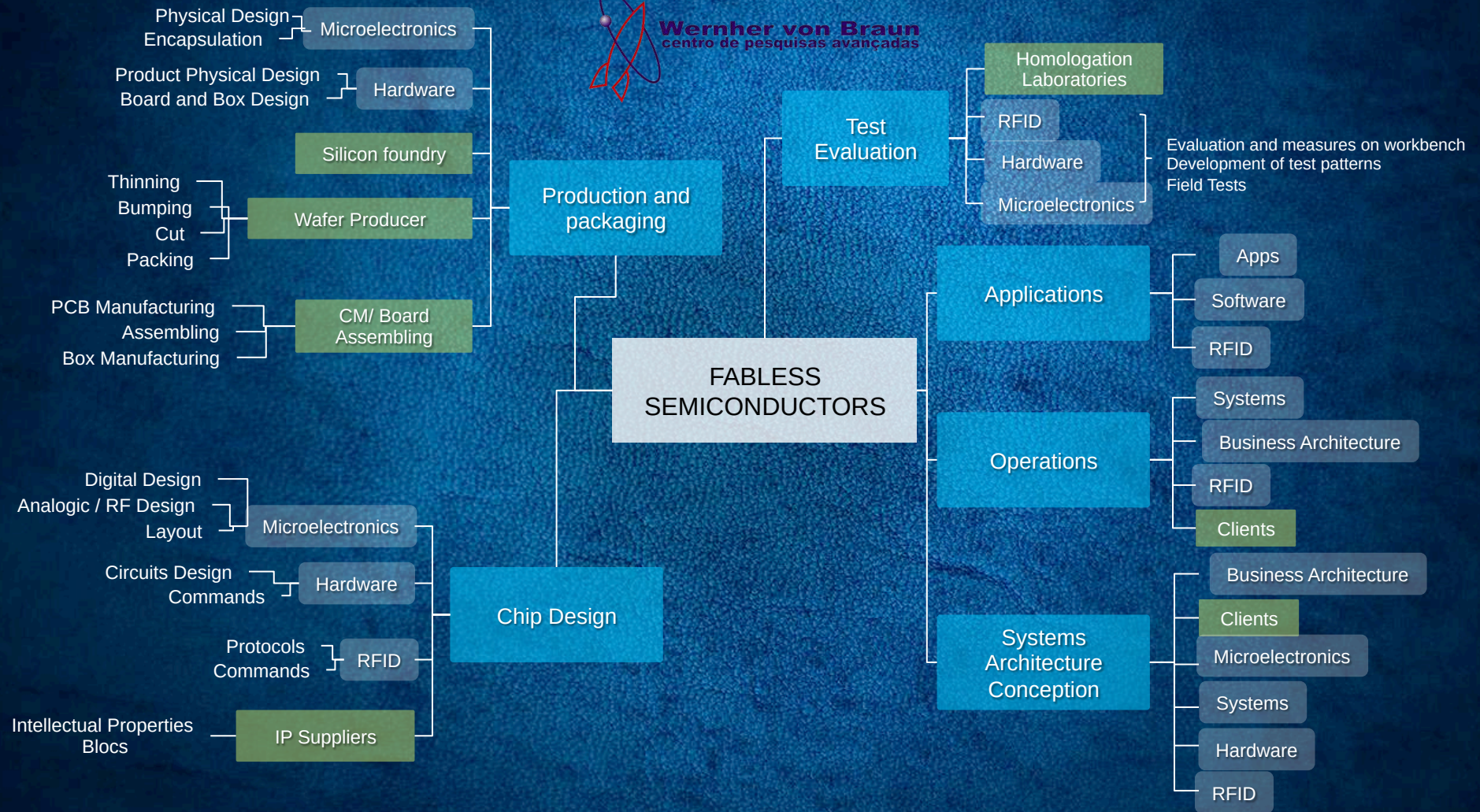
Remote monitoring and diagnostics



- Sensors
- Data indicators



Wernher von Braun
centro de pesquisas avançadas



Other Projects (Examples)



VBL's Apps ranked Top-5 in LA; VBL developed its own Educational content hiring Professional Teachers and Studios under a Game-App; Electronic Fuel-Injection Systems; Automated Nose for Gas Distribution System in Brazil; Medical Equipment's' Digital control

Experience in Mobile Apps

Von Braun Center works on multiplatform strategy to increase the range and the time-to-market of the application and service implementation.



Content gamerizing

Content & service oriented architecture

Using of devices sensors

Cloud sync

Billing modelling

Distribution and marketing strategy



- Acting in the last two years in the applications segment, Von Braun Labs developed a complete ecosystem with content providers, professionals training and development of services and marketing strategies based mobile applications.



Education



Entertainment



Sports



Health



Languages



Public utilities

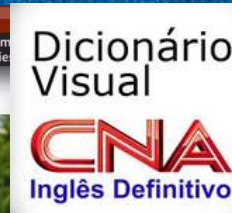
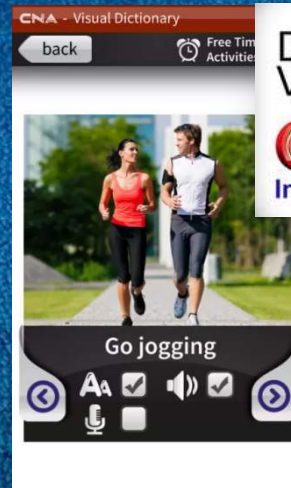
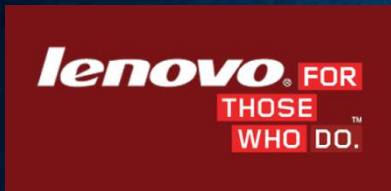


Games



Social networks

- Besides developing software, the von Braun Center operates throughout the process of design, content generation, service-oriented architecture and distribution strategy, providing its partners the comfort of having all the support, even if you are not experienced in this ecosystem .



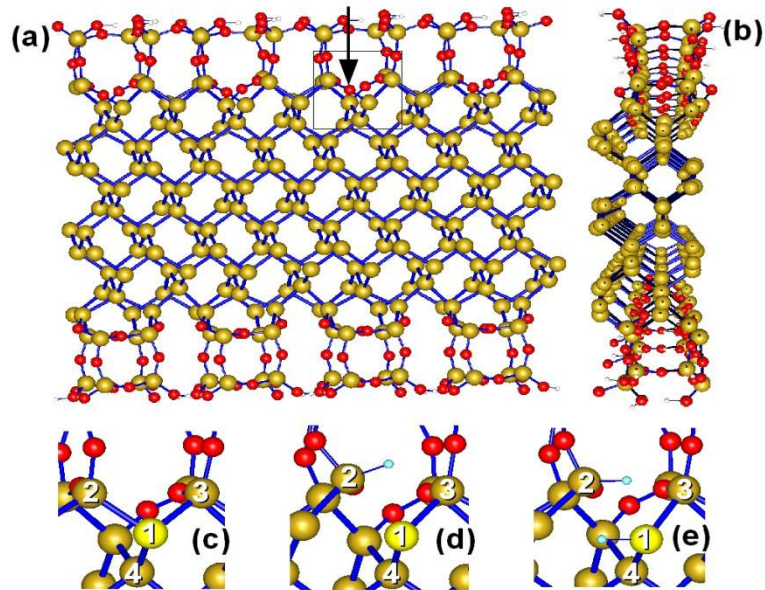
- 26 applications with Content exclusively generated for this project;
- VBC coordinated the whole content generation, from video recording to graphic design;
- <http://apps.microsoft.com/windows/pt-br/app/enem-para-lenovo/c72539b9-ea12-4228-9b34-4ab1ab4208f6>

- Partnership with CNA to develop apps and games for second languages;
- App design and content generation;
- <https://play.google.com/store/apps/details?id=br.com.cna.visualdictionary>

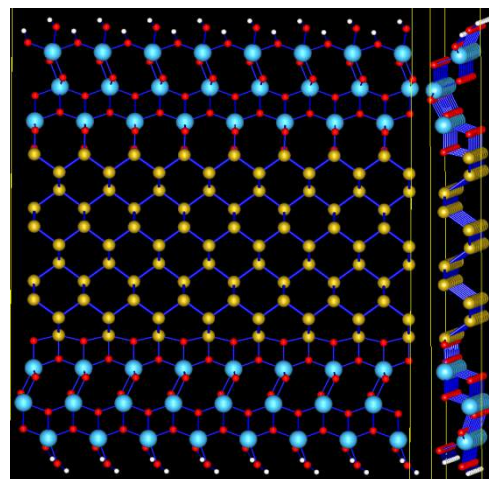
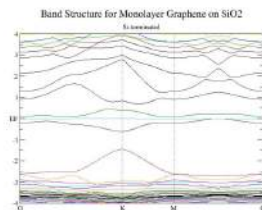
- Partnership with KidsKnowIt.com portal
- This app occupied the Top 3 Educational apps into the Brazilian Windows Store;
- <http://apps.microsoft.com/windows/pt-br/app/kidsgeonosso-planeta/acf38630-4f18-4c4b-a8e7-c063f4e99efd>

[illegible]

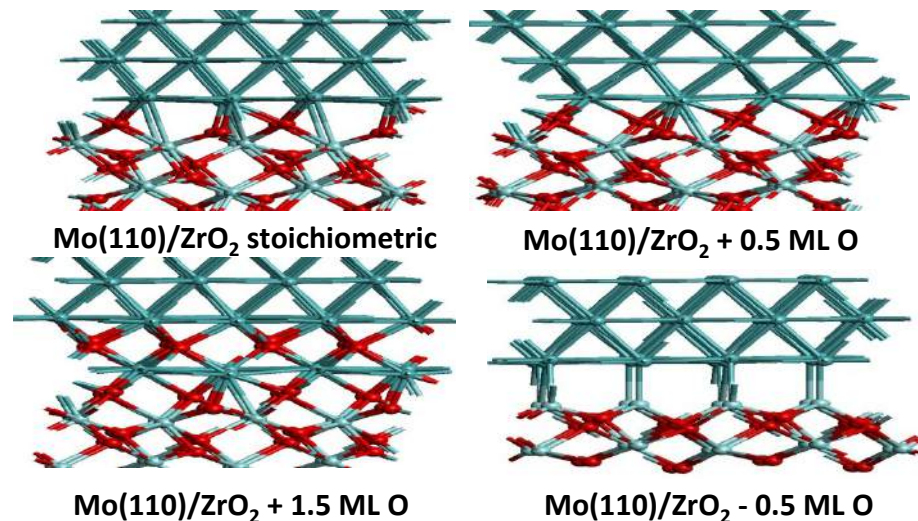
Automated Optical Inspection equipments for quality assurance and defect/fault analysis of products in manufacturing lines, Electronic Fuel Injection Systems' Firmware, Low-Cost PC Platforms for Industrial Utilization, VoIP platforms and Special Antennas



Ribeiro and Fonseca, "Ab-initio calculation of transport in ultra-thin SOI transistors: the impact of Pb centers and hydrogen passivation on electron and hole transport", in preparation



Giorgi, Fonseca, Korkin, and Yamashita, "Impact of the crystal structure of HfO₂ on the transport properties of model HfO₂/Si/HfO₂ silicon-on-insulator field effect transistors: a combined DFT-scattering theory approach", *Phys. Rev. B* 79, 235308 (2009).



Nanotech: 6 months to 0.5 weeks reduction in simulation time

New methods for simulations

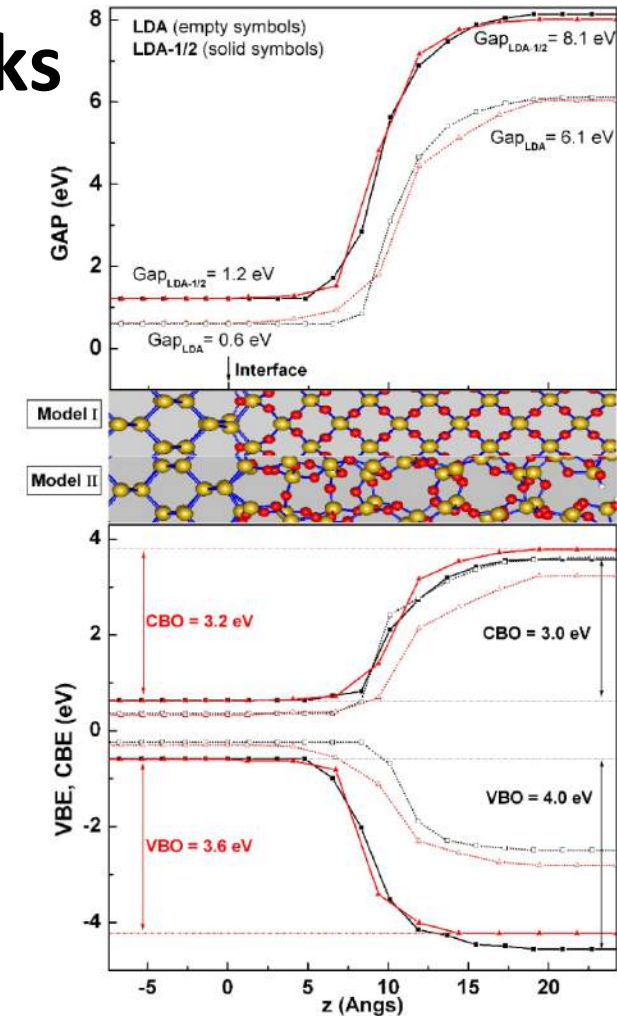
Self-energy correction for accurate and efficient calculation of excitations

Goal: to develop a method for accurate and efficient band gap and band offset calculation.

Experimental evidence: DFT/LDA underestimates the excitation energy.

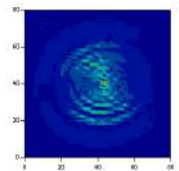
Impact: band gaps are usually underestimated by a factor of 2. Band offsets are unreliable. Predictive interface engineering is not possible.

Results so far: excellent for a number of dielectrics and interfaces.



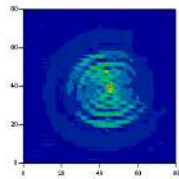
Origin is in Basic Research in Non-dispersive wave motion

At von Braun, the origin of all innovation is in basic Research – Mathematics & Physics

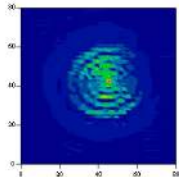
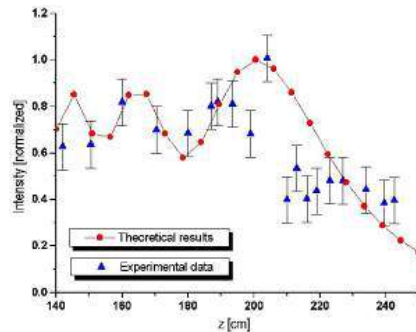


max(Y) = 174

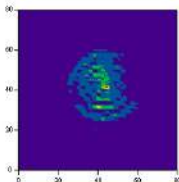
Special wireless devices to launch non-dispersive waves in the microwave – range were developed by von Braun at the research – phase.



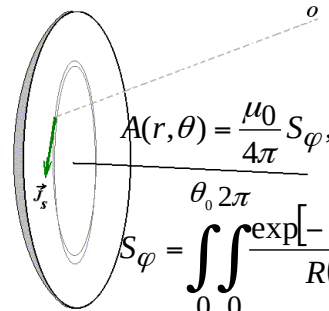
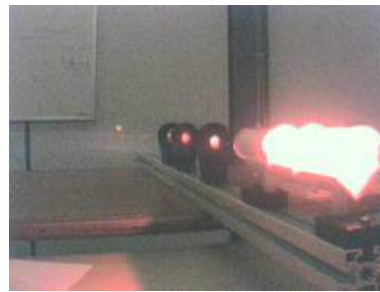
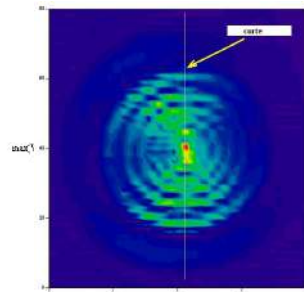
max(Y) = 160



max(Y) = 177



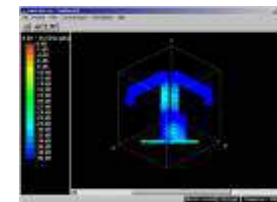
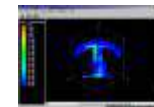
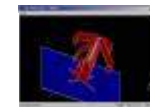
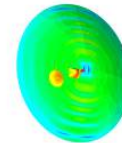
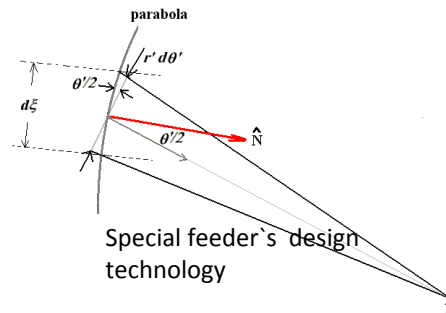
max(Y) = 177



$$A(r, \theta) = \frac{\mu_0}{4\pi} S_\varphi,$$

$$S_\varphi = \int_0^{\theta_0} \int_0^{2\pi} \frac{\exp[-ikR(\theta', \varphi')]}{R(\theta', \varphi')} J_s(\theta', \varphi') \frac{r(\theta')^2 \sin \theta' d\varphi' d\theta'}{\cos(\theta'/2)},$$

$$R(\theta', \varphi') = \sqrt{r^2 + r'(\theta')^2 - 2rr'(\theta')(\sin \theta \sin \theta' \cos \varphi' + \cos \theta' \cos \theta)}$$



Example of Wernher von Braun's 13.56 MHz solution



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(54) **SELF-TUNING RADIO FREQUENCY
IDENTIFICATION ANTENNA SYSTEM**

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(21) Appl. No.: **11/357,679**

Publication Classification

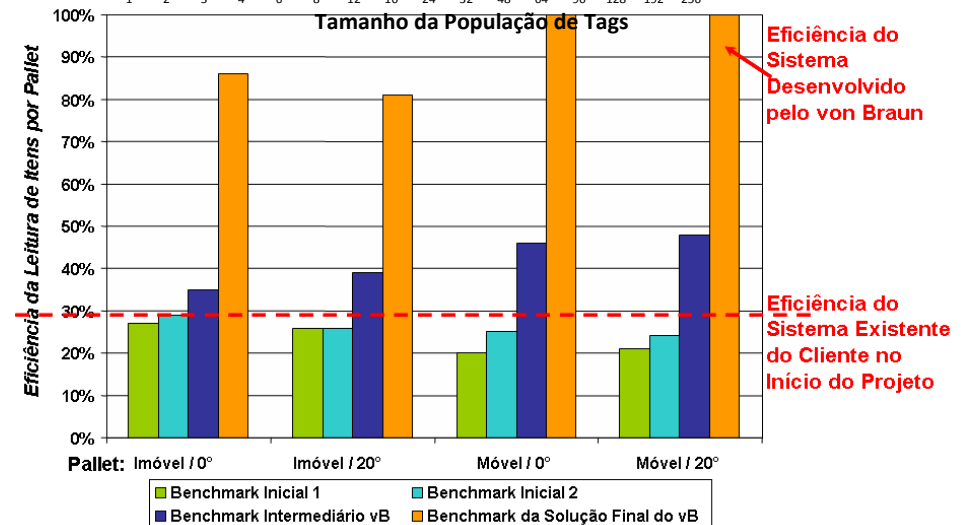
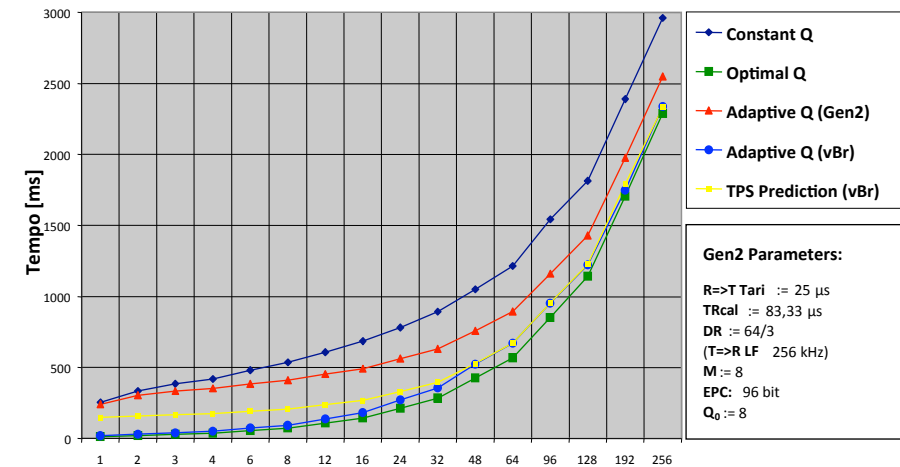
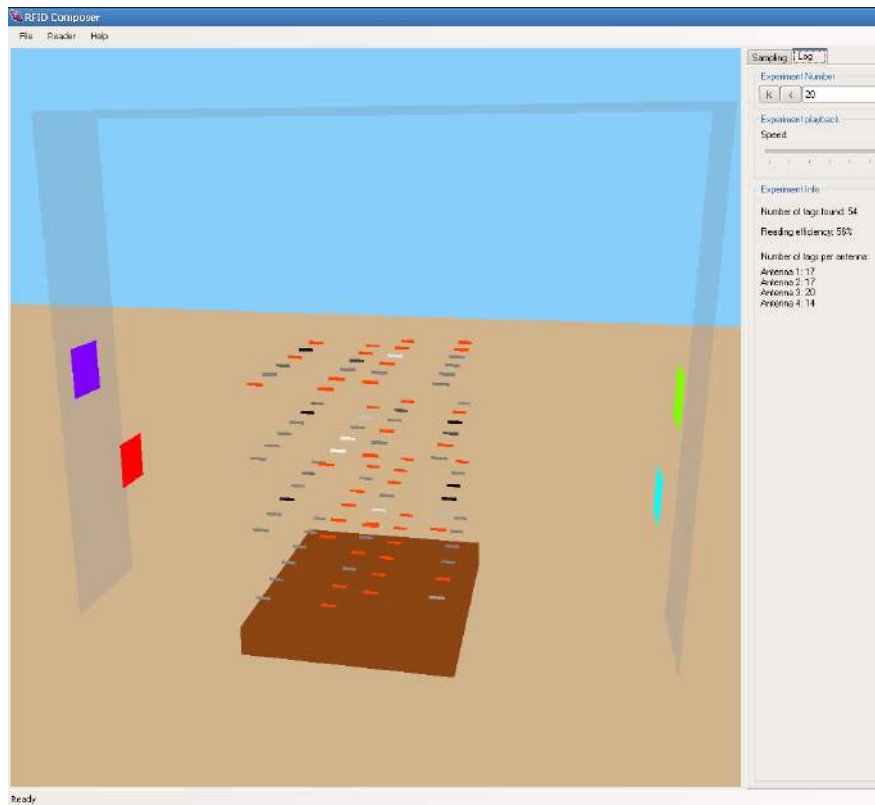
(51) **Int. Cl.**
H01Q 9/00 (2006.01)

(52) **U.S. Cl.** **343/745**

(57) **ABSTRACT**

A self-tuning antenna that automatically adjusts its input impedance to compensate for externally induced impedance variations is provided. A variable impedance is adjusted by a control circuit to reconfigure the input impedance of the antenna to compensate for different environmental situations and different transponder mismatch situations. A negative-feedback signal is employed to determine or infer impedance mismatches and reconfigure the antenna input impedance (e.g., capacitance and/or resistance) until a desired equilibrium of the antenna input impedance is reached. A reference measurement (e.g., VSWR measurement) is automatically performed by an antenna tuning circuit that adjusts

Experience in developing high-eff asset tracking



Past experience in developing solutions for Cargo Container Tracking

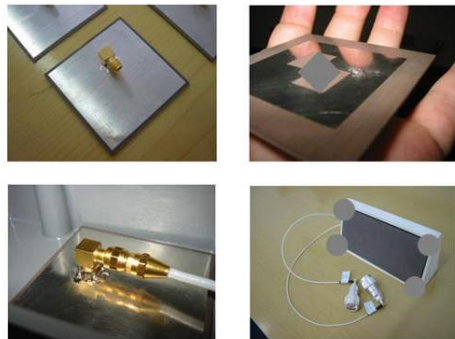
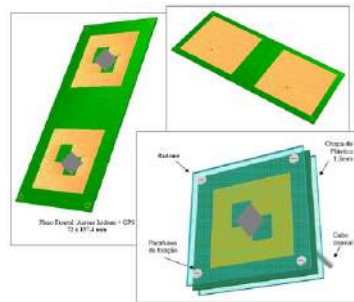


Figure 2 – a standard container showing the place where will be fixed the antenna (red circle)

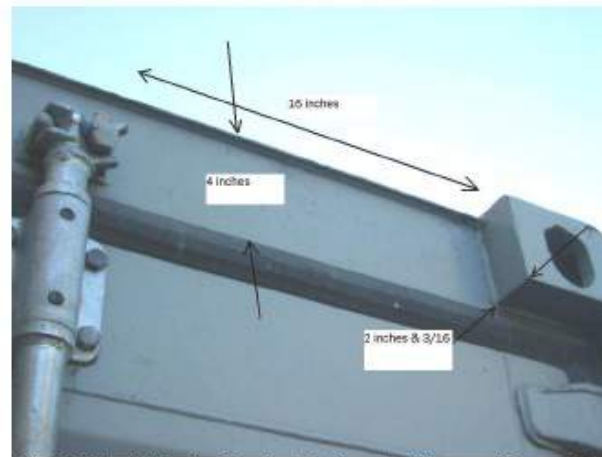
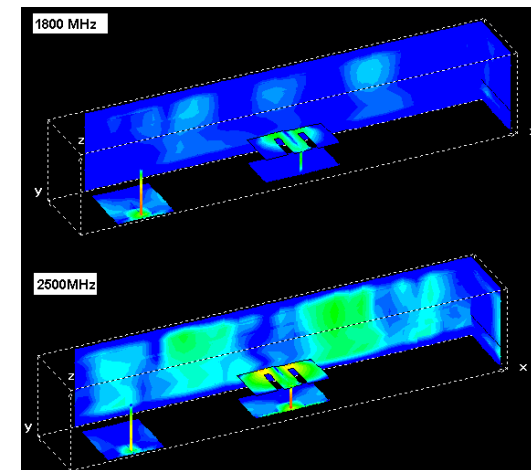
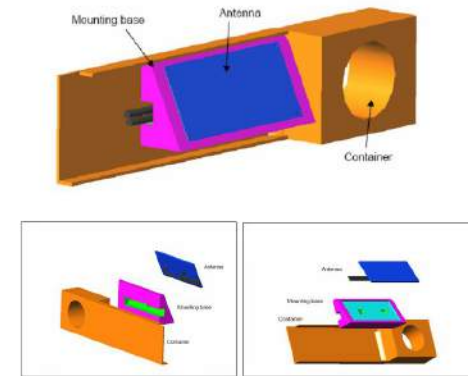


Figure 3 – A Standard Container Photo showing the place where will be mounted the antenna. The measurer show the free space to mount the antennas.





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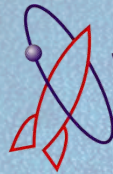
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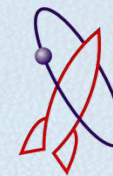
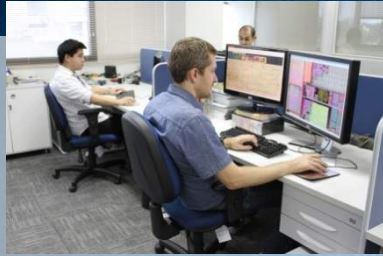


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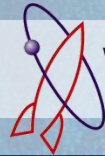


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