



SE view on PMR BB

Broadband for Critical Communications – Barcelona 14-15/2/2012

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15/02/2012



- **STRATEGIC ANALYSIS**
- **MULTI-TECHNOLOGY NETWORK
INTEGRATION**



Strategic Analysis

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- **Broadband needs**
- **Current context**
- **Future scenarios**

Broadband needs

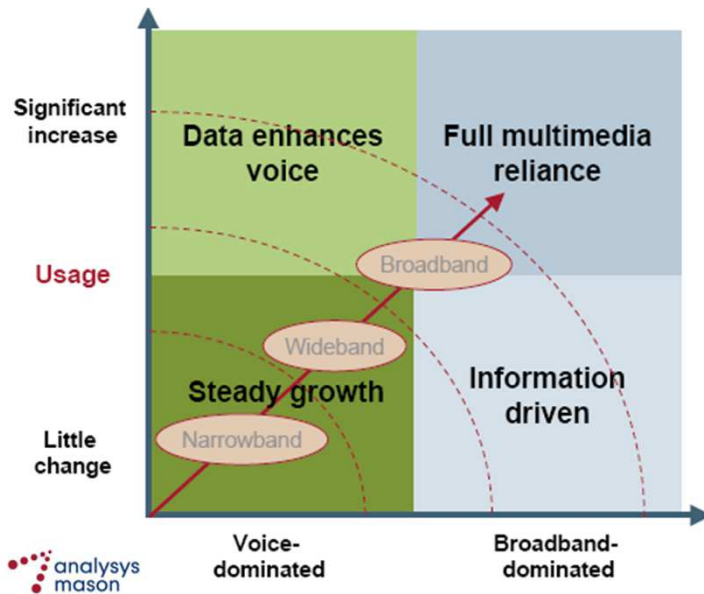
Who and why?

- **BB demand today coming mainly from US & Europe PSS market sectors**
 - **For high resolution full motion video TX**
 - **To broaden the access to existing data consuming apps to more end users**
 - **Different time scales for BB adoption from country to country**
- **Other sectors may follow depending on both regulatory/commercial constraints and apps**

Requirements evolution

- **New ways of working require mobile broadband**
- **Data and multimedia apps used alongside voice**

➔ Mobile office	<ul style="list-style-type: none"> • Instant messaging • Email, intranet and Internet
➔ Transfer of still images	<ul style="list-style-type: none"> • Images sent between field and command centre (e.g. missing persons, casualties, etc.)
➔ Digital mapping / location services	<ul style="list-style-type: none"> • Tracking location of vehicles, objects and people • High-quality digital maps of different environments (e.g. indoor floor plans and building plans)
➔ Remote access to databases	<ul style="list-style-type: none"> • Medical journals, real-time patient data • National databases (e.g. DNA, iris, facial recognition, hazardous materials, Fire Service Gazetteer)
➔ Personnel monitoring / sensor devices	<ul style="list-style-type: none"> • Asset tracking • Body sensors, biometrics
➔ Real-time and non-real-time video	<ul style="list-style-type: none"> • Thermal imagery, video conferencing • Streaming live images (e.g. CCTV surveillance, live views from scene of incident to control room)



- **Existing networks to become insufficient to sustain bandwidth needs**
- **PMR specific features available in NB networks remain basic reqs**



Target sectors and apps

PPDR

- Mobile office
- Mobile command and control
- Intensive tracking
- Multi-media group calls
- Real-time video sharing
- Extensive use of (intelligent) sensors

Transport

Rail

- New generation signalling systems
- Public Information & Entertainment
- Videosurveillance (on board/on ground)

Tires

- Tracking and tracing
- Vehicle remote interaction
- Infotainment / video surveillance

Energy & Utilities

- New generation SCADA
- Multimedia operational communications
- Wide area videosurveillance
- Smart metering
- Smart grid

Public or dedicated?

- **Public BB networks not usable for mission and operational critical apps**
 - **Different driving factors from public operators (coverage, availability, reliability, etc...)**
- **Need for dedicated BB networks**
- **BB solutions adequate for PMR may enable not just video but re-invent the operational routine**
 - **Application paradigms from “consumer world” might be adopted in a PMR style**

Current Context

LTE is the choice

- **LTE is the most promising technology to give an answer to BB needs in PMR sector**
- **European TETRA operators forum considering LTE as broadband technology**
 - **Initially...for PSS overlay data networks**
 - **Later...also for voice services**
 - **Target**
 - **to have “in future” a unique technology for both BB data and voice**

- Availability of dedicated **spectrum**
- LTE Adaptation to PMR user needs
- Availability of **scalable low cost** LTE solutions for small/medium sized systems
- **Integration** with existing PMR technologies

Spectrum saves lives!

- **Dedicated networks ⇒ Dedicated spectrum**
- **Spectrum availability is the main issues preventing rapid BB diffusion in PMR market**
- **In Europe**
 - **spectrum management process quite complex & slow**
 - **PPDR community challenging broadcasters and public operators lobbies**
 - **forecast for spectrum availability not easy due to political and economical factors**

- **SE is active in TCCA and CEPT in supporting request for PPDR broadband spectrum < 1 GHz**
- **SE position in the spectrum debate**
 - **400 MHz band NOT a viable option**
 - **1.4 or 3 MHz LTE version would not give enough benefit over a combination of TEDS channels**
 - **700-800 MHz bands much more viable and promising to take full advantage of LTE power (e.g. video TX not possible in less than 5 MHz band)**
- **LTE use in PMR environment today practicable outside Europe due to “easier” regulatory rules**

- **LTE standard is not conceived for critical users**
- **Improvement needed even just for LTE as an overlay network**
- **Later for voice a complete TETRA-like service suite should be developed over/in LTE**
- **TCCA shall drive LTE adaptation acting in 3GPP on behalf of the mission/operation critical community**

Future scenarios

Our vision...

- **SE is investing in LTE and its adaptation to PMR**
- **TETRA still as solution for voice for a long period**
- **TEDS as “trade-off” solution where dedicated BB spectrum is not available and/or for investment optimization**
- **LTE where context and requirements allow it**

No single technology in the near-mid future

Our vision...

- Whichever the future...it will be **heterogeneous**
- Capability to provide a **smooth evolution** of PMR to a full BB environment is a must
- Technology integration is THE solution
- Whichever the technology mix, the network needs to be perceived **as a single entity** by users and apps

- **Service perspective**
 - **TETRA for voice & basic apps complemented by TEDS/LTE data overlay for demanding apps**
- **Network composition perspective**
 - **WB & BB may co-exist or stand alone depending on customer needs and spectrum availability**
 - **LTE hot spots in metropolitan areas & other locations of interest and TEDS elsewhere (rural areas)**
 - **rapidly deployable LTE solutions in limited areas in case of disaster, incident or special events**

- **“Evolved” LTE as dominant technology**
- **Both voice and data on BB in most cases**
- **PMR TETRA-like voice services ported over LTE**
 - **Long standardisation effort**
 - **New ruggedised LTE-based radio terminals**
 - **Interoperability process to be renewed**



Multi-Technology Network Integration

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15/02/2012

Summary

- **Context**
- **Targets**
- **Selex Elsag solution**
- **Use scenarios**
- **Advantages**

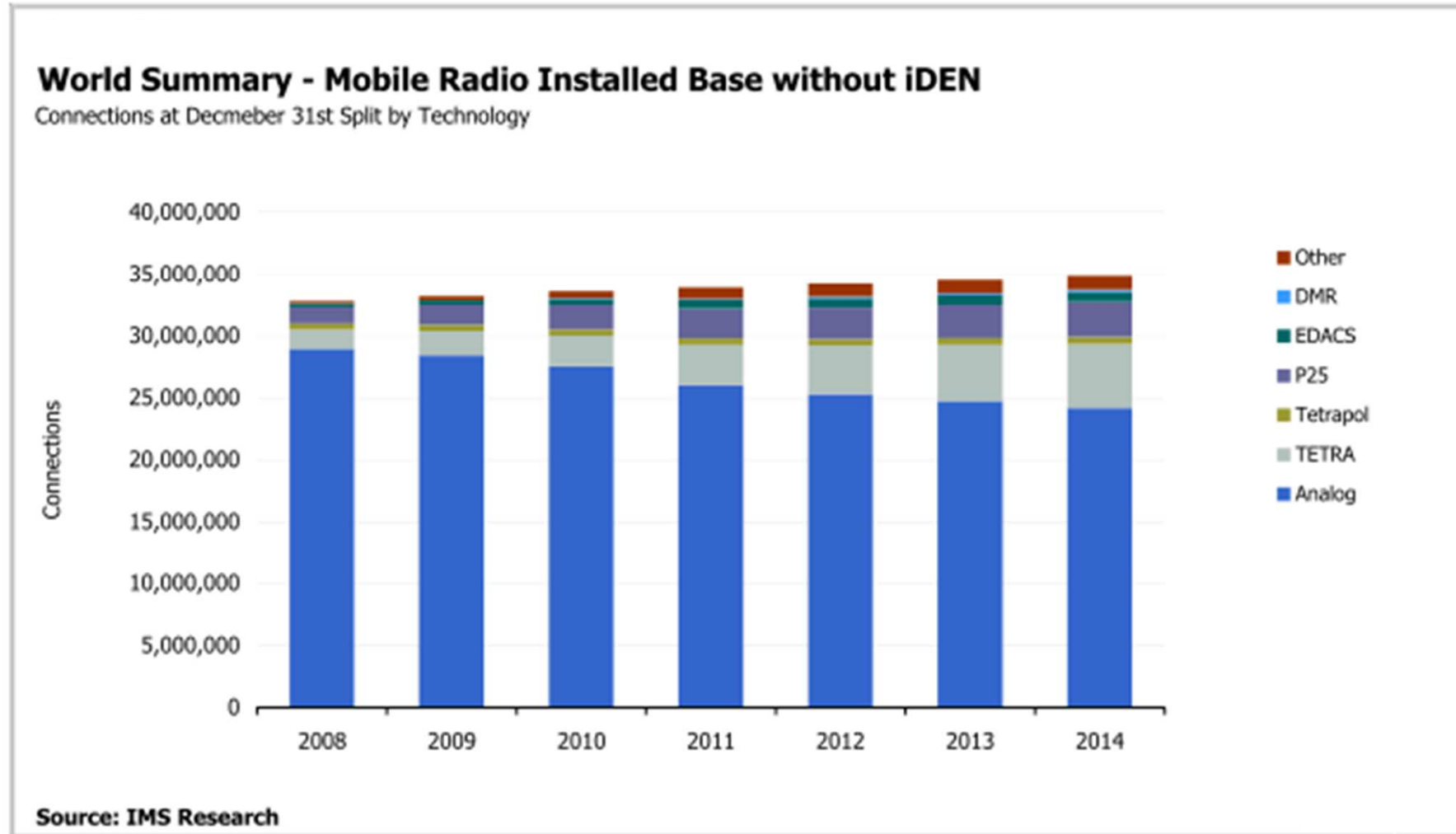
Context

Change Factors

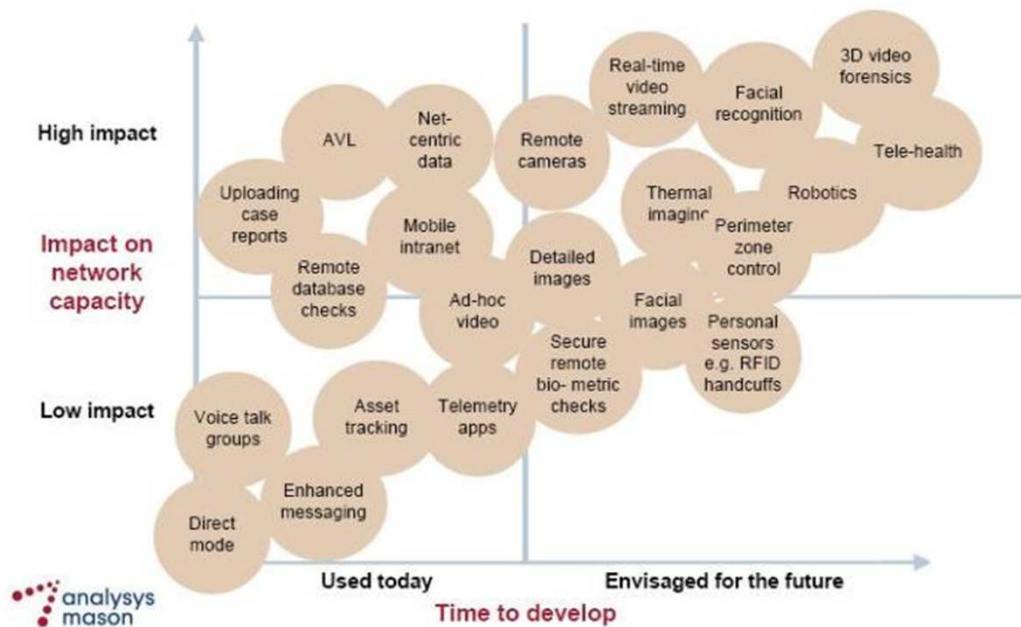
- **Analogue to digital** transition
- **Narrowband to Broadband** transition
- **Fixed/mobile convergence**
 - => exploiting consumer models (e.g. IMS)
- **From a single Network to a Solutions**
 - => integration of different technologies
 - => also **data** become **mission-critical**

- **Information**
 - **Data more and more used to enrich voice information**
 - **Awareness of the added value represented by multimedia information**
- **Operativity**
 - **Data Applications in addition to voice modify operations/procedures**
- **Coordination**
 - **Command and Control also on the scene: more and more necessary Dispatching functions on the field**
 - **Interaction between PMR-users and non-PMR entities (under different communication systems)**

PMR: a heterogeneous Comm's Environment



- Heterogeneous technologies **interoperability** is needed
- **Transition to digital systems** accelerated by low-cost digital standards (e.g. DMR)
- Still focus on voice services but increasing **broadband** data services is required



- Operational requirements (new services) implies the **evolution** toward new broadband technology
- But, **interoperability** with legacy and presently more secure technologies is required

Targets

Key-points

Various capacity needs to enhance communication services and provide multimedia applications



Broadband introduction

To master **Heterogeneity** for providing Communication Services abstracted from the Access Technologies while saving Interoperability



Integrated Communication Platform

Flexibility towards applications for different organizations, with different business objectives and needs



Scalable & Distributed Core Service Oriented Architectures

This approach leads to:

- overall **cost reduction** when various communication technologies are involved
- PMR **architectures** easily adaptable to different needs
- increased ability to **fulfil customer reqs**
- easier integration of newcomer Technologies (e.g. 4G/LTE) enabling **new services**

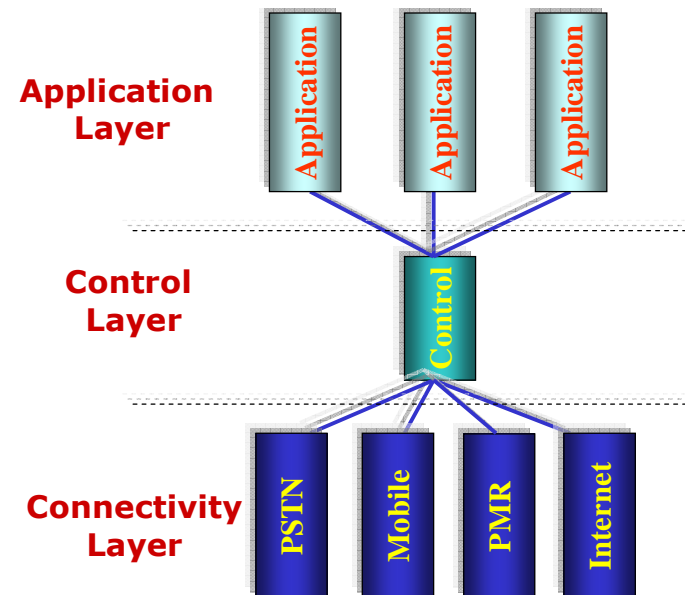
Selex ElSag Solution



Vertical Model (typical network)

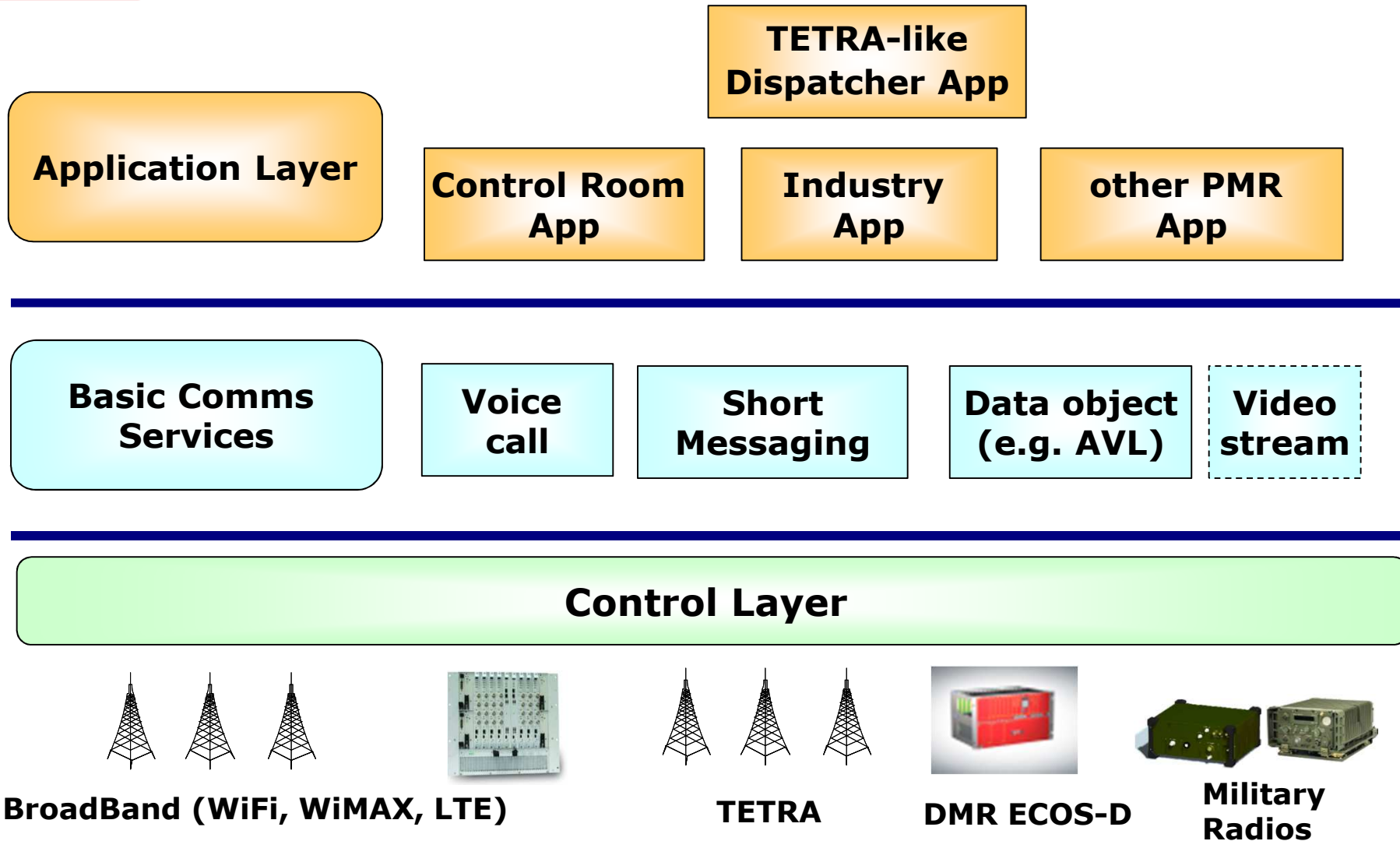


Horizontal Model (NGN)



- **CSP-Perseus** is SE TLC platform to provide PMR and multimedia services regardless of the access technology integrating also LTE and 4G
- **CSP-Perseus** integrates not only heterogeneous PMR and TLC networks, but also their subscribers by obtaining a single, unified and homogeneous network
- **CSP-Perseus** design envisages a control plane fully separated from the user plane
 - processing platform easily scalable according to load of signalling transactions
- **CSP-Perseus** core network is fully IP, with:
 - Control Plane based on SIP/SIP+ and TETRA L3 protocol transported over IP
 - User-Plane is based on RTP transported over UDP datagram

Communication Service Platform



- CSP-Perseus retains **full control** on system network elements and users
- CSP-Perseus able to supply a **unified set of PMR services** in a Heterogeneous System (incl. LTE)
- PMR Voice/Data services over BB access technologies need **standardization**

The Architecture is ready for extension to new PMR Services

3 types of network implementation

Emergency operations and Unplanned events



Incident areas



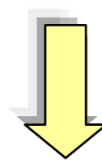
Compact systems

Day-by-day operations and planned events



MAN areas

Major Events venues



Light/medium systems

Regional and National networks

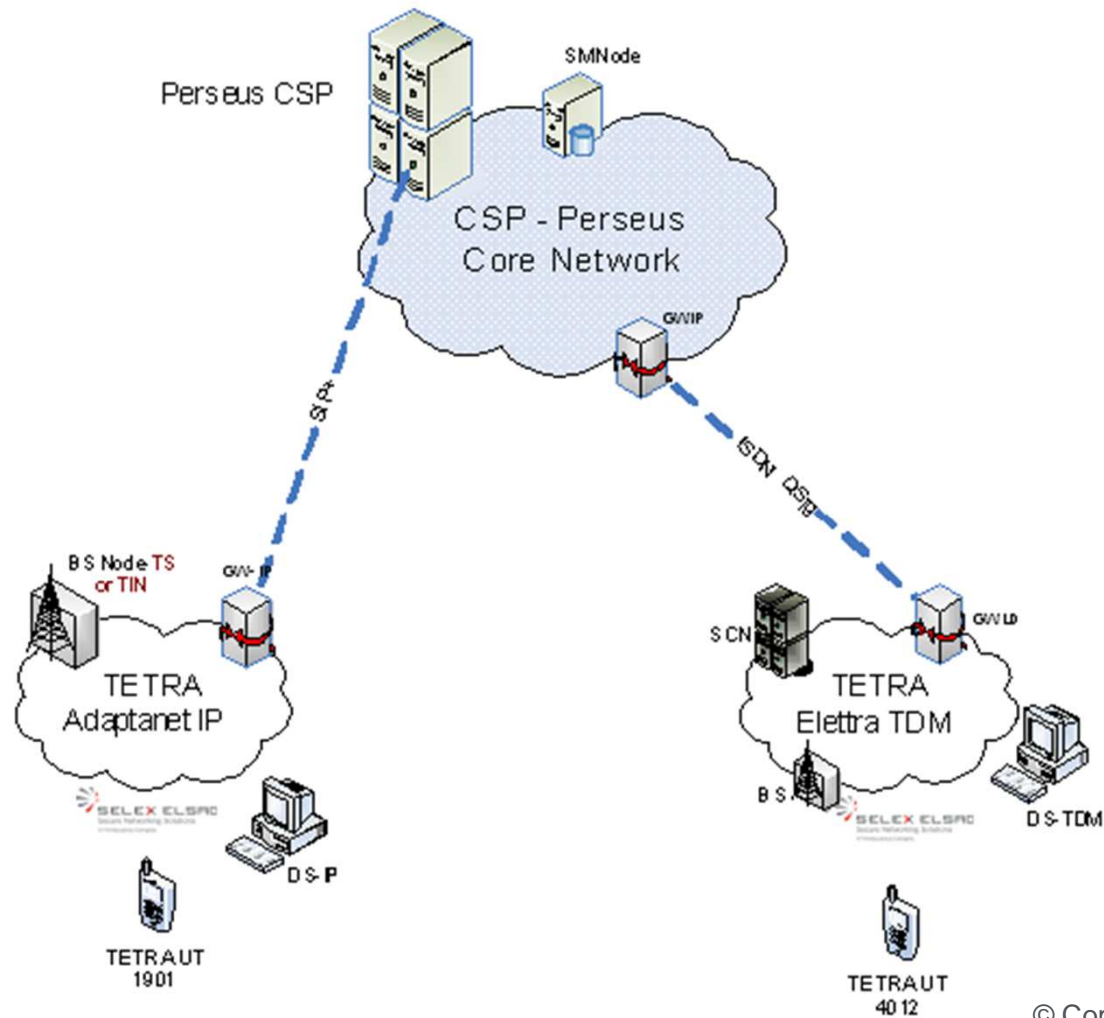


Large systems

Use scenarios

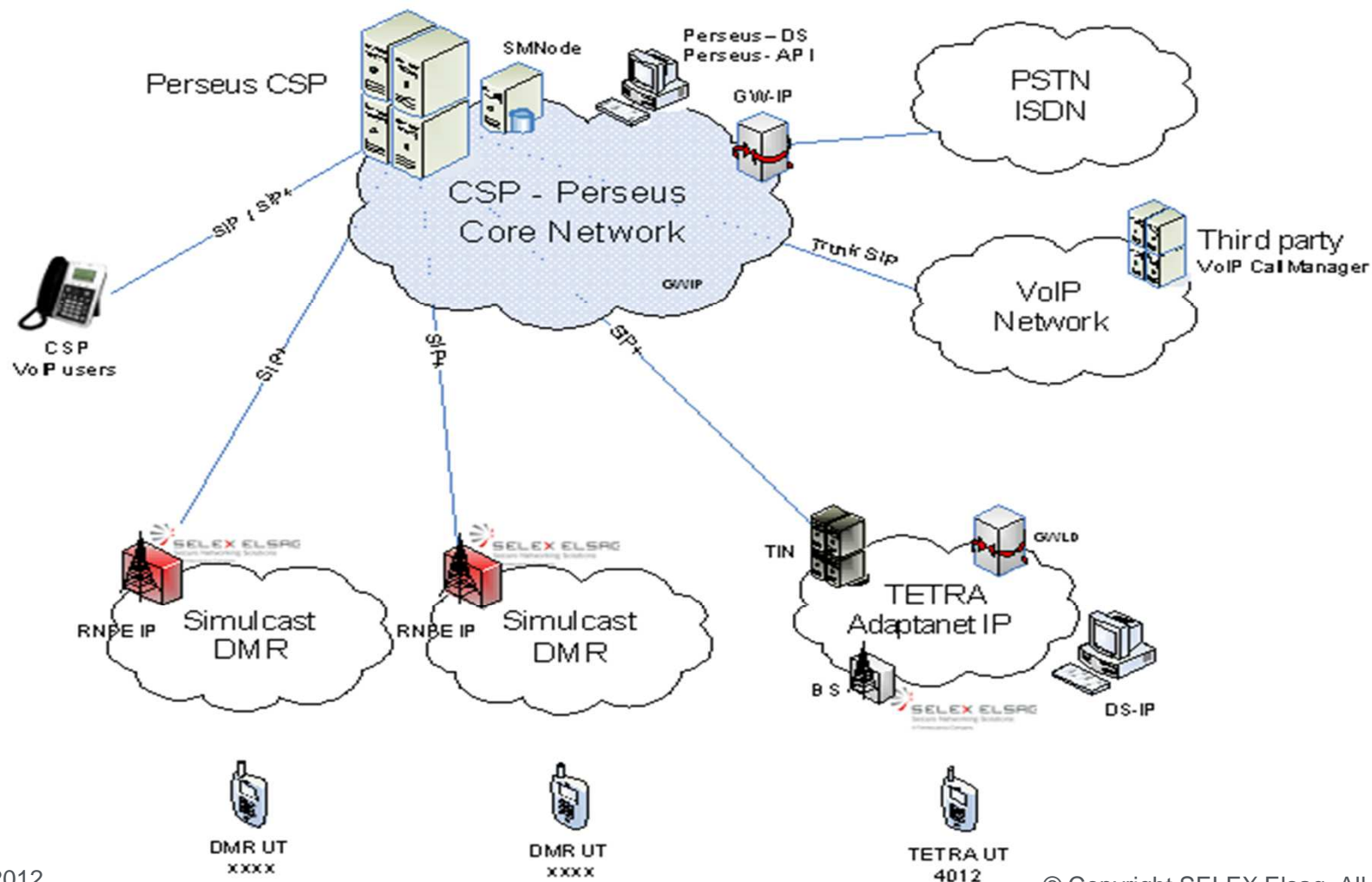
Heterogeneous Networks Integration

From TETRA networks...



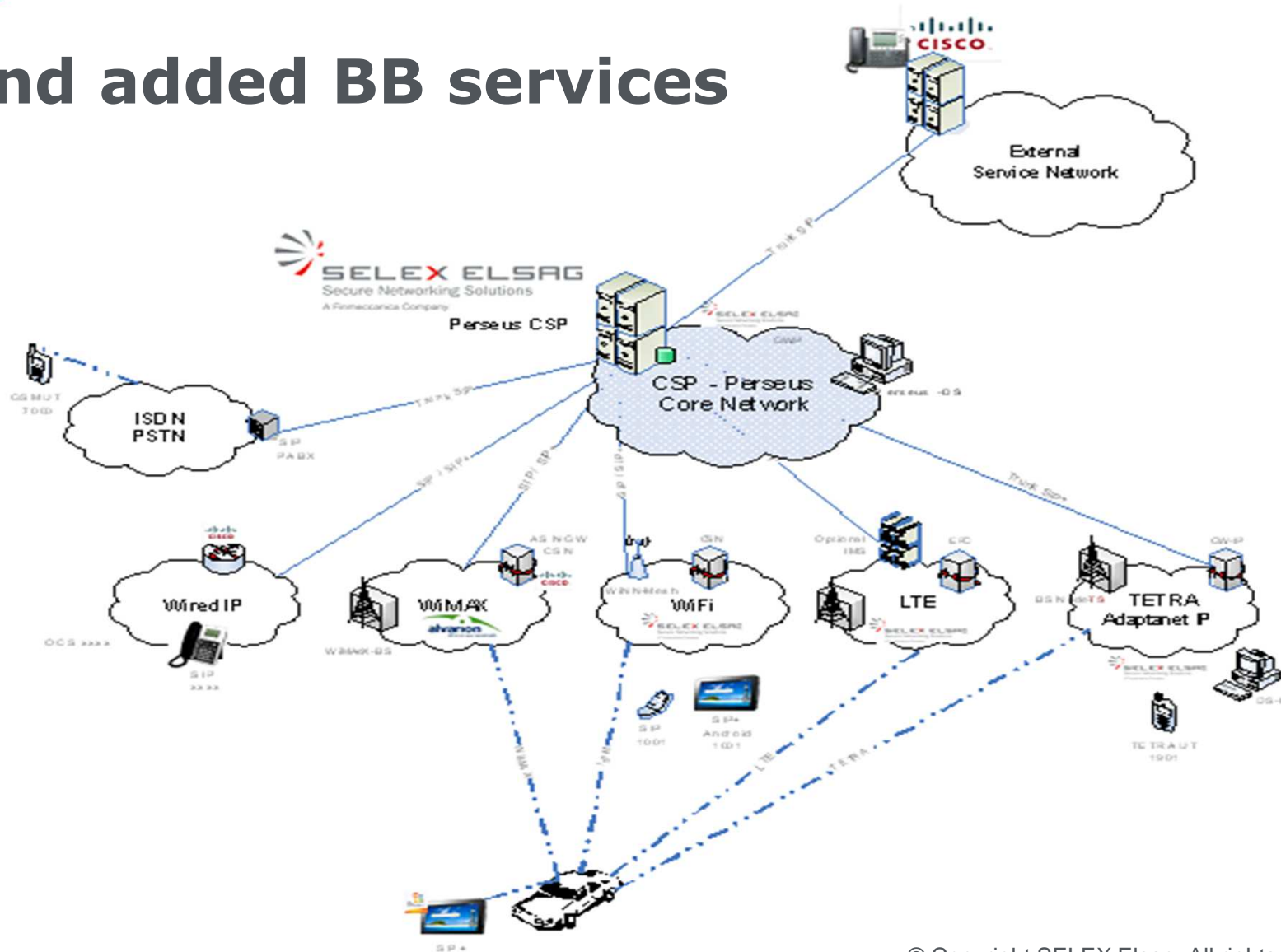
Heterogeneous Networks Integration

... to mixed PMR networks ...



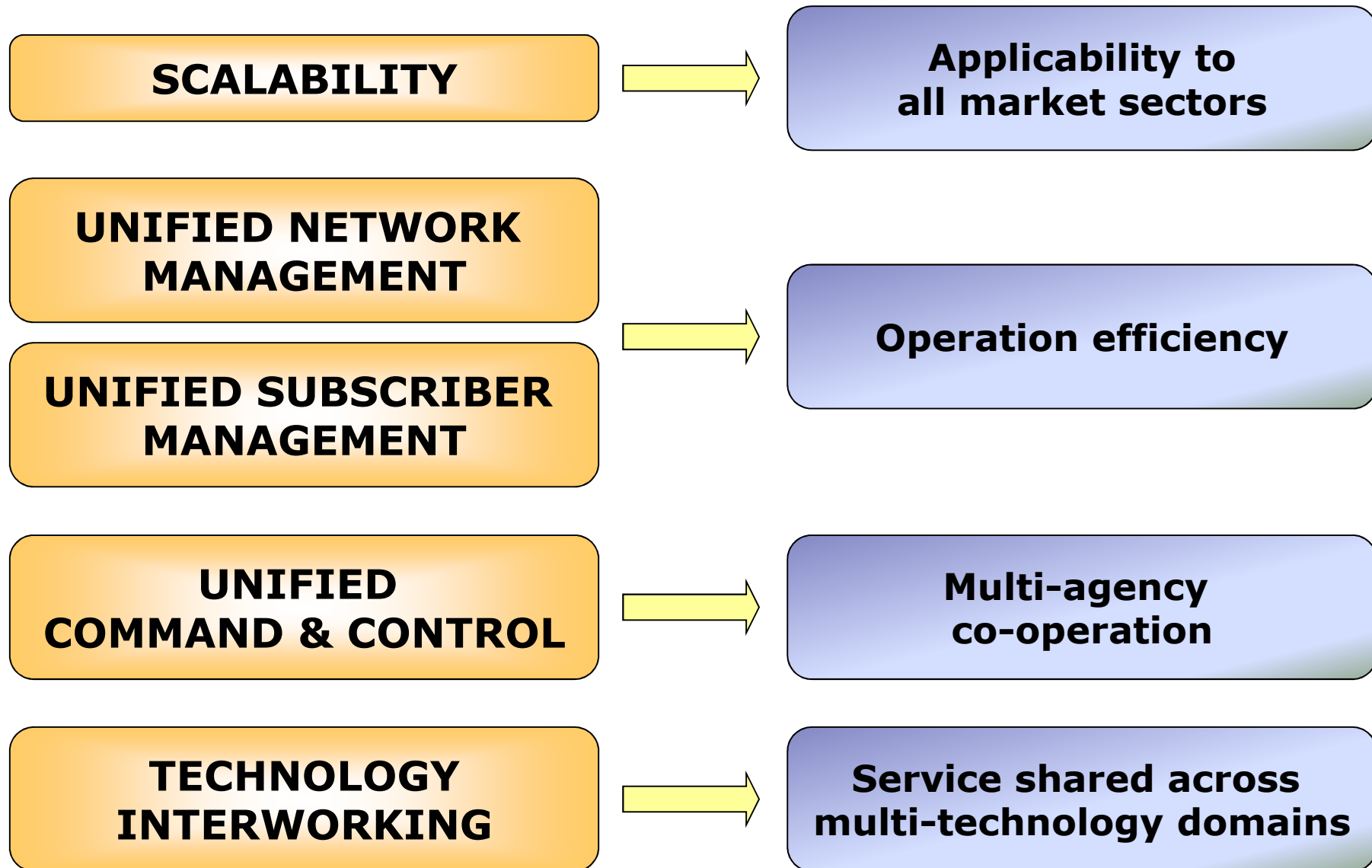
Heterogeneous Networks Integration

... and added BB services

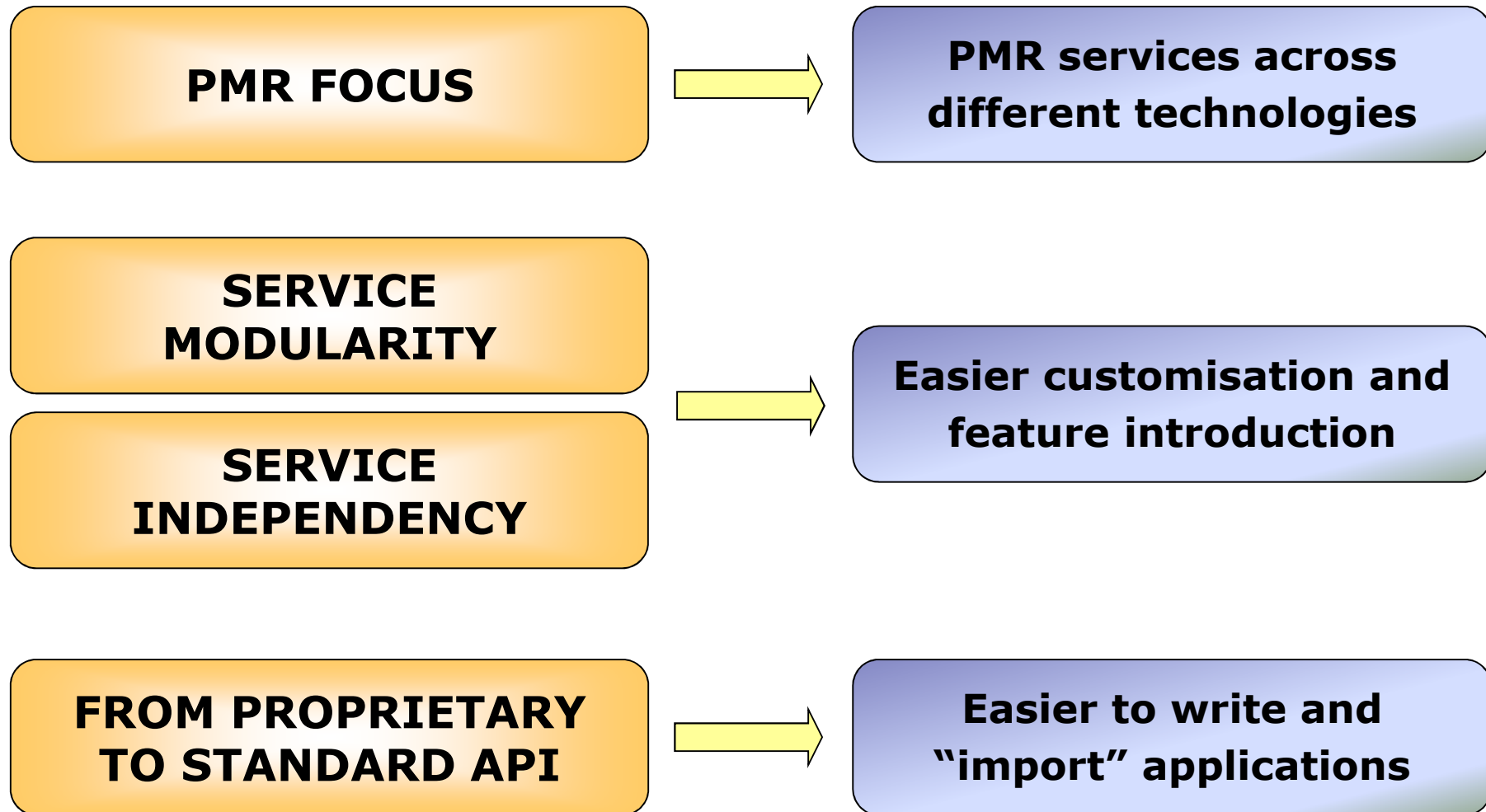


Advantages

Benefits of Perseus Architecture



Benefits of Service Orientation



THANK YOU !