Using the FRAME Architecture

ITS Associations Meeting
Prague, 15 October 2009

Richard Bossom and Peter Jesty
Siemens plc and PJCL

SEVENTH FRAMEWORK PROGRAMME

Why are ITS Architectures needed?

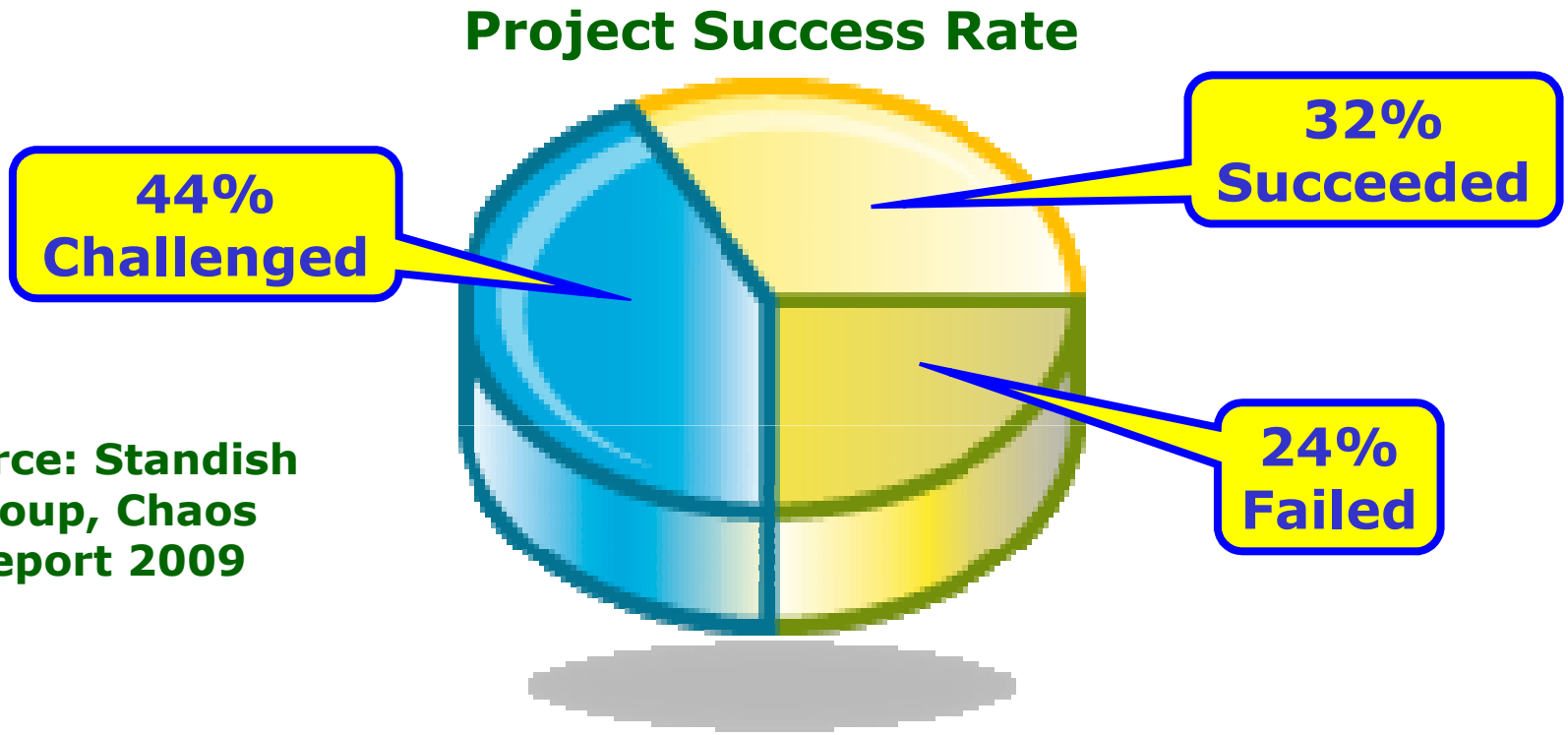
ITS Characteristics (1)

- **Goal is to enable safe, comfortable and seamless travel for people and goods possibly using more than one transport mode**
- **Has many Stakeholders that must cooperate:**
  - **Owners, Operators, Users, Authorities, etc.**
  - **Varying commercial interests: public services, commercial services, end users**
- **Requires the integration of several systems:**
  - **Some already exist, others have to be procured**
  - **Each will use its own set of data**
  - **Some may use the same data but in different ways**

ITS Characteristics (2)

- **Implementation issues:**
  - **Systems produced by several suppliers**
  - **May use different technologies**
  - **Needs multi-disciplinary activities, e.g. hardware, software, electronics, traffic engineering**
- **Service may be provided by one or more systems:**
  - **Enhanced services provided by integrated systems**
  - **Integrating systems is often a major issue**
  - **Overall system responsibility must be assigned**
- **Nothing more than Information and Communications Technology (ICT) for the transport domain**

Success rate for IT related projects



Source: Standish Group, Chaos Report 2009

Success Rate	2009	2006	2001	1994
Succeeded	32%	35%	23%	16%
Challenged	44%	46%	49%	31%
Failed	24%	19%	28%	53%

Some reasons for IT project failure

- **Project objectives not fully specified**
- **Bad planning and estimating**
- **Technology new to the organisations**
- **Inadequate/No Project Management methodology**
- **Insufficient senior staff on the team**

Why can ITS Architectures help to address these issues?

- **ITS Architectures provide a view of an integrated ITS implementation that is:**
  - **High-level:**
    - **Provides a clear picture**
    - **Does not need a systems/electronic engineer to understand it**
  - **Not based on technology:**
    - **Technical solutions up to the suppliers**
    - **Can change over time**
- **If used early in the implementation process enables issues to be explored and decisions taken before procurement starts**

Other reasons for using ITS architectures

Project Success Factors	ITS Architecture involvement
User Involvement	ITS Architecture creation involves all stakeholders
Executive Management Support	ITS Architecture enables Executive Management and Policy Makers to be involved
Clear Statements of Requirements	ITS Architecture starts from stakeholder aspirations that must be understood by all those involved
Proper Planning	ITS Architectures can provide valuable input to the high-level planning process
Realistic Expectations	ITS Architectures help to promote realistic expectations amongst stakeholders
Smaller Project Milestones	*Project Specific*
Competent Staff	*Project Specific*
Ownership	ITS Architecture can help define who owns and operates each part of the ITS implementation
Clear Vision & Objectives	ITS Architectures help to promote these
Hard-working, Focused Staff	*Project Specific*

What are ITS architectures and where do they fit into your implementation programme?

What is a System Architecture?

- **Top-level framework**
- **Strategic plan for designs**
  - **Non-deterministic**
    - **"What is needed"**

      NOT

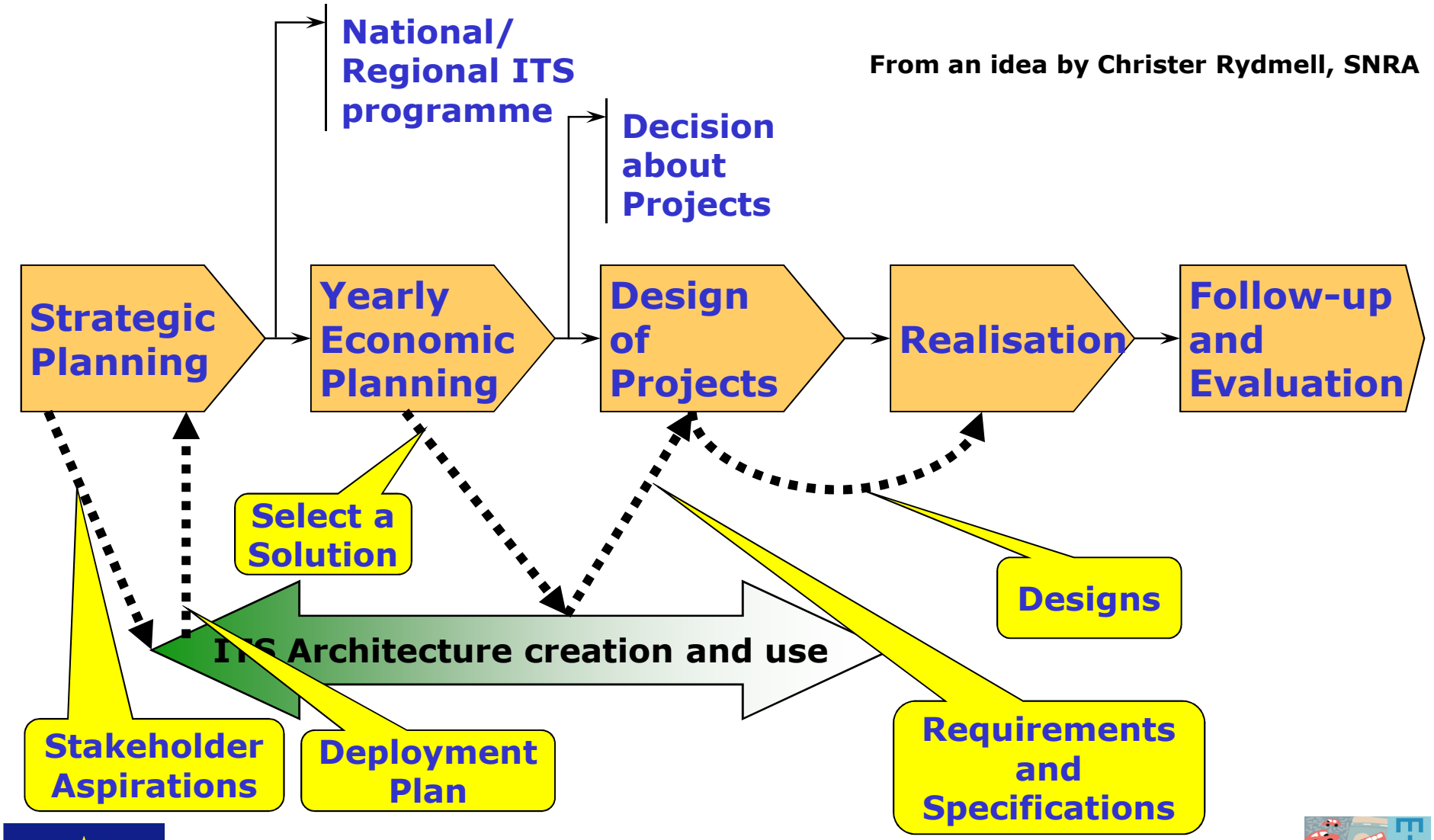
    - **"How is it to be implemented"**
      - **Technology independence**
- **Top-level assumptions**
  - **Minimum necessary**

    NOT

  - **Maximum Possible**

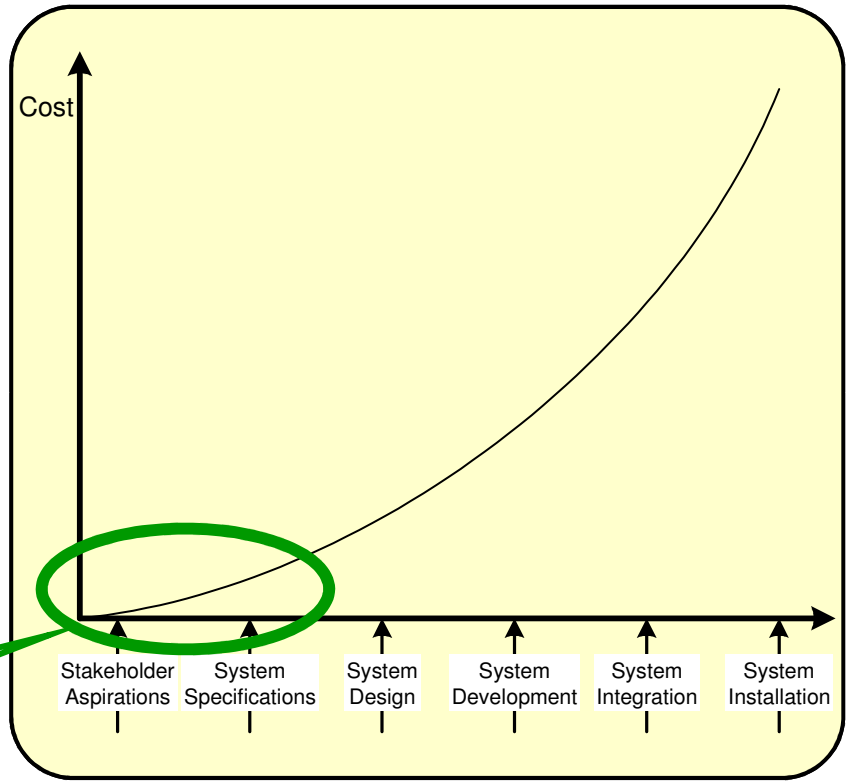
Planning and Deployment

From an idea by Christer Rydmell, SNRA



Impact on Development Costs (10 : 100: 1000 Rule)

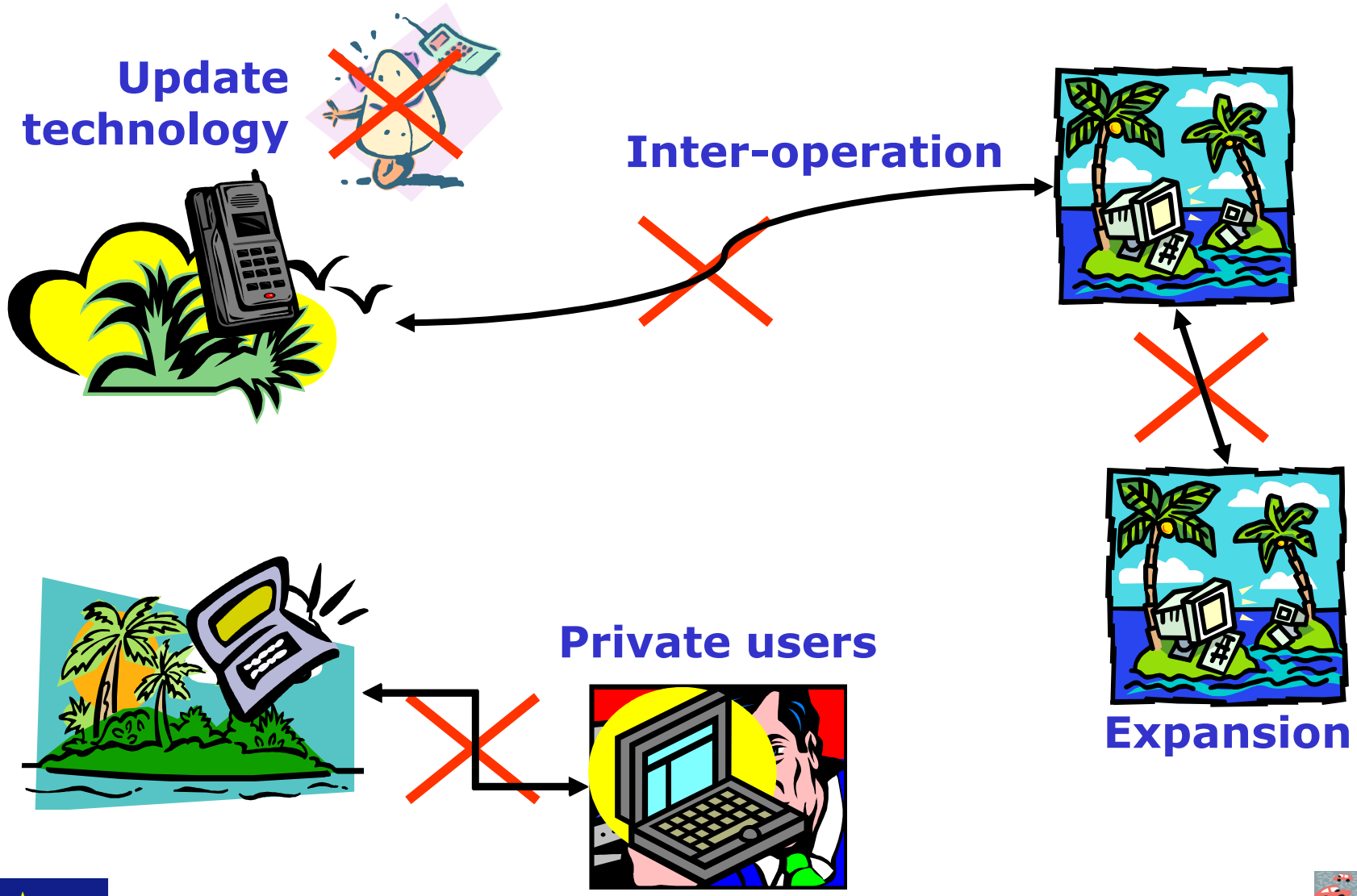
- **Cost of fixing problems in System development increases exponentially with time**
- **System Architectures can expose these problems early in the development cycle**
- **Early fixing costs less**



System Architectures used here

The Risks if no ITS Architecture is Used

The Risks of No ITS Architecture

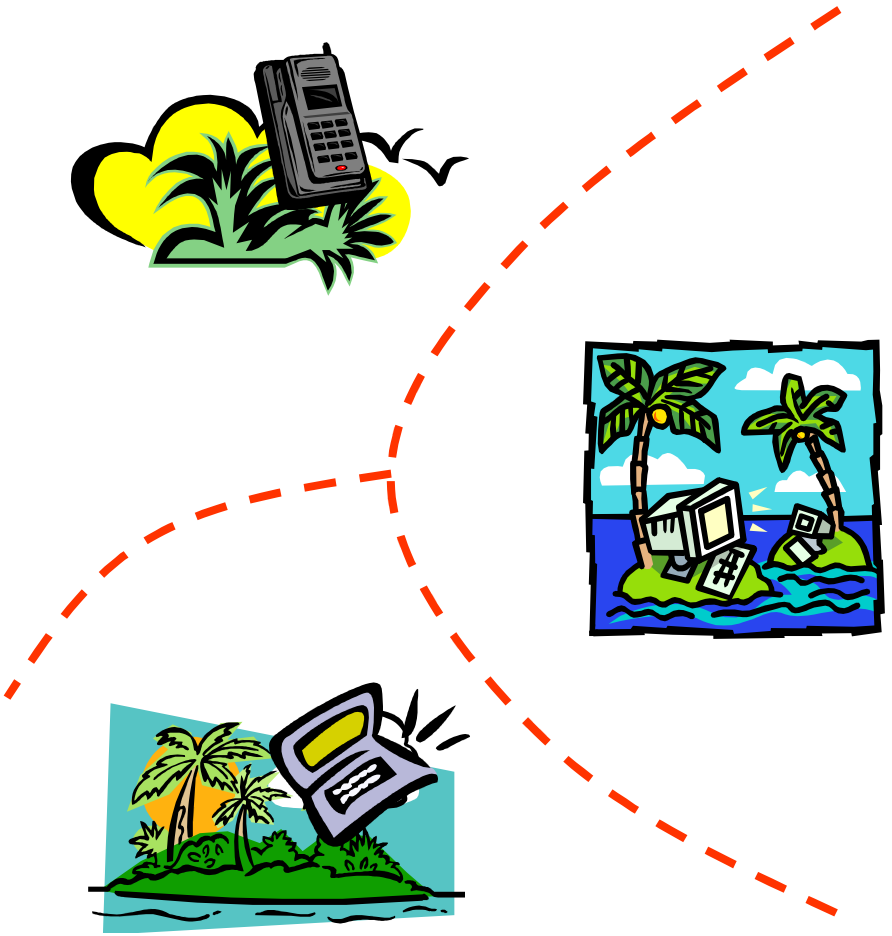


Technology Islands

- **High cost for updates**
- **Limitation on services**
- **Lack of inter-operability**
- **Failure to use ITS fully**

To get it all right

PAY TWICE



Example – Piecemeal Development

Road Traffic Management

Request Priority

Public Transport Management

Road Link Data

Congestion

None
Medium
High

Traffic Flow

Vehicles per hour

Road Link Data

Real Journey Where

Time Times from?

Trip Planning

Service Data

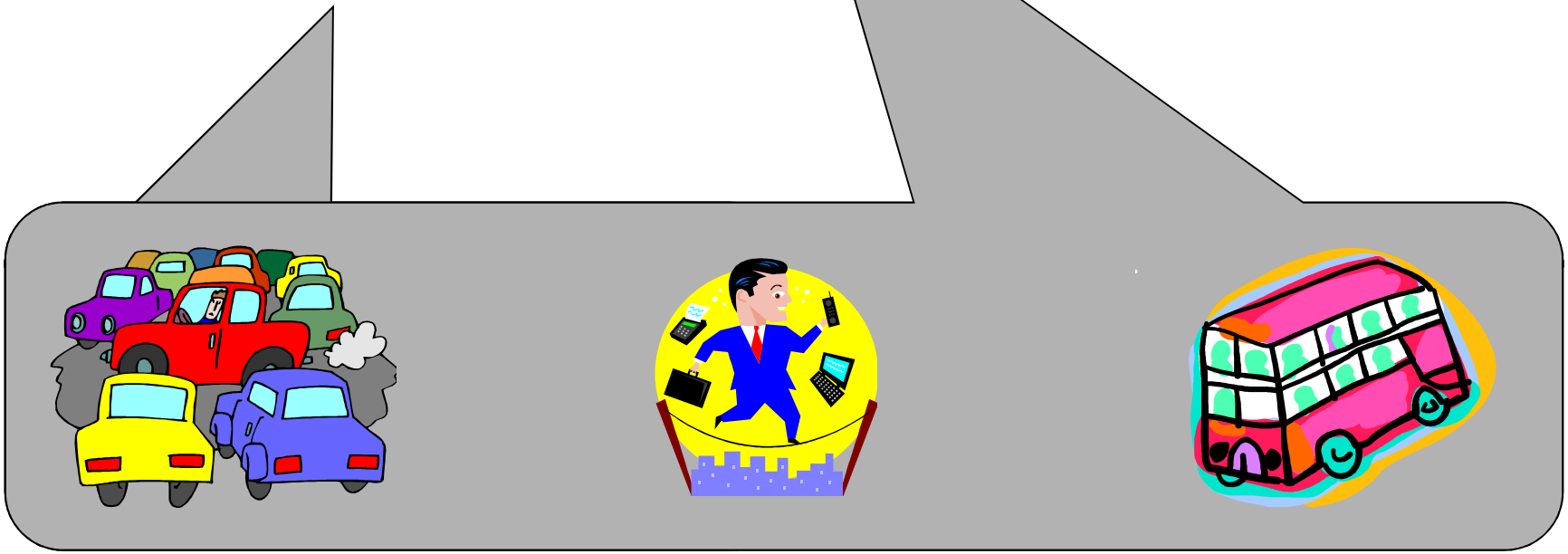
Arrival Time, Delay

Example – Harmonious Development

Existing ITS Architecture
Functions required
Data available
Data flows needed

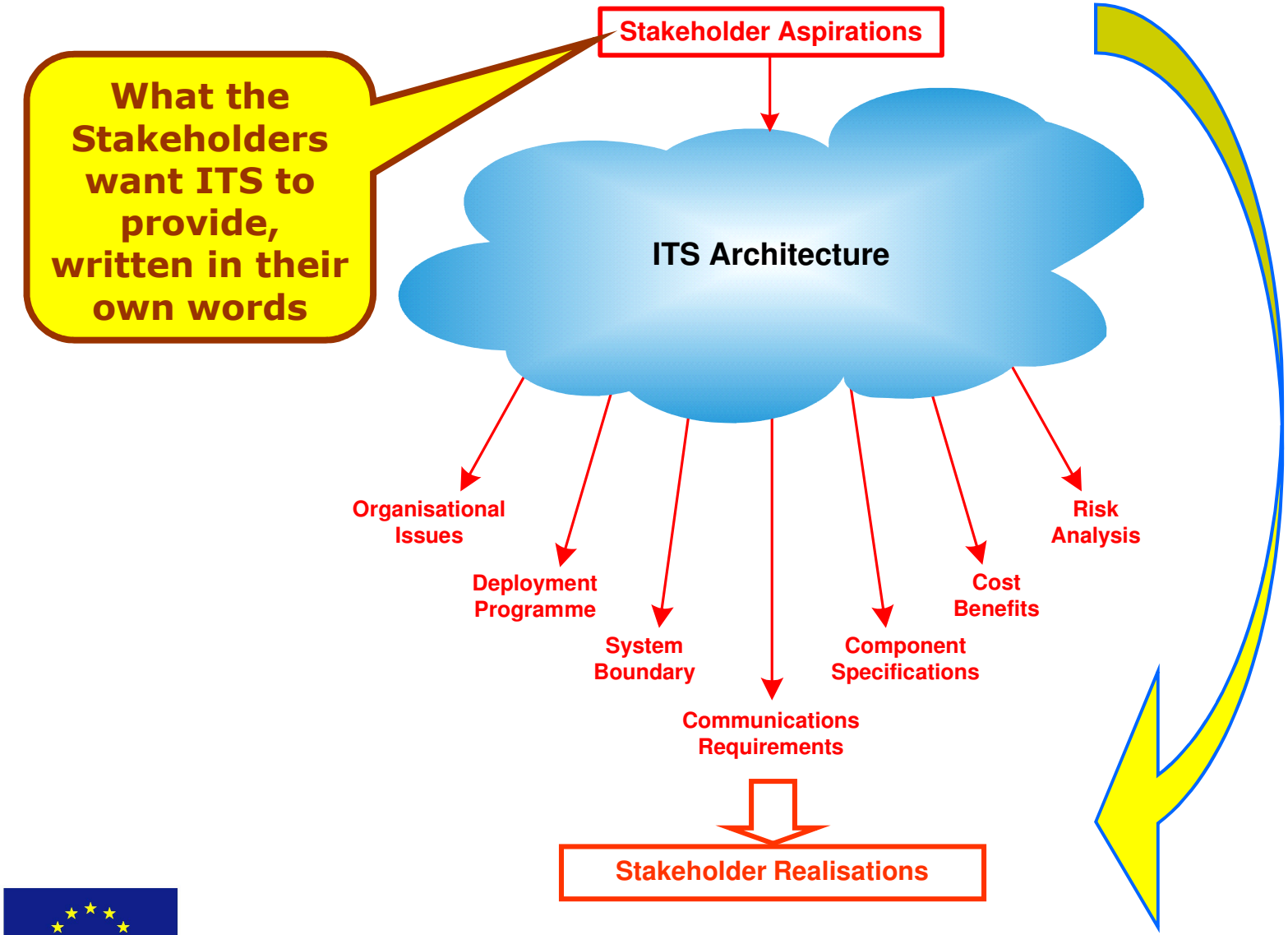
+

Extension
Functions desired
Data required
Conversions needed

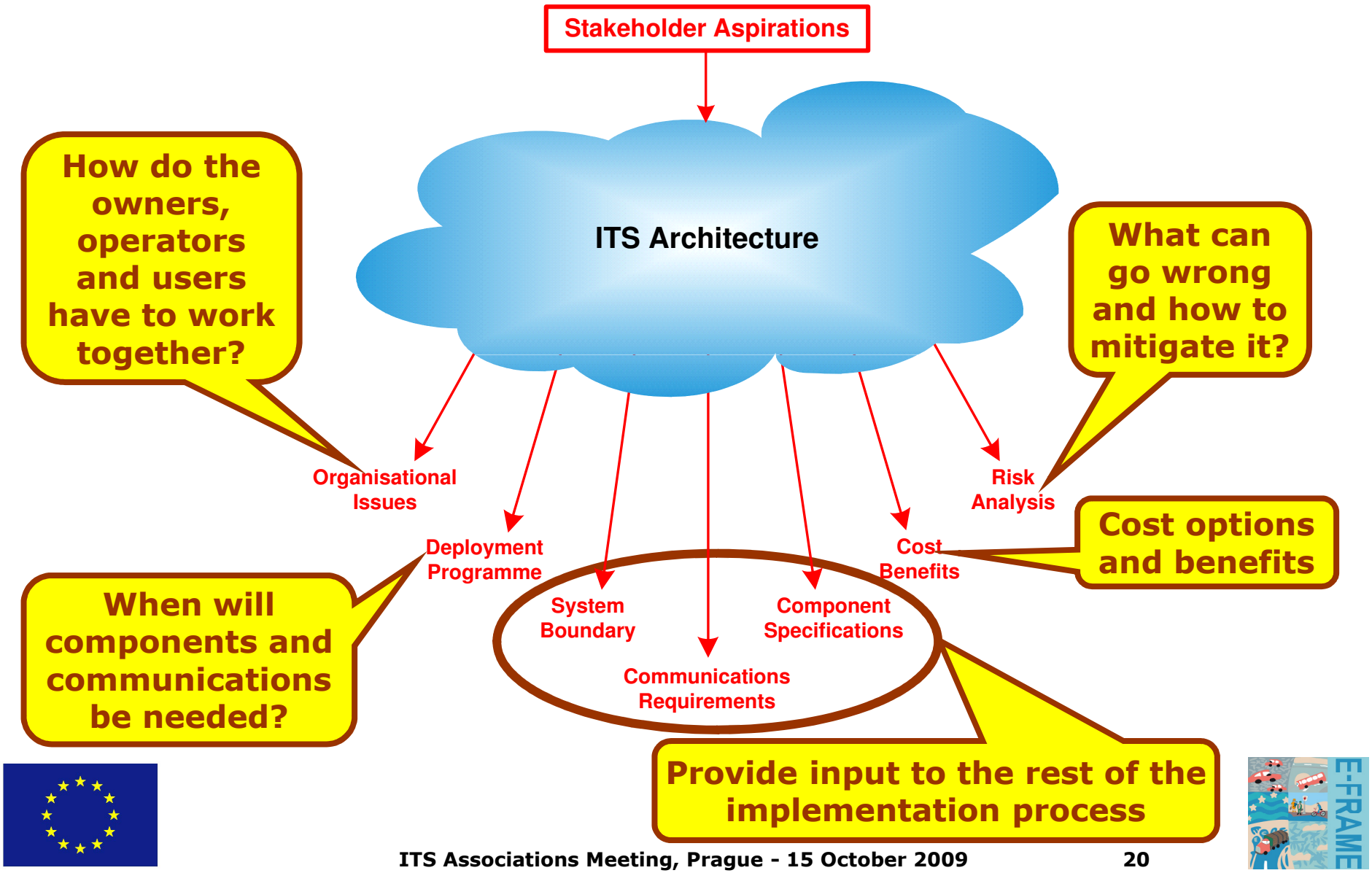


Creating an ITS Architecture and using the results

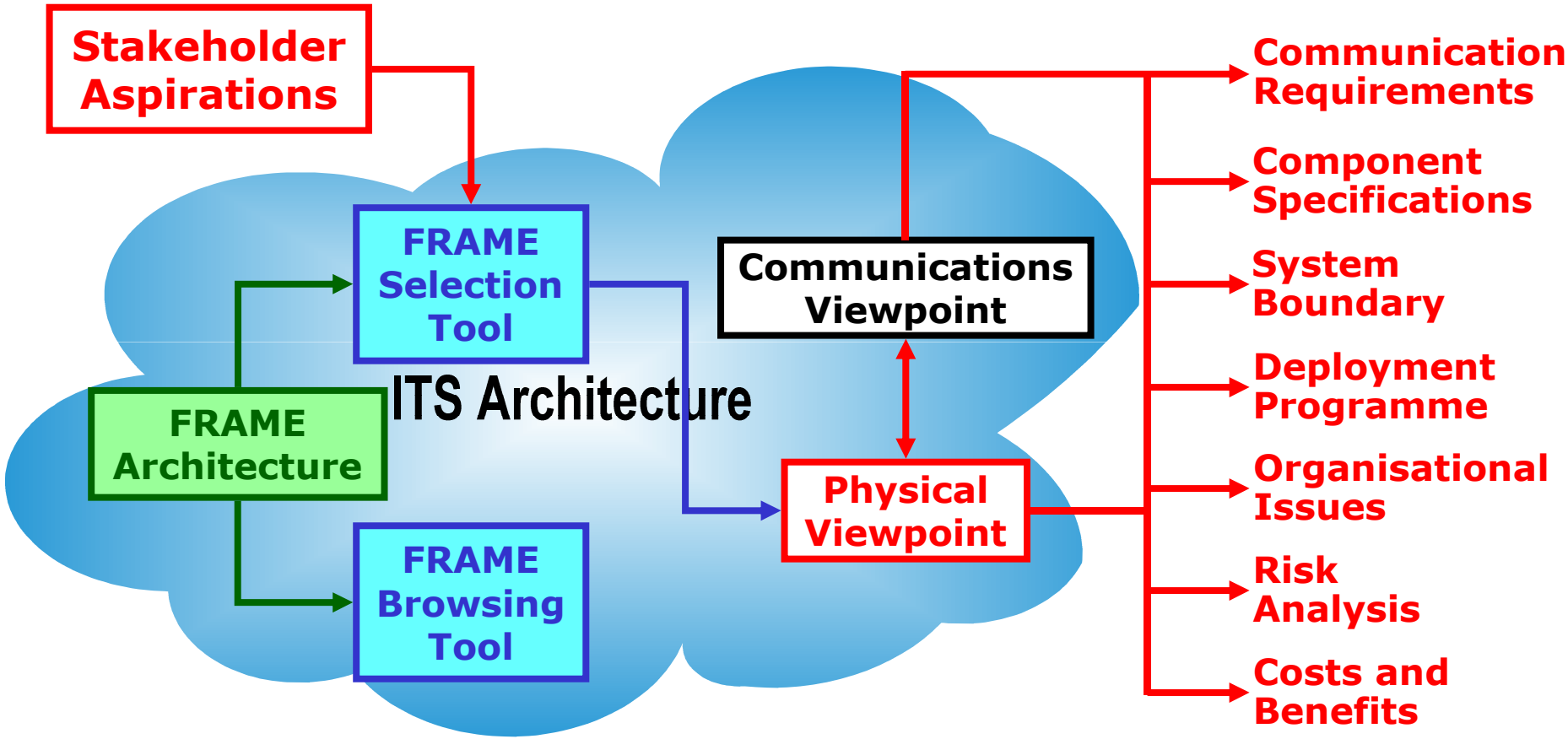
Creating an ITS Architecture



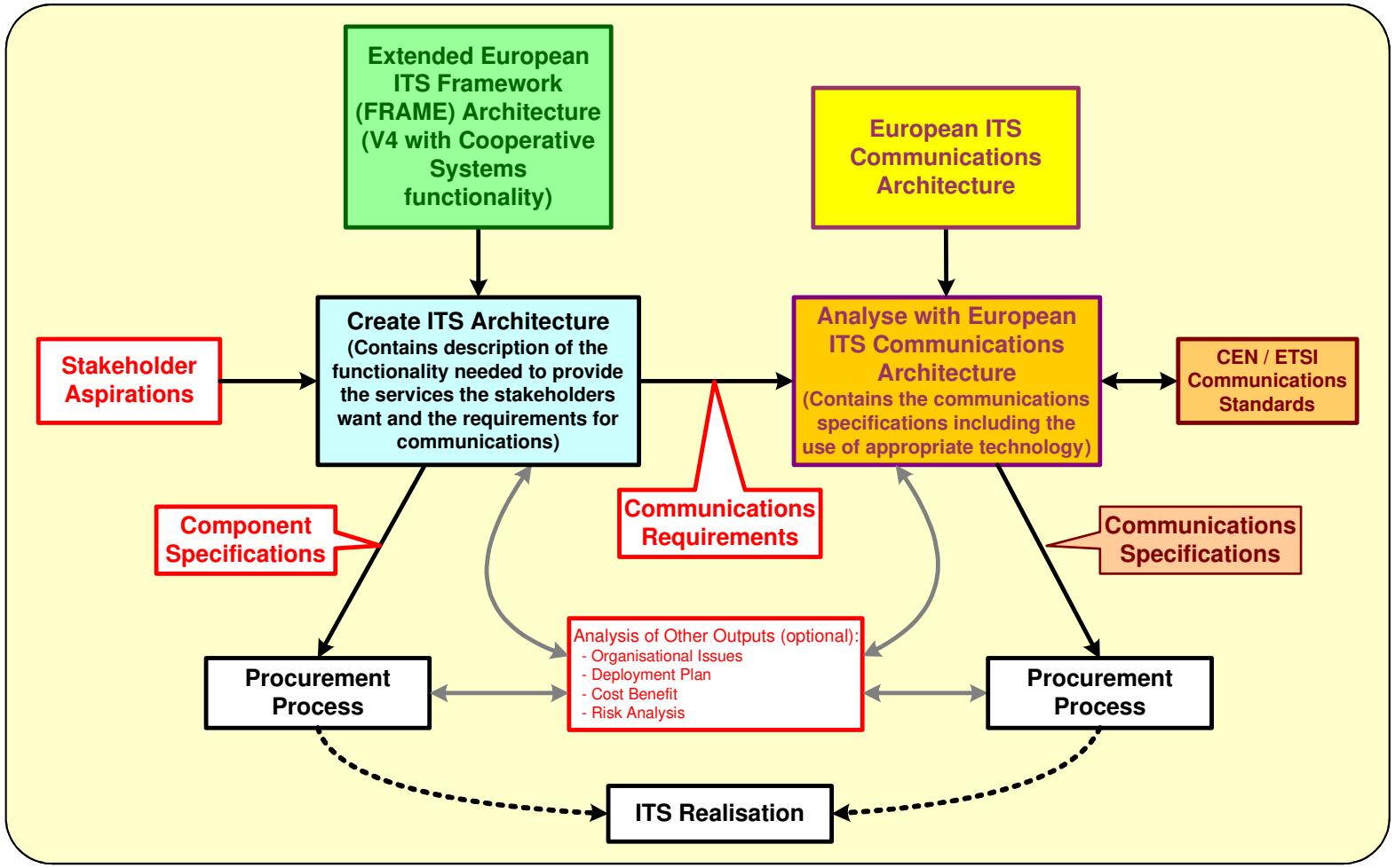
Architecture Creation Process Products



Using the FRAME Tools to create an ITS Architecture



How the FRAME Architecture fits into the ITS implementation process



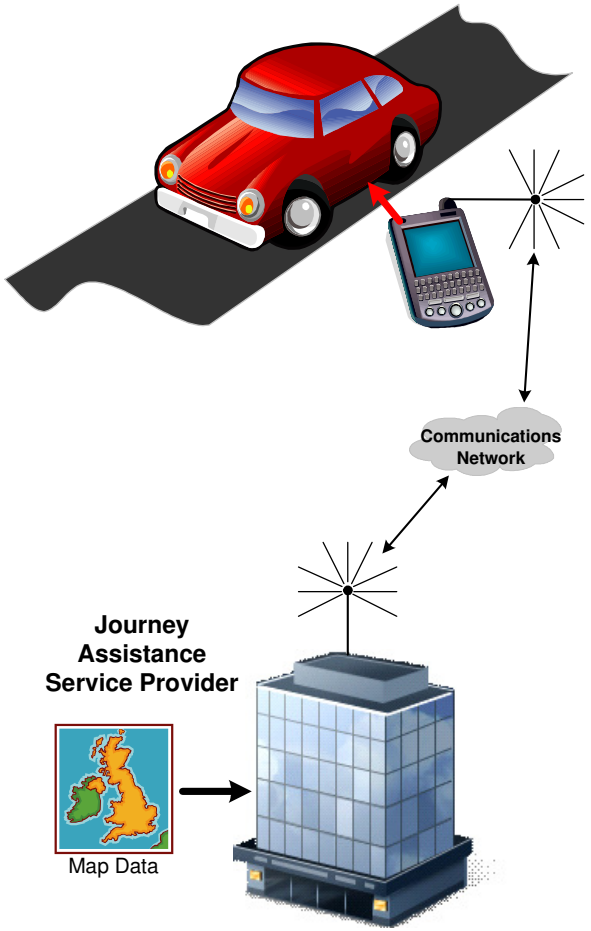
Points about using the FRAME Architecture

- **Plus Points for using the FRAME Architecture:**
  - **It contains functionality for ITS services used in many European countries**
  - **Can be extended to include other services**
  - **FRAME Tools:**
    - **Enable several physical implementations to be created from the same functionality**
    - **Free and easy to use**
    - **Follows a logical process**
    - **Similar to methodology used elsewhere, e.g. USA**
- **Not so good points:**
  - **Creating ITS Architectures needs resources, but these are reduced by starting from the FRAME Architecture**
  - **Progress towards implementation may initially appear slow because no tangible results evident**

What can you do with an ITS Architecture?

Examining options

Journey Assistance Service
Option 1: service provided centrally



- **Service provider holds the map and other transport data**
- **Journey assistance through link to PDA in vehicle**

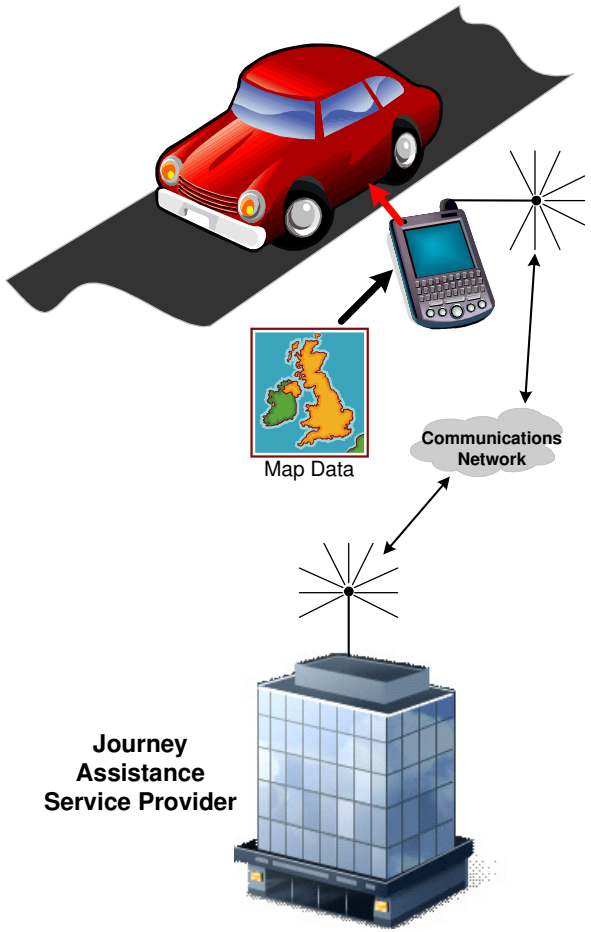
+ Travel information and data easy to update

+ Easy to incorporate real-time travel information

– Travel data can be large (maps?) so medium communications load

– Service cut off if communications become unavailable

Journey Assistance Service
Option 2: service provided in-vehicle



- **Static travel data (maps?) in PDA**
- **Travel information updates only sent from Service Provider**

+ Basic service always available – not dependent on communications

+ Little data transfer when map and other static data not being updated

+ Easy to incorporate real-time travel information

– High burst of data transfer when map and other static data updated

– No guarantee that PDA will have current map and other static data

How is the FRAME Architecture used?

- **ITS Architectures can be created for both system proposals:**
  - **Same functionality in both (FRAME Architecture provides a common starting point)**
  - **Only difference is physical location of functionality**
- **Discussion/debate is about merits of each system proposal:**
  - **Based on analysis of each system for:**
    - **Communications requirements**
    - **Physical constraints**
  - **If required further alternative systems can be created from the FRAME Architecture**

Conclusions

- **Creating and using ITS architectures provides a mechanism that enables the study of:**
  - **What the ITS implementation will look like?**
  - **Possible alternative configurations for implementation**
  - **Any issues that surround the implementation, e.g. organisational, cost profiles**
- **ITS architectures are independent of the technologies to be used and hence:**
  - **Do not become obsolete when technology changes**
  - **Enable different technological solutions to be considered later in the procurements process**
  - **The results are more easily understood by those making decisions about the ITS implementation**

Creating and using ITS Architectures provides a

WIN WIN situation

http://www.frame-online.net/