Autonomic Road Transport Support ("ARTS") Systems

Prof Antonio Skarmeta, University of Murcia

On behalf of Prof Lee McCluskey,
University of Huddersfield, UK

(ARTS Action Chair)

www.cost-arts.org
“ARTS” is an EU COST Network

- As systems become too complex to maintain by engineers, computer scientists are seeking to embed “autonomic properties” into them.
- In short, this means giving systems the ability to self-manage, maintain and adapt themselves (the original IBM initiative declared the properties as self-configuring, self-healing, self-optimising, self protecting ..)
Road traffic systems are complex, heterogeneous systems that are expensive to maintain, and difficult to optimise. Challenges include:

- **Congestion Costs, Environmental Damage, Safety**
- **Support System Costs**
- **Information Overload and Management Complexity**
- **Large Software-intensive Systems needing Regular Maintenance**
Network Aims

• The Network aims to engender collaborative research that will lead to Autonomic Road Transport Systems
  – new ways of engineering RTS systems so that they exhibit autonomic behaviour,
  – deliver savings in the cost of system configuration, maintenance, and infrastructure,
  – improving network efficiency and reducing the chances of human error.

• The potential benefits of this Action are to provide the unified, cross disciplinary scientific community which will lead effective research into and development of ARTS systems
CONTEXT OF THE network

Political Context

EU Mob & Transport 2011 White paper
Emerging ITS Standards eg DATEX-II
EU ITS IPs And NoEs

Major European Initiatives

National ITS projects And initiatives
ITS Reference Models and Standards
ERA-Net
Grand Challenges
- Resource efficiency
- Safety
- Environmental Impact

Practitioners & User Groups

Societal Changes

ARTS

Autonomic Systems
Organic Computing
Automated Planning
Semantic Web

Service-Oriented Computing

R & D Areas

Intelligent Transportation Systems
Autonomic Pilots
- Energy Management

Agent Technologies

Control Theory

Requirements Modelling

EU ICT IPs And NoEs
ARTS TIME frame and activities

- **Year 1**
  - Community Building

- **Year 2 (NOW)**
  - Thematic Workshops
  - Summer Schools
  - Competitions
  - Demonstrator Systems
  - Short Term Scientific Missions

- **Year 3**
  - Resource Websites
  - Collaborative Projects
  - Gap Bridging Seminars
  - Pilot Applications

- **Year 4**

**Stakeholders:**

- **ACADEMIA**
- TRANSPORT MANAGERS & AUTHORITIES
- TRANSPORT INDUSTRY, STANDARDS ROAD USERS
ARTS STRUCTURE

WG1: Architectures, Methods and Models for ARTS
- technological challenges
- demo potential benefits
- platforms and methods for engineering systems
- abstract models for development and analysis

WG2: Exploiting the results of previous research and technological development
- community building activities
- distil lessons learned from previous pilot uses of autonomic systems
- connect up relevant university research and transport stakeholders

WG3: External Factors, Environmental Benefits and Application Scope
- identify and quantify the scope, nature and potential pay-off
- potential for contributing to environmental goals
- classification of the potential application scope

WG4: Human Interaction and Human Factors
- identify the major socio-technological challenges
- insights into likely human interfaces and ARTS-induced behaviour change
WG1:
What kind of computing architectures do we need to support ARTS? Are there fundamental scientific/technological obstacles to be overcome?

WG2:
What are the prime areas of ITS in which we can demonstrate ARTS? Are there already examples of ARTS systems in ITS? How does ARTS supplements/interact with the vast amount of EU research in ITS already?
Example Questions

WG3:
Can we create a “business case” for ARTS in a range of road applications? What are the potential cost, safety, environmental benefits?

WG4:
If we had ARTS now, what would be the political, social, and institutional implications .. ? .. and can we use the answer to this question to influence current design thinking?

FINALLY.. WHAT WOULD BE THE EFFECT ON STANDARDS?
“ARTS” has been active for 1 year -

- We now have around 60 active members in 23 European Countries
- The nodes are academics, consultants, government transport organisations .. even car manufacturers.
- Our members have a wide range of backgrounds - transport researchers, computer scientists, civil engineers, software engineers
- We are busy creating business cases for ARTS, acquiring prototypes to demonstrate the techniques, looking into social, legal and political implications, as well as researching into the fundamental science.
- This year we have a Competition, workshops, a Training School and 10 scientific visits planned. Details on www.cost-arts.org