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ERCIM NEWS

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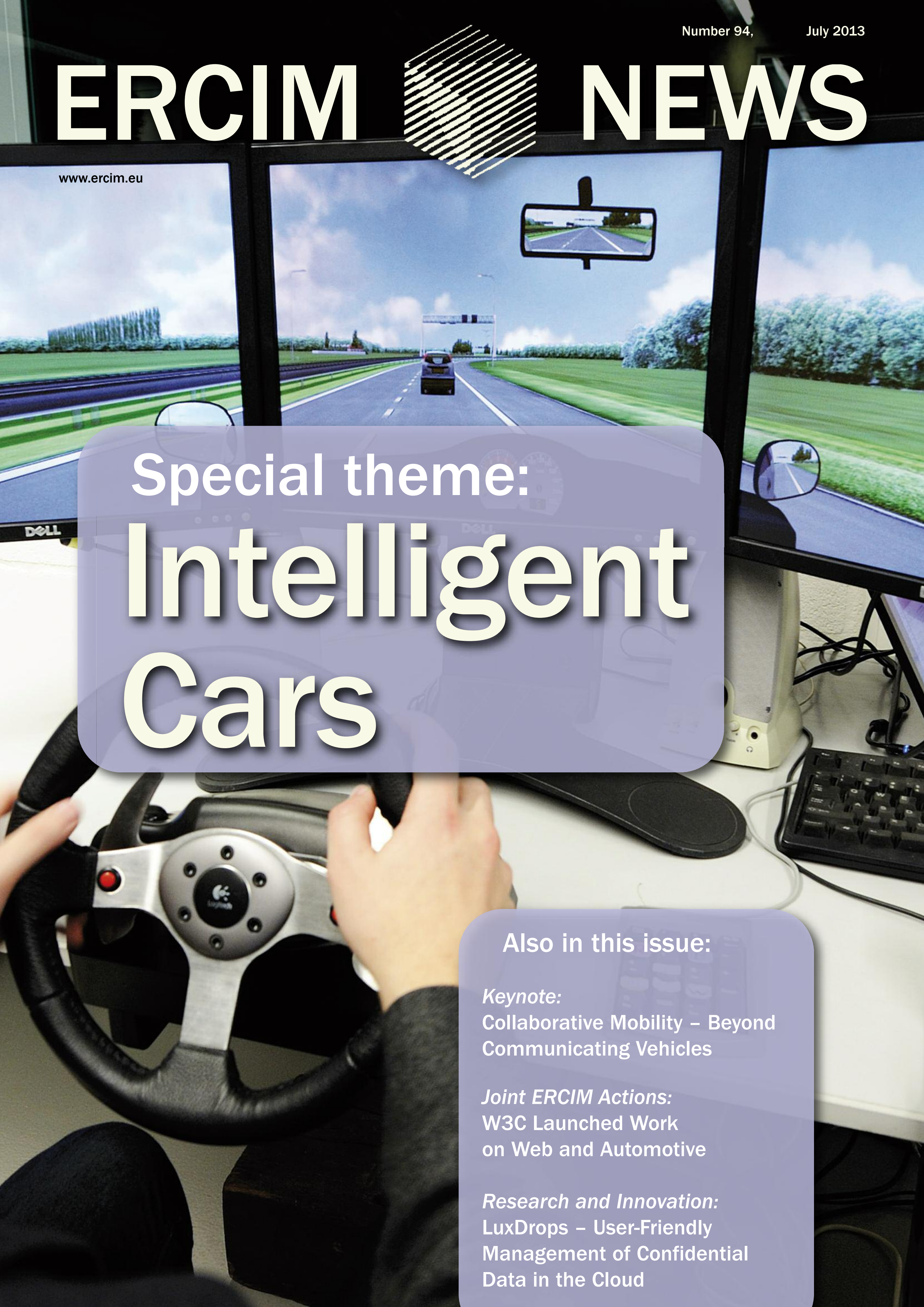

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Intelligent Cars

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ERCIM News is the magazine of ERCIM. Published quarterly, it reports on joint actions of the ERCIM partners, and aims to reflect the contribution made by ERCIM to the European Community in Information Technology and Applied Mathematics. Through short articles and news items, it provides a forum for the exchange of information between the institutes and also with the wider scientific community. This issue has a circulation of about 8,500 copies.

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Ilja Radusch, head of department "Automotive Services and Communication Technologies" at Fraunhofer FOKUS and head of the Daimler Center for Automotive IT Innovations.

Collaborative Mobility – Beyond Communicating Vehicles

European efforts for more intelligent transport systems have a long history with the first programmes focusing on Road Transport Informatics (RTI) dating back to the 1980's. The corresponding Intelligent Vehicles Safety Systems started even earlier in the late 1950's by progressing from passive safety systems towards truly pro-active safety functions we envision today. The state of the art in road and vehicle safety is today represented by the concept of cooperative driving. Current cooperative driving is based on vehicles communicating with each other – widely regarded as vehicle-2-vehicle communication – and with the infrastructure – accordingly named vehicle-2-infrastructure communication. This development has been driven mainly by safety needs to provide travellers sufficient information early enough to be able to respond to dynamic traffic situations. Additionally, vehicles anonymously announcing their general position and velocity are set to be far more effective for assessing current traffic conditions and improving general traffic efficiency. Thus, vehicle-2-x communication technology (the "x" stands for vehicles and infrastructure) extends the range of vehicle sensors to yet unseen distances allowing vehicles to "see" around corners and warn drivers of upcoming dangers, making sure she or he can act in due time to avoid an accident or at least mitigate its impact.

Paving the road for communication till 2015

Recent years and research projects have been dedicated to test and assess vehicle-2-x communication under real world conditions. Europe's largest field operational trial was successfully concluded in Germany with over 500 drivers travelling 1.6 million kilometres in one of 120 vehicles. By 2015 this technology will be included in new vehicles saving up to 11 billion euros in Germany alone due to accidents avoided and travel times reduced. These estimated savings, however, rely on a rapid adoption of vehicle-2-x communication not only by vehicle manufacturers but also road and infrastructure operators. Therefore, in a first step to full deployment, Dutch, German, and Austrian authorities agreed to establish an intelligent corridor ranging from Rotterdam in the Netherlands via Frankfurt/Main in Germany to Vienna in Austria where construction areas are announced wirelessly to the equipped vehicles. This corridor will be the first installation of cooperative traffic where vehicles and road infrastructure work together.

The road ahead

However, the possibilities of cooperative traffic do not stop there. Just like the Internet, vehicle-2-x communication technology is providing a link between travellers and not just their vehicles. Therefore, the next task is to join those travellers (which include drivers and any type of road users) and the infrastructure operators in a collaborative network to solve various travel needs all the way from eco-friendly parking to short-term decisions on trip planning. Collaboration is the key concept of a future mobility approach, which extends the cooperative concept of the first generation systems and applications – such as travel time optimizing navigation systems – by including the human user in a highly integrated cooperative, interactive, and participatory network. In this collaborative concept, it is not only the systems and vehicles that communicate, but all actors (systems and humans) are engaged in a continuous bi-directional, dynamic exchange of information allowing for pro-active traffic system management which encourages active participation and interaction of road users.

Mobility research so far has been focused on safety systems and applications relieving drivers from the most exhausting tasks. However, further improvements require a behavioural change in all road users and operators in the direction of a collaborative pro-active mobility management that steers the network of users towards an optimum of network level benefits (as opposed to simply maximizing individual benefits). Acceptance of such a collaborative mobility concept – that ties together interaction with participation and will achieve progress beyond simple cooperation – requires continuous coaching of travellers and drivers not only while driving but also within the realm of other co-modality options. The objective of this coaching is to support the traveller pro-actively with adequate hints tailored to his or her current situation.

From static to elastic infrastructures

The overall effect of collaborative mobility will be the necessary balancing of the needs of all road users and road operators alike, thereby extending towards all citizens. Future cities will be built on benefits that will accrue in making the transition from the static concept of mobility arising from the needs of individual road users only, to a community-aware and adaptive concept of mobility using reliable real-time data, capturing the needs and intentions of all travellers. Social awareness will regard actions encouraging road users to follow collaborative strategies that benefit all road users as a group. Elastic infrastructures refer to the ability of the road operator to react to the needs of all road users without having to strain the environment by building new roads.

Ilja Radusch

The LuxDrops platform implements the core features of a storage platform as mentioned by the Fraunhofer Institute. In contrast to existing solutions, the LuxDrops platform offers advanced sharing, replication and versioning features specially adapted to manage confidential data:

- Reliable user authentication is guaranteed through LuxTrust certificates, which are heavily used by the Luxembourg banking industry. Other types of certificates can be easily integrated on request.
- The storage platform can be deployed on-premise or in the context of local Cloud offerings. By locating cloud provider and customer in a same country, legal aspects are easier to handle.
- Innovative visualization tools improve the traceability and transparency of the overall solution. Key visualization features are: an intuitive multi-dimensional search engine and a meta-data browser to visualize access rights. A first design of the meta-data browser shows the access rights at file/folder or at user/groups level and also provides statistical overviews.
- Depending on the level of trust put in the cloud provider the customer can activate client side data encryption.

The LuxDrops solution aims to increase confidence in Cloud based storage solutions. A first version of the LuxDrops prototype will be made available during the second quarter of 2013 and will be evaluated by selected pilot customers.

Screenshot of the LuxDrops application

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InGeoCloudS: A Cloud-Based Platform for Sharing Geodata Across Europe

by Claudio Lucchese, Raffaele Perego, Salvatore Trani, Makis Atzemoglou, Benoit Baurens and Dimitris Kotzinos

InGeoCloudS is a project funded by the European Commission under the CIP-Pilot actions program. The goal of InGeoCloudS is to design and build a cost-effective platform for data publication and services, able to promote collaboration and innovative development in the European environmental and geological/geophysical science domain.

The Inspired Geodata Cloud Services (InGeoCloudS) project, coordinated by AKKA Informatique et Systèmes (France) was launched in February 2012 with the aim of establishing the feasibility of using a Cloud-based approach for the publication and use of geodata across Europe. The initiative seeks to leverage the economies of scale achievable for a multi-consumer consortium and its ubiquitous availability of access for the geographically distributed end-users of the European institutions in the environmental field. The purpose is to demonstrate that a Cloud infrastructure can be used by public organizations to provide more efficient, scalable and flexible services for creating, sharing and disseminating spatial environmental data. InGeoCloudS is exploiting this concept based on the work of eight partner institutions from five different countries (including ERCIM members CNR, Italy and FORTH, Greece); some partners are IT enterprises and some are public data providers, covering hydrogeology and natural hazards applications. The project roadmap entails two main steps: Pilot1, which is currently available to project partners, and Pilot2 that will open up the services to a broader audience in summer 2013. The whole set of services will be available for free for the duration of the project.

Environmental science, like other fields, both benefits and suffers from an avalanche of data. From an IT resource management perspective, hardware and network resources have become a critical bottleneck and major cost item. One of the main characteristics of the Cloud is that its resources are virtually unlimited in terms of storage and computing power – it scales transparently and in a semi-automated manner, while offering up-to-date underlying technology – and it offers a pay-as-you-go/pay-per-use delivery model with potential reduction of traditional IT infrastructure costs.

From a scientific point of view, rising data quantity and quality has not been accompanied by an equivalent increase in visibility, accessibility and sharing. The 2007 Infrastructure for Spatial Information in the EC (INSPIRE) Directive established rules for geographic and environmental data to ensure that the geodata are consistently available, interpretable and usable across European regional and state boundaries. The Directive requires the use of established standards and online availability of geodata. InGeoCloudS services intend to support and respect all obligations stemming from the INSPIRE Directive and to facilitate data providers in fulfilling their obligations.

The InGeoCloudS platform is structured in three main software layers. The most basic one provides applications with transparent access to an elastic distributed file system, a GIS-enabled database server, and to some compute facilities for managing on-demand jobs and elastic services. The second layer provides higher-level services including elastic pool of map servers, database synchronization mechanisms, and also an advanced data publication service which allows data providers to publish OGC services and their corresponding datasets by simply uploading their data in some standard

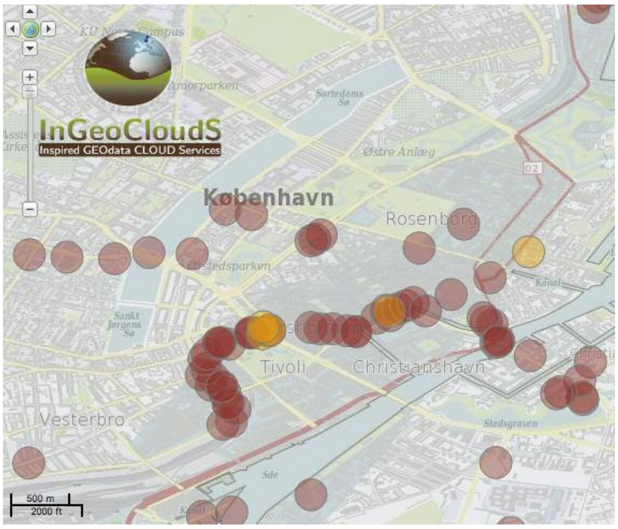

Figure 1: InGeoCloudS Portal: visualization of Copenhagen groundwater data

format and exploiting the geo-publication services of the InGeoCloudS infrastructure. The last layer includes the Web portal and an elastic web servers pool hosting the front-end of geo-applications.

One of the most innovative InGeoCloudS services is the Linked Open Data based data and metadata management service. The InGeoCloudS consortium designed an interoperable Geo-Scientific Observation Model (GSOM) that allows the mapping of different data sources into a harmonized data/metadata representation space. Thus the potential users of the platform would have the ability to publish their data as Linked (Open) Data and link them to existing data either inside or outside of the platform. By exploiting this model and RDF-based technologies, InGeoClouds opens the doors to cross-country queries as well as cross-discipline analysis, e.g. facilitating correlation of data between various scientific domains.

Three main use cases are currently hosted by the platform: (i) Geohazard management in Slovenia, which provides an early landslide warning system on the basis of past landslides, rainfall forecasts and geology for 14 Slovenian municipalities. (ii) Measurement of earthquake post-effects in Greece, with automated notification services for interested parties implemented by the Earthquake Planning and Protection Organization (EPPO). (iii) Integration of generalized services for groundwater management, showing areas where high concentrations of pesticides can be met or displaying samples chemical analysis. These use cases are owned by geological institutes in Denmark, France and Greece (GEuS, BRGM and EKBAA/IGME) and illustrate how pan-European exploitation of data can be achieved.

We hope to make InGeoCloudS a sustainable platform capable of attracting data providers from diverse horizons. Every owner of geoscientific data (not just geologists) is expected to find the platform and its services attractive, facilitating the publishing of data to larger and broader audiences and developing new services economically. Consortium members – and possibly other partners – will offer both scientific and necessary IT skills in this endeavour, far beyond the project's timespan.

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Electromagnetic Fields for Neuron Communications

by Rié Komuro and Ilangko Balasingham

Are electromagnetic fields harmful to the brain? We are continuously exposed to electromagnetic (EM) fields generated by electronic devices such as cell phones. The effects on human bodies by EM waves, especially ones with the frequency range between 3 kHz and 300 GHz, called radio frequency (RF), are of great interest. Reported effects of RF fields on living systems are widely variable; harmful, negligible, or nil. Although no definitive evidence has been found, it is generally considered that exposure to low energy RF waves could be a risk to human health. However some beneficial effects were also reported.

Our research group belongs to the Department of Electronics and Telecommunications at NTNU in Trondheim, Norway and has been working on the effects of EM fields on neurons for about three years. The work was inspired by some results obtained by a group at the Florida Alzheimer's Disease Research Center in 2010 [1]. The research group anticipated that long-term cell phone use could damage the brain, especially the region controlling memory. The same physical environment as cell phone use for two one-hour periods a day was established, and genetically modified mice mimicking Alzheimer's disease (AD) as well as healthy mice were put there. After several months of EM wave exposure, the experimental results showed some positive effects for