

## **Summary of all ideas created during the ROADIDEA and ROADIDEA-INCO Innovation Seminars in 2009-2010**

Detailed results are available in these public documents:

ROADIDEA D5.1 Results of the First Innovations Seminar V1.1  
ROADIDEA D5.2 Results of the Second Innovations Seminar V1  
ROADIDEA-INCO D1.1 Comparing conditions for innovation and provision of  
mobility services in the EU, the USA and Canada V1.1

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## 1. All Ideas of the 1st Innovation Seminar 2009

The detailed results of the first Innovation Seminar are available in document D5.2. All ideas created during the seminar are presented in following, classified in four "baskets" according to the maturity of the idea.

### **BASKET - Ready-to-go**

Ready-to-go basket – ideas that are judged to be ready for implementation, or at least mature enough to be further developed by WPs, clear and realisable ideas

1. Free all weather data: free geospatial data, free data platforms  
"FREEDATA"–
2. USA 511 for Europe
3. Mobile sensor data acquisition: Mobile phones as sensors
4. Mobile Pocketguide with position services – all traffic modes
5. **EYEAR:** Road Eye: friction data collection and transmission (acoustic, optical, invehicle etc.)
6. Port-related traffic modelling
7. Multipurpose use of GPS-based road tolling
8. Data collection from electronic ticketing system
9. Cross border weather alerts – Weather and traffic information through mobile phones

### **Ideas Presented**

- Road climatology – thermal mapping
- Friction measurements compared to prevailing weather situations
- Free all weather data – free geospatial data
- Product: box to collate data in vehicle weather measurement, crash diagnosis as a source of transmitted real time data
- Dense network of roadside changing signs, showing current problems nearby (weather, accidents) like develop an intelligent traffic sign – operating quasi-automatically
- With weather data, traffic data, warnings –display as a sign

- Pedestrian, cyclist, m-cyclist all have strong weather dependent choices to make – often pre-trip advice – on route adjustments, advice all based on microweather data
- In-vehicle information about speed, road conditions, and traffic situation
- Inclusion of traffic load & weather data into route planning
- Free our geo-data:
  - Good
    - Trend is right: work done in EU directives, many open services e.g. penstreetmap.com, Galileo, some signal free (perhaps from 2010 on), more data coming from new sources; more competition-> prices go down or disappear
  - Problems
    - Personal data security sometimes a barrier to get data
    - Private companies do not have to give their data
    - No integrated data sources, e.g. road weather data
    - Most problems in map and weather data
    - Pricing rules may differ per country
  - Solutions
    - Data providers and business and service providers must be separated -> no conflict of interests
    - If everything is for free, only way to have costs covered are: a) taxmoney (not much), b) advertisements (only big and attractive services survive), c) other? New business models!
- Mobile sensors for data acquisition in efficient use – weather and traffic: mobile phones as sensors – peer to peer to infrastructure data acquisition: efficient use of cell probe (mobile networks) in traffic flow; public sector is buying data, not investing in infrastructure
- Weather observations from airport combine with satellite info; lots of important parameters are manually measured 48 times a day. Same standard over the world and it's free! Visibility, fog, etc. weather condition, temperature, dew point
- Mobile Pocket Guide: utilisation of existing data for positional services of pedestrians and cyclists (mobile) - > positioned extra services for mobile information guide
- Weather: slippery, strong wind, heavy rain etc. environment fine particles, road works, incidents, warnings, commercial services, restaurants, shops, events, public transport: stops, lines, arrivals

- EYEAR: friction data collection and transmission: use of optical friction sensors in route buses and trucks to get information of the slipperiness on highways. Also information from brakes
- Mapping of acoustic emission data to estimate friction and slipperiness
- Permafrost road network – data fusion, models, prediction of bearing capacity -> paper industry mining
- Friction data collection and transmission: many methods to be tested simultaneously – acoustic, optical, in-vehicle data, wheel, Pilot: vehicles with a lot of sensors some test have already been done, varying road conditions required.
- Port-related traffic modelling: modelling the intermodal traffic situation for ports -> depicting the interrelationship between the road traffic situation and ship arrivals online and for planning purposes
- Multipurpose use of GPS-based road tolling: use of truck-tolling systems for other purposes like FCD collection, road weather detection, emergency calls
- Weather observations with satellite: use weather observation from airports, lot of important parameters that can be used for road use. The observations are made manually two times every hour. Same standard all over the world, combine with satellite info.

### **BASKET - Pub**

Pub basket – ideas that need further free brainstorming by various combinations of expertise, i.e. self-organising teams in a pub, radical ideas.

1. Friction model: combined with RWIS and weather and maintenance activities – **“PULP FRICTION”**
2. Personal filtering: Collect information about users: age, state of health, car type, status, and create intelligent algorithm that will find the interesting data for him/her (e.g. pollution, allergies), compare: eCall, **MyRoute**
3. Social equality issues: age, gender, language
4. Information on eco-efficiency – while planning – while driving
5. Smart location finder for personal services – new issues e.g. nearest toilet **“ToiletTOMTOM”**
6. Social mobility information and contact system
7. Multimodal routing system adaptive /learning personal traffic, mobile route selection
8. Urban data fusion for a better traffic information, Traffic forecast models

9. European databases
10. Satellite data and traffic structures
11. Satellitedata; airport weather observations – see group 3 – Ready, Pub

### **Ideas Presented**

- PULP FRICTION
- **Friction Model**; prevailing situation, and forecast, is friction and slippery same thing?  
Factors leading to the slippery condition: weather, surface and the structure  
below it, traffic, maintenance activities;

Local points or all road stretches

Friction measurements: optical, mechanical (brakes, sliding), acoustic, remote sensing

What is best way to measure friction, how to get observations?

The goal: less traffic accidents, localised maintenance activities, warnings, prevailing friction and friction forecasts, a lot of work to be done

Poor friction is dangerous for cars in winter, in summer paintings and other stuff can be dangerous for motorcyclists

Problems: monitoring of the value of friction, taking into account maintenance activities

- Estimation of friction and slipperiness from sounds emitted tires – acoustic emission analysis; Combine with RWIS and weather and maintenance activities
- Automatic friction detection using can-bus informations of heavy duty vehicles;  
Combine info from maintenance activities with road weather info
- Cars observing friction and road weather when moving
- Automatic speed adjustment from road weather – friction and conditions

- On-line mobile measurements from vehicle will be integrated to a nationwide service -> analysis available also on-line
- Customisation and adaptation of general info: there is value in a specific vehicle collecting data which allows modification of more widely available data that may be broadcast on radio: this is for example to adjust vehicle warnings etc. to the preferences of the driver -> routing etc.
- Current warnings on my daily route will be shown on my refrigerator's door
- Personal filtering: we have too much data: collect more about users: age, state of health, car type, status. Create intelligent algorithm that will find the interesting data for him/her (pollutions, allergies)
- eCall: information to be used in route planning
- Product interfaces to Galileo Centres
- Weather data needs consolidation and local disaggregation – services to offer
- Current warnings on my daily route will be shown on my refrigerator's door
- Personal filtering: we have too much data: collect more about users: age, state of health, car type, status. Create intelligent algorithm that will find the interesting data for him/her (pollutions, allergies)
- eCall: information to be used in route planning
- Product interfaces to Galileo Centres
- Weather data needs consolidation and local disaggregation – services to offer
- **Smart location finder** (personal services)  
     Facility /service/location finder

Multifunctional service with several service options. Etc. toilet, restaurant, weather, road conditions, traffic jams, operation funded by advertisers with maybe governments  
 Smart petrol station finder system: GPS

Enablers: positive taxation treatments, positive legislation (liability, etc), NGOs; lobby groups, community: idealism

### Smart toilette finder

Parking-lot information system for truck drivers (along highways especially): process: limited parking lots for trucks, truck drivers are obliged to rest regularly, if no parking lot is available they are forced to drive longer than allowed -> penalties may apply -> safety risk .Idea: information system with pre-booking opportunity

Supporting automatic driving and guidance on public roads: PT-vehicles (busses) could be guided through traffic. So far the problems are mainly of legal nature, automatic driving is already possible, however, automatic driving on public roads in running traffic requires innovative solutions that fulfil legal requirements.

Driving condition monitoring system & warning; driving style monitor

Dissolving the need for traffic management centre by co-operative systems (C2C, C2I): the emergence of C2C and C2I technologies may lead to a decentralization and automation of traffic management. Maybe in future there will be no need any more for having people and technology in one control room. Traffic managers will be mobile! This is based on: more powerful computer and communications links, ubiquitous information, self-regulating C2C traffic

- **Social mobility info/contact system / Social mobility**

Fellow driver service – intelligent assistance & support; history of the area; he or she is singing with you; tell stories

Communication means versus driver's attention; traffic systems inform users about its state; infrastructure to car communication – engine starts

Person-to-person travel info system; need transport from metro to centre, etc. linked to GPS; transportation face book – social driving

Carpool planning service, route pooling

Website for giving info about oncoming trips -> maybe to be combined; to be organised by organisation or similar, driven by incentives

Known vs. unknown people: has to be easy to use for driver (equipped car/driver necessary); user view: as a public transport info system; connected to public transportation (user view); problems: involving drivers providing free cap -> incentives (taxes, petrol price share)

- **My Mobile travel manager**

Multimodal approach to public transit; Journey assistant (planning route, tracking & guiding, monitoring changes, alerts). Where I am (already knows), where do I go (arriving place), recommend the best possible route! When chosen: current weather conditions, expected weather conditions, current road conditions, expected road conditions, other info. Red hot – flashing – something significant happened, recommendation

Adaptive /learning /personal traffic /travel information: traffic information automatically to a mobile utilizing behaviour learning: Automatic traffic information mobile application for commuters utilizing behaviour learning: application in a mobile device track users every-day-life (home-work-shopping-hobbies): personal behaviour (place, times, dates) tracking is input to a machine learning software: learning software can forecast information needs (for daily trip) and fetch/push e.g. traffic information alerts/warnings to the personal mobile device: user does not need to input or search information: can also utilize calendar information from mobile device.

Real time traffic and weather information on board (satellite navigator), interactive approach: problem: if we make private car use too easy we may discourage use of public transport!

Automatic road condition reporter: automatic information to road operators of problems on the road.

- **Multimodal routing system**

Multimodal info system for pedestrians, cyclists, public transit (non-motorised modes)

Sophisticated routing and route information system for cyclists: Problem: no perfect info system for cycling routes available -> cycle lanes are no part of route network (missing attributes), IDEA: detection and attributing lanes; mobile too: including info on current weather conditions; safety issues; multimodal. Game: participate and get tax reductions etc. -> ecodriving

Traffic nodes: have there been studies on road nodes?: map of Europe, services applications

Cycling routing system: Appropriate data base is required: road network, cycling network, pedestrians network, database mode has to be developed (facilitating adequate attributing) ; info to be included:

availability/position, surface quality, maintenance status (snow removal etc.) gradients, linkages to public transport

Infrastructure & telematics: multimodal journey planner with comparison of costs, time, emissions

Multimodal on-line GIS: see [openstreetmap.org](http://openstreetmap.org) -> personal level

Trip weather forecast (web), for bicyclists, motorcyclists, skaters, walkers for pre-trip planning (W pre-trip planning will be better with TWF; A weather company, route planner company; C DEMIS bicycle route planner, KNMI rainfall radar forecast; S web server; V better trip decision; O time is not used in planning; D just do it, easy to implement)

Weather and traffic: get the info to the driver always in time through his cell phone/GPS; How? Cell phones enable to locate you very precisely, voice messages (SMS messages when the driver starts a car: he has to define the final destination and along the road he is informed about the next half an hour of driving conditions - Done locally?

- We need to have better weather and slipperiness information inside the car. Today we have good info of the traffic situation but this is not in line with the weather info. By increasing the quality of the weather info the total info will help in preventing queues and traffic jams.
- Traffic forecast: technology company and mobile industry interest. Needs real time traffic data flow with coverage; historical model with time series GRP
- Predict car flow, don't observe car flow, know it before it happens, e.g. if using navigator also send the route to a central and other cars, use information for active car control
- Cars report: the intelligent sensors built in to the cars report the average speed and the traffic conditions; data are sent to a database and sent to other cars so driver/computer can plan properly
- Urban data fusion for a better traffic database: collection of traffic data from different sources, especially in an urban context, especially online traffic data, for example: taxi-FCD, motorway traffic control database, traffic-adaptive signal control, traffic information centre. Possibly merging with weather data: mobile weather FCD, stationary traffic
- Use the car flow prediction for trajectory planning
- Cross border weather alerts (road section)

- Building a special floating rescue system on the basis of an accident forecasting model: using traffic and weather data for the flexible command of the ambulance vehicles, a) forecasting of the spots of accidents over the road network, b) forecasting of the probable time interval of accidents, c) method to command the ambulance cars in advance on the basis of forecast accident information.
- Traffic data form airborne and space sources
- Combination of the automatic rescue system (eSafety project) with the traffic regulation and information centres; interaction of the automatic rescue call. System proposed in the eSafety project into the system of traffic regulation and information centres.
- RTFM: Better and tailored user-interfaces of text, image, audio, considering personal characteristics of users: language, disabilities, age, health, and other personal needs
- Satellite time series: using single pixel information to combine with ground observation to learn fog characteristics. This could later be distributed over the landscape -> which info? More specific!
- Traffic structure: using congestion characteristics to evaluate road conditions
- Environmental and traffic data -> plenty of items but no services?
- Proximity warning services; GPS plus microwave enables warnings

### **BASKET - Wild**

Wild basket – ideas that cannot be seen as to be applied straight on or need more research: technology is not ready or facts are missing, debate is on, etc.

1. Fellow driver service
2. Car-to-infrastructure communication
3. MyMobile travel manager
4. Automatic traffic management information system
5. Eye from above: traffic information from satellites, unmanned planes, helicopters, balloons, aircrafts; meteoinfo from satellites
6. **EUROADMAP** – Northern Europe Module (NEM) for mapping road weather conditions online – Wild (NEM Pub) – (Conceptual)
7. Everything that moves gives location information – passive transmission of data

8. User interface development – consider social issues: age, language, ecology, equality “RTFM” – Pub, Wild

### Ideas Presented

- Satellite photos for traffic measurement. Not enough details to count the number of the cars but we can see car clouds: size, movement
- Use road study sensors to both collect and transmit information
- Detection of collapsed road structures
- Location blind corner approach warning – weather & location dependent (2-way)
- Animals on road: easy device developed that can be shot on moose, showing their location (GPS/Galileo) + central data analysis and delivery
- No more friction! New vehicles “flying” without ground contact!
- Free data platforms! Remove data pricing constraints
- We must give valuable information to the driver -> how human brains works?
- Intelligent car can and must collect information about driver and environment, and give forecast. There are objective and subjective variables.
- Too many data, we must compress -> patterns
- Based upon patterns we could proceed to an optimal control of driver actions and to increased safety
- **Automatic traffic management information system**  
 Traffic transport management & forecast (weather /events)  
 Adjust traffic capacity in real time – automatically based on traffic  
 Variable message signs  
 Abolishment of physical road signs – replacement by electronic means:

Road signs of physical nature will gradually be replaced by electronic means; the road user receives information via radio and all kinds of electronic gadgets

“CAR BUS” – cars are auto-guided in traffic jams to increase throughput; cars will be “forced” together; infrastructure will adjust.

- Weather-dependent urban traffic situation
- Modelling the behaviour of road users on public transport under adverse weather conditions & prognosis -> forecasting the changes in the traffic situation (in rain, in snowfall etc.)
- Traffic demand forecast patterns including weather & events
- Intelligent traffic data warehouse
- Theoretical base: data mining, historical data
- Plan repair activities based on projected data
- Road infrastructure capacity planning: identify possible bottlenecks ahead of time; simulate impact of road works
- Fellow driver service
- Car-infrastructure communication
- Eye from above: 1) satellite, GS bad resolution, CP low frequency over same point, 2) aircrafts, no permanent actions, in future unmanned or UL aircraft, 3) cameras on road infrastructure, not dependent on weather or day/night, only local info. All aircrafts are equipped with camera under them -> obligatory to send pictures to central processing unit; Legal obstacles, costs and expenses: airplanes investment to high, remote controlled aircrafts 500e/h pilot not roadidea; Satellite – not feasible
- Systematic assessment of the local traffic situation using aerial photos taken by small pilot less exploratory aircraft: a) collecting data from accident scene by photogrammetric methods on the basis of aerial photos, b) survey of the extent of disturbance caused by local weather condition, c) survey of the extent of disturbance caused by an accident, d) need to develop a special method to evaluate the traffic and microclimatic situation from the aerial photos, e) developing mathematical methods to calculate the necessary exact traffic parameters from the aerial photos similar to the parameters came from point-based and link-based data. (density of traffic, speed of different

vehicles, volume of traffic, level of service etc.). Other data: gasoline stations/maintenance, restaurants, toilets, rest parkings

- Locate all kind of traffic and environmental changes: put transmitters on everything, pedestrians, bicyclists, cars etc. then it is possible to warn car drivers for pedestrians, cycles etc. then use car to car communication to forward it. Everything that moves gives location info passive transmission of data
- EUROADMAP: Universal Europe-wide road weather service: north-European road weather service as part of it.: mapping road weather conditions for northern Europe online; road section-based online display
- Weather monitoring on European road map, radars, observations, combined weather radar and synoptic weather observations on European road map, covering the whole Europe, the driver can zoom in the area where he is location – application of the lhs

### **BASKET - Waste**

Waste basket – ideas that have been discarded during the sessions for whatever reason (possibly to be studied later), i.e. left- overs, controversial ones.

1. In-vehicle information: about speed, road conditions and traffic situation combined information from maintenance activities with road weather information
2. Animals on road: fasten device that can be shot on moose, showing their location (GPS-GALILEO) + central data analysis and delivery
3. Mapping of risky road stretches
4. Weather wikipedia – weatherwiki for roadweather; road weather data
5. Dynamic driving trip services
6. eCall and airport weather observations

### **Ideas Presented**

- Cars will be equipped with warning light (e.g. in the rear window) if car observers or receives a message of dangerous condition or accident
- Use Bayesian method to dynamically update location specific data, and to dynamically update location specific data fusion on a route service
- Multiple services info to public transport cars

- Why contact friction data? A key issue is the human factor to use this information
- Friction plus weather data is valuable for pre-planning, especially for heavy vehicles, pedestrians, cycles and motorcycles.
- Dynamic on-route information is equally valuable
- In-vehicle data collection can be improved by between vehicle information exchanges plus external info
- Using external information to directly control vehicle has attractions but major human factor issues are to be addressed
- Mapping of risky road stretches: position and velocity of vehicles are recorded; the data could be used to detect parts of the road network or situation, where the driver has braked hard. At these locations, the road might have to be rebuilt to increase safety.
- ECall
- Airport weather observations
- Meteo information, satellite data & images: (primary images of high resolution? EUMETSAT), price & will to sell
- Weather data – actual get the local authorities involved, e.g. police, fire dept, town halls, why: they are there in every moment, it is in their best interest, it will not cost too much, no extra labour costs. How? They will create a schedule of regular info on weather sent every 30 minutes to a central database, severe weather: immediate info to the database
- Develop a non-parametric model of traffic & weather phenomenon based upon self-organised optimal information storage
- Residual road salt detection? Development of reliable measuring system, data collection, optimization of salt spreading
- Data collection from electronic ticketing system (time, place, passengers)
- Route searches to transport planning: collect data from searchers done with route planner (PT) and use the data to describe public transport flows. This could be used for route and the table planning, e.g. to find out the connection where the service level is lower than targeted in terms of travelling time, number of transports

- Weather wikipedia: good coverage and real-time, whoever wants to connect his weather data to the service could do so, what kind of platform? Who is hosting the service, technological issues? Dynamic during trip services (meteoalarm, Baltic roads)

### **Ideas in All Baskets**

- Adaptive learning personal traffic (mobile route selection)
- Immigration effect!
- Car running on compressed air or solar energy: etc, renewable energy sources for traffic.
- Assessing environmental impact of all traffic participants -> privacy issue -> tracking might be necessary
- Stay home! What are the effects of choosing staying home instead of choosing to travel a certain route?
- Note: ecological and equality questions: gender and age
- Climate change: information (real-time) on eco-footprint as you drive, as you plan
- Environmental data should influence traffic management decisions
- Collect the emission information from vehicles and use it to improve environmental efficiency of traffic
- Sponsored services -> viable business model. Data platforms European wide data platform for all insurance companies
- European data library for SPs, create European-wide data library where service providers can get basic data free of charge
- European road & rail database: infrastructure, characteristics, signage, etc.
- Public data pricing issues cleared

## 2. New ideas of the Second Innovation Seminar, Free Radicals Session

In the Second Innovation Seminar, first part was used to analyse the state of ideas created in the first seminar. The second part "Free Radicals" created new ideas, now with a focus further into the future (see document D5.3 for details).

### Summary Table and Evaluation of Free Radicals

IDEA	Evaluation points (hearts)	Ranking
Semi-public transport	55	1
DYNAMOBI	52	2
No-man driving	43	3
Waste to energy	42	4
TRAWORK	41	5
LEGO-block transport	39	(6)
Industrial Transport	31	(7)
Free energy	29	(8)
HVI interface	23	(9)
TAR-TRANS	18	(10)
Location-based services	17	(11)
New transportation technologies	13	(12)
Megatrends of environmental backlash	11	(13)
General ICT conditions	6	(14)
Conditions of political turmoil	-	-

### Presentation of the Innovation Material Collected in the Session

During the session the four alternative worlds for 2030 were discussed in three groups: one group for each world. First, the conditions of different future worlds were discussed, then in addition some wild cards were also found, as are presented below.

### Conditions of different future worlds in 2030

#### World 2 Environmental Backlash

### **Megatrends Evaluation: (evaluation: 11 points - not used in final comparison)**

- High energy prices -> smaller and lighter cars -> lower speed limits (price > 10 e/litre fuel)
- Personalised emission trading based mobility management & service systems
- Megacities
- Population getting older - health care and well-being services increasingly needed
- "Mummy-mobile" specially designed for elderly needs - may also stimulate technological breakthroughs
- "Slower" holiday travelling (no more weekend trips done by airplane)
- More rural, local transport - public & private
- Agri-products with 0-km distance (below 50 km area) available all over (now in Italy)

Addition in 1st cycle: more bikes with small electric motor for uphill ride - recharged downhill

### **World 3: High-tech economy - Technology push**

#### **Wild Cards:**

- Virtual reality
- Cluster living - no need for car
- Flexibility at work and traffic - home office means less traffic - tax reduction could promote this, changing of influences to traffic - working time, holidays
- CEBRA - central brain ref. "Matrix"
- Tax incentives (Society's - stick and carrot)

### **World 4: Political Turmoil**

#### **Conditions of operational environment**

- Bankrupt states will disrupt long distance travel
- Separate personal luggage & people, city public transport services
- No unlimited globe trotting
- "War" effort takes about 20% of 1st world GDP
- Lower investment in major public transport due to terrorism vulnerability and events
- Oil price > 100 e/barrel
- Run out of uranium in 2050 confirmed
- WTO does not exist - regionalism rules
- People move out of cities

- EU will be one of the "imperiums" and behave accordingly
- Higher oil price, more efficient cards, small impact on mobility
- Smaller cars needed
- People don't care about CO2
- Government will enforce personal carbon budgets
- Power imbalances will ensure high mobility only for powerful groups

#### **What-if Analysis:**

- Oil lobby stops development of new technologies?
- Economic power goes to China
- Fusion power comes on stream
- Deregulation of traffic services
- No more GPS?
- Money vs. religion - which one rules? Money & religion always have been going together

#### **Wild cards:**

- Key low volume material becomes unavailable - e.g. rare earth!
- Russia will join the EU
- Global supply chains will be forcefully maintained by major powers (and used as political leverage)
- No war zones - No US - No NATO

### **Free Radicals Session Ideas**

There were 13 best ideas evaluated in the two brainstorming cycles: 1st cycle: studying the results of the group work and giving comments, 2nd cycle: giving hearts for best ideas (3 to excellent, 2 to good, 1 to potential).

### **World 2: Environmental Backlash**

#### **1. Semi-Public Transport**

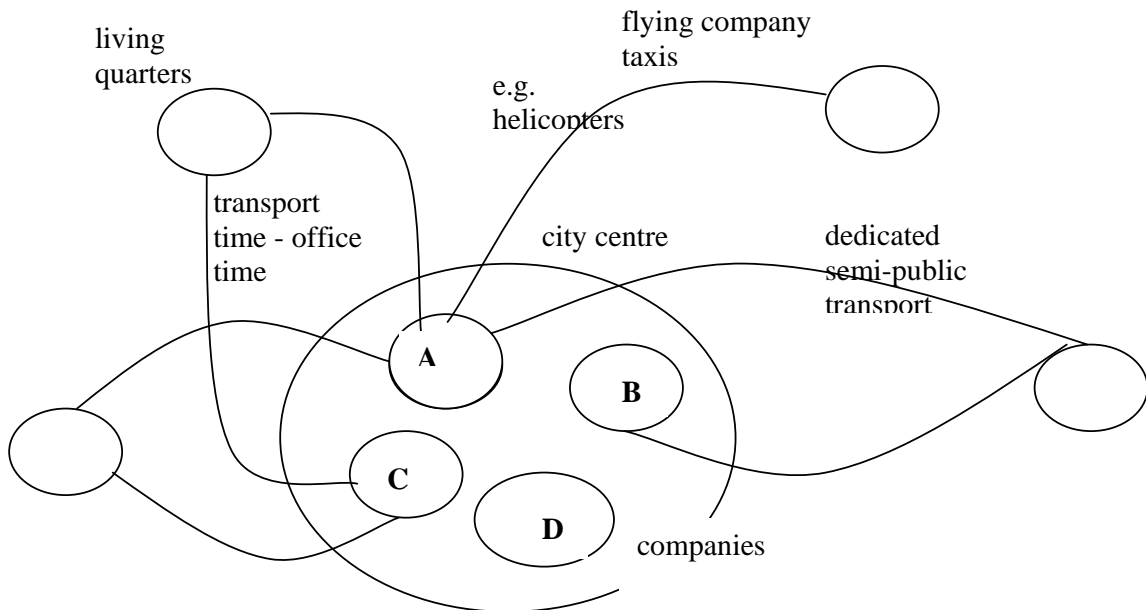
**Evaluation: 55 points - 1.**

- Best travel services are in public transport units
- Personal cars are not allowed for fancy nomadic devices, buses, trains and car-pool vans have all fancy services
- Service production & support systems of advanced private public transport services
- Security and safety services
- 3 dimensional (taxi) traffic navigation
- Radar-based collision avoidance systems
- Level of automation in public transport? (trams without a driver?)
- Flying taxis
- Car sharing based on electronic vehicles

- Accurate travel(time) information to make best choice
- Personal travel device service (rent) on (large) public transport stations
- Some kind of relaxing system as service

Addition in 1st cycle: Comfort on-demand at a price!

Figure: Semi-public transport MIS (management and information system)  
3 dimensional vision



## 2. Waste to Energy

Evaluation: 42 points - 4.

- (Human bio-waste used as energy for cars)
- Bio-waste into packed tubes -> can be used as an energy source later
- Biogas (& methane -> car) from waste
- Bio-waste collection service - tax refunds included!
- Stand-alone bus "fuelling" from bio-waste
- Biomass power plants -> car battery charging in-house -> independent energy demand & supply cycle
- Dense network of fuel stations with different fuels including changeable accumulators (batteries); possibility to leave your waste for bio-energy production

Addition in 1st cycle: Geobacteria harnessed to produce electricity

## 3. Industrial Transport

Evaluation: 31 points

- Railways connection among logistic centre plus other transport modes
- Food production: Europe & Megacities
- Location-aware web commerce applications (shipping costs included in price comparison)
- Get rid of unnecessary transport! Who defines the level?
- Emissions minimised for freight transport = always use the least emissive way
- Support local production -> without taxes!
- Equally levelled production costs all over the world!
- Production effectiveness competition & rewarding
- "Big Brother" system to follow your transport emissions -> includes carrots: tax reductions, includes sticks: more taxes, for private and industrial transport
- Integrated market needs based on logics services system
- Clearing house for knowledge exchange
- Real-time intermodal logistic services, booking & payment systems & service EU -wide
- New system of goods distribution in megacities + green vehicles
- Network of logistic centres around megacities

Addition in 1st cycle: Pay-as-you-transport

#### 4. TRAWORK

**Evaluation: 41 points - 5.**

- Virtual offices - office on demand!
- Travelling on offices - working on transport
- Office on demand rental company
- Travelling on office organisers
- Service: shopping while working
- Targeted transport service for companies (working during journey)
- Fluent "rent a vehicle" and taxi services
- WAN everywhere (web services)
- Daily activities & travelling management and optimisation services
- Dynamic incident-based network traffic management & services system
- New business models needed

Addition in 1st cycle: Traffic forecasting during incident duration with impacts

#### World 3: High-tech economy - Technology push

#### 5. FREE ENERGY

**Evaluation: 29 points**

- Plugless and cordless electric charging
- Personal equipment generating electricity - personal energy trading ( a person as a company selling excess energy)
- Low cost energy - >compressed air as driving force
- Solar panel roofs & windows in cars
- Friction used as energy in roads
- Money in electricity
- Low energy "plants"
- Wireless electric distribution (N-TESCA , end of 19 CT)?

Addition in 1st cycle:

Flying car-> gets in a very strict and complicate law of air transport

Rather "emission"-free energy (there is no free lunch)

Solar building material - > SOLAR BRICK?

## 6. No-man driving

**Evaluation: 43 points - 3.**

- Autonomous driving - semiautonomous (?), who is driving? - travel time is radically shorter
- Horse-intelligence to the car (rf to horse power)
- Speed control, reaction test in car, driving wheel as heart beat monitor - > other life indicators, thus avoid bad drivers: drunken, old, sick, young
- Speed control: cameras, black box, "outside" signals to speed regulation, behaviour control, witness, driving in the background all the time and recommending breaks, mandatory overnights etc.

Addition in 1st cycle:

Increasing the perception of risk with acoustic design of vehicle and acoustic risk indication features

Avoid also adverse and bad weather driving

Intelligent road condition monitoring

Liability

## 7. DYNAMOBI Dynamic mobility

**Evaluation: 52 points - 2.**

- Cooperative dynamic navigation
- Integrated traffic system: car/train/airplane/bike/taxi/boat
- Real-time network status model plus dynamic speed limits
- Intelligent control of traffic field

- Intelligent and efficient logistics
- Info (integrated), alerts of changes
- Ticket booking and paying
- Continuous rerouting on multimodal journey

The keywords for DYNAMOBI are:

- navigation: guides the user to his/her destination
- easy to use: user just points at the target in digital map or gives the name by keyboard or speech
- multimodal: includes all transport modes, also walking, cycling, rollerblading, skiing etc
- scalable: from a town or city to a country to continent to the globe,
- modular: utilising local and regional traffic network models in a grid
- dynamic: the models react to incidents and congestion immediately, predicting their duration and impact on the network (recurring congestion nationally built in)
- cooperative: users with the system get individual guidance, which will depend on how the other users are behaving and following the guidance so that in case of too many rerouting to the same route, a part is guided to the next alternative, etc etc (relying on users being positioned when needed or prompted by user query)
- full-service: also travel related booking and payment is included

## 8. LEGO-BLOCK TRANSPORT

**Evaluation: 39 points**

- Intelligent structure - modularity - lego-block car parts (cabin, engine, wheels)
- Super light weight vehicle cheap or as status expensive
- Car trains
- Wind shade for better aerodynamics of cars
- Small sizing as trend - slot time plan -> route, high speed travel possible, lower fuel consumption

## 9. TAR-TRANS

**Evaluation: 18 points**

- Hovering traffic in the air
- High speed highways -> 300 km/h, stops every ?
- New type of roads, 2-layers, weather shields
- Nanosurfacing - no ice, no snow
- Dedicated lanes for small cars

- Traffic goes underground
- Cooperative guidance on lanes

Additions in 1st cycle:

Revised traffic rules?

What is nanosurfacing? New surface materials which can not freeze

## World 4: Political Turmoil

### 10. General ICT-conditions

**Evaluation: 6 points**

- Internet is physically regional, but overrunning systems exist
- Accessibility must be ensured
- Cheap mobile services needed
- No cheap airlines, less business travel, EU research expensive

### 11. LOCATION-BASED SERVICES

**Evaluation: 17 points**

- Security applications: personal logistics services, esp. goods, separate personal luggage and people - >city public transport services needed
- Security applications: Monitoring protection devise , tracking people, child travel tracking system, automatic luggage management

Addition in 1st cycle: privacy?

### 12. HVI Interface Human-vehicle

**Evaluation: 23 points**

- Tracking people and vehicles -> connected travel
- Vehicle autopilot - but not owned by individuals, autonomous vehicles but not central control
- HMI interface for elderly: Car-toilet seat
- Tackle inability to undertake travel/communication that are desired
- Filter ITS while driving (GIDS project)

### 13. New transportation technologies

**Evaluation: 13 points**

- Car + train: 1) cars travel as train, 2) cars are onboard train for long travel, low range vehicles

Additions in 1st cycle: Smaller cars

Higher oil price, more efficient cars needed, small impact on mobility

### 3. All ideas in ROADIDEA-INCO Washington DC seminar

#### All Ideas presented in Three Groups

#### Group 1: World 2, Environmental backlash 2030

General discussion: cars will be more environmental friendly

#### Ideas:

1. Energy influences transport (scaled down?) optimised smart grid for transport (multisource)
2. Efficiency, optimal system (civil liberties)
3. Repurposing existing infrastructure (needs money to build new)
4. Encourage telecommuting (Financial impact)
5. Redefine commerce (work) and logistics and way of moving (e.g. golf carts)
6. Land use
7. Reduced winter maintenance -> "sleigh cars"
8. Meter the "essentialness" of transport
9. Environmental data beyond traffic impact (other uses)
10. Personal transport IntelliDrive (everybody can take part in contributing to the data pool -> gain access to new services from the system)
11. Flow control -> revolutionise traffic controls

Three best ideas were (quite equal number of points):

1. Personal transport IntelliDrive (everybody can take part in contributing to the data pool -> gain access to new services from the system)
2. Environmental data beyond traffic impact (other uses)
3. Repurposing existing infrastructure (needs money to build new)

#### Synectics session results on the second day providing more practical information on question: HOW CAN THIS BE REALISED? (phase two) on the three best ideas

**1. Personal transport IntelliDrive** (everybody can take part in contributing to the data pool -> gain access to new services from the system). Is there too much data? Interpretations might get confused? Quality of data and the differences result on need for more quality checks.

- Much data, but computers take care of integration
- Many obs. may contribute to one data point -> consolidated reporting (can be done locally)
- Needs sophisticated quality checking

- Need to decide where “the brains” of the system are. Centralized vs. distributed, find optimum
- Training of users needed, so that people use it, “marketing”, give people incentive to contribute voluntarily.
- Sensor development needed, tailored to different modes
- Is there a limit in available band width?
- Suburban and rural have different needs
- Results used to control transport actions (pollution level...)
- First: more sophisticated routing using IntelliDrive

## 2. Environmental data beyond traffic impact (other uses)

- Using data for other applications
- New sensors are needed, pollution obs.
- Viruses, pollen ->service: route planning
- Pollution also coming from the vehicle
- Cars/bicycles/pedestrians on the same lane: collision avoidance (radar, infrared)
- Sensors on helmets, clothes, jewellery
- Interact with the system by voice/thoughts

## 3. Repurposing existing infrastructure (needs money to build new)

- Innovation need: new type of rails and tires!
- Design the highway lines to new modes (bicycle lanes needed), multi-purposes roads
- Logistics need
- Repurposes also the data spectrum
- Must have back-ups and plan b’s
- Use of electricity, need rationalizing
- More rails!
- Must re-plan road maintenance actions: Better designed bike roads, less need for asphalt-> need magnetic asphalt!

## Group 2: World 3, Technology break through

General discussion: New kind of connectivity pushes through. All people, vehicles, incidents, etc. all information available for all wirelessly. Highway trust fund is financing the transport. The tax has been fixed not indexed. Tax increase is not possible...?

### PROBLEMS:

Haves vs. have not’s (or in Washington DC have not’s vs. have Yachts)

1. Vehicle miles travel is increasing, population is increasing at the same time the network is fixed not growing and Haves vs. have not’s (or in Washington DC haves vs. have Yachts)

2. Transportation financing
  - Advanced Tele-presence systems (decreases traffic volumes, and pollution) (stay@home) Flexible working time
  - Freight distribution policies improve efficiencies, improve goods tracking

### **INTELLIDRIVE: WHAT THE SYSTEM CAN BRING TO OUR WORLD:**

1. Personalized trip planning (multi –modal, optimized) assuming full access to all information. Special respect to personal mobility budget (when I can personally upgrade my mobility) daily/predefined trips get mode and routing suggestion, with respect to road weather and other events).
2. 100% crash avoidance, technologically supported
3. Driver or system making routing decisions? Technology steers the system, is there driver making routing systems? Technology steers the system, user has to follow otherwise fined  
Human forecasting (behavioural)  
Personally and systemically
4. Ground sourcing of data

The three best ideas were:

1. Decision made by system
2. Personalised trip planning
3. Advanced tele-presence systems (stay home)

### **Synectics session results on the second day providing more practical information on question: HOW CAN THIS BE REALISED? (phase two) on the three best ideas**

#### **1. Decision made by system**

- Data and information system
- Networks of networks
- Systems of systems
- Data
- Observation and surveillance
- Data and data modes
- Reliable d to d relation
- Data privacy?
- Computer and methods...advancements
- Communication (wireless) backbone

- Functional understanding, maths, optimisation
- Dramatic policies changing
- Primary vs. secondary network
- System optimisation
- Self learning, neuronal networks

## 2. Personalised trip planning

- Information dissemination
- Historical traffic patterns database
- Personal optimization
- Logistics (personal itinerary planning)
- Psychological backgrounds
- Social networks
- Changing paradigms
- Communication system I to car, car 2 user
- Internet 3.0

## 3. Advanced tele-presence

- Bandwidth challenges
- 3D TV
- Communication challenge
- Privacy
- Advanced personal tele-presence
- First: more sophisticated routing using IntelliDrive
- Virtual sandwiches
- Virtual reality (pub session, beach session)
- Holographic (?)
- Direct brain communication

## GROUP 3: World 4, Political turmoil

### PROBLEM AREAS THAT NEED ATTENTION:

1. Security issues (personal, equipment)
2. Area security
3. Data security
4. Enhanced personal security service
5. Communication (V to I, I to V, V to V)
6. Wearable IT
7. Networks important to keep up, vulnerability is high
8. Unequal distribution of resources
9. Telework? A solution in crises?
10. Commercial toll-roads (routes) profile-based services
11. No public private partnership possible

The three best ideas were:

- Networks important to keep up, vulnerability is high

- Data security
- Profiled customized services commercially provided (routes)

**Synectics session results on the second day providing more practical information on question: HOW CAN THIS BE REALISED? (phase two) on the three best ideas**

**1. KEEP UP THE NETWORKS.** Networks important to keep up at all times, vulnerability is high, must have contingency plans

- Assure a type of redundancy
- A budget, federal, state, city levels
- Critical to national, security designation
- There must be a tested contingency plan
- Reroute
- Multimodal flexibility
- Upkeep maintenance plan
- Parts lifecycle
- Education of the public
- re-organizing hubs/networks

**2. Data security** General discussion: Michigan test bed 63 million dollars  
There must be comparison between satellite data and mobile-data

- Contingency plan needed if data missing
- privacy laws
- Risk management plan
- Data sharing arrangements (private, government)
- Encryption methods
- Data management policies (incoming information)
- Privacy laws
- Levered satellite technology infrastructure

**3. Profiled customized services commercially provided for road/routes**

- Toll routes
- Emergency management should have more weather data for emergency
- Different tiers with services and cost, requires access to data
- Rules for data distribution
- Security services has to be vetted (vetted=security service clearance)



## 4. All ideas of the Montreal Innovation Seminar

### INSTITUTIONAL GOVERNANCE

- Find leaders to define shared/ secret information [14]
- Linking data -> different providers (we are dealing with networks of networks)
- Hospitals included and other new actors (police, events, etc.)
- Distributed data loading [4]
- Superimposing data on map (all the data you need in superimposed format)
- Business models must re-thought (competitiveness of private firms to be considered) [4]
- Physical and logical networks can be separately organised
- Translink models needed, get all in the same room once [7]

### DATA ACQUISITION

- Utilization of network
- Road works
- Optimized mode
- Total view of network (for planning, for traveller, for people and goods) [7]
- Total picture of the network (including supply and demand)
- User sees real cost of service on-line
- System suggests the mode based on urgency.
- Just price for just service
- Put in your need and the system pops up the optimised way to travel
- System provides: [6]
  - suppliers need information for the planning
  - Info to policy makers on sustainable demand management
  - Policy feeds boundary conditions to optimisation scheme
  - Selection: comfort, speed, accuracy of timing, facilities, parking lots, security, price
- Information needs [5]
  - all transportation modes( how much, where, when)
  - disruptions (road works, accidents, weather, events)
  - emissions per mode (costs of each mode)
  - parking lots, tolls
  - estimated time of arrival (based on history)
  - seat availability, first and second class...
  - terminal amenities
  - wi-fi...
  - accessibility

- cost for the user
- reliability
- maps
- Scalable; local to continental
- Public security needs:
  - evacuation routes
  - advice to users
  - automatic info at the accident place
- Privacy issues?
  - is anything private in transport?
  - surveillance cameras
  - social networks as sources of data
- Role of big info companies (Google) vs. public authorities, who can afford to keep up the system?
- Main goal efficiency , sustainability
- Urban <-> suburban <-> rural (all have different needs, costs etc. balance is needed)
- User interface: all you can wear it! In the future all are connected, it can be used in every language everywhere [5]