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Critical Success Factors

for Implementing RUC Systems

Bernhard Oehry
Rapp Trans AG
Basel, Switzerland

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What is a good RUC system ?

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A good RUC system is …

- **one that works!**
  - Good technology

What is a good RUC system ?

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A good RUC system is …

- **one that works! feasible**
  - Good technology proven and low risk concept

What is a good RUC system ?

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A good RUC system is …

- **feasible**
  - proven and low risk concept

What is a good RUC system ?

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A good RUC system is …

- **acceptable**
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What is a good RUC system ?

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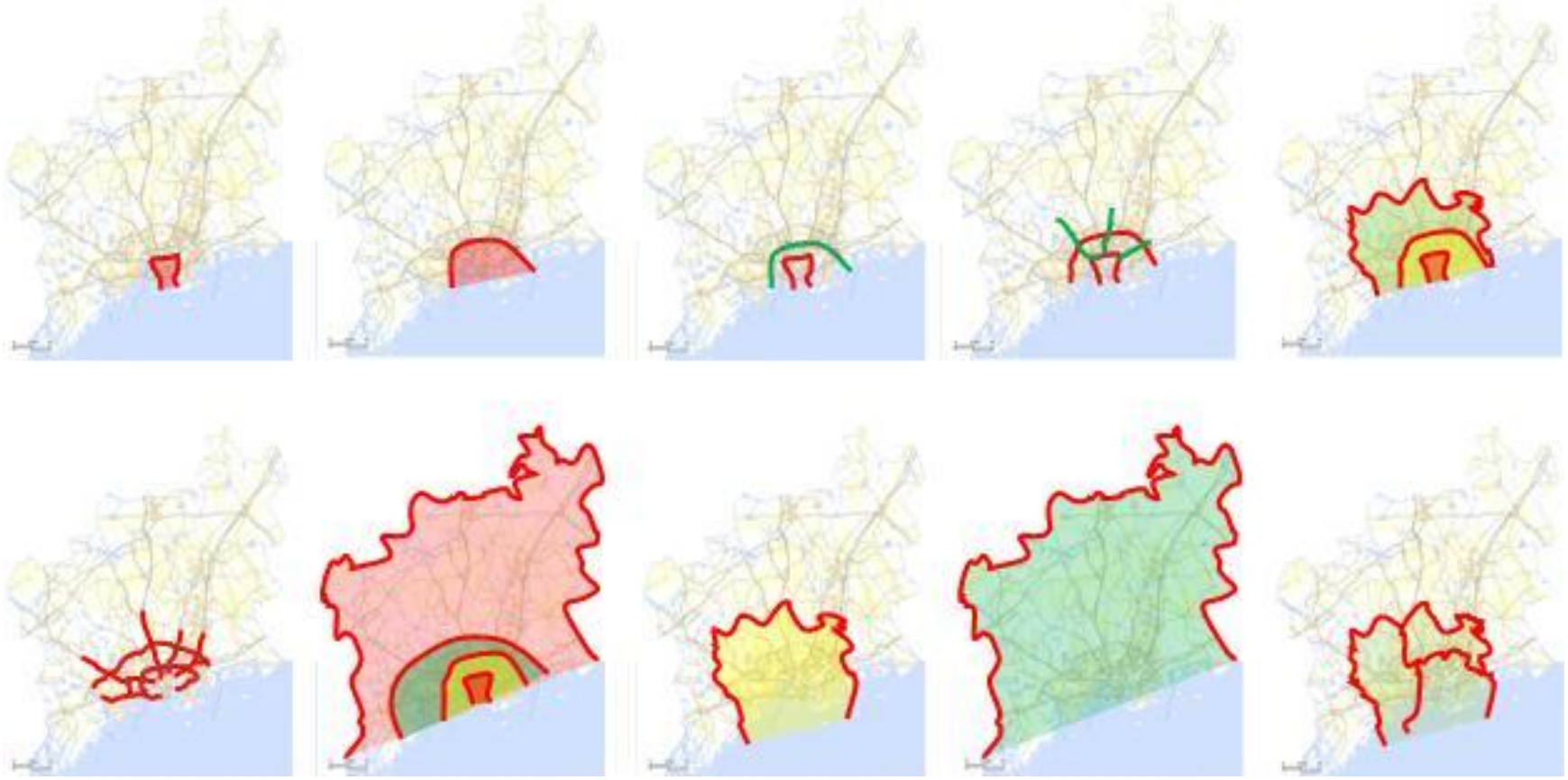
A good RUC system is …

- **acceptable**
  - understandable
    - how to use
    - how to react
- **feasible**
  - proven and low risk concept

.. a good RUC system is understandable



Some options discussed for a RUC scheme in Helsinki

What is a good RUC system ?

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A good RUC system is …

- **acceptable**
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What is a good RUC system ?

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A good RUC system is …

- **acceptable**
  - understandable
    - how to use
    - how to react
  - good effects
    - wanted effects on traffic and environment
    - cost effective
    - fair regarding areas and users
- **feasible**
  - proven and low risk concept

.. a traffic problem is essential

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Three ingredients

- **a major traffic problem**
- **trust that charging helps**
- **not facts, but perception**

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    - me & you
    - business
    - politics
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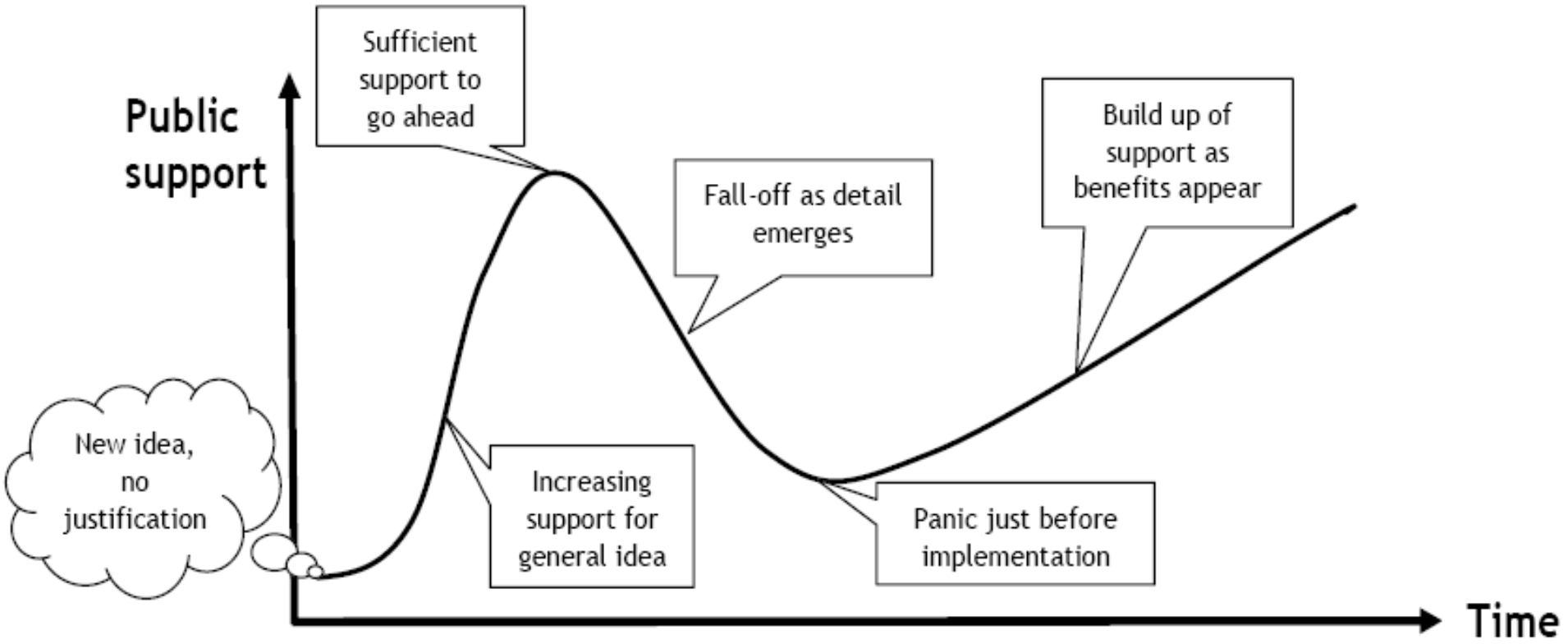
but this changes over time !

Acceptance changes over time



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Charging technologies in a nutshell

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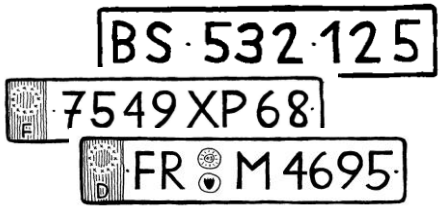
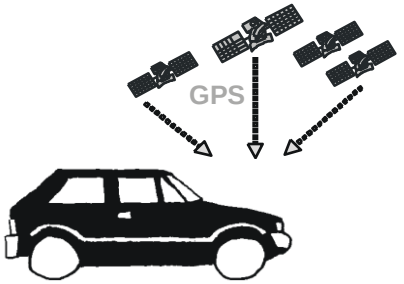
- **Vignette**
  - Pay for a day/month/year

- **Automatic number plate reading**
  - Camera to identify vehicle and location
  - Not for payment



- **Short range communication**
  - DSRC to identify charging location
  - DSRC for charging transaction

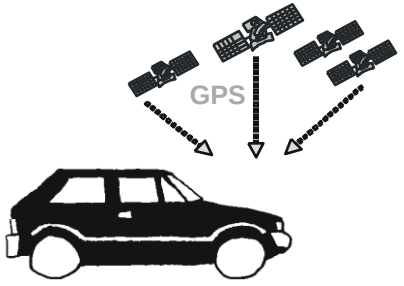
- **Positioning + wide-area communication**
  - GPS to identify charging location
  - GSM for charging transaction



On-board unit technologies compared

- **Short range communication**
  - Abbreviation DSRC
  - Cheap devices (10…20€)
  - Battery powered
  - Can be self-mounted
  - Requires special road-side infrastructure
  - Good if only few charging points

- **Positioning + wide-area communication**
  - Abbreviation GPS/GSM
  - Costly devices (100…200€)
  - Powered from the vehicle
  - Must usually be installed
  - No special road-side infrastructure
  - Good if large charged network



The challenge of the urban environment

… what with people without on-board unit ?

- **Occasional users**
- **Foreign users**

These users come without equipment, and need a simple and quick way to pay

Payment has to be fair.

If occasional or foreign users

- pay less, everybody becomes an occasional user
- pay more, it is against EU equal treatment laws

… what with people without on-board unit ?

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Possible solutions for occasional and foreign users

- **temporary on-board unit**
- **manual option** via self-service terminal, internet, SMS, etc.
- let foreigners **go for free**

The solution for occasional and foreign users

… decides about the sophistication of the charge

- capability of technology cannot be exploited

… is a tremendous cost driver

- high costs for a 24h/7d operations, but low income

… what with people without on-board unit ?

Examples from other systems

German Heavy Vehicle Fee

- Manual booking of a trip via terminal or internet
- Clumsy and costly

Austrian Heavy Vehicles Fee

- All users must have an on-board unit
- Efficient, but currently only for trucks and DSRC

Stockholm and The Netherlands

- Foreigners go for free since they are not causing the congestion
- Can be an acceptance problem

… what with people not wanting to pay ?

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- **Nobody throws a coin into the basket if there is no barrier**
- **Charging technologies usually automate the throwing, not the barrier**

Enforcement is required such that on average it is cheaper to pay correctly than to cheat

Enforcement is

- **costly**, requiring a lot of personnel
- institutionally **difficult**, requiring personnel with police powers
- **risky**, requiring water-tight court-proof evidence

… what with people not wanting to pay ?

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Enforcement = Detect + Catch

Detection can be automated with sophisticated technology

- DSRC to read out on-board units
- automated licence plate readers
- laser scanners for measuring vehicle size and shape
- cameras and flashes to record images

… what with people not wanting to pay ?

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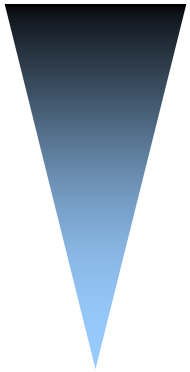
Enforcement = Detect + Catch

Catching national users is easy: just write a letter

Catching foreign users is difficult: stop and pay on the spot

In order of decreasing cost efficiency:

Tamper proof on-board equipment
Automated fixed enforcement stations
Mobile patrols stopping known offenders
Patrols making random spot-checks



Cost drivers

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- **Operations drives the costs**
  - Occasional users need a lot of attention
  - Enforcement needs a lot of personnel
  - Customer contact (help-desk, call centre, etc.) is costly
  - See the high costs in London and Stockholm

- **Important is total cost of ownership over 10 years**
  - Initial investment costs are not so important,
    but daily operations over all the years is very important

→ Occasional users and enforcement are big cost drivers

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- **feasible**
  - proven and low risk concept
  - solution for occasional and foreign users
  - can be enforced

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- **flexible**
  - regarding future developments and inclusion of other services
  - market oriented and open for commercialisation
  - interoperable with other countries

How to achieve interoperability ?

- **Different charging concepts**
  - fees for a certain duration of allowed use
  - tolls, i.e. fees per use of a certain infrastructure
  - distance dependent usage charges
  - access charges for zones and areas
- **Different technologies**
  - simple paper stickers
  - automatic licence plate reading
  - different flavours of radio links (DSRC)
  - GPS / GSM
- **Different classification and tariff structure**
  - a car in one country, a minibus in the next, …
  - per number of axles, emission class, weight, …
- **Different legal and institutional background**
  - public or private sector operator
  - fee or charge or tax or levy or …
  - with VAT or without VAT

How to achieve interoperability ?

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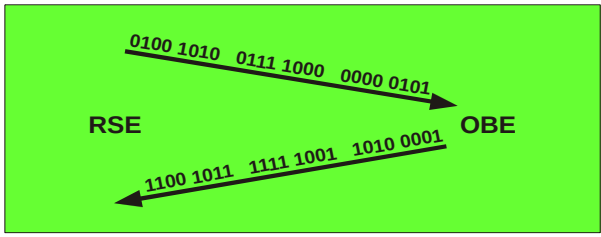
Technical compatibility

- Technical standards

cen

ISO International Organization for Standardization

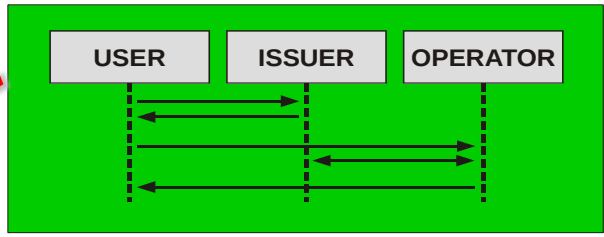
easy



Procedural solutions

- Roles of the involved entities
- Data exchange and clearing
- Handling of classes, exceptions, ...

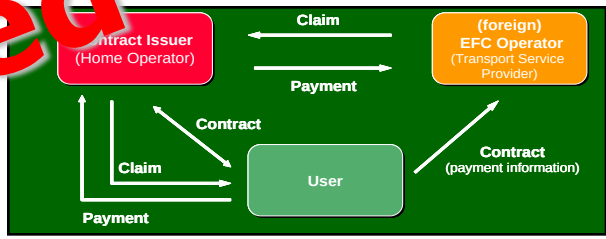
difficult



Contractual agreements

- Who is responsible for what ?
- Who is to pay for what ?
- Who owns the system ?

unresolved



How to achieve interoperability ?

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Progress in developing interoperability of fee collection system has been slow.

The European Commission has reacted by putting forward a Directive, mandating interoperability:

- **Directive 2004/52/EC** on "interoperability of electronic road toll systems in the community" adopted in April 2004
- The Directive requires the introduction of a new service: the **"European Electronic Toll Service, EETS"**
- Vision of **one on-board unit and one contract** for all systems
- The Directive prescribes the use of **3 technologies**:
  - satellite localisation
  - mobile communications according to GSM/GPRS standards
  - 5.8 GHz microwave DSRC
- Details to be laid down in **Commission Decisions**

How to achieve interoperability ?

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After 4 years of studying, drafting, and negotiating Europe still has no "Commission Decision" defining details of the EETS

Commission Decision issued October 2009

- 3 years later: EETS operational for heavy vehicles
- 5 years later: EETS operational for all vehicles

Lessons learnt:

- **Interoperability of fee collection systems is indeed a very difficult problem**
- **Several actors have no good business case**
  - Toll Chargers receive income in any case
  - Only relatively few users are truly "roaming" and benefit
  - Industry sells only one box instead of several

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Where are the risks of failure ?

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The 3 most important risks

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1. The RUC project looses political support
2. The project is stopped for political reasons
3. Politicians stop the project

Acceptance is the most critical factor

Achieving high acceptance is

- **difficult to steer and plan**
- **a non-linear process**
- **timing is critical ("window of opportunity")**
- **depends on people's believes rather than facts**

Summary

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For a RUC project the risks lie

- **not in technology, but in the acceptance,**
  which means that a good RUC system has to
  - be easy to understand how it works
  - must make people believe that it has good effects

The difficulty in creating such a good system lies

- **not in technology, but in processes,**
  which means that a good RUC system has to
  - be easy to use for occasional and foreign users
  - must make all users pay through good enforcement

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Bernhard Oehry
Tel.: +41 / 61 / 335 78 46
Fax.: +41 / 61 / 335 77 00
Mail: bernhard.oehry@rapp.ch
Web: www.rapp.ch

Congestion pricing is art, not craft !