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Report from the Local Workshops
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ABSTRACT

Starting in May 2008, N4C is a 36 month research project in the Seventh Framework Programme (www.cordis.lu/fp7). In cooperation between users in Swedish Lapland and the Kočevje region in the Slovenian mountains and N4C partners, the project will design and experiment with an architecture, infrastructure and applications in field trials and build two test beds.

This document reports on the local workshops that took place in the two regions in winter 2008/2009 as part of the process of planning and development of the test beds. It provides a summary of the events and is complemented by presentations and photographs in the appendices and hosted on the N4C project wiki (http://wiki.n4c.eu).

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1. INTRODUCTION

The Networking for Communications Challenged Communities (N4C) project is based around two large scale test beds that will be operated in the Sámi area of arctic Sweden and in the Kočevje region of Slovenia. These regions are ‘communications challenged’ in that they have little or none of the infrastructure that is needed to support today’s conventional wired and wireless Internet communications, and the economics of the regions are such that it is highly unlikely that this infrastructure will be installed in the foreseeable future.

One of these regions, the Sirges Sámi Village, is situated in north-west Sweden. It is the largest Sámi village in Swedish territory, with 500 members and 30,000 reindeer. The village was a partner in the Sámi Network Connectivity project (SNC) in the years 2002-2007. In the N4C project the partner heading the tests will be Tannak AB of Jokkmokk, Sweden. The cattle and animal services that will be developed in the project will be deployed on the market by Tannak.

The other test bed region, Kočevje, is situated in south-east Slovenia. This area became sparsely populated after the Second World War, almost without settlements in the last 60 years. It is now mostly overgrown with forests. There are only a few villages, with poor infrastructure. The partner heading the tests will be MEIS storitve za okolje d.o.o. of Škofljica, Slovenia.

As part of the process of planning and development of the test beds, local workshops were held in the two test regions. These events belong to Subtask 8.2.2 (Kočevje) and 8.2.3 (Sirges) of Task 8.2 Test planning with user participation and local workshops of Work Package 8 Tests and validation in two remote test beds of the N4C project. As planned in the description of Task 8.2, there were two local workshops, one per test region. Each of the workshops consisted of two parts, held for different audiences. The partners responsible for the workshop in Kočevje were MEIS and ITTI with participation of Tannak; the partners responsible for the workshop in Sirges were Tannak and ITTI with participation of MEIS. This report presents basic information on the workshops. Complementary material in the form of slide presentations shown at the events and photographs taken there is in the appendices as well as available online on the N4C project wiki (http://wiki.n4c.eu).
2. LOCAL WORKSHOP IN SWEDEN

Tannak organized its local workshop in two parts – for two different audiences – in February and March 2009. The purpose was to inform local people of the work being done in the N4C project, to awake their interest in it and hopefully to get their involvement in the tests. It was also a way to show that with interest and commitment, it is possible to initiate and pursue development. Furthermore, information on upcoming tests, both summer and winter, as well as those that had already been carried out, was propagated. The total number of attendees was ca. 80.

2.1 PART 1

Part 1 of the workshop was held on February 12, 2009 at the Sámi School for 10 students in grades 5b-6 (aged 11-12 years).

The workshop began with a brief presentation of Tannak and N4C. The reason for undertaking the project and the essential differences between the Internet and the networks investigated in N4C were presented. Then a film was shown that was made earlier in the SNC project, which many of the children can relate to. Many of them live in the various camps that appeared in the movie and could therefore recognize themselves. The film also explained in simple terms the ideas of the DTN technology.

The children were then asked to consider and write down what communication means for them and what can be done if communication possibility is provided. Natural was also thinking of what cannot be done when there are no communication facilities.

All the children had computer experience and most had access to their own computers. Their computer usage was mostly game playing, communicating on "Facebook", chatting and communicating via e-mail. Some of them had also participated in computer-based distance learning.

Finally, the children drew pictures of themselves and what they imagined doing with a computer and an Internet connection in the mountains.

2.2 PART 2

Part 2 of the workshop was held on March 23, 2009 at the Sámi Education Centre for approximately 70 people. There was a joint interest by companies and schools, and as a result the audience included last year students at the Sámi Program (High School), Sámi Educational Centre students and job seekers.

Tannak began the workshop with a presentation of N4C. The motivation for the project, its predecessors, its main objectives, the key ideas of Delay Tolerant Networks and the applications to be developed in the project were presented. This was followed by a film, produced by Tannak, describing the DTN technology and its potential.

After that there was time for discussions and reflections. The general conclusion was that the participants saw great opportunities for the municipality and with the test bed operation, and also for the community to provide and operate the network. They also talked about new possibilities that working DTN networks can open for the tourist industry.
The audience were interested and were invited to participate in future testing.
3. LOCAL WORKSHOP IN SLOVENIA

MEIS organized its local workshop in two parts – for two different audiences – in March 2009. The purpose was to inform local community as well as cooperating scientists from a nearby institute of the work being done in the N4C project, to awake their interest in it and hopefully to get their collaboration. The total number of attendees was 33.

3.1 PART 1

Part 1 of the workshop was held on March 26, 2009 at the OŠ Ob Rinži, Kočevje (a primary school). The attendees were 17 schoolchildren and 1 teacher. The children came from remote villages of Kočevje. They were all interested in a computer class.

The presenters were dr Marija Zlata Božnar and Darko Popović of MEIS. The workshop began with a slide presentation and a discussion. The reason for undertaking the project and the essential differences between the Internet and the networks investigated in N4C were presented. Following that, three short films were shown: on N4C winter tests at MEIS, on N4C tests in Lapland, and on reindeer. The attendees were informed about the testing process and were given brochures about N4C. In addition to the strict N4C subject, they could also learn many interesting facts about Sámi people and their culture and about nature in Lapland.

All the participants were very interested. Some of them expressed the wish to participate in the tests; they could have, for example, a meteorological or radiological station at home and they could bring the data daily to school by a DTN-like transport, on a school bus.

At the end the attendees responded to a short inquiry designed to get some form of feedback. The questions and answers of the inquiry were the following:

Q1: Did you find the presentation interesting?
YES (14)  NO (3)

Q2: Would you like to participate in further testing?
YES (6)  NO (11)

Q3: Have you ever before heard about Lapland or Sámi people?
YES (9)  NO (8)

Q4: Where do you live in Kočevje:
in town (2)  outside town (15)

Q5: Do you have any other remarks?
The respondents generally had no other remarks, except they liked the movie about reindeer.

Photographs were taken during the workshop and are available in a ZIP file at:
http://193.77.212.133/n4ctmp/meis-n4c-workshop-march2009.zip
3.2 PART 2

Part 2 of the workshop was held on March 30, 2009 at the Department of Systems and Control of the Jožef Stefan Institute in Ljubljana, hosted by dr Juš Kocijan. There were 15 people attending. The Jožef Stefan Institute is the largest natural science and technology institute in Slovenia. Although not strictly in the Kočevje region, it is not far-away and has traditionally collaborated with MEIS, being a natural audience for the workshop in particular and for spreading the information on N4C testing in general.

The presenters were dr Marija Zlata Božnar and dr Boštjan Grašič of MEIS. The workshop began with a slide presentation and a discussion. The motivation for the project, its predecessors, its main objectives, the key ideas of Delay Tolerant Networks and the applications to be developed in the project were presented. Following that, three short films were shown: on N4C winter tests at MEIS, on N4C tests in Lapland, and on reindeer. The presentation and discussions were more focused on technology, on a professional scientific level. A possibility of future collaboration in this area appeared.

Photographs were taken during the workshop and are available in a ZIP file at:

http://193.77.212.133/n4ctmp/meis-n4c-workshop2-march2009.zip
4. CONCLUSION

The two local workshops were held as planned. The assumed number of participants has been exceeded (actual 113 vs. planned 60). The aim of the workshops being open and specially designated for the local population has been achieved. In addition to that, the local communities in each of the two countries involved learned about the environment and living in the other country. Also, there occurred opportunity to tighten the cooperation of industry with scientific community.
APPENDICES

The following material is enclosed in the appendices and can also be found on the N4C project wiki (http://wiki.n4c.eu):

A. The presentation showed at the Sirges workshop
B. The presentation showed at the Kočevje workshop
C. The photographs taken at the Kočevje workshop – part 1
D. The photographs taken at the Kočevje workshop – part 2

Note: the presentations contain animated elements, which cannot be properly shown in this static document. To see the actual animations, please visit the web pages indicated above.
A. PRESENTATION AT THE SIRGES WORKSHOP

Test Planning Workshop
Sirges 2009

What is N4C and what benefits can it bring?
Tannak AB

www.tannak.se

The Internet is pervasive ...  

... but still not accessible everywhere

www.n4c.eu
How many inhabitants have Internet access?

- *any type?*
  - Sweden: 77%
  - European Union: 60%
  - the world: 24%

- *broadband?*
  - Sweden: 27%
  - European Union: 18%
  - the world: 4.6%


What is needed to successfully provide network and Internet connections?

- users
- place
- technology
- service providers
- law
- time
- money
Communications challenged communities

- where *communications* is a *challenge* because of some reason, e.g.:
  - users: few, dispersed
  - places: distant, inaccessible
  - technology: not suitable
  - service providers: not interested
  - law: restrictive
  - time: not enough to build (if there is an urgent need)
  - money: not enough – deployment too expensive

Usual technologies for network connections

- **cables**
  - wires
  - optical fibers

- **wireless**
  - Wifi (wireless LAN)
  - cell-phone networks
  - radio point-to-point lines
  - satellite
Why not feasible?

- cable? very long distances, difficult terrain
- radio? regulations disallowing construction of antenna towers (natural reserves)
- satellite? poor transmission at high latitudes
- no or sparse power lines

- no business case:
  - few inhabitants, maybe nomadic
  - high cost per user
  - long time to build
  - no providers interested

What can be done?

- technology: develop and test new networking paradigms
  - permanent connections hard to provide? Consider opportunistic networking, delay/disruption-tolerant networks (DTN)
- business: develop and test suitable business models
  - incumbent operators not interested? Consider new undertakings, engage local interest
- involve both researchers and local communities
A lot has already been happening:

- **KIS**
  (Kvinna i Sameby – Woman in the Sámi Village)
  2001-2003

- **NMKR**
  (Nyå Möjligheter för Kvinnor i Renskötselbetag –
  New possibilities for women in reindeer herding)
  2001-2003

- **Communication Platform Siges**
  2006-2007

- **SAGA**
  (Sámi Network Connectivity
  Gender Allocation)

- **Lyftet**
  2005-2008

- **SNC, SNC+1**
  (Sámi Network Connectivity)
  2002-2007

- **C4**
  (Communication Concepts
  for Challenging Contexts)

- **CroCoPlI**
  (Cross-border Co-operation Pilot)
  2005-2007

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**N4C**
(Networking for Communications Challenged Communities)
2008-2011

**N4C objectives**

- deploy and test ubiquitous and pervasive networking
  for communications challenged communities
  - use a range of connectivity methods
  - focus on DTN (Delay and Disruption Tolerant Networking)
  - develop and test specific applications
  - create two test beds:
    - in Lapland – Sweden
    - in Kočevje – Slovenia
  - sustain (at least) one of them beyond the project lifetime
Unconventional connectivity methods

- no permanent link
- use opportunistic connectivity
  - people travelling
  - cars, trucks, buses, tractors
  - helicopters

What is the difference?
Regular Internet connections are:

- permanent
- low-delay: with delays of milliseconds
  - 1000 km of cable (about Jokkmokk to Stockholm): 5 ms one-way
  - geostationary satellite link: ca. 250 ms one-way (Earth-satellite-Earth)
  - each router adds a few milliseconds
What is the difference?

Opportunistic connectivity methods are:

- not permanent — depending on connection opportunities
- *high-delay*: with long and often unpredictable delays
  - scheduled transport: maybe hours (usually predictable)
  - opportunistic transport: various — maybe hours, maybe days (unpredictable)

What is the problem with the delays?

- communications would not feel interactive ...

- ... if it worked *at all* — it might *not* because of the *protocols* used by regular network applications to exchange data
Regular Internet protocols

- assume permanent connectivity
- expect millisecond delays
- use acknowledgements
  - the ubiquitous TCP (*Transmission Control Protocol*) requires
    3 message transmissions to only
    *initiate* (establish) a connection:
    - a „SYN” packet
    - an „ACK+SYN” packet
    - an „ACK” packet

In case of long delays ...

- acknowledging all data makes the long delays much longer
- the reply may come too late for the sender device
  - this may trigger a „time-out” event and make the
    application program believe there is no connection
  - the sender device may have already been switched off and there is nowhere to deliver the reply to
... a special approach is needed

- DTN: Delay/Disruption Tolerant Networks
  - use special protocols for transmission and routing
  - are tolerant of the delays and disruptions
  - communicating is more like sending letters than phoning
  - some applications are possible, some are not:
    - e-mail: YES
    - Web surfing: YES, with some restrictions
    - Skype: NO
    - games: chess – definitely; shooting – not really...
  - the idea originated in the context of Interplanetary Internet concept where long delays and disruptions are unavoidable

Applications to be developed and tested in N4C

- Hiker’s PDA (Personal Digital Assistant)
- Web caching
- Meteorological and environmental data capture
- Animal (reindeer) tracking
Hiker’s PDA

- a Personal Digital Assistant device
- providing services to travellers in DTN regions:
  - localized information
  - messaging ("not so instant")
  - emergency
  - advertisments

Web caching

- provide possibilities of Web browsing in DTN regions
- use proxies
- collect pages in advance
- push information to the user’s browser, e.g.:
  - daily news
  - education material for pupils
- extends the results of the SNC project
Meteorological and environmental data capture

- a standard meteorological station for measuring basic ground level parameters
- capable of communicating in a DTN region
- data browsing application to view, interpret, and analyze weather information

Animal tracking

- for locating and tracking reindeer and other herds/cattle in DTN regions
- develop novel sensors and power sources to mount in necklaces to be worn by reindeers
Local workshop

- develop plans for test deployment, set locations for network nodes, inform the public
- provoke discussion, get information from the local communities
- engage them in cooperation

Ideas, questions, discussion?

- What are your needs and problems in the area of communication and information?
- What communications challenges do you experience?
- What do you think about the usefulness of the proposed applications? What requirements would you state? What do you believe to be most important?
- Can you think of other applications that would be worth developing and trying?
- Can you see any potential business to be made?
- Do you expect any problems?
Thank you for your attention

Tannak AB

www.tannak.se
B. PRESENTATION AT THE KOČEVJE WORKSHOP

**Test Planning Workshop**
**Kočevje 2009**

What is N4C and what benefits can it bring?  
dr Marija Zlata Božnar – MEIS d.o.o.  
info@meis.si  
www.meis.si

The Internet is pervasive ...

[source: en.wikipedia.org/wiki/Internet_access_worldwide]

... but still not accessible everywhere

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Thank you for your attention

dr Marija Zlata Božnar
MEIS d.o.o.
info@meis.si
www.meis.si
C. PHOTOGRAPHS FROM THE KOČEVJE WORKSHOP – PART 1
Kaj lahko storimo?

- tehnologija: razvoj in test novih modelov omrežja
  - so težave pri zagotavljanju stalnih povezav? Razmislimo o
    proizvodnih omrežjih, odsotnih omrežjih (DTN)

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N4C

21. marca 2009

www.n4c.cc
Delavnica o načrtovanju testiranja
Kočevje 2009

Kaj je N4C in kakšne koristi nam lahko prinese?
Murdoša Božnar - MEIS d.o.o.
bibo@meis.si
WWW.MEIS.SI
D. PHOTOGRAPHS FROM THE KOČEVJE WORKSHOP – PART 2

Delavnica o načrtovanju testiranja
Kočevje 2009

ko je N4C in kakšne koristi nam lahko prinese?

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