



“Business” means all form of industrial and commercial profit-seeking activity

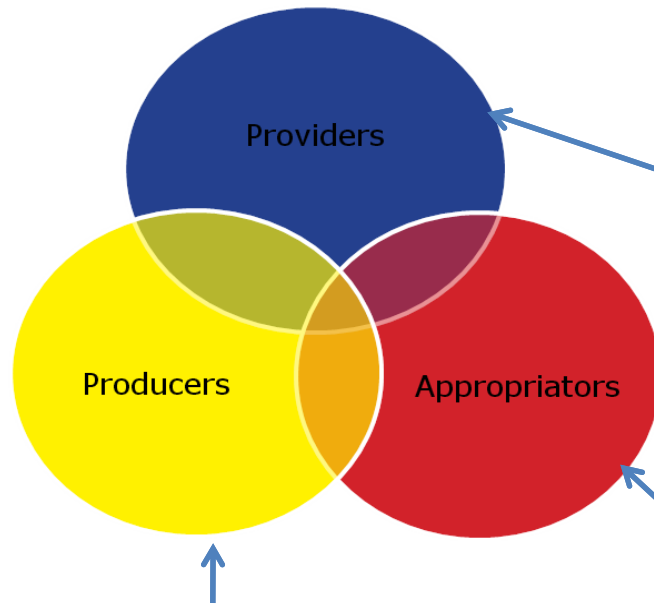
But there is hardly any business to develop connections to the internet in some rural areas! N4C business planning have to take that into account and develop models suitable for communication challenged areas.

My research aims at **describing, testing and evaluating business models** suitable for N4Cs business planning and to identify suitable models for governance of N4C outcome. Research is rooted on three pillars:

1. Business models; **both generic models** for ICT devices and services and **business models for Open Source Software (OSS)**. For OSS I have tested models developed by Hecker.

2. Governance models; N4C (the *DTN based internet access, and test beds*) have been tested on recommendations by professor and Nobel Laureate Elinor Ostrom’s models for managing Common Pool Resources (CPR). My research question is: what can we learn from those governing models when we develop models for N4C? Dry-run test have been conducted of usage of an economic association for the *DTN based internet access*.

3. **User-driven interactive research** with participatory design methods was used.



“Providers” are European Commission , LTU, TCD, UPM and central government in participating countries.

“Appropriators” are citizens in Gällivare and Jokkmokk, SMEs (tourist companies, and helicopter transport enterprises), NGOs (Sámi organisations and their cultural associations) and those who uses *DTN based internet access* for communication. Appropriators can also be local authorities.

“Producers are those who actually construct, repair or ensure the long-term sustainability of the *DTN based internet access*. In N4C it includes LTU, TCD and UPM local SMEs, NGOs and private persons.

All three; Appropriators, Providers and Producers can be the same individuals.

Questions to be asked: (Markides 1999) for N4C outcome:

1. Who is the target customer?
2. What products or services is N4C offering?
3. How can these services be delivered in the best way to the customer?

N4C OUTCOME

- **DTN based Internet access** in Swedish Lapland and in Slovenia)
- **Test Beds** (in Swedish Lapland and in Slovenia)
- **MEIS' Applications (3)**
 1. Meteorological station - AMS-DTN for wind power
 2. Meteorological station with extended autonomy for critical situations measurements
AMS-cs estimates the possible air pollution dispersion in the cases of accidents at nuclear power stations.
 3. Symbinode gamma dose rate measuring device u-garamo

Norut's Application: Apps for Hiker's PDA a portable hand-held computer device for Communication Challenged Regions

Tannak's Application: Animal Tracking

UPM / Alberta's: Wireless technology for sensitive areas

LTU / TCD / IPLS/ Folly's: Improvement of usability of *DTN based internet access* (routing, podcast, NSIM, web cache, e-mail, and hardware)

Based on an idea by (by Pacific Coast Research Inc. presented in Schlueter Langdon, C and Hars, in *Open Source Software Business Models and Customer Involvement Economics*.

MODEL

Business Scenarios
Descriptive analysis

Qualitative Assessment
Conceptual model

Quantitative Estimates

Rollout Decision

N4C OUTCOME

MEIS – Application Symbinode gamma dose rate measuring device - u-garamo

Test Bed

Swedish Lapland

NORUT: Apps for hikers PDA
LTU / TCD / IPLS / Folly: Improvement of usability of DTN based internet access , i.e. Routing, podcast, NSIM,web cache, e-mail, hardwares

MEIS – Application (Meteorological station - AMS-DTN)

UPM / Alberta Wireless technology for sensitive areas

Tannak Animal Tracking

Test Bed

Slovenia

MEIS – Application (Meteorological station with extended autonomy for critical situations measurements AMS-cs)

MEIS Test Bed is in roll-out stage whereas Test Bed Swedish Lapland is in Qualitative Assessment Phase. Norut's apps are in Qualitative Assessment Phase whereas MEIS AMS-cs is in roll-out phase.

Pillar	Business Model/ Building Block	Description
Product	Value Proposition	Access to the internet with <i>DTN based internet access</i> including e-mail and web browsing service on a basic level.
Customer Interface	Target Customer /User	Appropriators: people living part of the year in Swedish Lapland and/or working or visiting the area. Producers: citizens living in the area, researchers (LTU, etc.) universities incl. Gällivare and Jokkmokk dev. agencies.
	Distribution Channel	Services on the <i>DTN based internet access</i> will be distributed by Producers gathered in an Economic Association for N4C Delay Tolerant Network in Swedish Lapland.
	Relationship	The economic association will be open for anyone but depend on Providers and Producers .
Infrastructure Management	Value Configuration	Demands limited budget (in cash) as the N4C <i>DTN based Internet access</i> use Commercial-Off-The-Shelf (COTS) and Open Source Software (OSS) (Apache 2.0).
	Core Competency	The Producers competencies (citizens in the area but also researchers and similar staff at the LTU, TCD, UPM including the two municipal development agencies in Gällivare and Jokkmokk). The Producers role is to maintain the infrastructure and run the Economic Association.
	Partner Network	Providers and Producers will be member of the economic association operating the <i>DTN based internet access</i> .
Crosscutting issues	Gender	Qvotation will be considered.
	Cutural diversity	Representation on the board
Financial Aspects	Cost Structure	Monetary consequences of the DTN based internet access will be costs for updating and maintenance of the equipment and work on improving the system . Cost for extra test equipment etc. will be carried by the clients who need that extra infrastructure.
	Revenue Model	The business model service support seller (Hecker) . Revenues for updating and maintenance will be gained from other sources than from licence fees, i.e. membership fees and donations from ICT industry etc. Other sources of revenues will be from usage of the DTN internet based access on the test bed and as infrastructure for the applications (both those available now and developed in future).

Pillar	Business Model/ Building Block	Description
Product	Value Proposition	Access to the internet with <i>DTN based internet access</i> including e-mail and web browsing service.
Customer Interface	Target Customer/ User	Appropriators are users living in Slovenian mountain who will benefit. Provider is MEIS and their collaborating partners. Producers are citizens living in the area but also researchers and similar staff at MEIS who are prepared to work on the <i>DTN based internet access</i> .
	Distribution Channel	Services on the <i>DTN based internet access</i> will be distributed by MEIS and their partners .
	Relationship	The organizations taking part in running the <i>DTN based internet access</i> are MEIS and their partners.
Infra-structure Management	Value Configuration	The N4C <i>DTN based Internet access demands limited budget (cash) as is</i> uses Commercial-Off-The-Shelf (COTS) hardware's and Open Source Software (OSS) (Apache version 2.0 licence).
	Core Competency	MEIS is the "carrier" of the DTN based internet access. Their competencies are in ICT and energy.
	Partner Network	Appropriators: people living in the area; Provider: MEIS, Producers: MEIS, transport companies, etc.
Crosscutting issues	Gender	Quotation will be considered.
	Cultural diversity	Representation on the board
Financial Aspects	Cost Structure	Monetary consequences of the DTN based internet access will be costs for updating and maintenance of the equipment and work on improvement of the system administrated by MEIS. Cost for extra test equipment etc. will be carried by the clients who need that extra infrastructure.
	Revenue Model	A business model called service support seller (Hecker) will be used by MEIS and their partners. Revenues for updating and maintenance will come from other sources than licences. Main sources of revenue will be usage of the DTN internet based access on the test bed and as infrastructure for MEIS own applications.

Pillar	Business Model/ Building Block	Description
Product	Value Proposition	The Test Bed will offer services in Communication Challenged Communities with test area where the climate is harsh and with testing performed on a <i>DTN based internet access</i> as infrastructure.
Customer Interface	Target Customer /User	Universities, SMEs, ICT industry and authorities.
	Distribution Channel	Test Bed services can be distributed by an Economic Association in Swedish Lapland run by SMEs (helicopter companies, boats, tourist cottages, tourist stations) and by private citizens and authorities.
	Relationship	The organizations taking part in running an economic association for the test bed (the Producers) will in some cases be involved in running the <i>DTN based internet access also</i> .
Infrastructure Management	Value Configuration	The test bed will rely on infrastructure in form of N4C <i>DTN based Internet access</i> .
	Core Competency	The Producers competencies (citizens in the area but also researchers and similar staff at the LTU, including the two municipal development agencies in Gällivare and Jokkmokk).
	Partner Network	Providers and Producers will set up and administrate the Economic Association for the test bed in Swedish Lapland.
Crosscutting issues	Gender	Quotation will be considered.
	Cultural diversity	Representation on the board
Financial Aspects	Cost Structure	Monetary consequences of the test bed will be limited to staff for marketing of the test bed. Other costs will be carried by the tester.
	Revenue Model	Business model service support seller (Hecker). Revenue anticipated from test service but also complementary service such as transport, hotels, restaurants etc. Full cost principle. Sales of complementary services will be factured by the seller.

Pillar	Business Model /Building Block	Description
Product	Value Proposition	Test Bed services with DTN based internet access as infrastructure.
Customer Interface	Target Customer /User	Universities, SMEs, and ICT industry. MEIS present clients from nuclear industry and clients from new business ideas that will be developed.
	Distribution Channel	Test Bed services will be offered by MEIS.
	Relationship	MEIS will build relationship with industry and SMEs interested to take part running the test bed services. Federation with Fire offered by N4C.
Infrastructure Management	Value Configuration	The test bed will rely on infrastructure in form of <i>DTN based internet access</i> . MEIS and other SMEs who are willing to run the infrastructure or to give service to the testers can form an association similar to the one in Swedish Lapland or run the service independently.
	Core Competency	MEIS will need other SMEs competencies (i.e. companies offering complementary services in form of transport, hotels etc. in the area but also technical and similar staff) to run the test bed.
	Partner Network	MEIS and other Producers have defined roles in the partnership for the test bed in Slovenia.
Crosscutting issues	Gender	Quotation will be considered.
	Cultural diversity	N.A.
Financial Aspects	Cost Structure	Monetary consequences of the test bed will be limited.
	Revenue Model	A business model called service support seller (Hecker) will be tested. Revenues are anticipated from test service but also from complementary service such as transport, hotels, etc. Full cost principle. Sales of complementary services will be factured by the seller.

N4C / MEIS' Results:

•Three devices and services have been tested with good forecasts. One service is being rolled-out!

•The Meteorological station - AMS-DTN contributes to reductions in CO2.

•The Meteorological station with extended autonomy for critical situations measurements AMS-cs contributes to better surveillance of nuclear power plants.

Type	Meteorological station AMS-DTN	Meteorological station with extended autonomy for critical situations measurements AMS-cs	Symbinode gamma dose rate measuring device u-garamo
Offering	Stand alone meteorological station with DTN connectivity for estimation of wind power capacity.	Estimation of the possible air pollution dispersion in the cases of accidents at nuclear power stations with releases into the atmosphere.	A simple to use gamma dose rate measuring device for personal use.
Relationship	MEIS will build relationships with consultant companies in wind power development industry.	MEIS business partner is the Nuclear Power Plant in Slovenia. New relationships will be developed.	This service can be sold on line when a USB (or similar device) is developed.
Revenue model	This application will generate revenues to update and maintain the DTN based internet access in Slovenia and to the private company MEIS.	This development is already out for sale by MEIS. The application generates revenues to update and maintain the DTN based internet access in Slovenia and to MEIS.	This application will generate revenues to update and maintain the DTN based internet access in Slovenia and to MEIS.

Norut's Apps for Hiker's PDA for Communication Challenged Regions (CCR)



Apps for Hiker's PDA

Offering	<p><i>Apps for Hiker's</i> use a PDA and is developed for usage in a CCR. The use cases that have been developed and tested are:</p> <ul style="list-style-type: none"> • DTN based e-mail and web caching • Auto Discovery • Geoblog <ul style="list-style-type: none"> • Send Message with own location • Maps for own location: Downloading maps of the area around one's own location. • Point Of Interest (POI) suitable for CCRs: <ul style="list-style-type: none"> Location of nearest medical services (medical, physical or heart starter) Location of hostels Location of food stores and petrol stations Location of best site for cloudberries, fishing sites etc. Where to get a wash / shower / bath <p>Other issues of location privacy [EFF], security, battery life time, wireless range and ad hoc connections, all very important for the functionality and usefulness of the applications.</p>
Relation-ship	<p>The Apps for Hiker's PDA are designed for people working / staying in Scandinavia Artic area. Users are:</p> <ol style="list-style-type: none"> 1. Professional users (Business): Reindeer herders, tourist guides and forest workers 2. Professional users (Government): Nature Park Rangers and the police 3. Private users (Private citizens): Tourists who are hiking in the area
Revenue model	<p>Two alternative is being considered for the Apps for CCR</p> <ol style="list-style-type: none"> 1. To sell it 2. To give it away <p><i>Sales of the Apps for Hikers PDA to can go via</i></p> <ul style="list-style-type: none"> • Companies for outdoor equipment • Sami organizations • Mountain Cabin and/or Mountain Station Personnel • Forest industry • Nature park rangers and police force



N4C / Tannak's Results

- Trials on using the DTN by a small SME with little ICT experience
- Development of models for collaboration with future users

Herdview by Tannak	
Offering	Products, systems and consulting services for identification and tracking of free-ranging livestock, wild animals, objects, and people. The aim is to substantially improve the efficiency and profitability of the livestock owner, and the business value. The USP with Herdview is to radically reduce the use of snowmobiles, motorcycles and helicopters. The technology contribute to reduction of energy use by motor vehicles and damages to the environment. It also contributes to reduction of workplace injuries an important issue because herders are the most injured among workers in Sweden today. The technology can also be used to yield better meat and increase the profitability of reindeer herding.
Relationship	Both Ms. Susan Spik and Ms. Karin Kuoljok are Sami women who have grown up in traditional reindeer-herding families and themselves worked as a reindeer herder in more than 20 years in Sirges village. Susan Spik and Karin Kuoljok have a strong interest in the Sami culture and in the development of a special part of their heritage - the reindeer. Through their N4C work, they have developed their product 'Herdview by Tannak'.Herdview is done in close collaboration with future users.
Revenue model	Tannak will use a traditional pricing /revenue model. When the application is used on the DTN based internet access it will generate revenues to update and maintain the DTN based internet access in Swedish Lapland.