Udvalget for Forskning, Innovation og Videregående Uddannelser 2012-13
FIV alm. del Bilag 46
Offentligt

Startup skaber elektronisk sundhedsrevolution
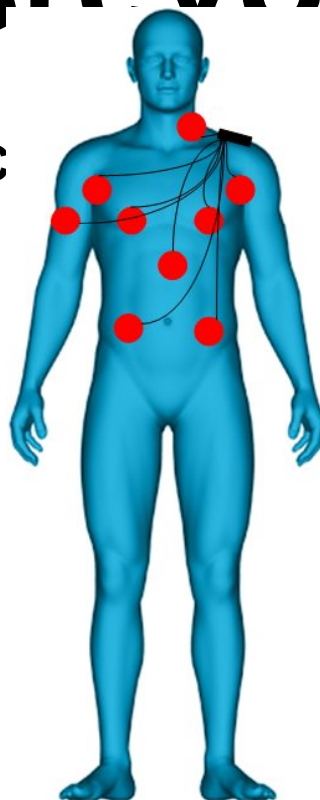
Copenhagen X-Prize Team (C

Jens Raarup

CEO/CTO

Jacob Nielsen Board

Board Chairman

Rolf Ask Clausen

CCO

20.11.2012

Topics of the presentation

- Electronic / Mobile Health evolution

- CXT Vision

- CXT technology approach

- CXT Purpose & Business case

- CXT's needs

- Questions & Answers

Who are we (CXT Board) ?

Jens Raarup – CEO/CTO (Former R&D Director, Nokia)

- B.Sc.EE RF & Signal processing
- 24 years in mobile device R&D

Jacob Nielsen – Board Chairman

- Master of Political Science
- 13 years in EU program public funding

Rolf Ask Clausen – CCO

- B.Sc. Mechanical engineering
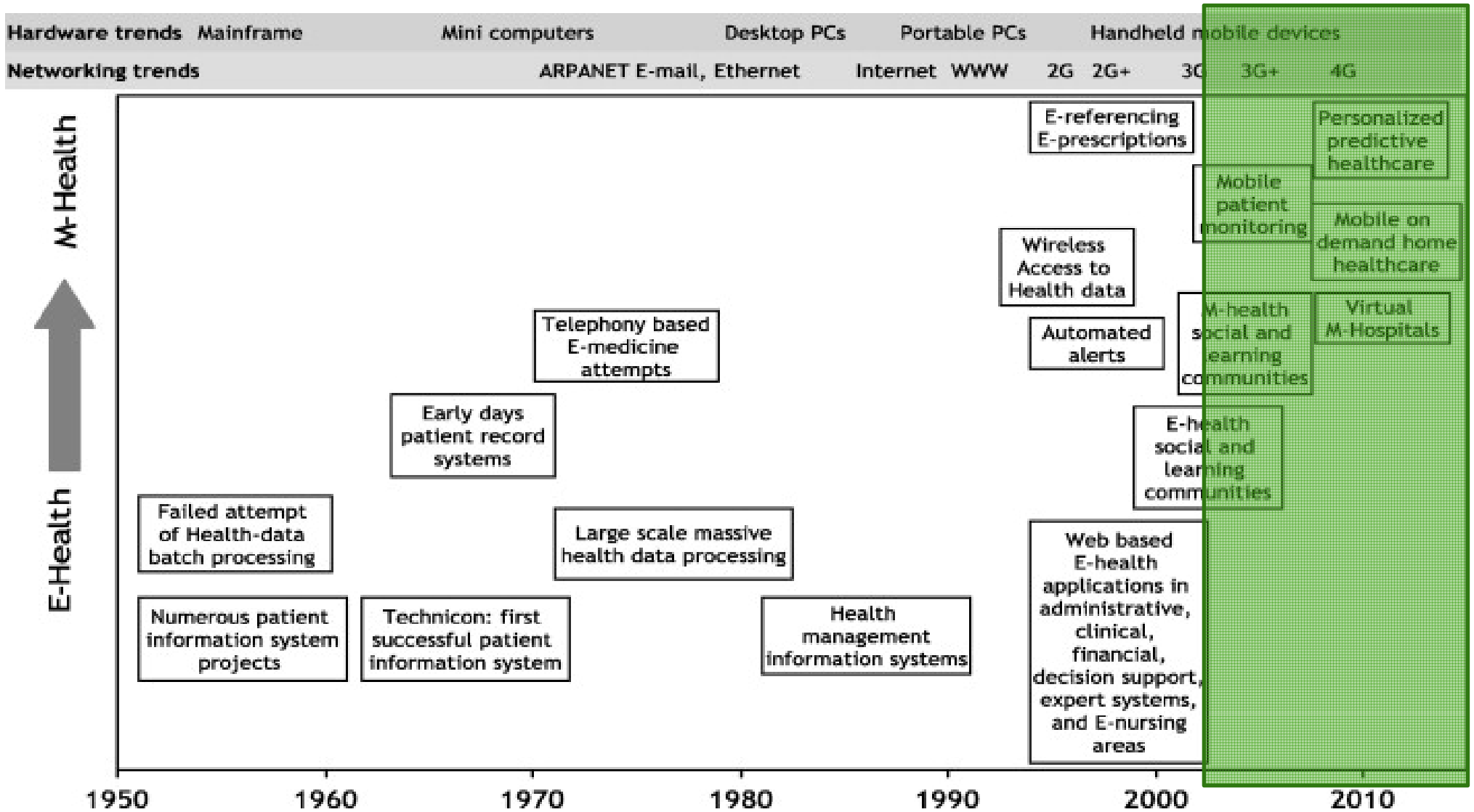- 27 years in communications & technology

CXT Design team

Jesper Jepsen	SW Designer
Børge Fischer	SW Designer
Niels Sandholm	HW Designer
Christian Selmer	MD, PhD
Lone Olufsen	Medico and User interaction
Ian Jørgensen	SW & UI designer
Per Andersen	HW Designer
Benny Pedersen	IT architecture
Roxane Baghi	CBS Student
Gytis Sakalauskas	CBS Student
Yvonne Ditlevsen	CBS Student
Dominik Weber	CBS Student

Mobile Health evolution

Hardware trends	Mainframe		Mini computers		Desktop PCs	Portable PCs		Handheld mobile devices		
Networking trends			ARPANET E-mail, Ethernet		Internet WWW	2G 2G+	3G	3G+	4G	

E-referencing
E-prescriptions

Personalized predictive healthcare

Mobile patient monitoring

Mobile on demand home healthcare

Wireless Access to Health data

Automated alerts

M-health social and learning communities

Virtual M-Hospitals

Telephony based E-medicine attempts

E-health social and learning communities

Early days patient record systems

Failed attempt of Health-data batch processing

Large scale massive health data processing

Web based E-health applications in administrative, clinical, financial, decision support, expert systems, and E-nursing areas

Numerous patient information system projects

Technicon: first successful patient information system

Health management information systems

M-Health

E-Health

1950   1960   1970   1980   1990   2000   2010

Mobile health Business outlook
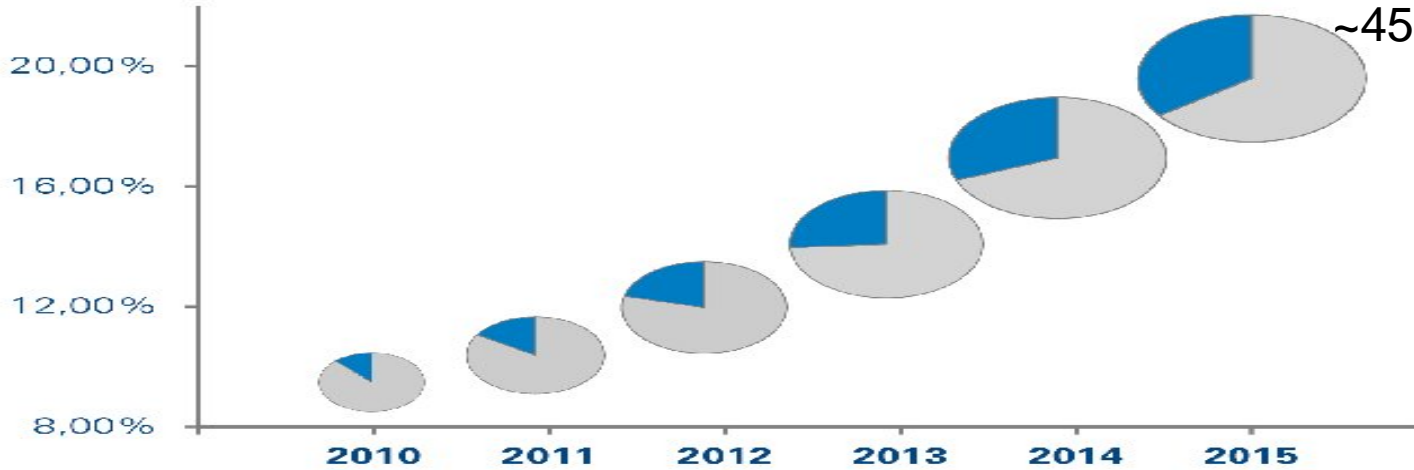
33% of 20% of 7 Billion
~450 Million potential users
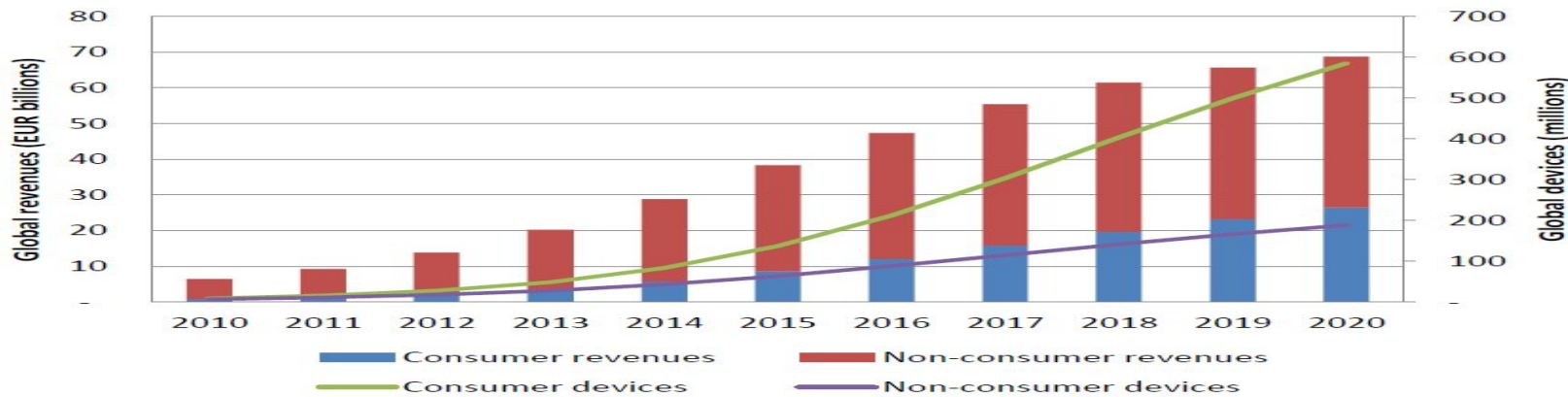
The various offering today (real or vision)
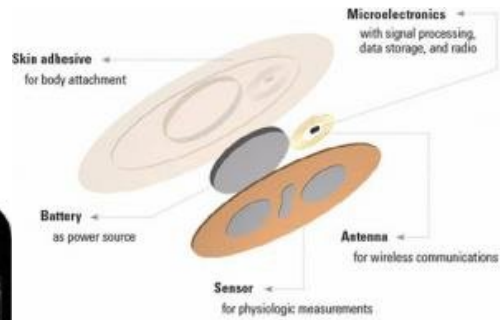
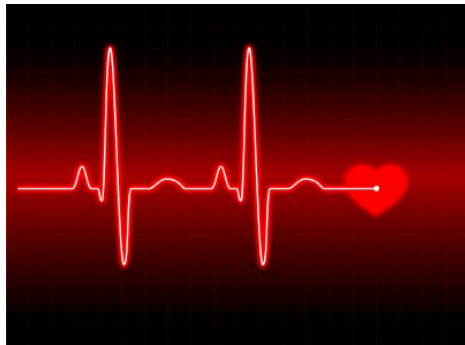# Background for Qualcomm X-Prize Challenge

- *Radical innovation*

- *Collaboration: Research – Tele-Medico industry – Public Health Sector*

CXT vision

- Position Denmark in Stronghold of Mobile Health technology.
    - Creation of Mobile health cluster in Denmark.
    - Leading to new jobs being created.
    - Combat the declining global investment in Denmark.

- Cut down on the escalating national health costs. (36 Billion)
    - Enable people to take ownership for their health and act accordingly.
    - Democratization of the health system.

- Increase the lifespan of the workforce.
    - Increased BNP.
    - Increased quality of life.

Elevator Speech

Let your smart device tell you if you are sick !
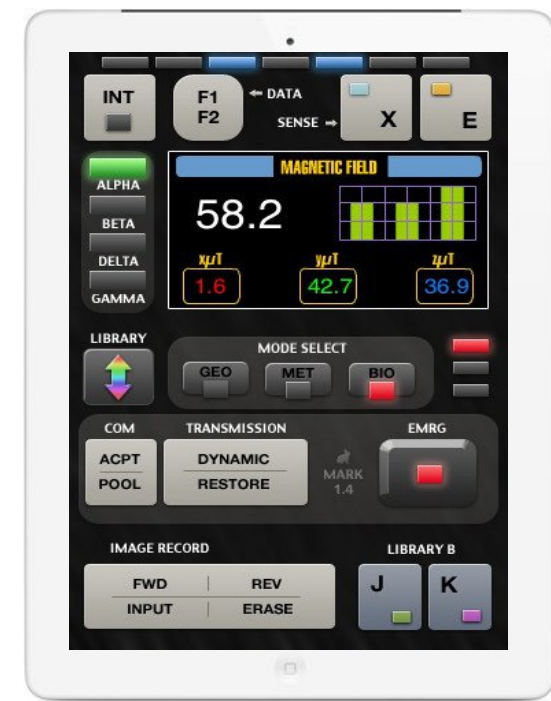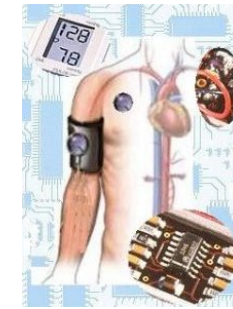
Inspiration:
The Star Trek Tricorder - all
knowledge at hand.

Star Trek 1980
TR-580 Tricorder
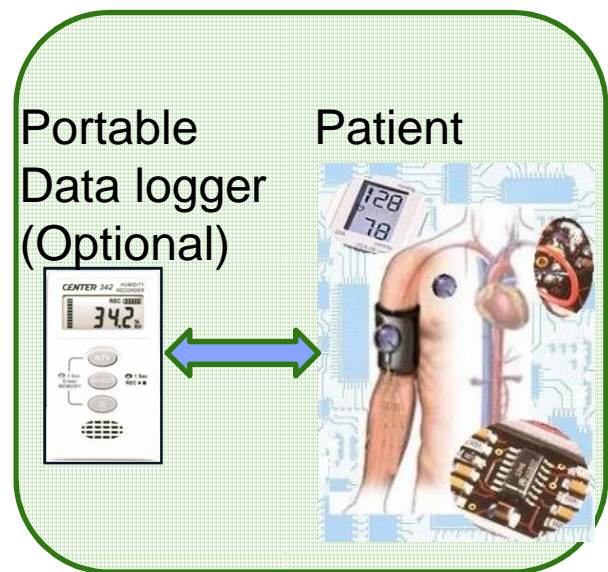Starfleet R&D San Francisco

Vision:
Smart Device with wireless bio-sensors,
cloud connection & artificial intelligence

CXT Tricorder vision
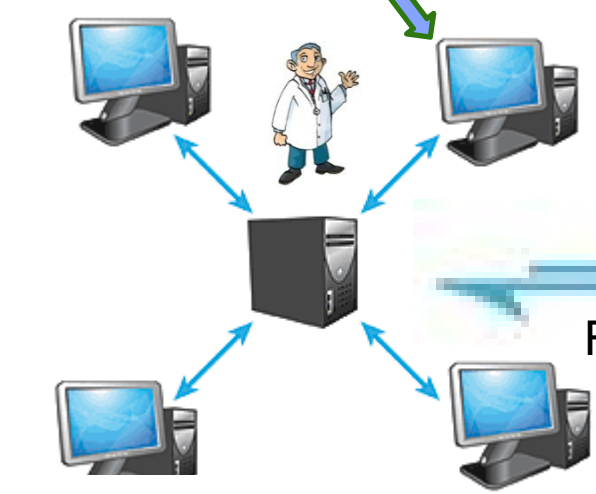
Tricorder
IPAD or similar smart device

Portable
Data logger
(Optional)

Patient

BTLE

58.2

Remote diagnostic center (optional)

3G/4G/WLAN

Supercomputer, Amazon, Google

Fiber

Network

Fiber
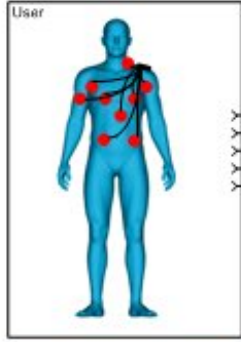
NET2. 1.Floor

8 * Dell GX620
8 * 42 " monitors

8 * Dell GX745

32-48

16 * HP Z800

CXT™

11

64 * HP Proliant DL385

Firewall

64

Local server Pnch.

AAU N2 server room

© Jens Raarup 2012

	Qualifying Round	Final Round	Scoring
Core Set	A minimum of 5 of 12 conditions*	All 12 conditions	Points
Vital Signs Set	A minimum of 3 of 5 parameters	All 5 parameters	Pass/Fail
Elective Set	None required	Any 3 acceptable conditions	Points

*Except "Absence of disease"

Condition	Sampling Frequency
1. Blood pressure	> 100 Hz
2. ECG	> 250 Hz
3. Temperature	> 0.5 Hz
4. Respiratory rate	> 18 Hz
5. Pulse oximetry	> 0.5 Hz

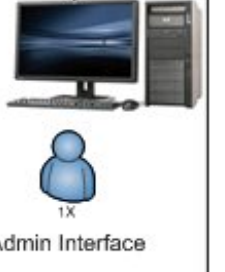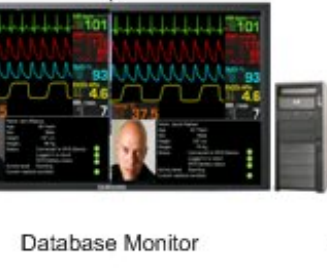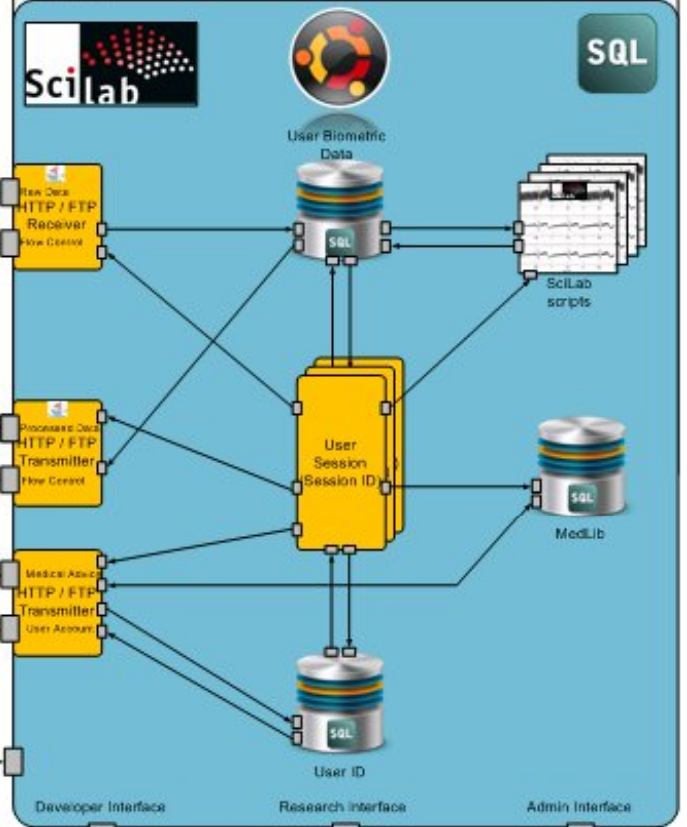| Core Set	Condition
1	Anemia
2	Urinary tract infection
3	Diabetes
4	Atrial Fibrilation
5	Strep Throath
6	Sleep Apnea
7	Melanoma Screen
8	Cronic Obstructive Pulmonary disease (COPD)
9	Abnormalities in a Comprehensive metabolic panel
10	Hypothyrodism / Hyperthyrodism
11	Leukocytosis
12	Absence of Disease

User

User Data	Parameter
Name	First, last name
Age	Years
Weight	Kg
Sex	Male / Female
Height	Meters

Elective Set	Condition
1	Urine culture and sensitivity equivalent
2	Bacterial or viral sexually transmitted infections
3	Acute pharyngitis and the causative organism
4	Outpatient rashes
5	Bacteremia and its causative organism
6	Abdominal aortic aneurysm, presence and size
7	Lung cancer
8	HPV DNA for cervical cancer screening
9	Pneumonia and causative organism
10	Vision problems including refractive errors, cataracts, and macular degeneration
11	Colon cancer

Device	IPAD3	IPAD Mini	Iphone 5	Iphone 4S
Horizontal resolution	1536	768	640	640
Vertical resolution	2048	1024	1136	960
Processor	A6	A5	A6	A5
Aspect ratio	3:4	3:4	9:16	2:3

CXT WVSS

User Device

SmartPhone Internet Gateway

UI Controller

CLOUD

Server Room

CXT Servers
64 * HP Proliant 385

User Biometric Data

SciLab scripts

Raw Data / HTTP / FTP Receiver — Flow Control

Processed Data / HTTP / FTP Transmitter — Flow Control

Medical Advice / HTTP / FTP Transmitter — User Account

User Session (Session ID)

MedLib

User ID

Developer Interface

Research Interface

Admin Interface

CXT Medical Tricorder Version 1.1

Date: 11.11.2012

Author: Jens Raarup

1X Developer Interface IAR Workbench

10X Developer Interface Xcode

Database Monitor

10X Developer Interface

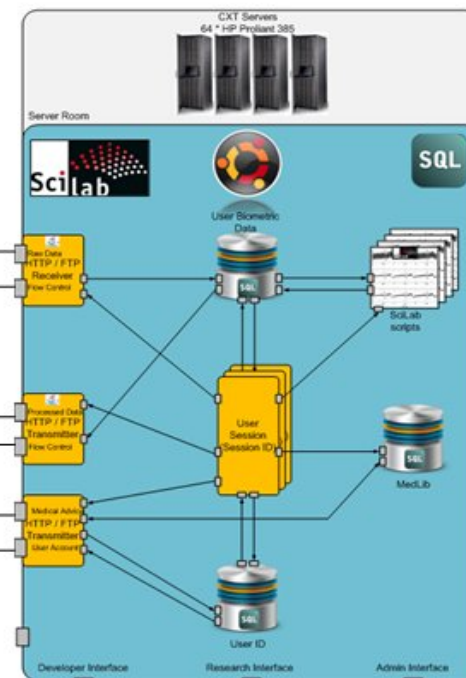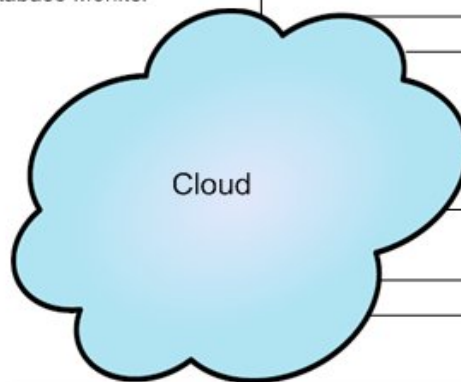100X Research Interface

1X Admin Interface
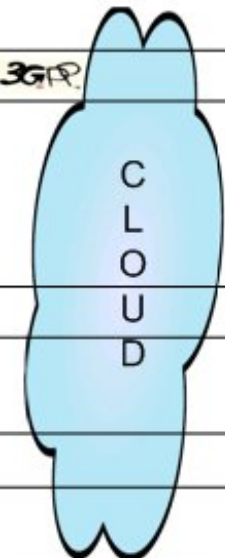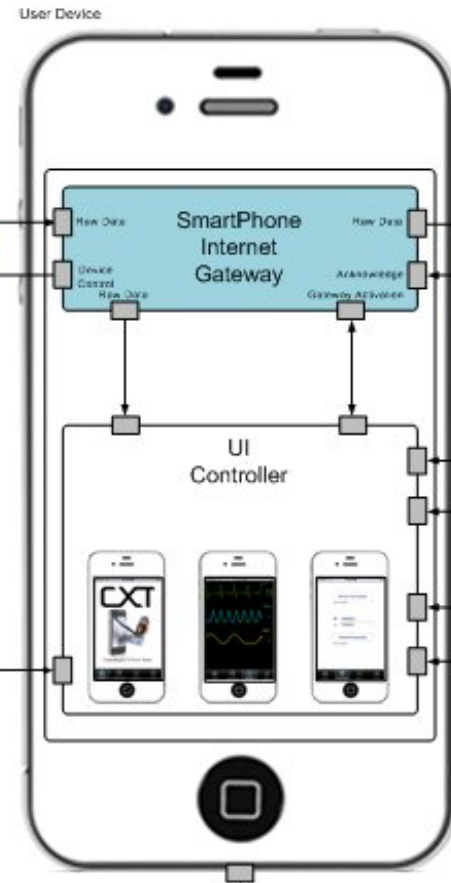
CXT Platformens anvendelsesmuligheder

Database Monitor

Cloud

Tilknyttet Læge

Patient Database

Ældrepleje

Genoptræning

For tidligt fødte børn

Hospitals Patienter

Why ?

- E/M-Health is the new blue ocean and hence,
  new business, growth and profit is possible
  - Rules not defined, platforms not established
  - Our target is to create open platform for the industry to benefit
  - Qualcomm X-Prize Tricorder challenge is the technology vehicle

- Denmark has proven potential within medical technology and CXT will leverage this potential.
  - Integration of existing technology is the key

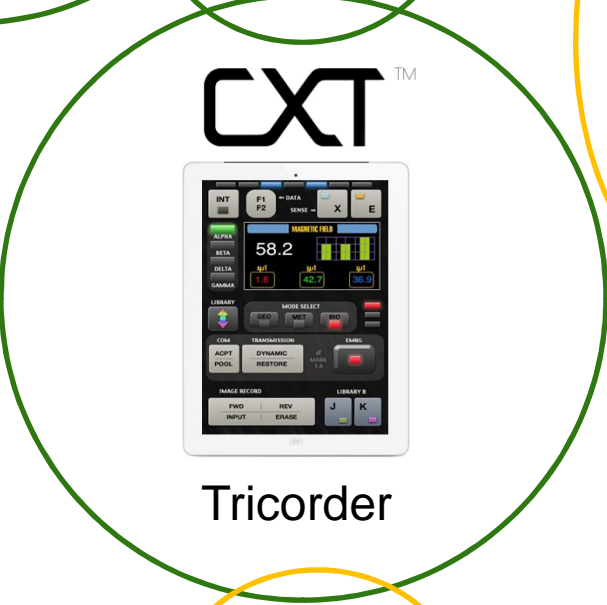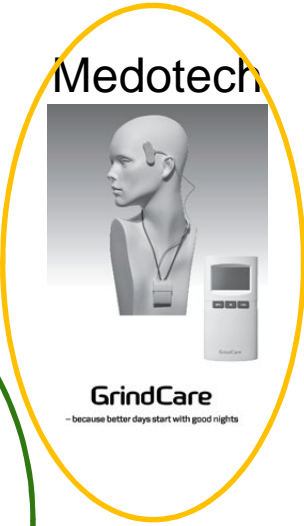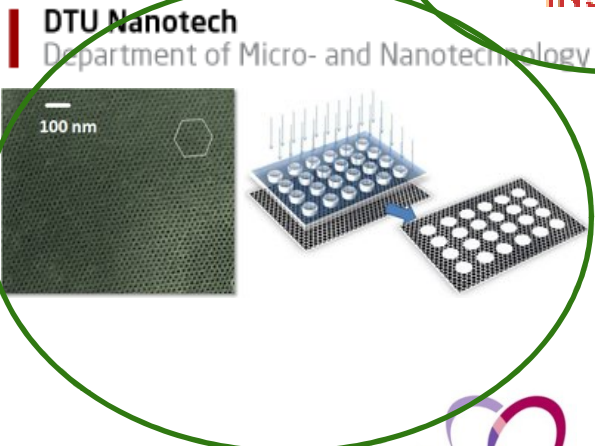- Our capability inside HW, SW and User Interface design will enable CXT to succeed.
  - Our Scandinavian approach combined with open innovation model will give us advantages. The Nokia close down in Copenhagen will give the kick start for CXT

Local medico technology landscape in Denmark *

*List not complete

Tricorder X-Prize requirements

#	5 Vital Signs
1	Arterial blood pressure
2	Electrocardiography
3	Temperature
4	Respiratory rate
5	Pulse oximetry

#	Core Set (All)
1	Anemia
2	Urinary tract infection
3	Diabetes
4	Atrial fibrillation
5	Strep throat
6	Sleep apnea
7	Melanoma screen
8	Chronic obstructive pulmonary disease (COPD)
9	Abnormalities in a comprehensive metabolic panel
10	Hypothyroidism/hyperthyroidism
11	Leukocytosis
12	Absence of disease

#	Elective Set (minimum 3)
1	Urine culture and sensitivity equivalent
2	Bacterial or viral sexually transmitted infections
3	Acute pharyngitis and the causative organism
4	Outpatient rashes
5	Bacteremia and its causative organism
6	Abdominal aortic aneurysm, presence and size
7	Lung cancer
8	HPV DNA for cervical cancer screening
9	Pneumonia and causative organism
10	Vision problems including refractive errors, cataracts, and macular degeneration
11	Colon cancer

CXT ™

QUALCOMM
TRICORDER X PRIZE

CXT targets

•Participate (and winn) the Qualcomm Tricorder X-prize competition.

•Proliferate the automatization of medical diagnosis.

•Create new possibilities for patients to monitor their own health.

•Gather and leverage the Danish Medico know how into commercial products.

•Pave the ground for new companies as spin-off from the X-Prize achievements.

•Secure public and private funding to finance the R&D required to participate in the X-Prize competition.

Nokia contribution

Office & Lab facilities for 1 year for approximately 10 employees.

Computer equipment, servers and R&D lab equipment.
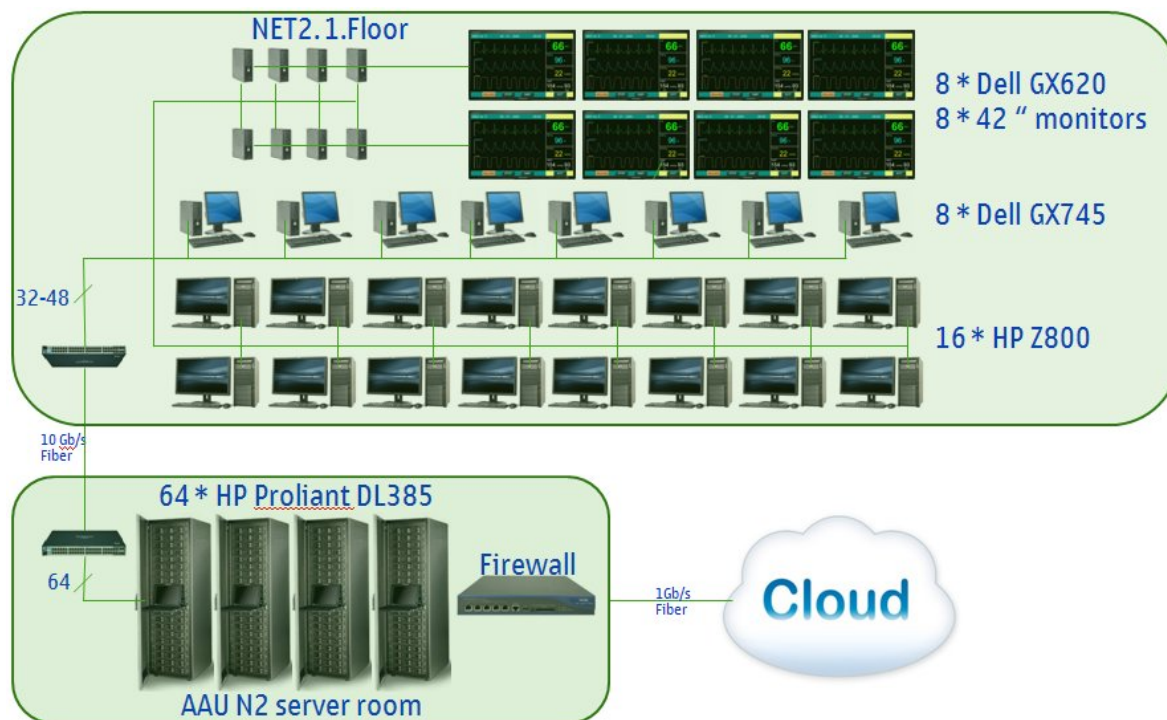
CXT purpose

- Non-Profit organization with the aim of promoting Danish position in Tele-medicine and Tele-health (M-Health)
- Like:
    - Mobile phone adventure in the 90's
    - Windmill adventure

- M-Health is one of the next big growth areas.

- Democratization of health system
    - Should be part of health / Innovation / ICT policy.

- Danish health care costs are galloping and M-Health can lead to large public savings if citizens have the opportunity to follow up on their health condition at home.

- CXT offers a platform to communicate a political message on.
    - A lighthouse to steer the development.

- Creation of Danish m-health cluster to create jobs and growth.

Region Øresund Mobile-health cluster potential
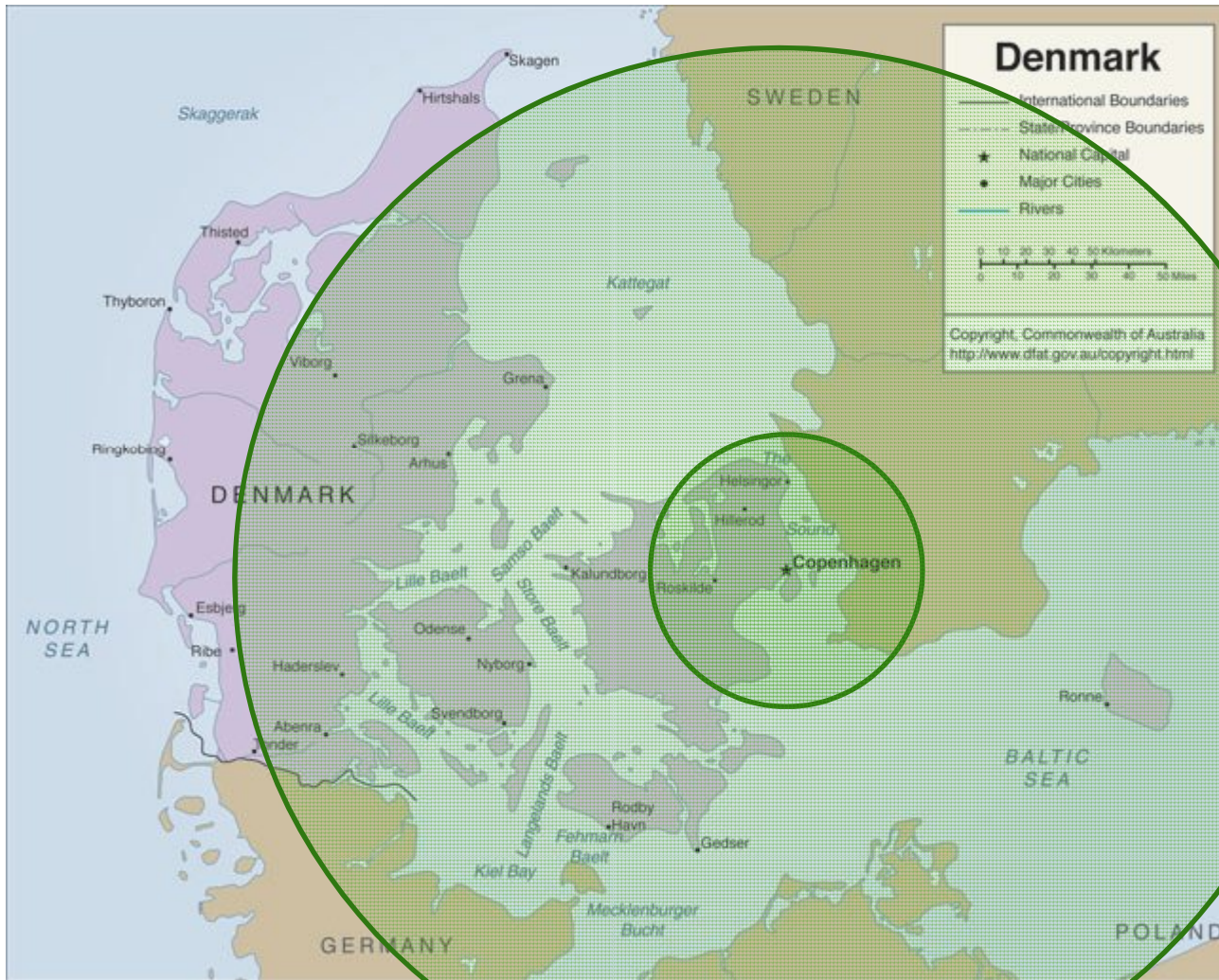
200 Km Boundary

The Mobile-health Cluster stakeholders

Private Investors

National health care Budget

Solutions

Companies Making Health Devices

National Health Care

IPR & Collaboration

National Strategy

National Universities

Regional Initiatives

Local & Global researchers

Funds

Research & testing

CXT™

010 Nokia

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QUALCOMM TRICORDER X PRIZE
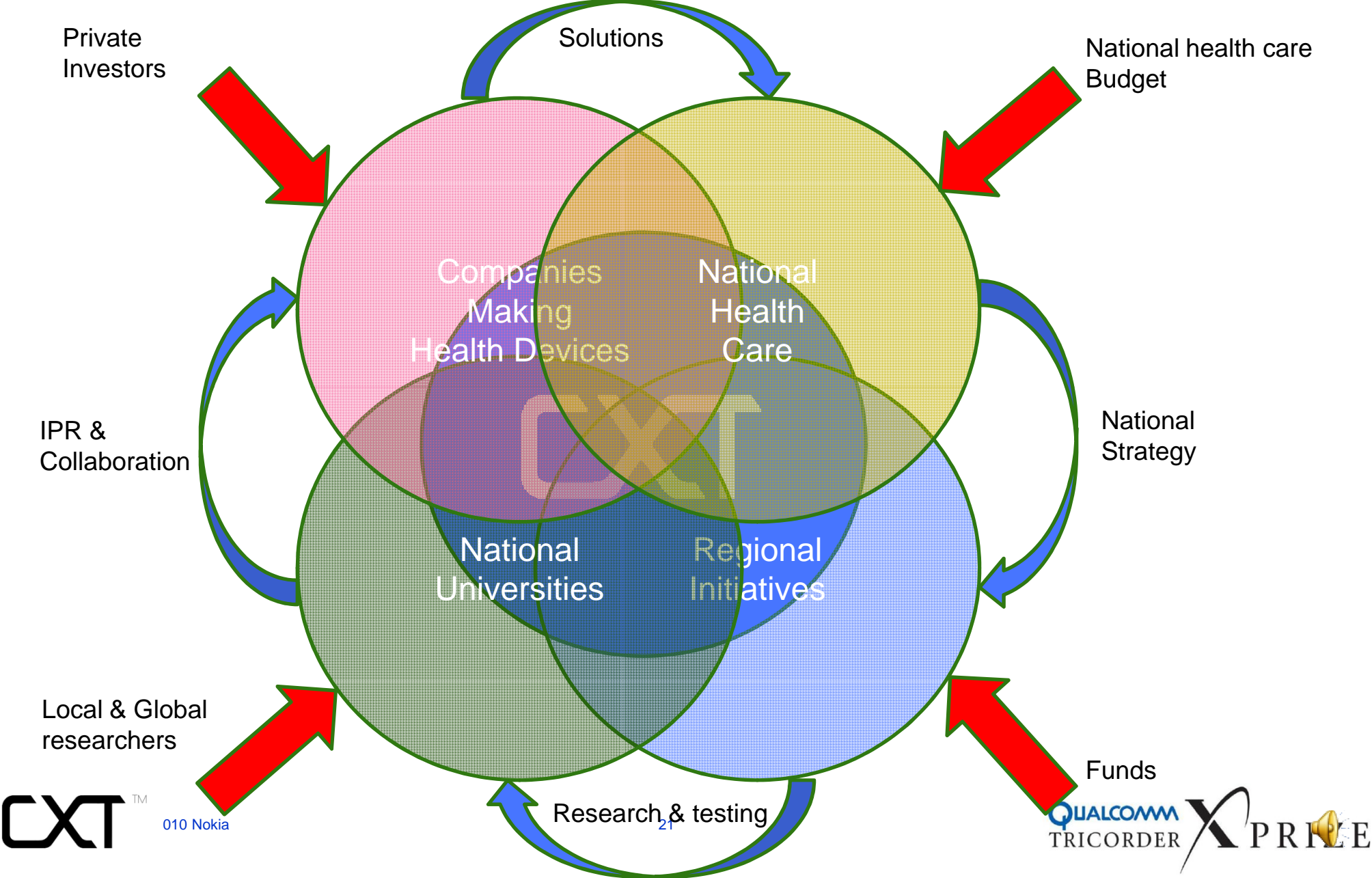
Business case for Denmark

Business case for CXT	Year 1	Year 2	Year 3
Investment	12.000.000	20.000.000	20.000.000
FTEs	8	10	12
Network created (e.g. people involved in CXT)	100	300	500
Total investment	12.000.000	20.000.000	20.000.000

	Aalborg	UN	Nokia
	N/A	50.000.000	N/A
	N/A	50.000.000 / year	N/A

Benefits - creation of spin-outs			
No. of spin-outs created (akkum.)	2	6	12
Revenue generated by new spin-outs	1.000.000	12.000.000	34.000.000
No. of jobs created in new companies (akkum.)	15	76	135
No. of jobs created in partner companies	0	35	75

50			
	N/A	N/A	
2.000			
500			

Benefits - foreign investment			
Expected no. of foreign VC investment	0	1	3
Expected impact of foreign VC investment	0	5.000.000	15.000.000
Attracting of large foreign mHealth company	0	0	1
Number of new jobs by large foreign mHealth company	0	0	200
Expected economic impact of large foreign mHealth company	0	0	200.000.000

	N/A		
	N/A		
3	2	1	
1.500	1.000	1.100	
1.200.000.000	0	1.400.000.000	

	Year 1	Year 2	Year 3
Total economical benefit	1.000.000	17.000.000	249.000.000
Number of new jobs	23	121	422

	Aalborg	UN	Nokia
	1.200.000.000	0	1.400.000.000
	4.000	1.000	1.100

	Year 1	Year 2	Year 3
Potential synergies / stimulation of local economy	4.000.000	68.000.000	996.000.000

	Aalborg	UN	Nokia
	4.800.000.000	250.000.000	5.600.000.000

CXT need's

- Political momentum to get success in our work.
  - A position on the political agenda that ensures that we will get contact to the relevant governmental functions.
  - Danish M-Health policy.
  - Public communication to ensure that M-health is addressed.

- Funding to attract and maintain the necessary companies.
  - Platform development funding 50 Million DKK from 2013 - 2015
  - Investors within M-Health products.

- Education policy that is aligned with the development of M-health.
  - Universities driven by the national M-health requirements

- Partners within:
  - Healthcare and sensor technology.
  - Medical Database implementation.
  - Medical signal analysis.
  - Medical diagnostics.

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QUALCOMM TRICORDER X PRIZE

Contact information

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