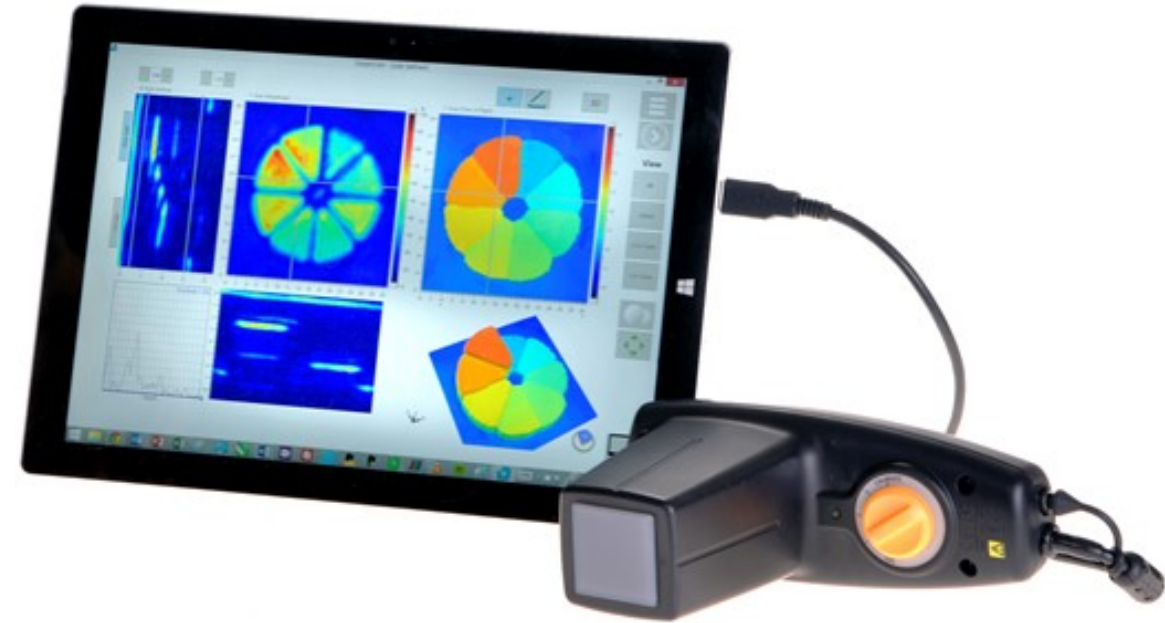# INVISIBLE VISION

23. september 2016

Supporting technology for Remote NDT
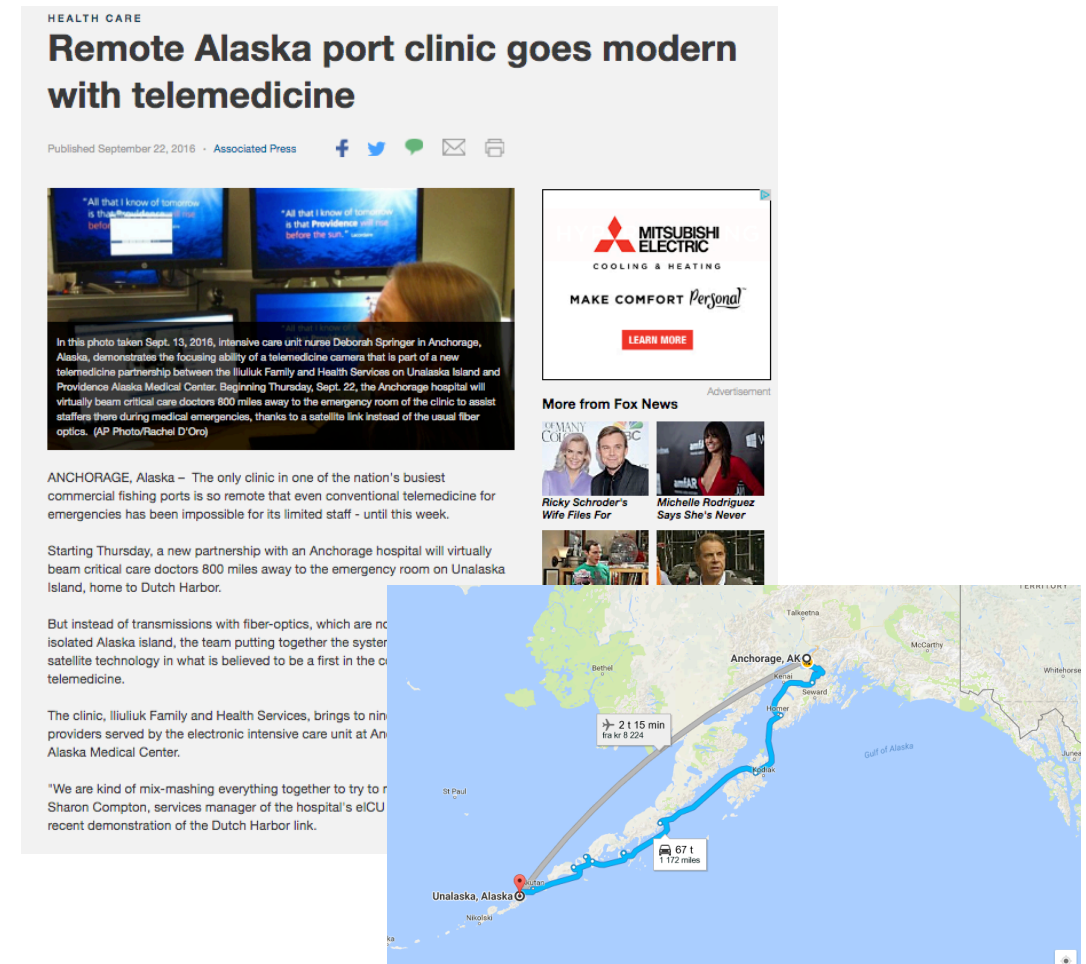**A4A 2016 San Diego**
Jan Olav Endrerud- CEO DolphiTech

DolphiTech

– Unique UT transducer and imaging technology

– Making even non-experts capable of performing structural inspections

– Accepted by leading companies in both aerospace and automotive industries.

Background

- Industry 4.0 / Internet of Things
- Increased use of new materials and joining methods outgrow NDT capacity
- Remote NDT receiving increasing interest
- (Some) equipment manufacturers (slowly) moving
- Wait-and-see attitude among professionals
- FAA report "Sensory Prognostics and Management System II" (DOT/FAA/TC-15/41)

http://www.foxnews.com/health/2016/09/22/remote-alaska-port-clinic-goes-modern-with-telemedicine.html

DolphiTech Survey on Remote NDT (predictions, drivers and inhibitors), n=65

Certifications

Industries

Remote NDT - An inspection of a remotely located object by a certified NDT inspector, assisted by on-site personnel and real-time video-, audio- and inspection data

No certification

	0	5	10	15	20	25	30	35
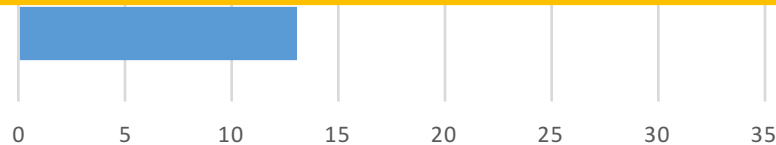
	No certification	Level I	Level II	Level III
■ Certification level	13	5	16	31

Marine

Automotive

Other
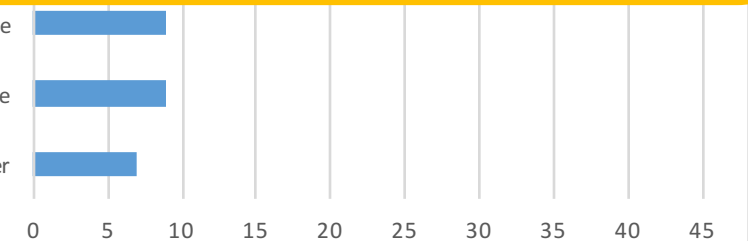
	0	5	10	15	20	25	30	35	40	45

http://www.dolphitech.com/home/remote-ndt-survey/
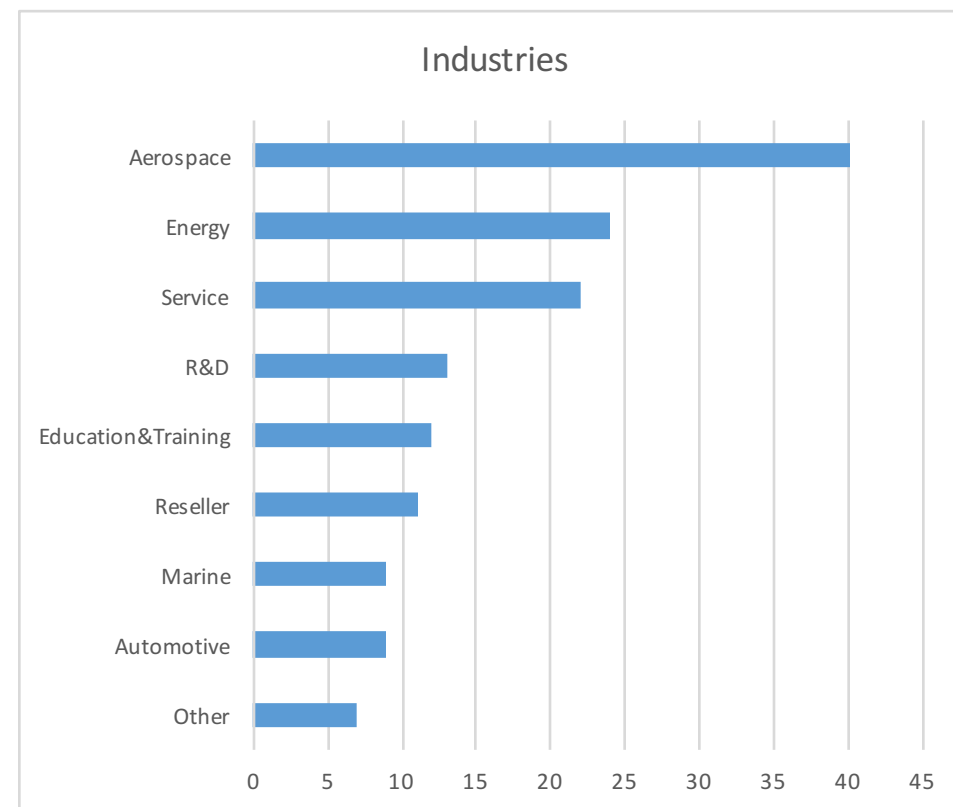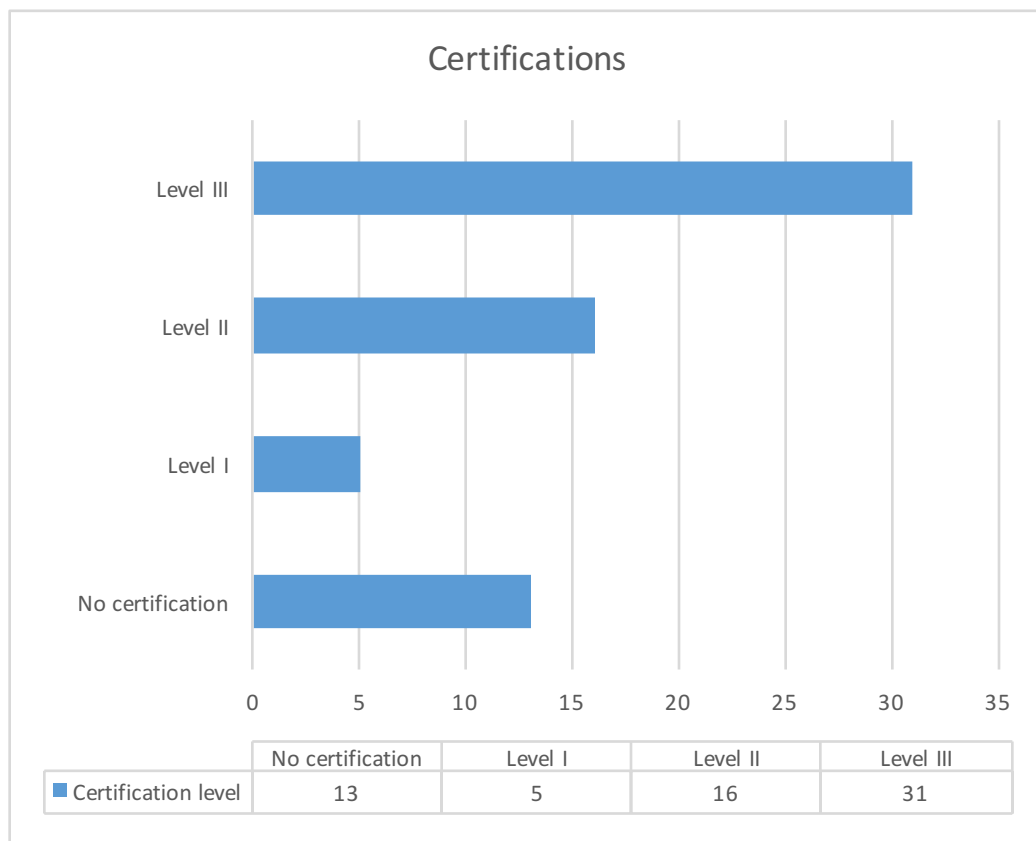
DolphiTech Survey on Remote NDT (predictions, drivers and inhibitors), n=65

Certifications

	No certification	Level I	Level II	Level III
Certification level	13	5	16	31

Industries

Drivers

Driver	Value
Productivity	~3.1
Out of service	~2.85
Inspection quality	~2.8
Travel cost	~2.75
Reducing personnel	~2.6
Train new inspectors	~2.55
Documentation	~2.45
Train & Cert cost	~2.4
Equipment cost	~2.2
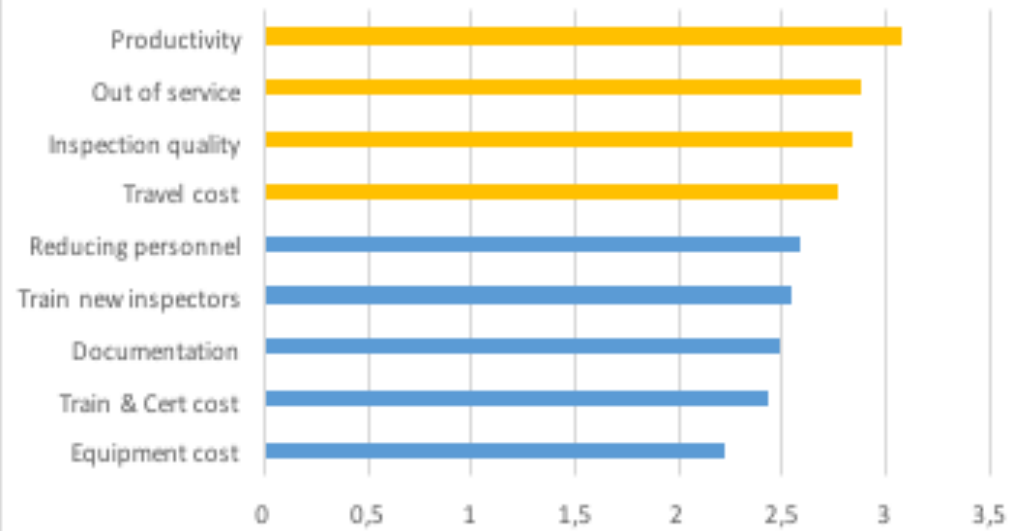
Remote NDT introduction prediction

In 1 year	28%
In 2 years	47%
In 5 years	73%
Not foreseeable	27%

Inhibitors

Inhibitor	Value
Network/comm	~2.95
Difficult to operate	~2.85
Client noaccept	~2.8
Laws&regulations	~2.75
Quality	~2.75
Non-integratable equipment	~2.65
Company Policy	~2.55
Training issues	~2.45
Complexity	~2.4

http://www.dolphitech.com/home/remote-ndt-survey/

Some comments from respondents

- "Very long time before accepted. Inspectors will refuse to sign their name to an inspection they don't have full control over. Things like feel are lost and most folks won't feel comfortable"

- "Its unlikely to be accepted in the big industries such as Aerospace, Nuclear Power Generation etc as they are very conservative and there's a lot to be said for actually being on plant"

- "Equipment must be reasonably priced if it is to be deployed at many sites"

- **"Remote NDT inspection to me is the next evolution to the NAS 410 or ASNT SNT-[TC]-1A program. If the NDT tech does not have to be on-site the client would likely prefer to only have to pay a fraction of the cost of employing a full time or on retainer NDT technician"**

FAA report "Sensory Prognostics and Management System II" (DOT/FAA/TC-15/41)

- The availability of data collected from aircraft, support equipment, and maintenance information systems has created opportunities to reduce operation, maintenance, and certification costs

- The SPMS program sponsored by FAA and Boeing identified and studied specific application areas

- Remote NDT one of several case studies
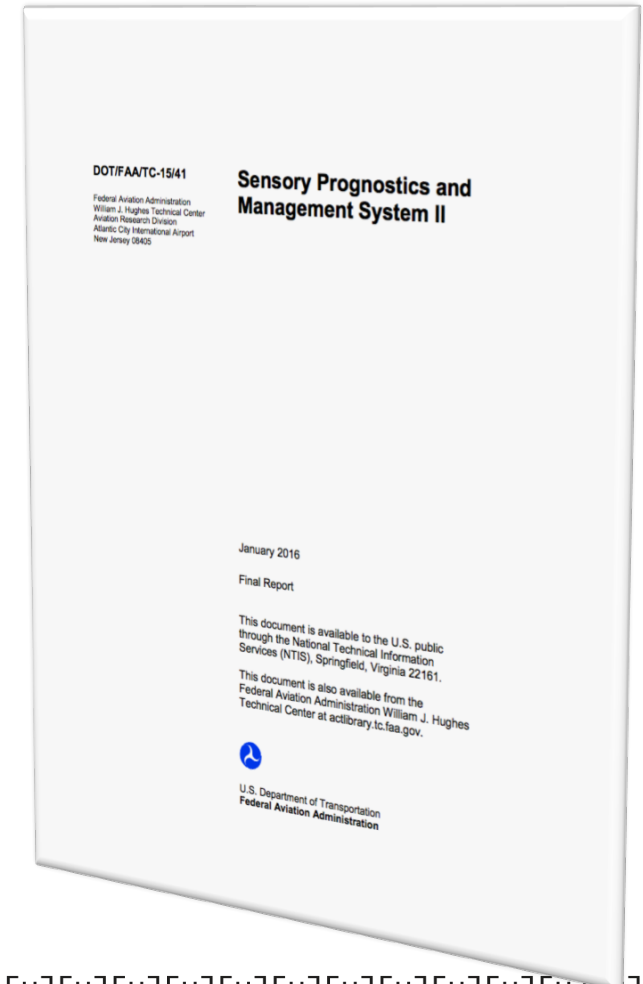
Authors: Robab Safa-Bakhsh, Justin Kearns, Gary Georgeson, Boeing Research and Technology
FAA Tech library: http://www.tc.faa.gov/its/worldpac/techrpt/tc15-41.pdf

- DolphiTech strategy in line with report

- Embodiments:
    1. Real-time Remote Expert NDT
    2. Advanced Remote NDT, Local Positioning System and Integrated Visualization Tool
    3. NDT with simplified tools
    4. NDT with simplified tools and <u>local decision making</u>

- Comments

1. Real-time Remote Expert NDT

Expert workstation
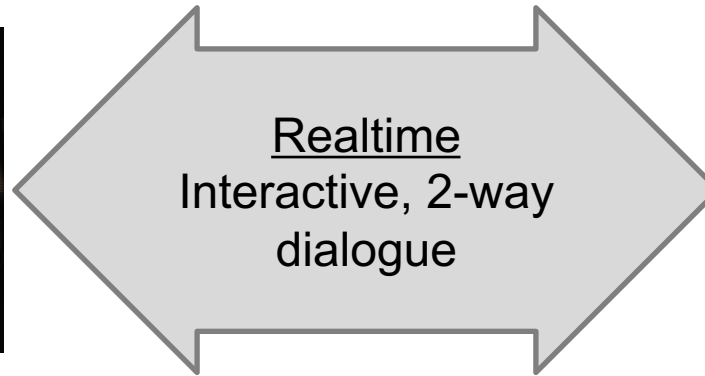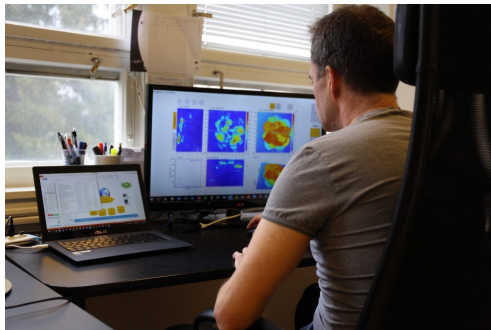
Realtime
Interactive, 2-way
dialogue

1. Setup and prepare

Basic requirements

Far-field video
Near-field video
Web conferencing tool
Telephone

Realtime device control

Near-field camera   Far-field camera
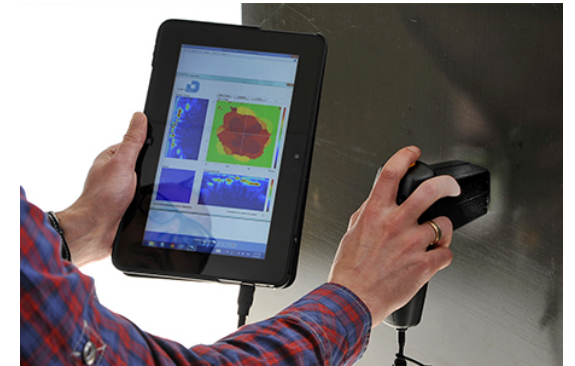
3. Evaluation

Buy-off

2. Collect data

A, B and C-scans
Metadata
Photo proofs

Real-Time	Yes
Device control	Expert control or verification
Realtime sound	2-way
Realtime video	Far-field and near-field
Struct. context	Video, photo proofs
Buy-off	Expert

2. Advanced Remote NDT, Local Positioning System and Integrated Visualization Tool

Expert workstation
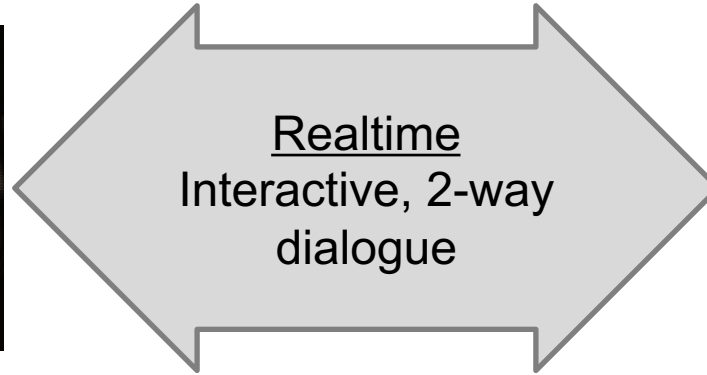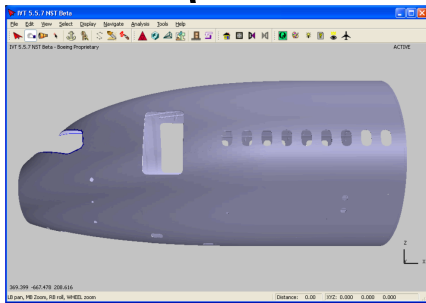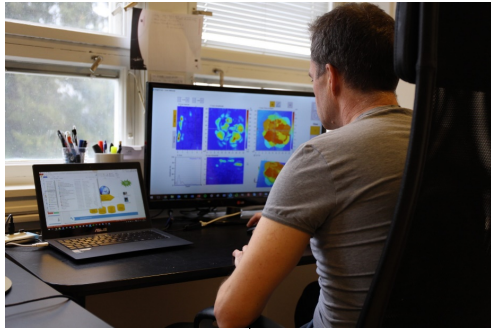
Realtime
Interactive, 2-way
dialogue

1. Setup and prepare

Basic requirements

Far-field video
Near-field video
Web conferencing tool
Telephone

Realtime device control

Near-field camera

Far-field camera
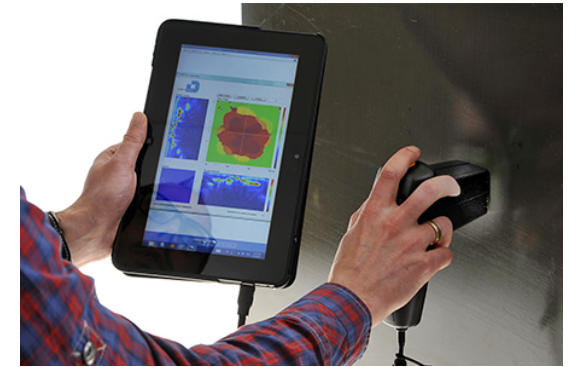
3. Evaluation

Improved structural
awareness
Buy-off

2. Collect data

Position data (xyzijk)
A, B and C-scans
Metadata
Photo proofs

Local
Positioning
System
(LPS)

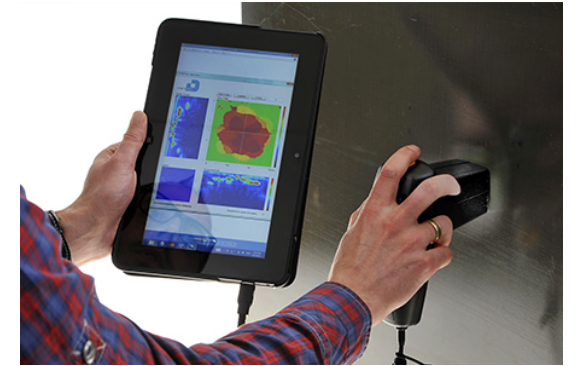| Real-Time | Yes |
Device control	Expert control or verification
Realtime sound	2-way
Realtime video	Far-field and near-field
Struct. context	LPS and 3D software
Buy-off	Expert

3. NDT with simplified tools

Expert workstation
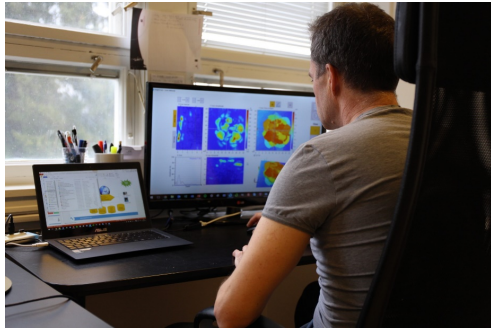
Near real-time
"Smart, locked tool"
Clear instructions

1. Setup and prepare

Load configuration file
Follow instructions
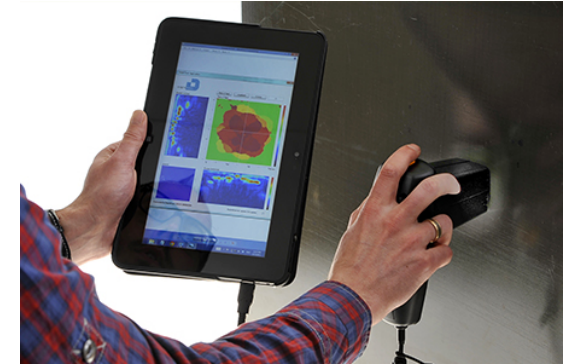
3. Evaluation

Input: Report
Buy-off

2. Collect data

A-,B or C-scans
Meta-data
Photo proofs
> REPORT

Real-Time	No
Device control	Through "lock" feature
Realtime sound	n/a
Realtime video	n/a
Struct. context	Proofs in report
Buy-off	Expert, based on report

4. NDT with simplified tools and local decision making

Expert workstation
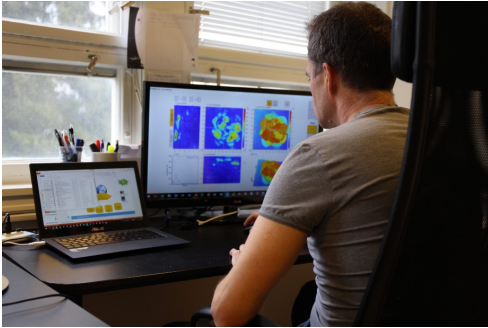
Unsupported
"Smart, locked tool"
Clear instructions

1. Setup and prepare

Load configuration file
Follow instructions

2. Collect data

A-,B or C-scans
Meta-data
Photo proofs

3. Conclude

"Expert knowledge
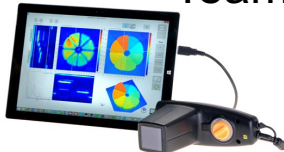embedded in the
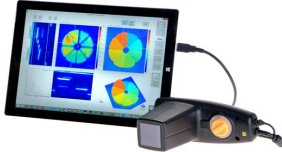operating characteristics
of the equipment"
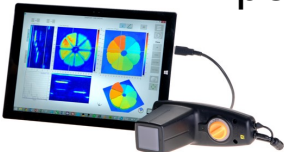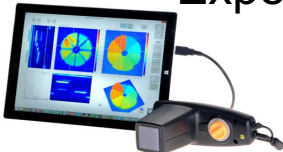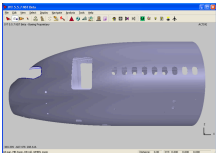
Real-Time	No
Device control	Through "lock" feature
Realtime sound	n/a
Realtime video	n/a
Struct. context	Proofs in report
Buy-off	Local user

As well as quite a few other requirements…

- Instrument validation
- Training
  - For operator
  - For remote expert
- Remote NDT practices
  - Ambient lighting, phone audio, far-field spatial resolution, marking of inspection area, use of LPS (local positioning system)
  - Near- and far-field cameras
  - Lync or equivalent collaboration functionality
  - NDT data must be taken and displayed in a format that allows the remote expert to make a definitive assessment of the damage.
  - Photo proofs as necessary
  - Minimum 2 yrs preservation of NDT data
  - Etc…

	Advanced Remote NDT	Real-time Remote NDT	Simplified NDT	Unsupported NDT
NDT method	Expert	Expert	TeamCenter	TeamCenter
Collaboration	TESTIA OMA Cisco webex Lync	TESTIA OMA Cisco webex Lync	-	-
Positioning	LPS One	-	-	-
Visualization	CAD / IVT	-	-	-
Training	Training	Training	Training	Training
Platform	Integration Platform			

Comments

- Monolithic systems or **Mix and Match**?

- IT/document standards ?

- Share cloud systems or company internal?

- Team issues and human factors (including cultural)?

Remote NDT

- It will be a reality!
- Who will drive it forward?

You

or

Your boss?

https://media.licdn.com

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