

**Virtuelle Schulung bei Land- und Baumaschinen
TH –Köln / 19.01.2016**

Zukünftige Herausforderungen und Möglichkeiten

**UX und Service Aussicht:
Simulation needs in the future?**

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LINK DESIGN AND DEVELOPMENT

Professionals: ~40

Designers, Engineers, Economists, Psychologists

Turnover: ~3 M€

Aalto University Campus Area

(Tekniikantie 12, 02150 Espoo, Finland)

www.linkdesign.fi



reddot design award

Brunel Awards

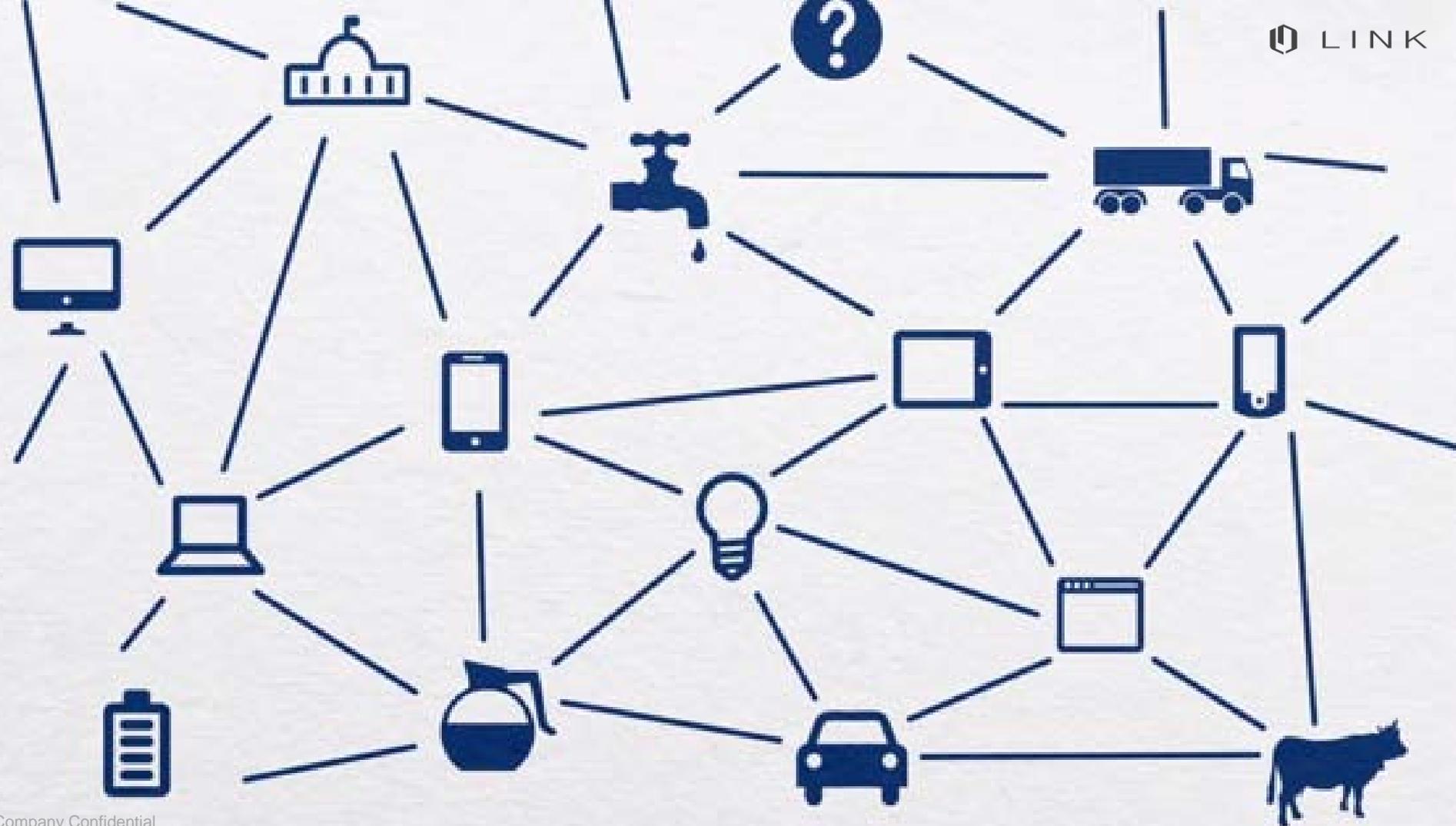


product
design award



fenniaprize

DRIVERS



Industrial Internet / Internet of Things (IoT)

- Every**Thing** is networked, interacting autonomously, creating continuously learning systems with physical inputs and outputs.
(e.g. Cyber-physical systems (CPS))
- Next generation of embedded systems
- **Thing identity**

Industrial Internet / Internet of Things (IoT)

- **UX and Service thinking**
- Requires completely new interaction methodologies and User Interfaces
- Also requires new ways of prototyping, and test services and systems that interact with humans

THE WINNER OF
ELISA IOT INNOVATION
CHALLENGE 2015

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Foller

Material and production technology

- High strength, advanced materials enable completely novel solutions
- For example new type of glass, reinforced plastics, nanomaterials
- Integrated functionalities, e.g.
 - printed electronics, i.e. no PCB
 - surface treatment for conductivity, i.e. easy touch functionality
 - layered structures



Professional / Commercial mix

- Merging of professional and commercial interfaces, software, and devices
- Linking commercial devices to embedded systems (MirrorLink, Apple CarPlay)
- Widely in use with Military systems
- Emerging in cars and homes

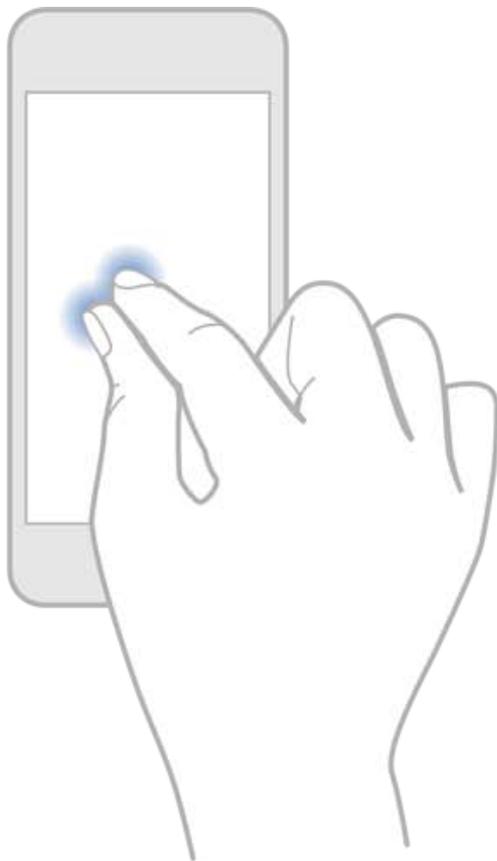




Interaction

Direct manipulation, e.g. touch screen in the computing world

Indirect manipulation, e.g. command prompt in the computing world



```
root ~ # ping google.com
PING google.com (74.125.95.103) 56(84) bytes of data:
64 bytes from iw-in-f103.1e100.net (74.125.95.103): icmp_seq=1 ttl=47 time=15.3
ms
^C
--- google.com ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 15.453/15.453/15.453/0.000 ms
root ~ # ls
Desktop README
root ~ # cd /
root / # ls
bin    dev  home  lost+found  mnt  proc  sbin    srv  tmp  var
boot  etc  lib   media       opt  root  shared  sys  usr
root / # pacman -Ss pidgin
extra/libpurple 2.6.6-1
    IM library extracted from Pidgin
extra/pidgin 2.6.6-1
    Multi-protocol instant messaging client
extra/pidgin-encryption 3.0-3
    A Pidgin plugin providing transparent RSA encryption using NSS
extra/purple-plugin-pack 2.6.3-1
    Plugin pack for Pidgin
extra/telepathy-haze 0.3.4-1 (telepathy)
    A telepathy-backend to use libpurple (Pidgin) protocols.
community/guifications 2.16-1
    A set of GUI popup notifications for pidgin
community/pidgin-fonmobutton 0.1.6-1
    Adds a video-chat button to the the conversation window
community/pidgin-libnotify 0.14-3
    pidgin plugin that enables popups when someone logs in or messages you.
community/pidgin-musictracker 0.4.21-2
    A plugin for Pidgin which displays the music track currently playing.
community/pidgin-otr 3.2.0-1
    Off-the-Record Messaging plugin for Pidgin
root / #
```

Major Modalities

- **Seeing** or *vision modality*
- **Hearing** or *audition modality*

Augmented / enhanced / virtual reality

- live direct or indirect view of a physical, real-world environment whose elements are *augmented* (or supplemented) by computer-generated sensory input such as sound, video, graphics or other data









Haptic Modalities

- Touch, tactile or *tactition modality* — the sense of **pressure**
- *Proprioception modality* — the perception of **body awareness**





Other Modalities

- **Taste** or *gustation modality*
- **Smell** or *olfaction modality*
- *Thermoception modality* — the sense of **heat and the cold**
- *Nociception modality* — the perception of **pain**
- *Equilibrioception modality* — the perception of **balance**

Balancing on
one leg



Leaning your
body



Rotating your
hips



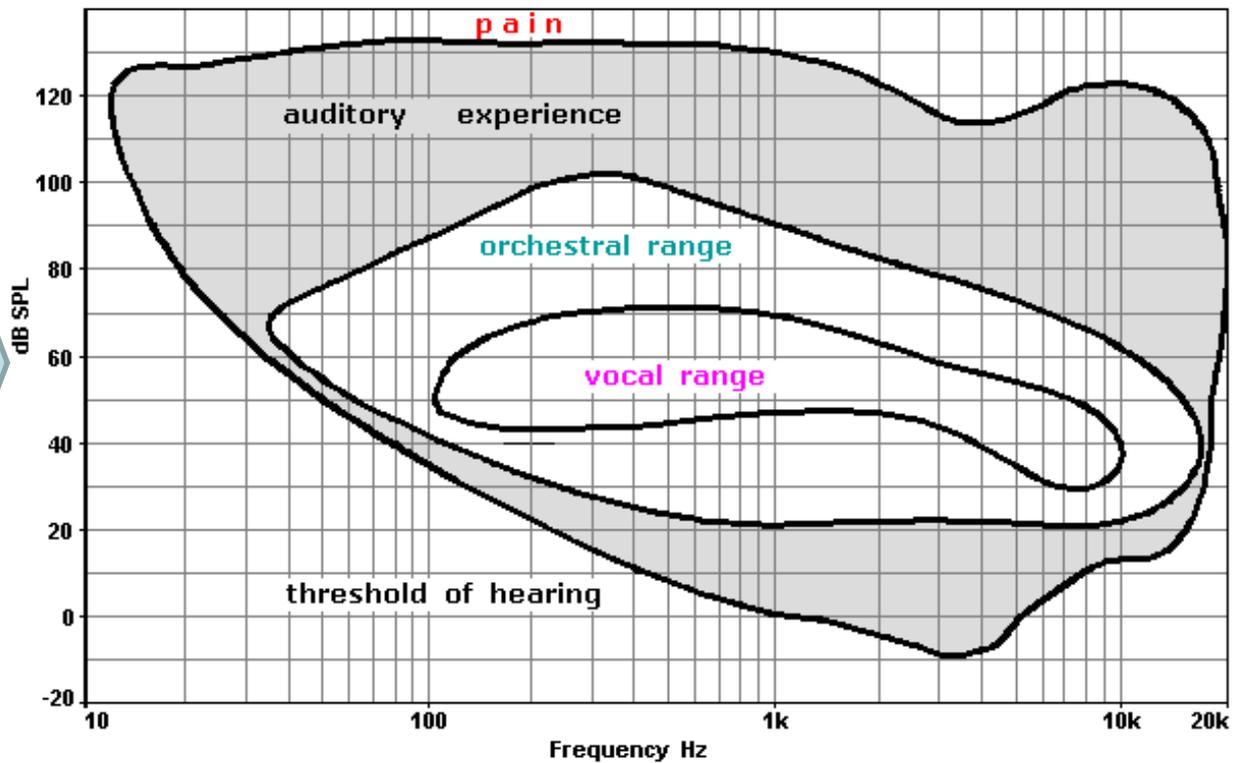
Moving your
body to a
rhythm



New Modalities

- **Enhancing existing modalities**, i.e. modifying signals so that the existing modalities can be used
- **Rewiring**, adding and re-teaching existing modalities





Fleets / Swarms

- Operator on the ground can control a fleet of unmanned military vehicles using a laptop and military radio, flying them in a similar manner to **a swarm of insects**.
- Positioning, navigation, traffic control





Operational context

- In case of moderately stable context, e.g. field, railroad, etc. higher automation level can be reached
- However, more complex operational environment, like forest with steep hills makes automation much more difficult





Social media

- It is here, and even the professionals use it, we just have to admit it.
- How to utilize it in work environment?



Gamification

- Game like **interfaces** and **thinking** to engage users in solving problems
- **Competitive** aspects.
- **Familiarity** aspects (e.g. iDevices and apps in the US Army)



Normal Sizes

0.5m 1.0m 2.0m 4.0m 8.0m 16.0m 32.0m

A horizontal row of seven 3D bar icons representing different railing heights. Each icon is labeled with its height: 0.5m, 1.0m, 2.0m, 4.0m, 8.0m, 16.0m, and 32.0m. The 1.0m icon is highlighted with a blue border.

Thickness

0.25m 0.5m 1.0m 2.0m

A vertical list of four 3D bar icons representing different railing thicknesses: 0.25m, 0.5m, 1.0m, and 2.0m. The 0.5m icon is highlighted with a blue border.

Special Sizes

Auto Pad Triangle

Three 3D icons representing special railing configurations: 'Auto' (a simple vertical bar), 'Pad' (a bar with a rectangular base), and 'Triangle' (a triangular bar).

Remote control

- Remote controlled very delicate operations
- Scalable, remote presense





Exoskeletons / avatars

- Performance enhancements for operators
- Rehabilitation of patients
- Remote access/control of machines





METAPHOR

Metaphor change

- Current cabin metaphor is basically still based on the direct hydraulic valve manipulation, or actually even back to the horse carriage.
- What it could be? What it should be?









LINK

Paina motoauki (Tarmo)

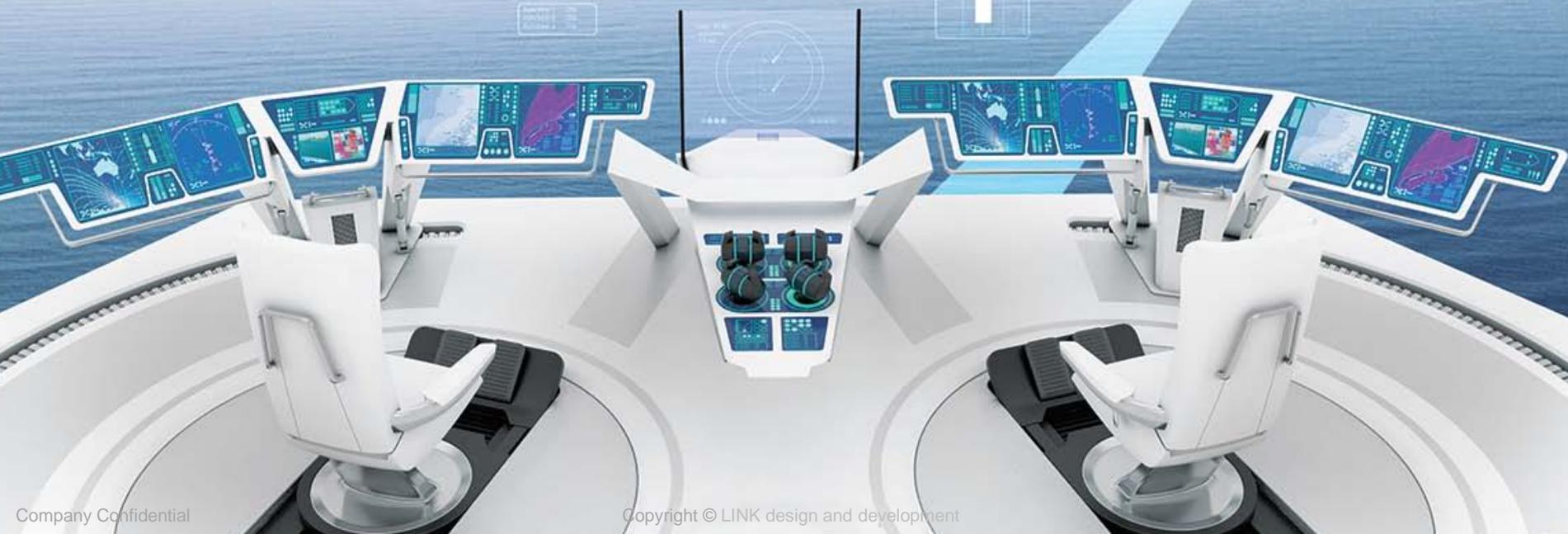
Ohjelma	Yksikkö	Yksikkö	Yksikkö	Yksikkö	Yksikkö
Siivitys SA				824 L	
48870				1761 cm	
0	1,8				
Tuote	260	Tuote	187	Tuote	123
429253	432217	431157	48967	370kg	56
2702	0,0	2703	65,5	2704	48,0
			2705	1,8	

LINK

CARGO VESSEL



BUI 205





Key factors affecting machines in the future

- There should be no need for a human operator to conduct simple tasks, e.g. the act of cutting down the tree
- Work should become more rewarding and stimulating, less boring and thus more productive
- The system should be adaptive and flexible regarding the level of autonomy, i.e. changing its behavior depending on the skill level, command, or mood of the human operator
- Individual operating machine in a fleet might not necessarily run a lot of functions, but one dedicated function, e.g. measuring a tree, aiming the fall, cutting down the tree, limbing, transportation, etc.

Key factors affecting machines in the future

- Use of intelligent, learning, autonomous systems
- Direct manipulation
- Utilizing many modalities
- System is able to give unobtrusive guidance to the human operator
- System capable of operating autonomously replacing human operator temporarily

User Experience and Services

- Understanding the actual user needs and requirements becomes even more important for being able to utilize technology in **useful** manner
- Actions take place over time and involve multiple user groups and touchpoints, e.g. devices, i.e. it's all about **Services.**

Simulation?

- Completely new set of needs and requirements as presented here
- Opportunities are infinite.



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