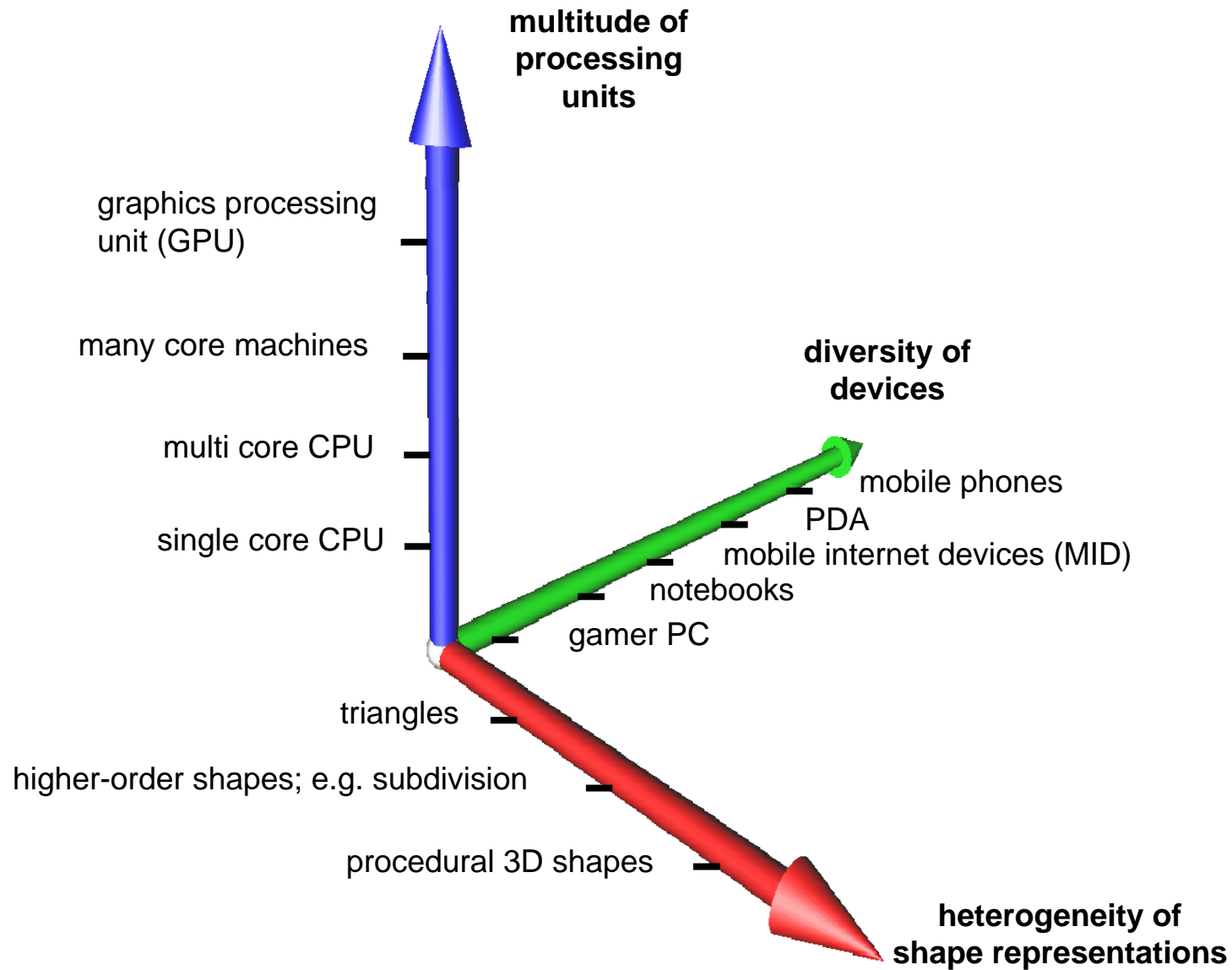# Problems for 3D Internet

Tor Dokken, SINTEF, NORWAY

Observation

- The user quality of 3D Internet application lags far behind the one of installed 3D applications.
    - Current 3D Internet solutions are based on the 3D graphics paradigms from the 1990s
- Claim: A increased us of 3D Internet depends on a significant improvement of the user quality of experience
    - This should not significantly differ from the quality offered by similar 3D services installed on the user's device.
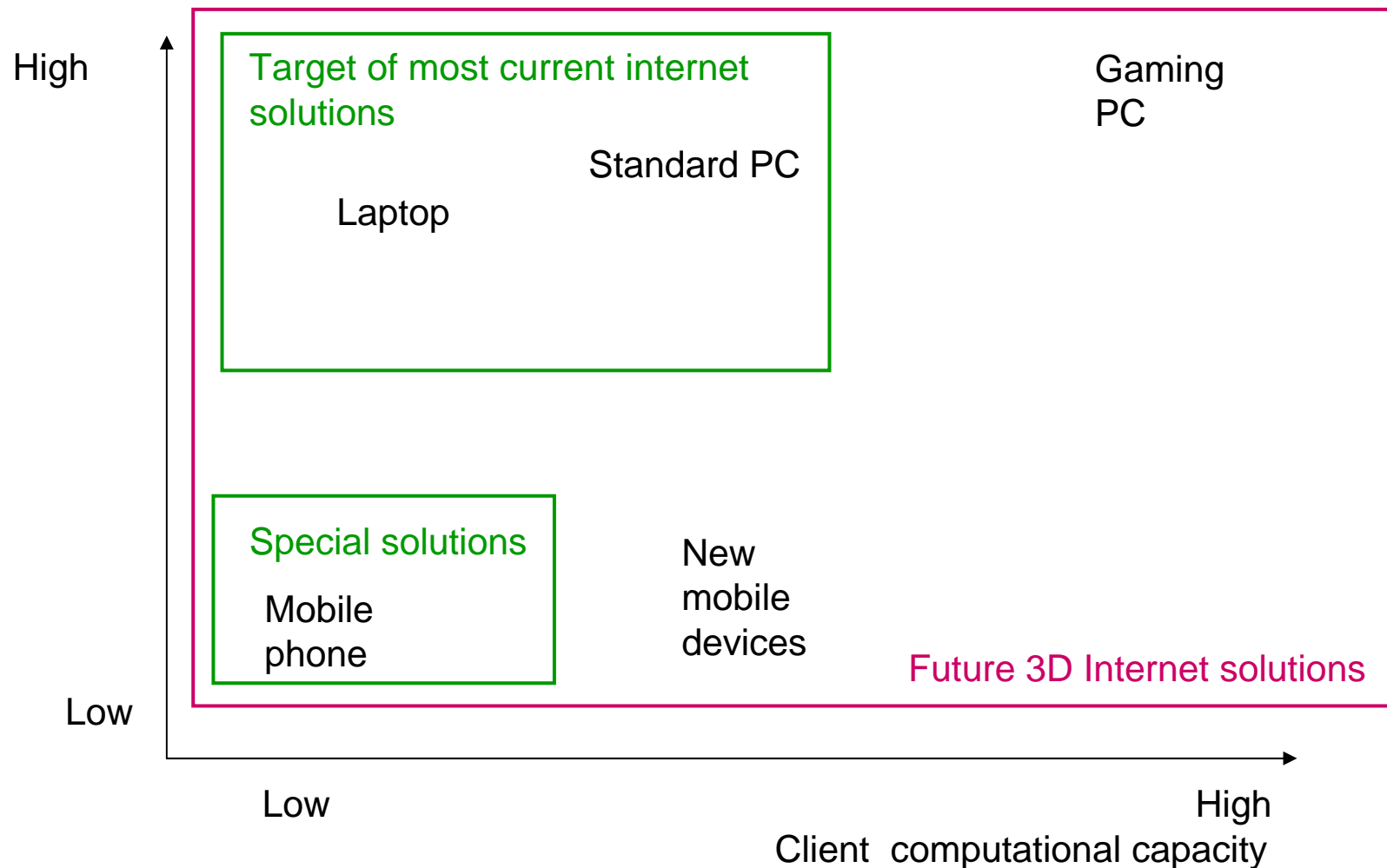
Three mega trends

- Many different shape representations
- The variety of end user visual devices is growing,
- A shift from single core devices to multi- and many-core devices

multitude of
processing
units

graphics processing
unit (GPU)

many core machines

multi core CPU

single core CPU

diversity of
devices

mobile phones

PDA

mobile internet devices (MID)

notebooks

gamer PC

triangles

higher-order shapes; e.g. subdivision

procedural 3D shapes

heterogeneity of
shape representations

SINTEF

Current and future 3D Internet

Network Bandwidth

High

Target of most current internet solutions

Standard PC

Laptop

Gaming PC

Special solutions

Mobile phone

New mobile devices

Future 3D Internet solutions

Low

Low

High

Client computational capacity

Taking a look at ten years old pictures.

Image
180 000 numbers

Graphics
45000 numbers

Geometry
4500 numbers

Taking a look at ten years old pictures.

Skeleton animated NURBS
body from 1999
800MHz Intel processor

We did impressive graphics both on PDAs and PCs ten years ago combining

- Compact representation of shape by NURBS
- Direct animation on NURBS
- Intelligent update of point coordinates of tessellation
- Efficient use of graphics resources

Animated NURBS head
on Ericsson prototype
1999 on a 206 MHz
StrongArm processor

- **Used Open GL on PCs.**
- **Tailored 3D graphics library for the Compaq iPAQ using only integer arithmetic**

The CAGD-community and 3D Internet

- The CAGD community address high quality 3D information for professional use
  - Low quality and low performance of 3D graphics through browsers complicates high quality 3D applications to be browser based
- 3D Internet applications, e.g. Google Earth, is based on positioning images in 3D and provide navigation in the landscape of images
- The CAGD community takes little part in the processes creating the research agenda for the next decade.
  - Other interests control
- Examples from Europe
  - Future Media Internet Task Force:
    - "*Research on Future Media Internet*"
  - European Robot Technology Platform
    - "*Robot visions to 2020 and Beyond*"

The EU ICT program and 3D Internet

- **EU ICT conference in Lyon November 2008, Session on 3D Internet**
  - No focus on what CAGD regards as challenges
  - Some talk of 3D TV (streaming of stereo video)
  - Talk about immersive 3D (advanced devices)
- **ICT Program Call 4, 3D Internet**
  - Oriented towards applications not technology
- **ICT future looking session September 2009**
  - Dominantly focused on 3D contents

"Future Media Internet Task Force"

- **5 EU Networks of Excellence brainstorming**
  - None of the participants from our community
  - Why are we not visible?
- **Report from dated January 2009**
  - I found it last week…
- **However, some very interesting challenges identified**

Research on Future Media Internet

January 2009

Created by "Future Media Internet Task Force"

Coordinated by five FP7 Networks of Excellence supported by the Networked Media Unit of the DG Information Society and Media of the European Commission

European Commission
Information Society and Media

Identified challenges

1. Embedded intelligence for search and retrieval in Virtual Worlds	(5-10 yrs)	Representation Algorithms
2. Physical-based worlds	5-10 yrs) to (>10 yrs)	Representation Algorithms
3. Compression, encoding, transmission & Portability and adaptation	3-5 yrs) to (5-10 yrs)	Representation Algorithms
4. Media Driven Networks	-	-

MODELLING

- **The European Robotics Technology Platform**

- **3D Challenge: The Mathematical described approximation of reality**
  - Short term: Lack of standards
  - Midterm: Modelling of soft and flexible bodies
  - Real-time dynamic modelling and interpretation
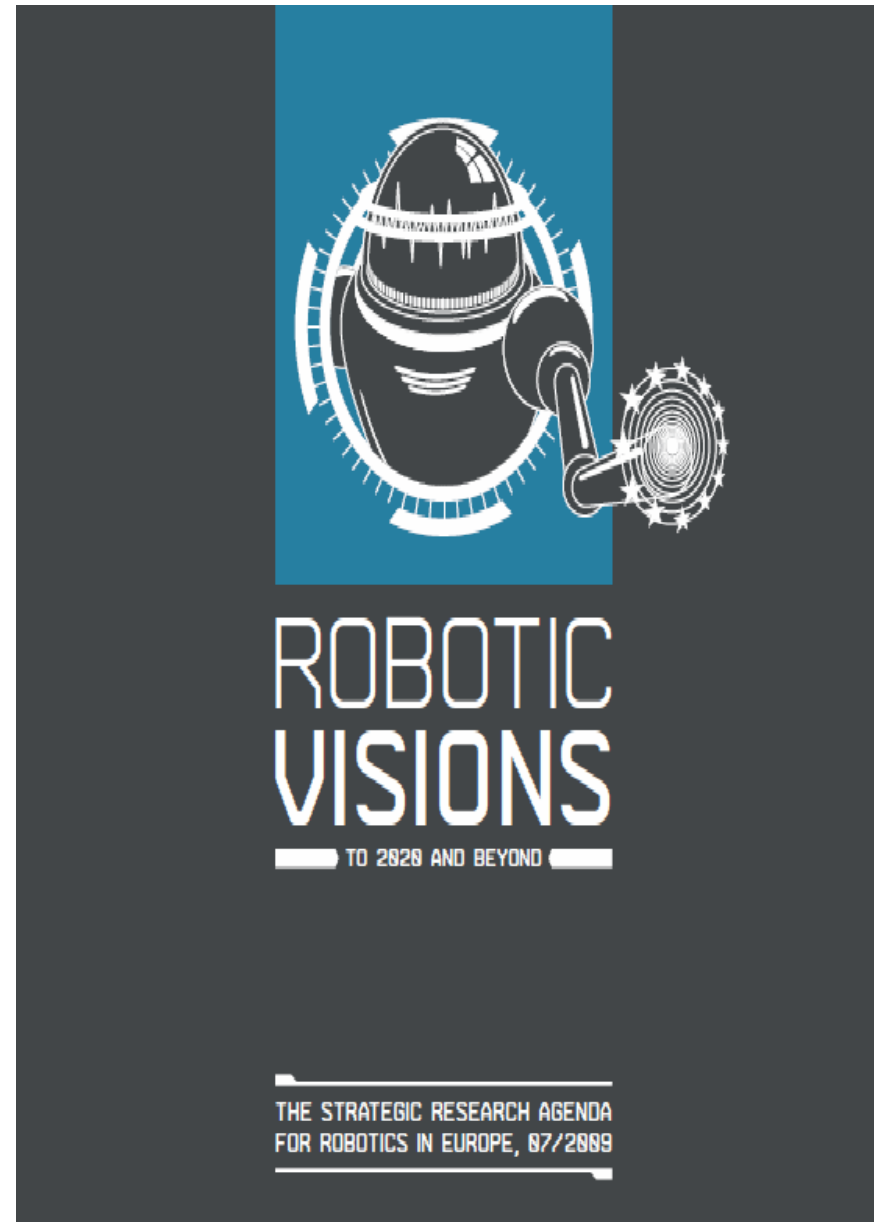
Conclusion

- CAGD is not visible within 3D Internet

- Can we do something about it?