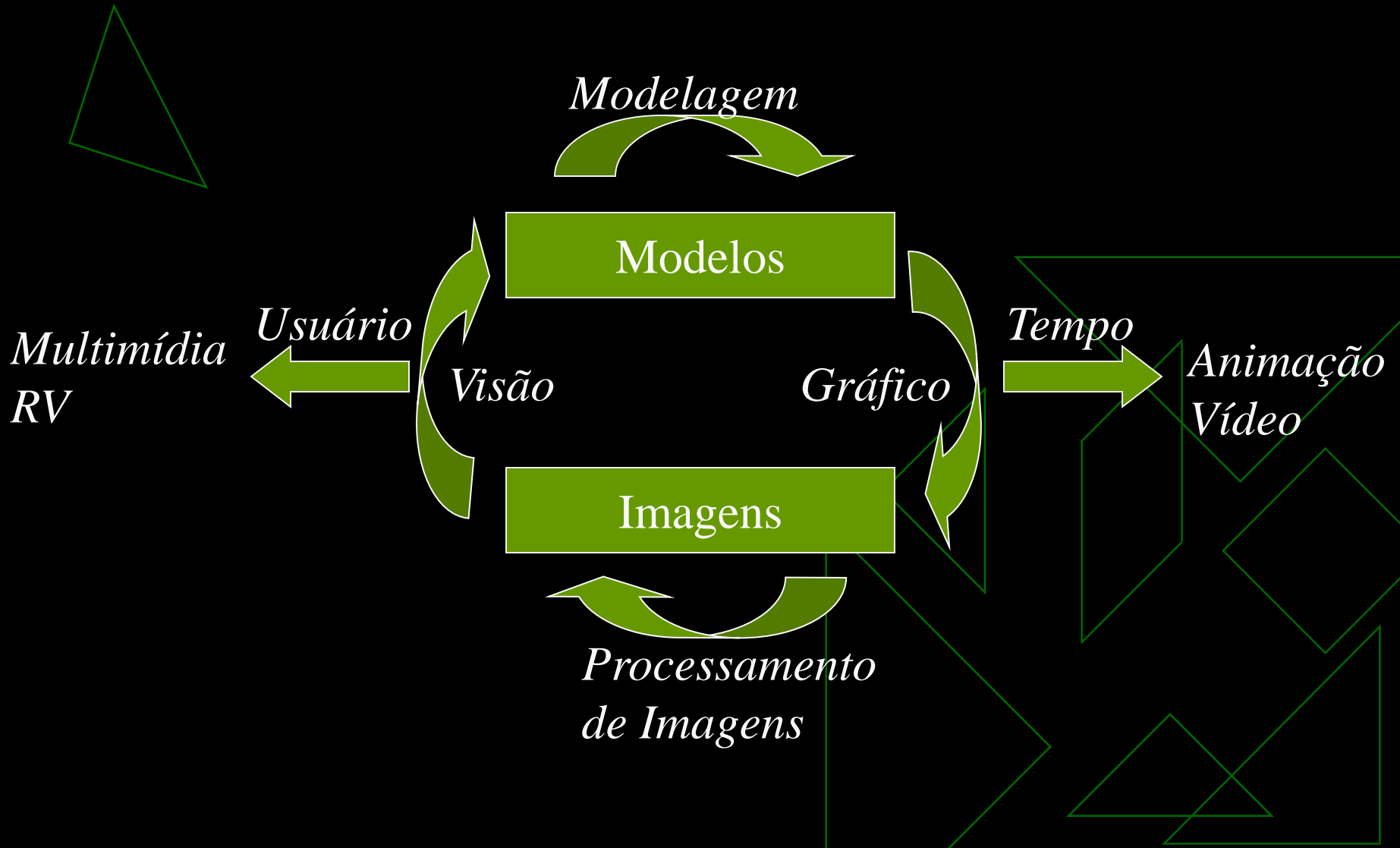


# *O que é CG??*



Soraia Raupp Musse

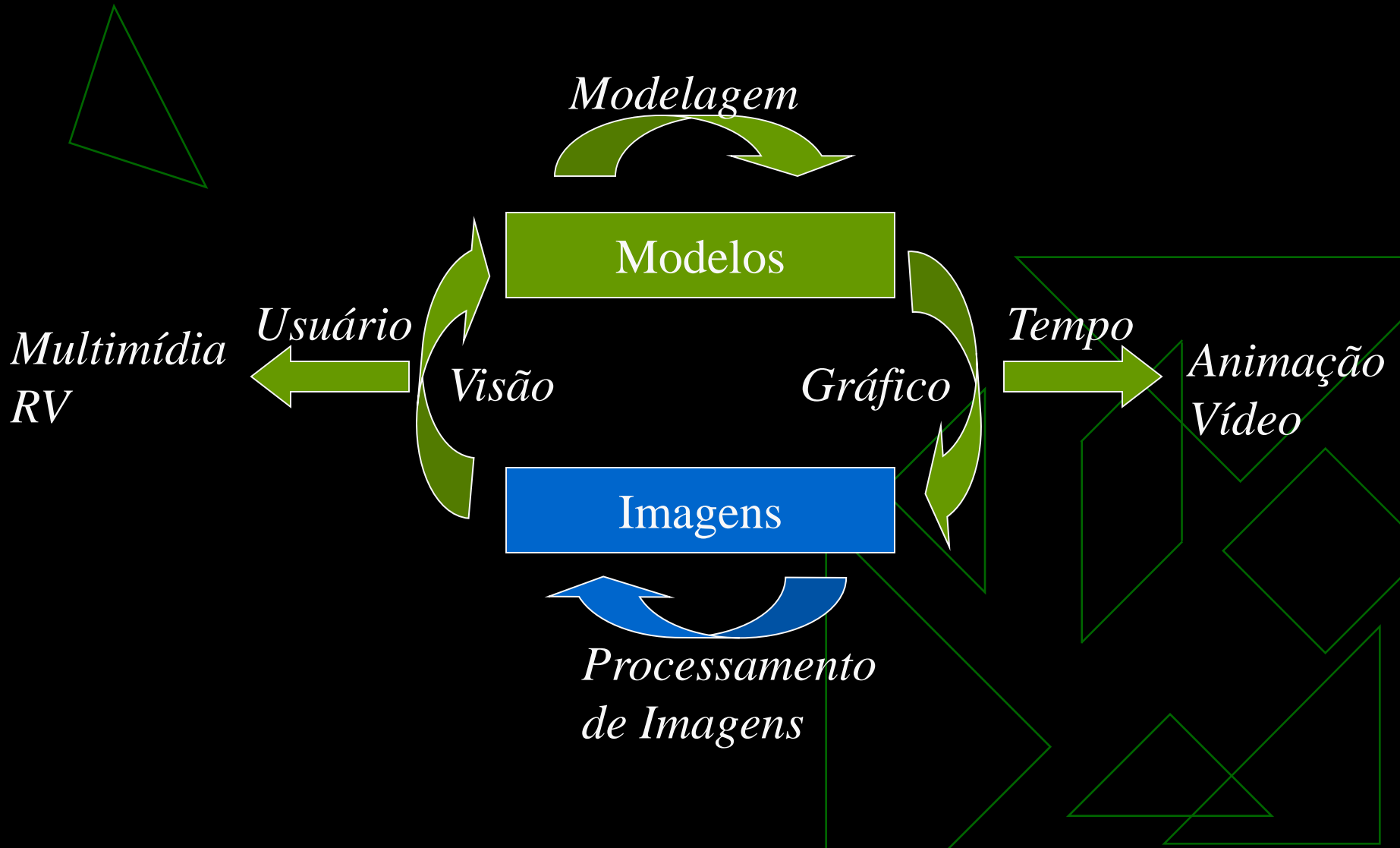
# Processamento Gráfico



*O que NÃO é CG??*



# Processamento de Imagens



# Restauração de Imagens

Objetivo:



Imagem *house* original



Imagem *house* borrada (movimento)



Imagem *house* restaurada (Wiener)



Imagem *house* ruidosa (salt & pepper)



Imagem *house* restaurada (filtro da mediana)

# Compressão de Imagens

## Objetivos:

- **Compressão sem perda:** imagem reconstruída e idêntica a original. Importante no arquivamento de imagens medicas, ou de satélite.
- **Compressão com perda:** imagem reconstruída apresenta diferenças com relação a original (as vezes imperceptíveis). Uso para imagens em geral (Web, fotografias digitais, etc.)



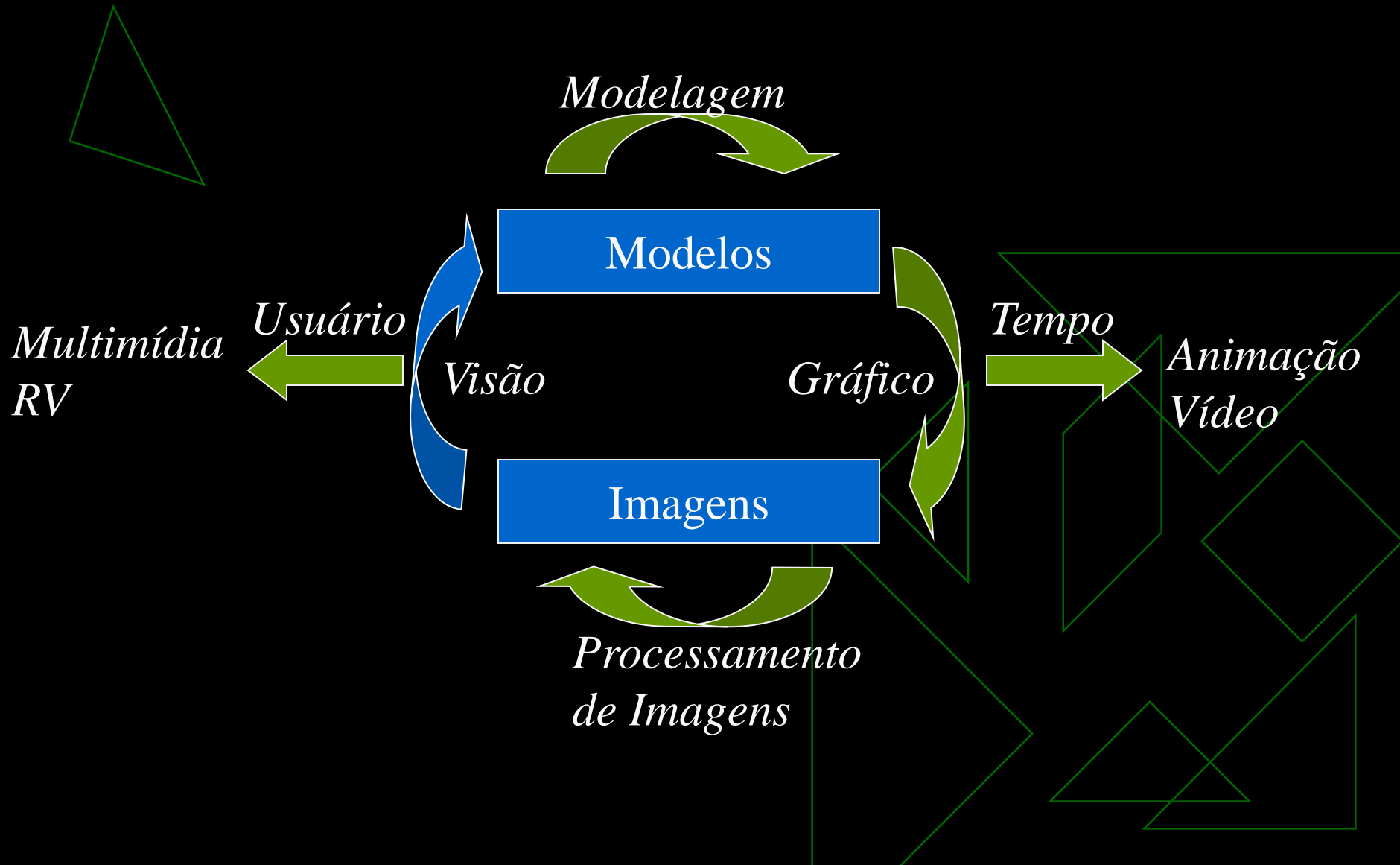
BMP (sem compressão) - 92 KB  
( 153 x 204 x 3 bytes)

JPEG - 6 KB

JPEG - 3 KB

JPEG - 2 KB

# Visão Computacional



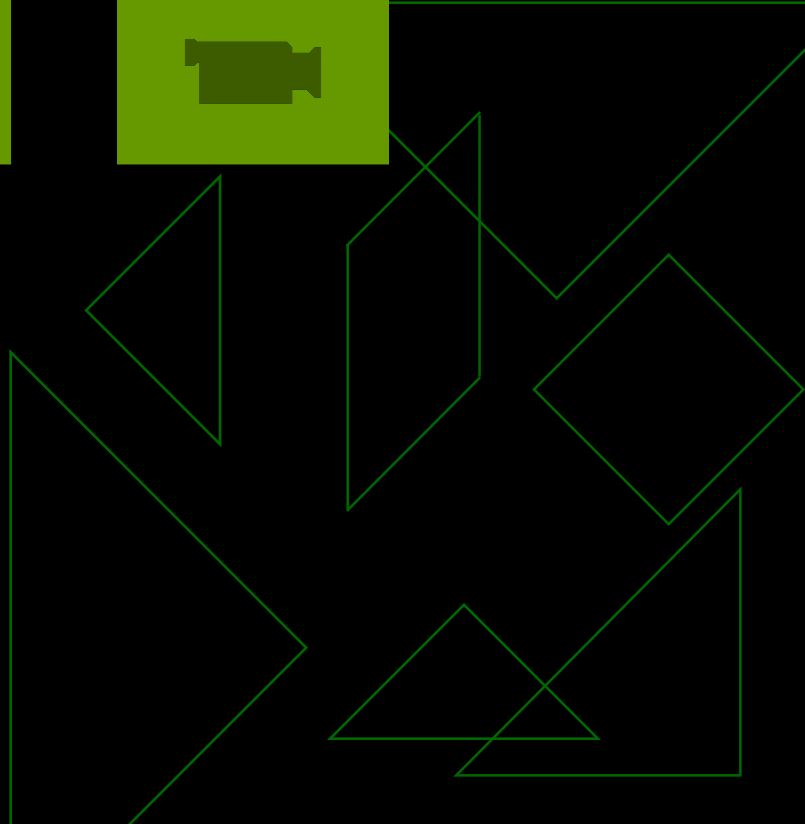
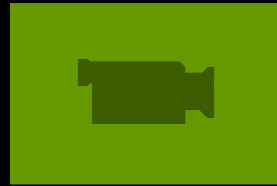
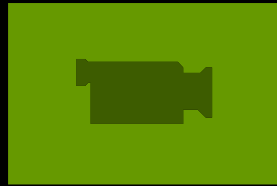
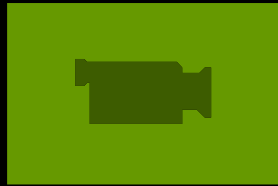
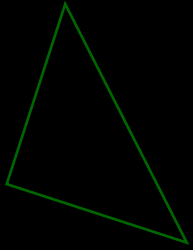




Image denoising and enhancement



Rectangle detection

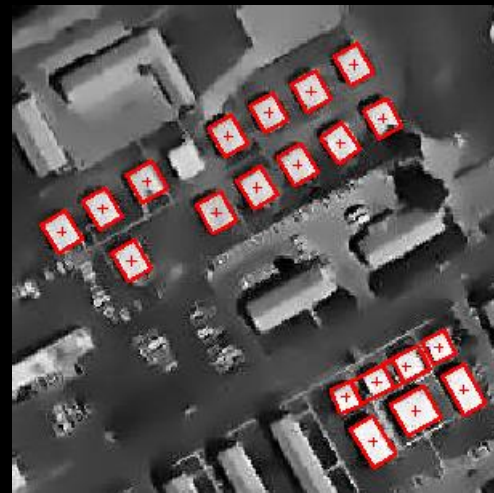
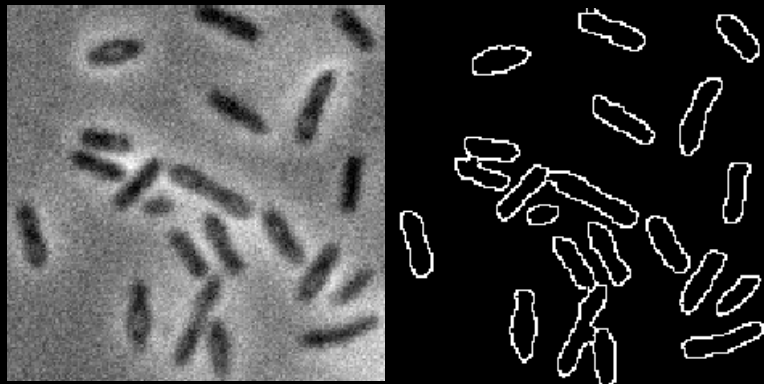
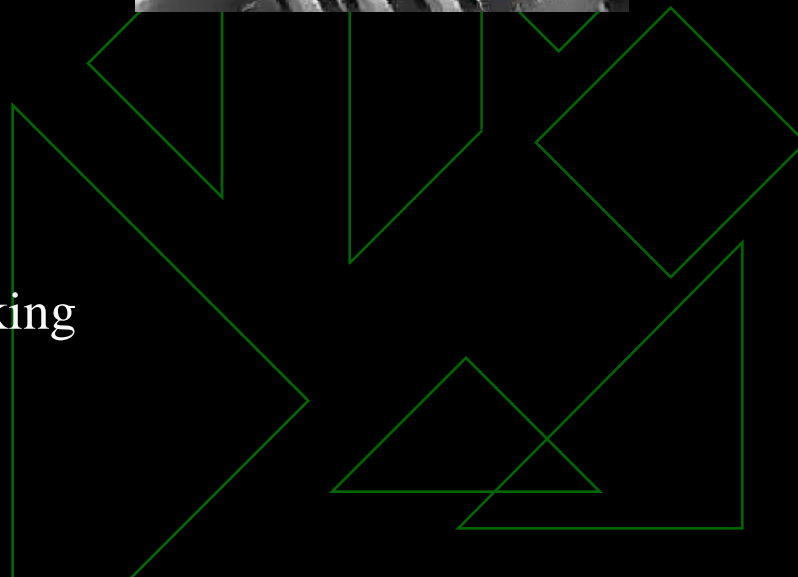
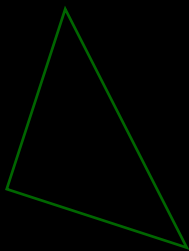


Image Segmentation



People tracking





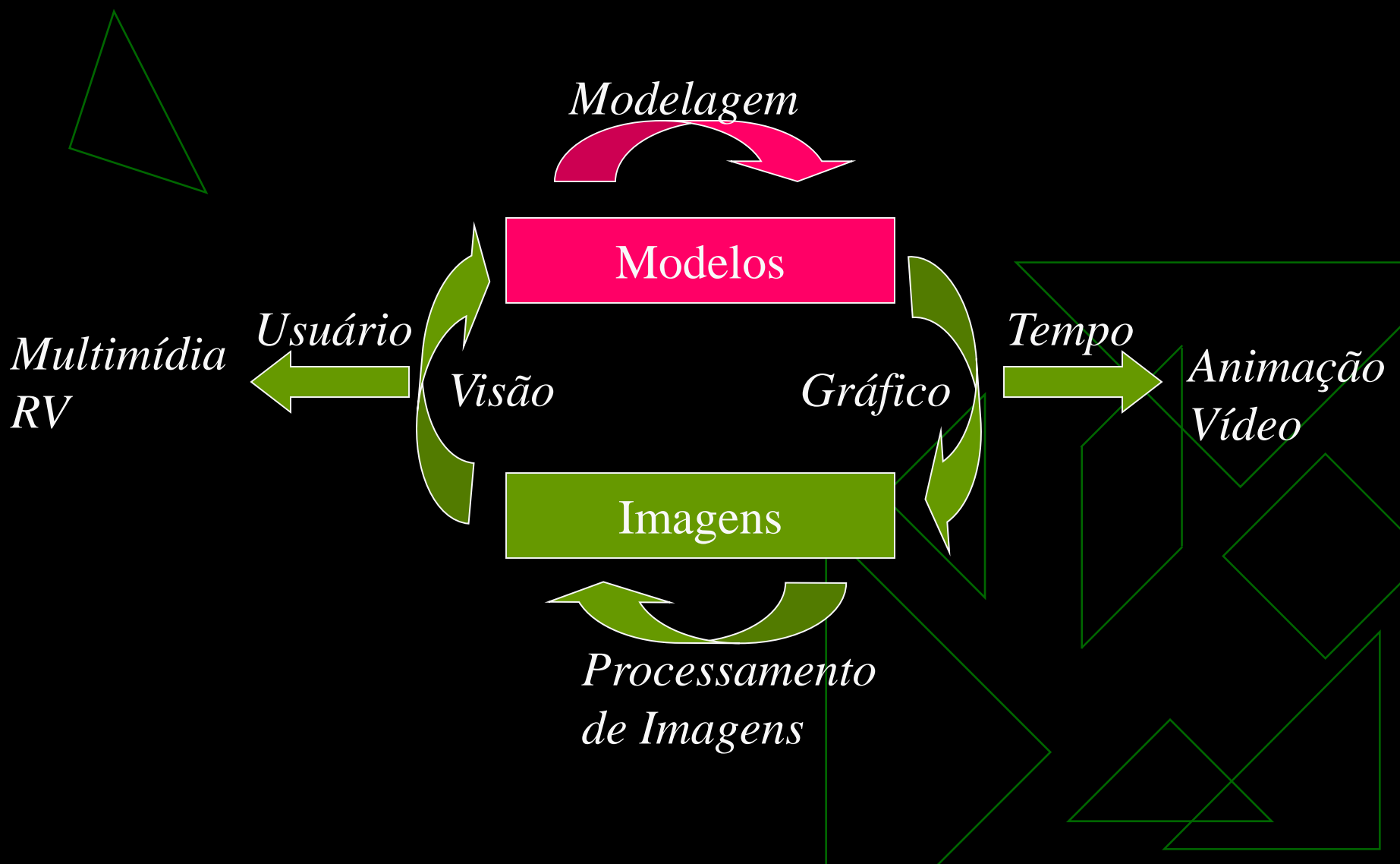
*Tá, então o que é CG??*



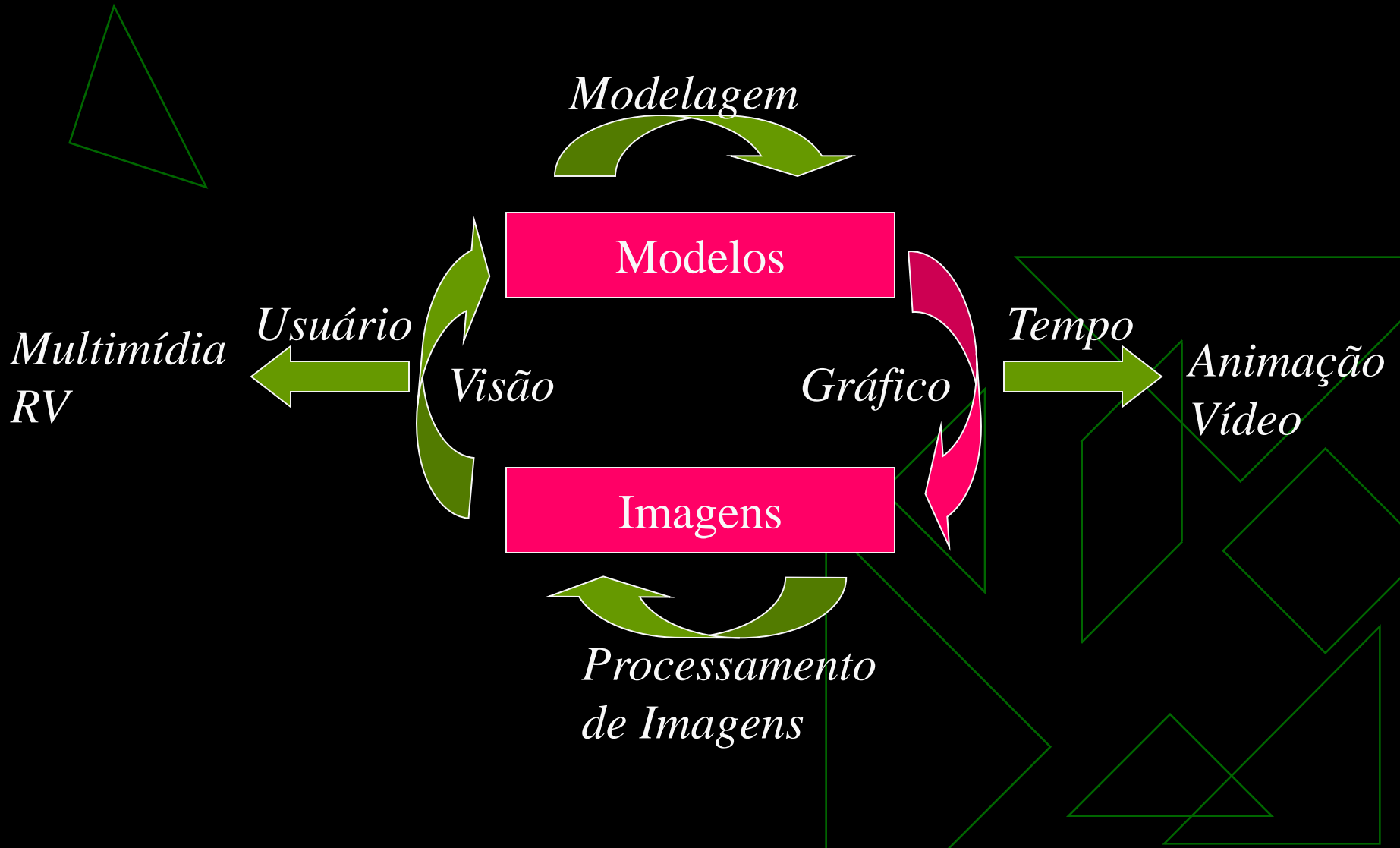
# Exemplos recentes

- ◆ <https://www.youtube.com/watch?v=H2Hy96sOnq8>
- ◆ <https://www.youtube.com/watch?v=OOqs31HUV4Y>
- ◆ [https://www.youtube.com/watch?v=CJ\\_GCPaKywg](https://www.youtube.com/watch?v=CJ_GCPaKywg)
- ◆ <https://www.youtube.com/watch?v=u4-FCsiF5x4>
- ◆ <https://www.youtube.com/watch?v=CY1hRAFo7cg>
- ◆ <https://www.youtube.com/watch?v=IEPzofGKSNE>
- ◆ <https://www.youtube.com/watch?v=V2xp-qtUlsQ>

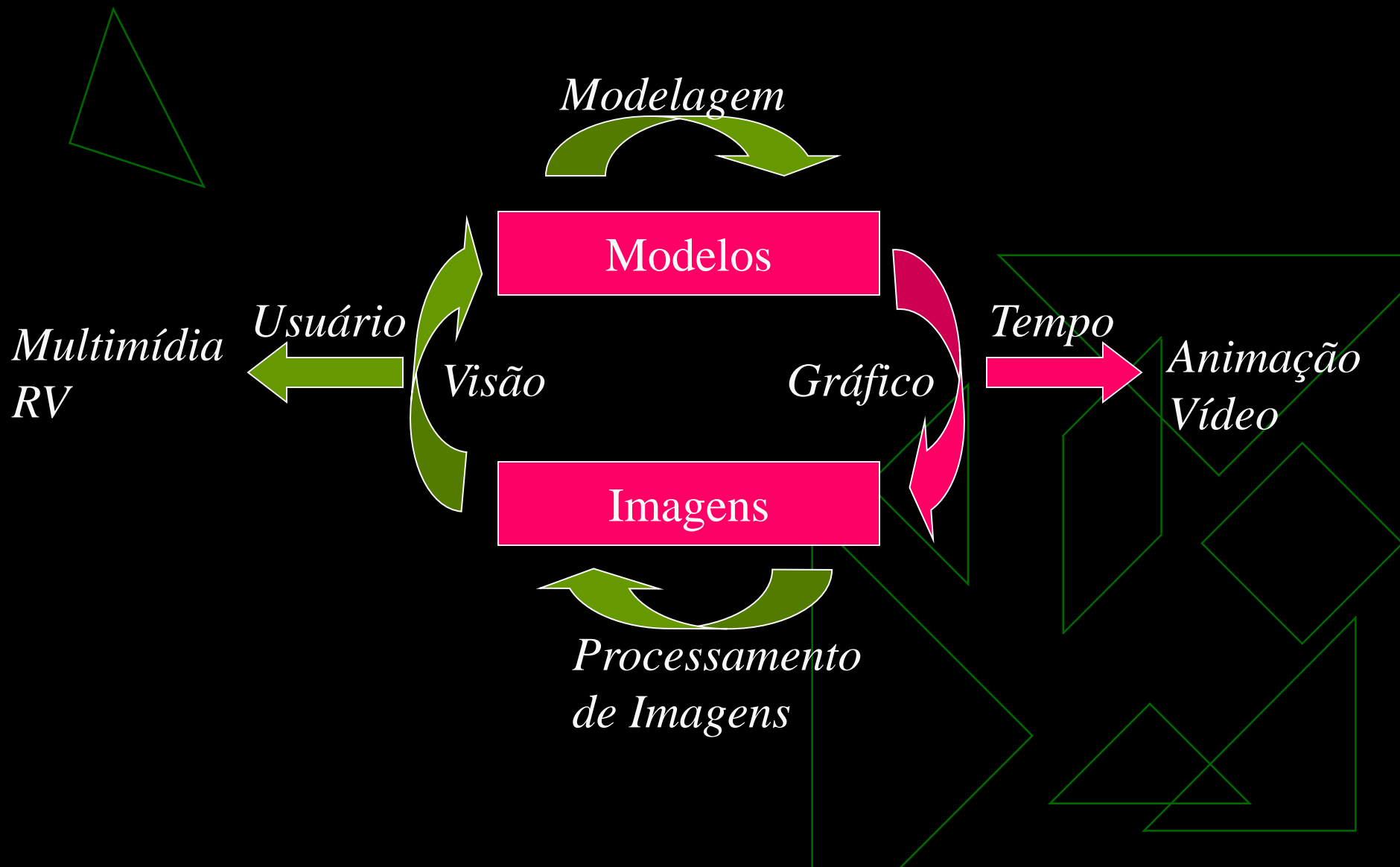
# Modelagem Geométrica



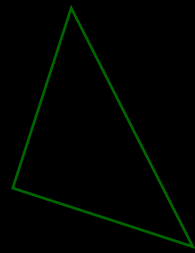
# Renderização



# Animação



# O que é Computação Gráfica?



**Dados**

- Objetos
- Fontes de Luz
- Interação
- ...

**IMAGEM**





# Temas da Computação Gráfica

Forma

Modelagem Geométrica

Aparência

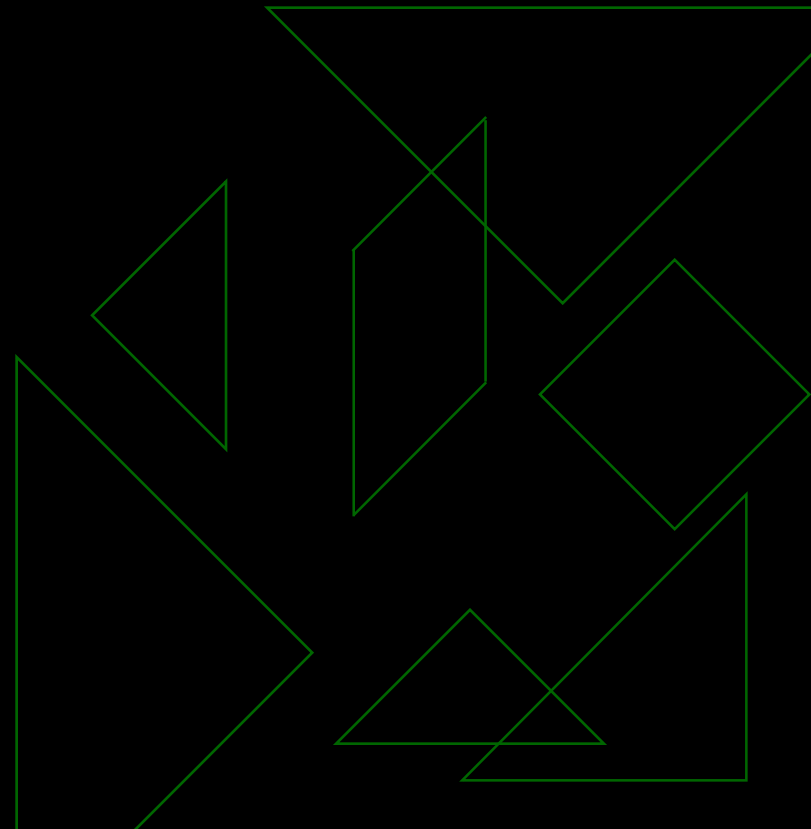
Renderização

Ação

Animação

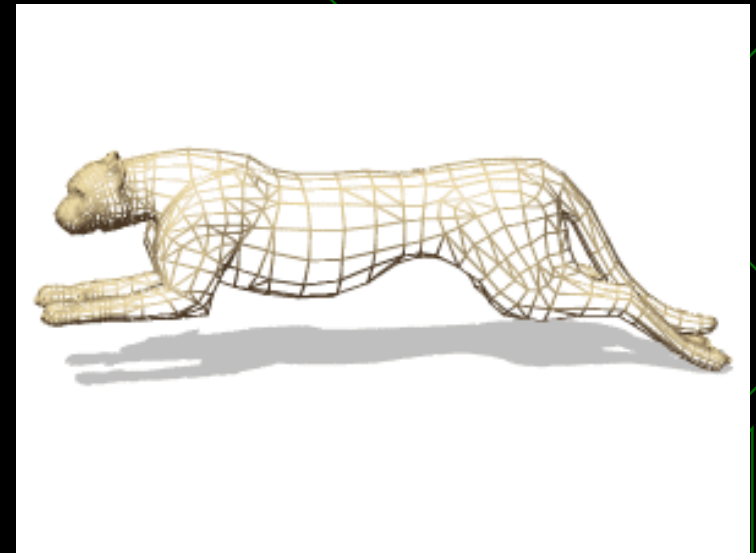
Interfaces

RV



# Modelagem Geométrica

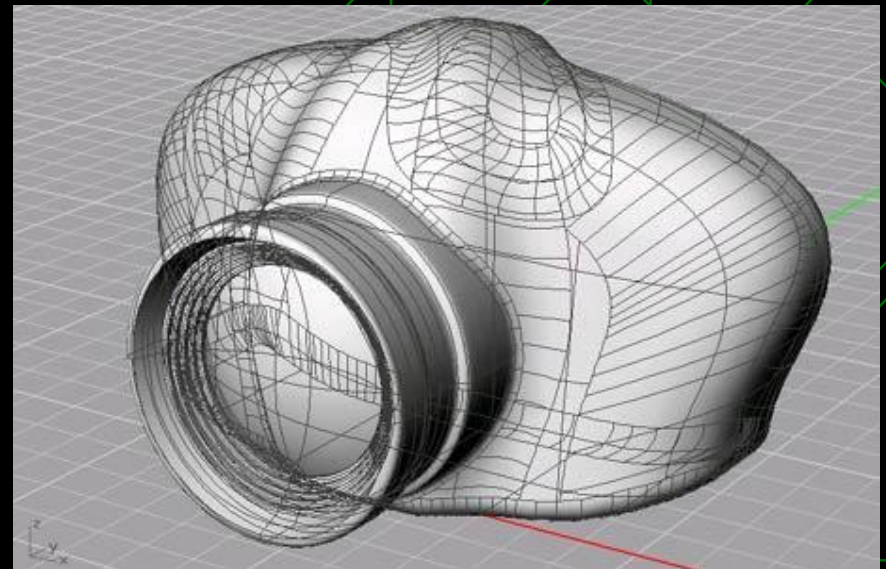
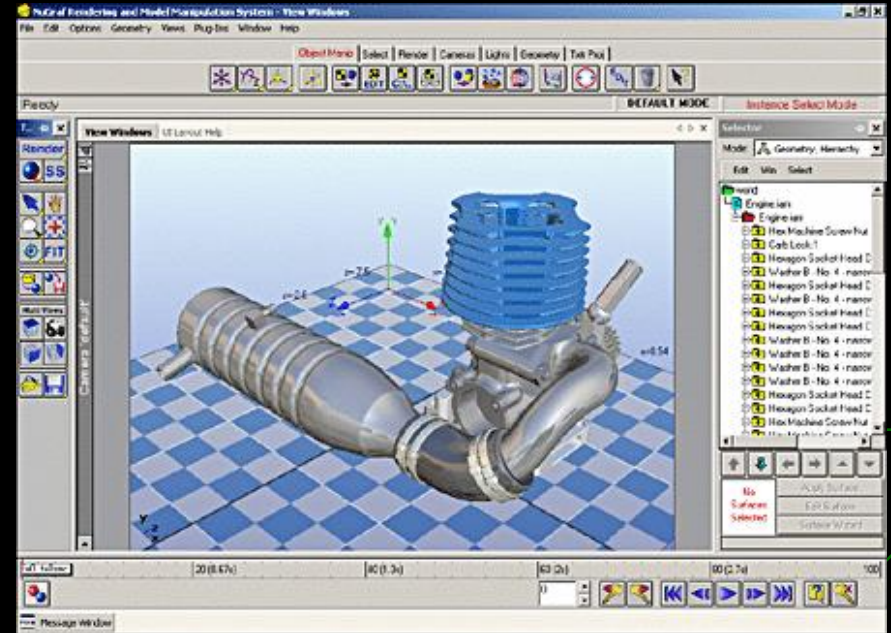
- ◆ Como criar/projetar/representar objetos
- ◆ Como representar coisas e ambientes complexos (um bicho de pelúcia é complexo?)



Coleção de vértices, conectados por arestas, formando polígonos

# Modelagem Geométrica

- ◆ Como construir estas representações?
- ◆ Como armazenar essas representações?
- ◆ Qual a unidade mínima dos dados a serem usados na representação?



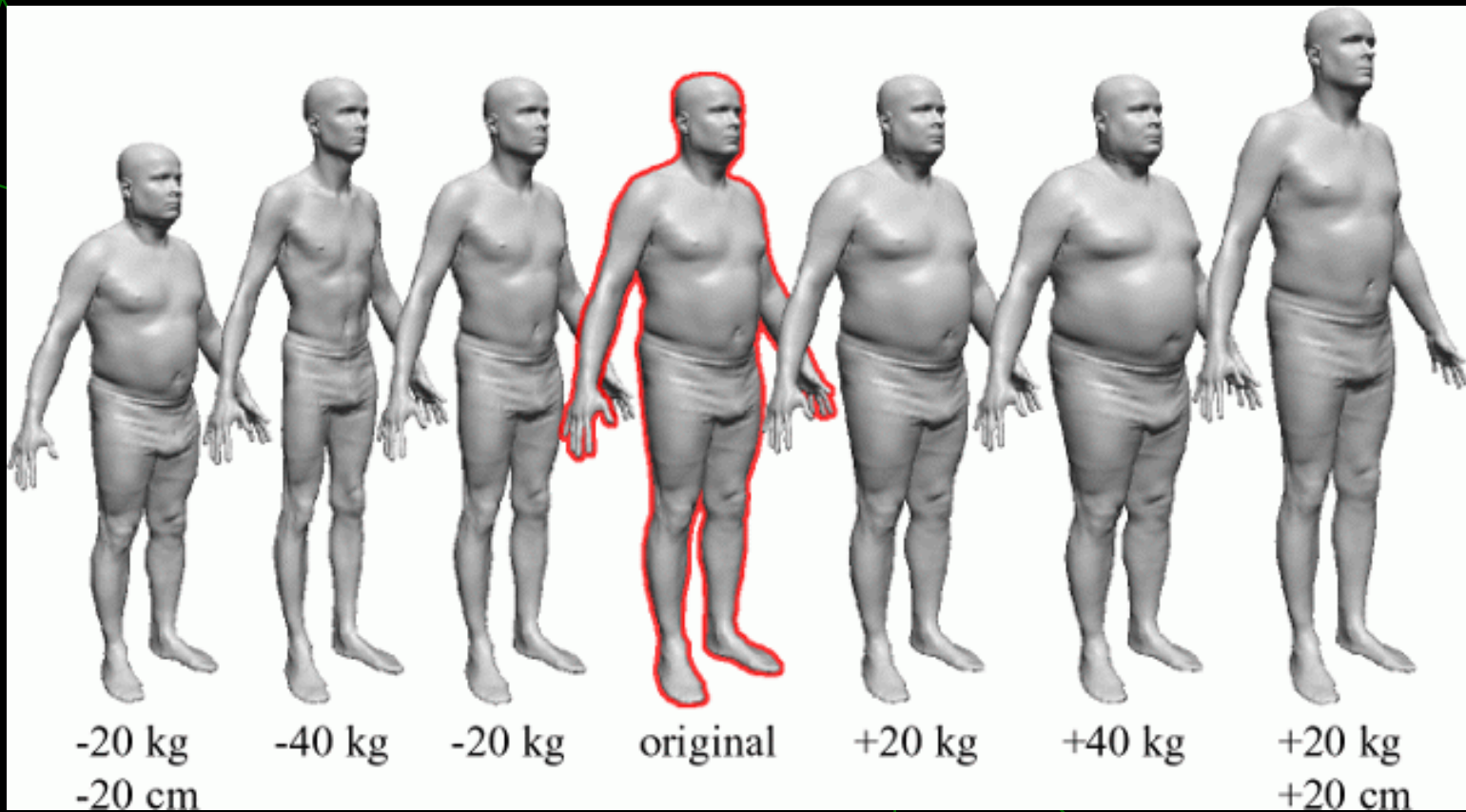
# Realismo da Forma

- ◆ Métodos Matemáticos
  - Polígonos
  - Curvas e Superfícies Paramétricas

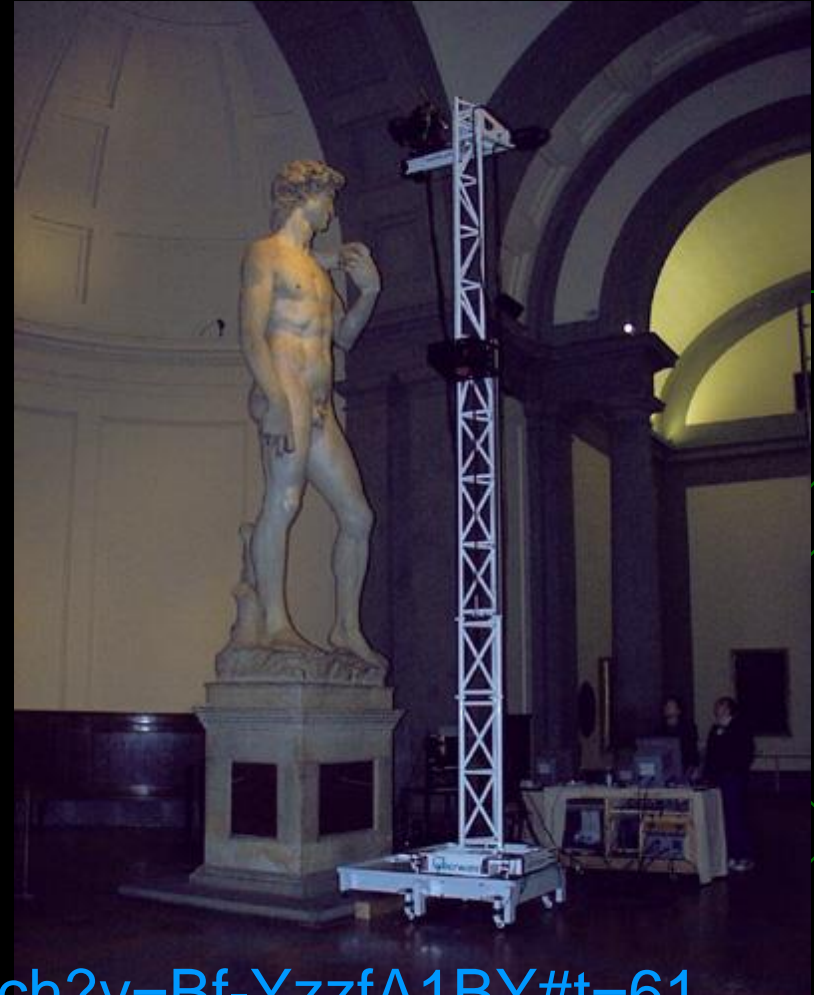
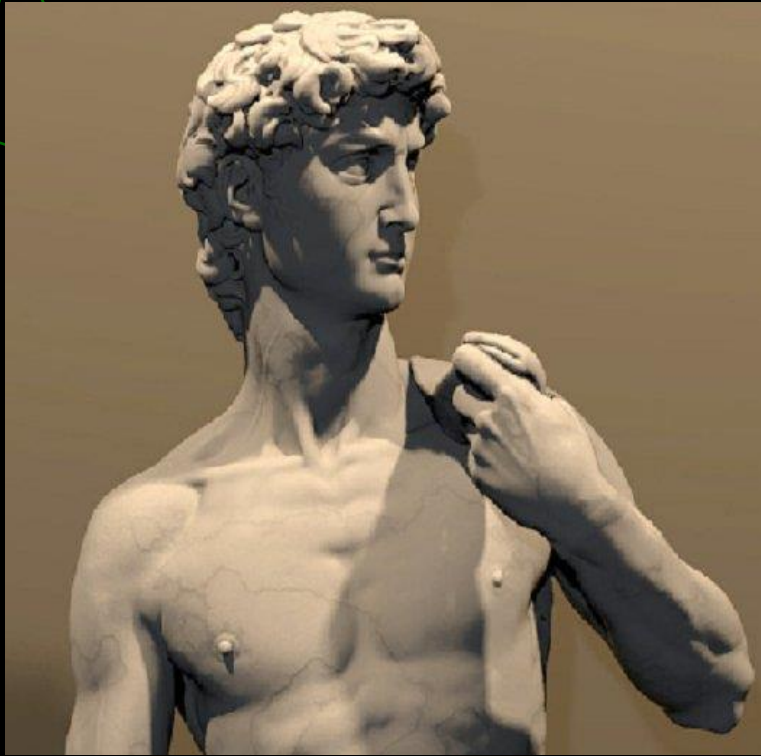


3D Studio Max

# Digitalização 3D



# Digitalização 3D

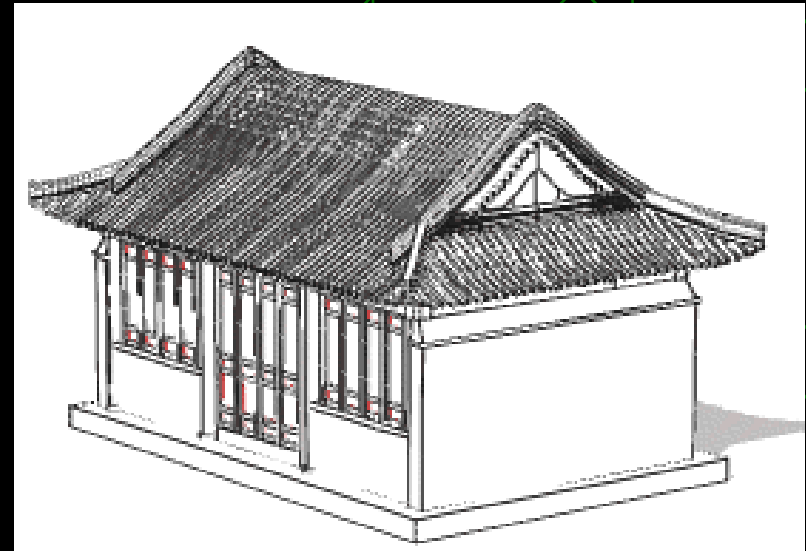
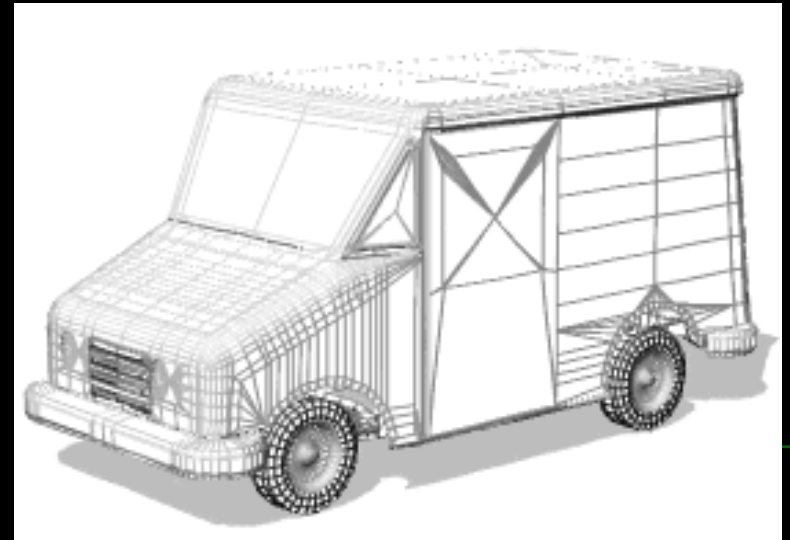
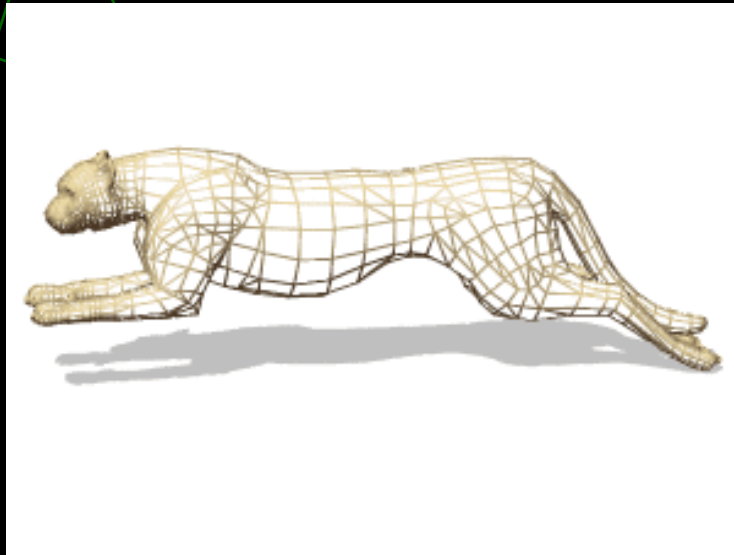


Porque digitalizar?

<https://www.youtube.com/watch?v=Bf-YzzfA1BY#t=61>

[https://www.youtube.com/watch?v=Ekc\\_9vPDbo8](https://www.youtube.com/watch?v=Ekc_9vPDbo8)

# Exemplos



# Exemplos

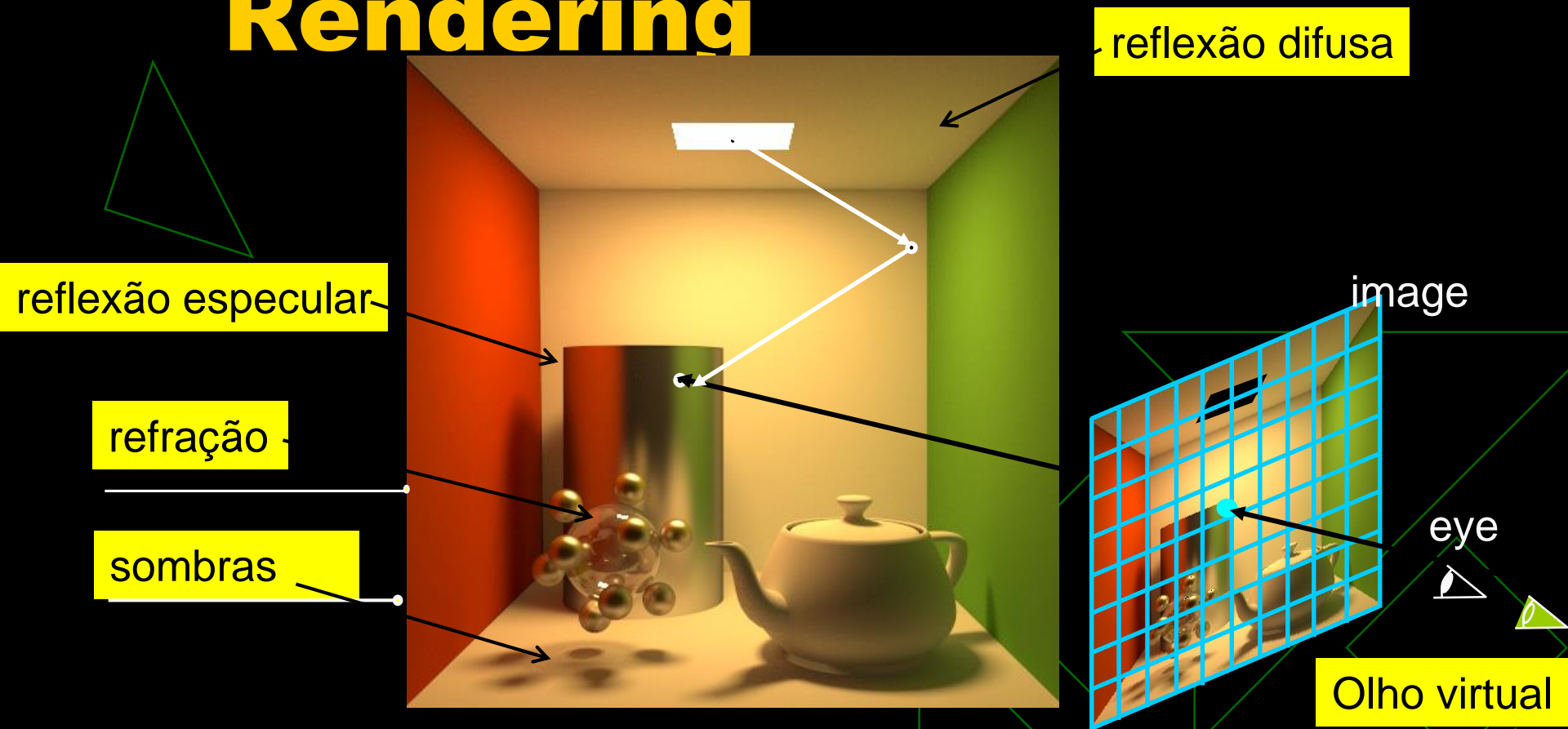




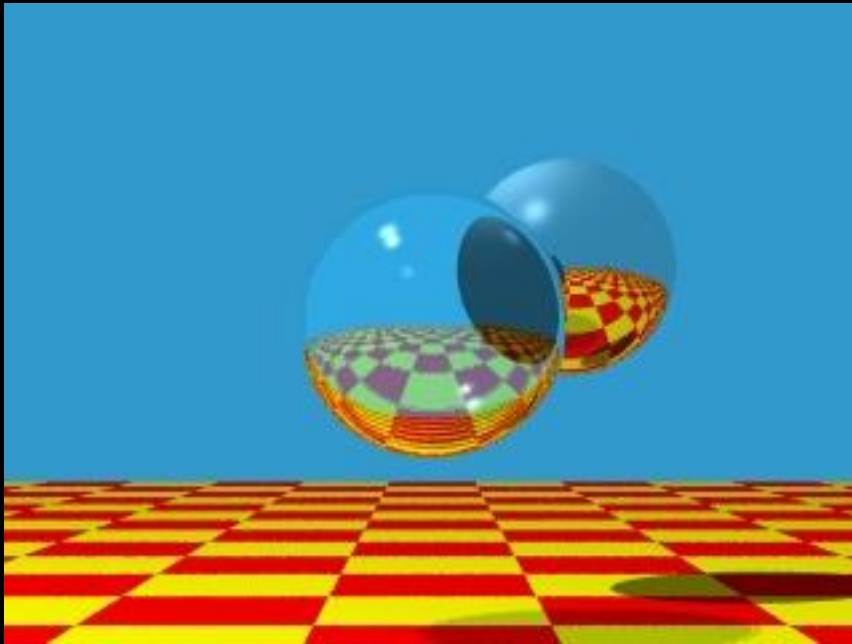
# Renderização

- ◆ Uma imagem é uma distribuição de energia luminosa num meio bidimensional (o plano do filme fotográfico, por exemplo)
- ◆ Dados uma descrição do ambiente 3D e uma câmera virtual, calcular esta energia em pontos discretos (tirar a fotografia)
- ◆ Resolver equações de transporte de energia luminosa através do ambiente!!

# Rendering



Principais fenômenos que podem acontecer na interação entre luz e objetos



**Década de 80...**



# Exemplo – *Ray Tracing*

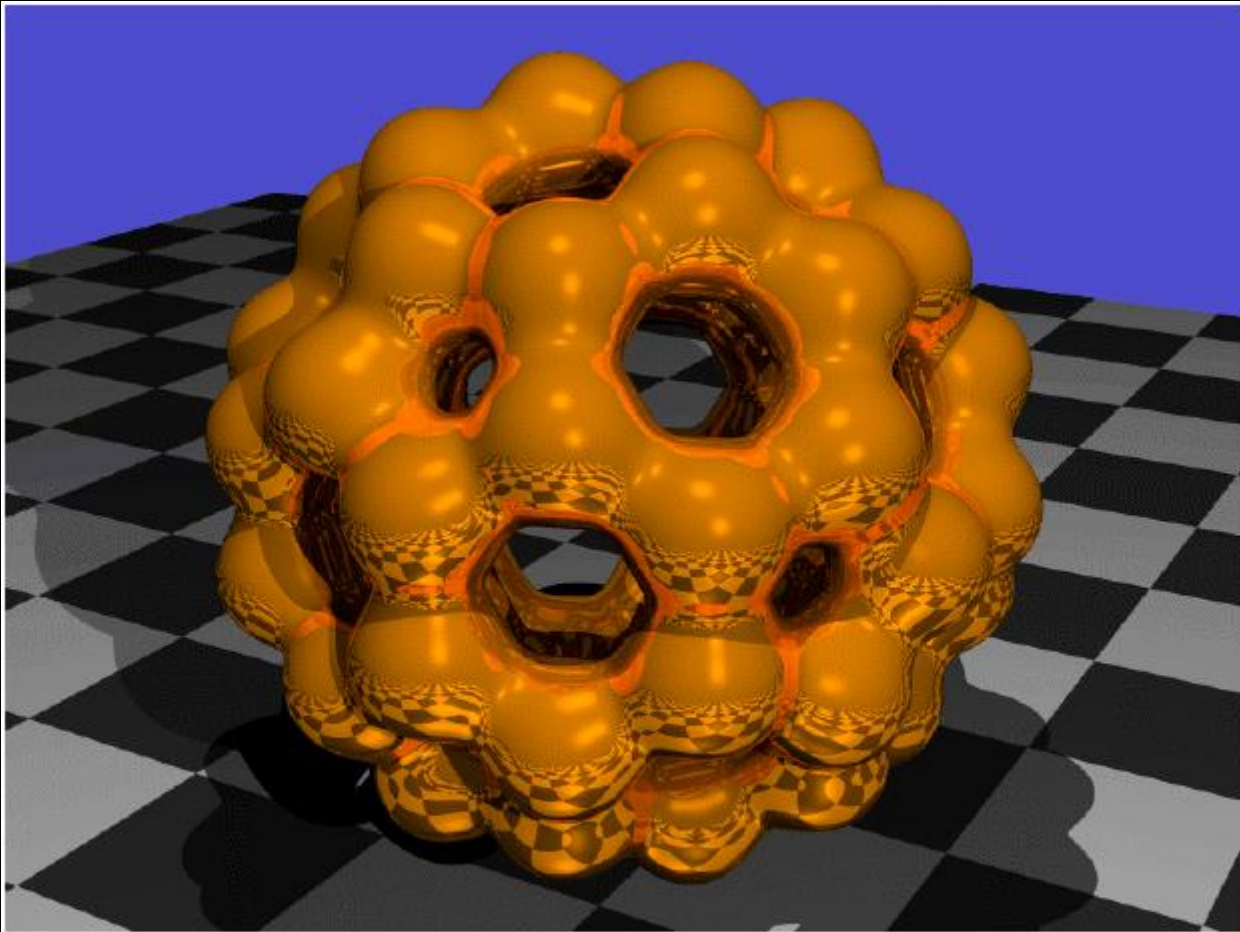


*Kirschner, Andre*

RENDERER USED: 3d studio max

RENDER TIME: approx 6 hours 30 minutes

HARDWARE USED: AMD1600+, ti4200

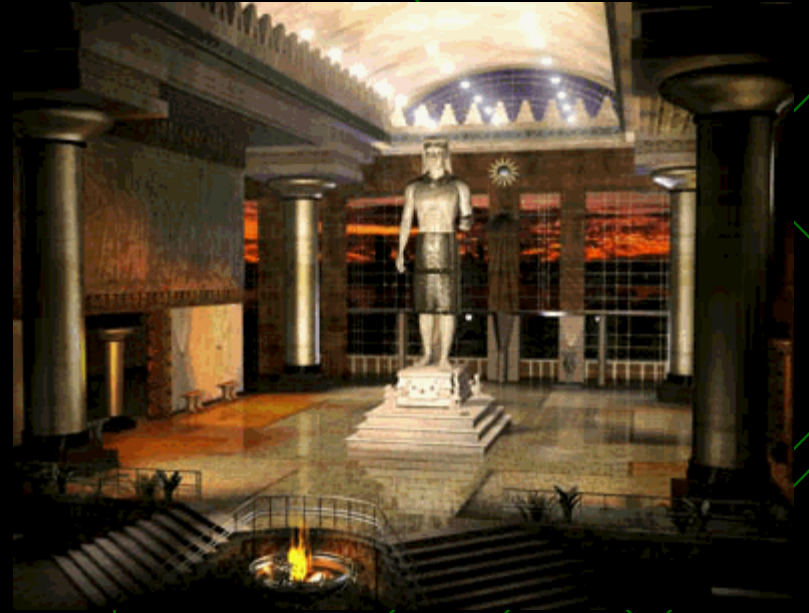


(Oliver Kreylo's Ray Tracer)

# Exemplo - Radiosidade











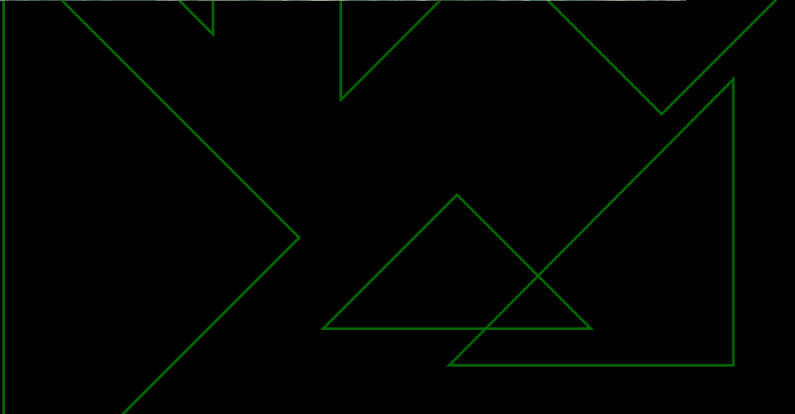
# Real ou Computação Gráfica?



<http://area.autodesk.com/fakeorfoto>

# Real ou Computação Gráfica?







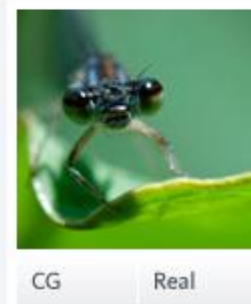
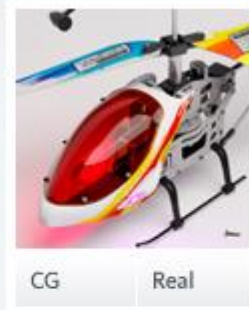
# Real ou Computação Gráfica?



Image courtesy of Glenn Melenhorst/Zephyr Animation

# Photo or CG

<http://area.autodesk.com/fakeorfoto>



# Photo or CG

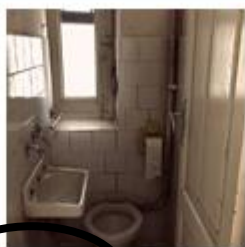
<http://area.autodesk.com/fakeorfoto>



CG Real



CG Real



CG Real



CG Real



CG Real



CG Real



CG Real



CG Real



CG Real



CG Real



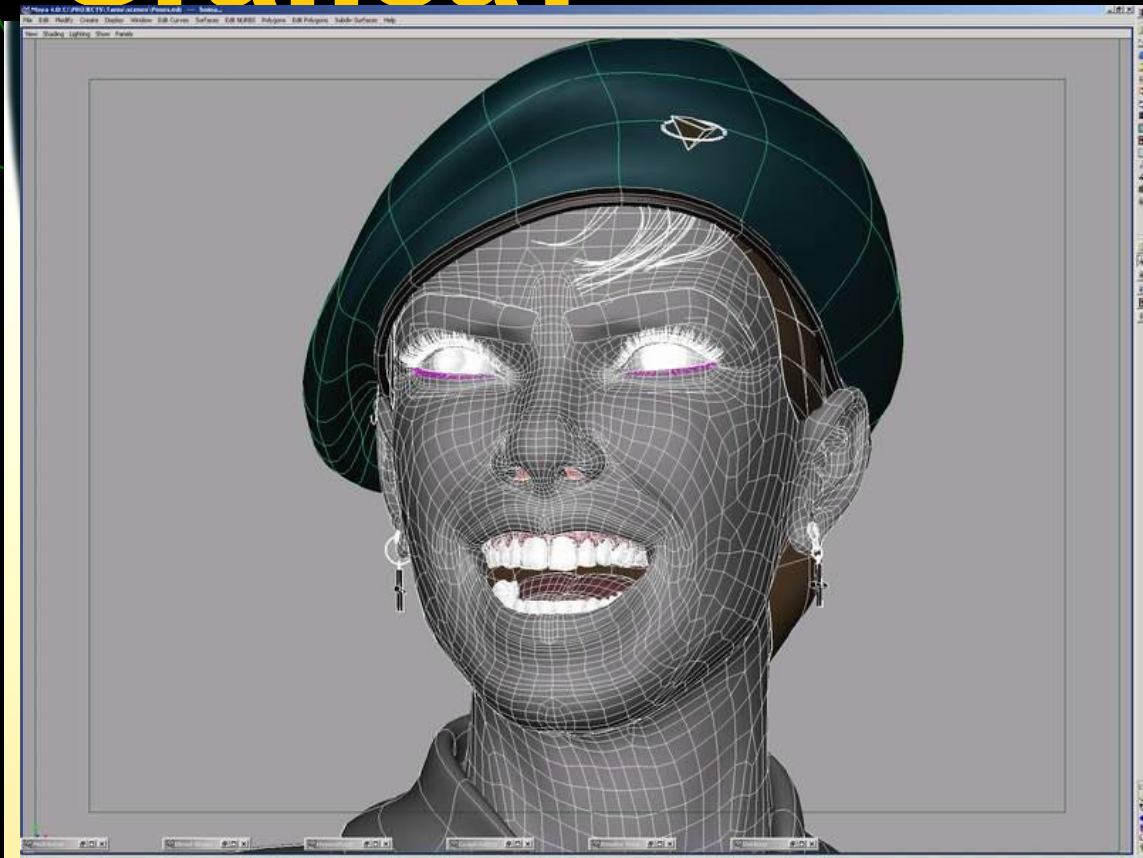
CG Real



CG Real

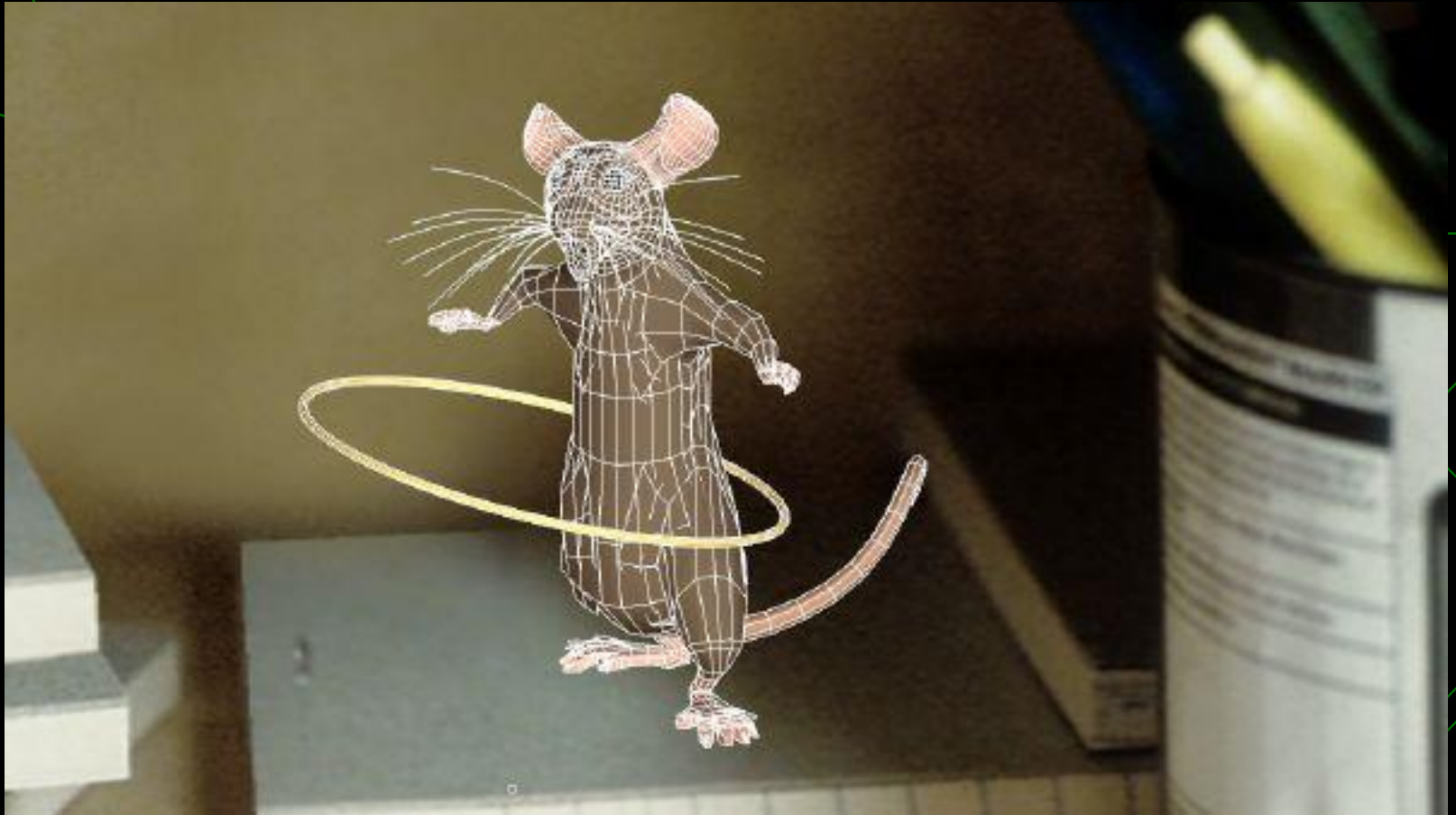


# Real ou Computação Gráfica?



Alceu Baptista  
Vetor Zero

# Detalhes



# Realismo Aparência



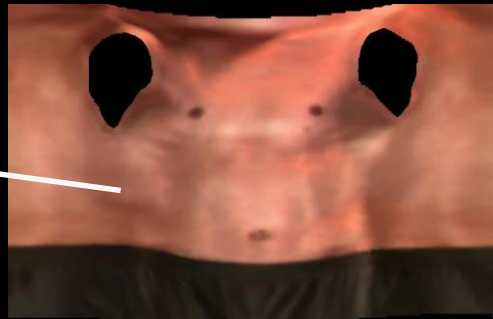
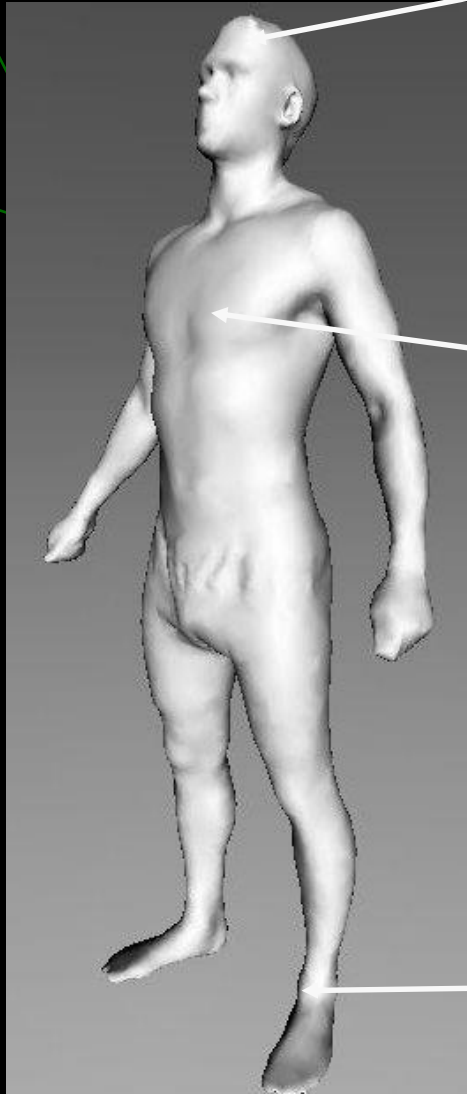
# Realismo Aparência

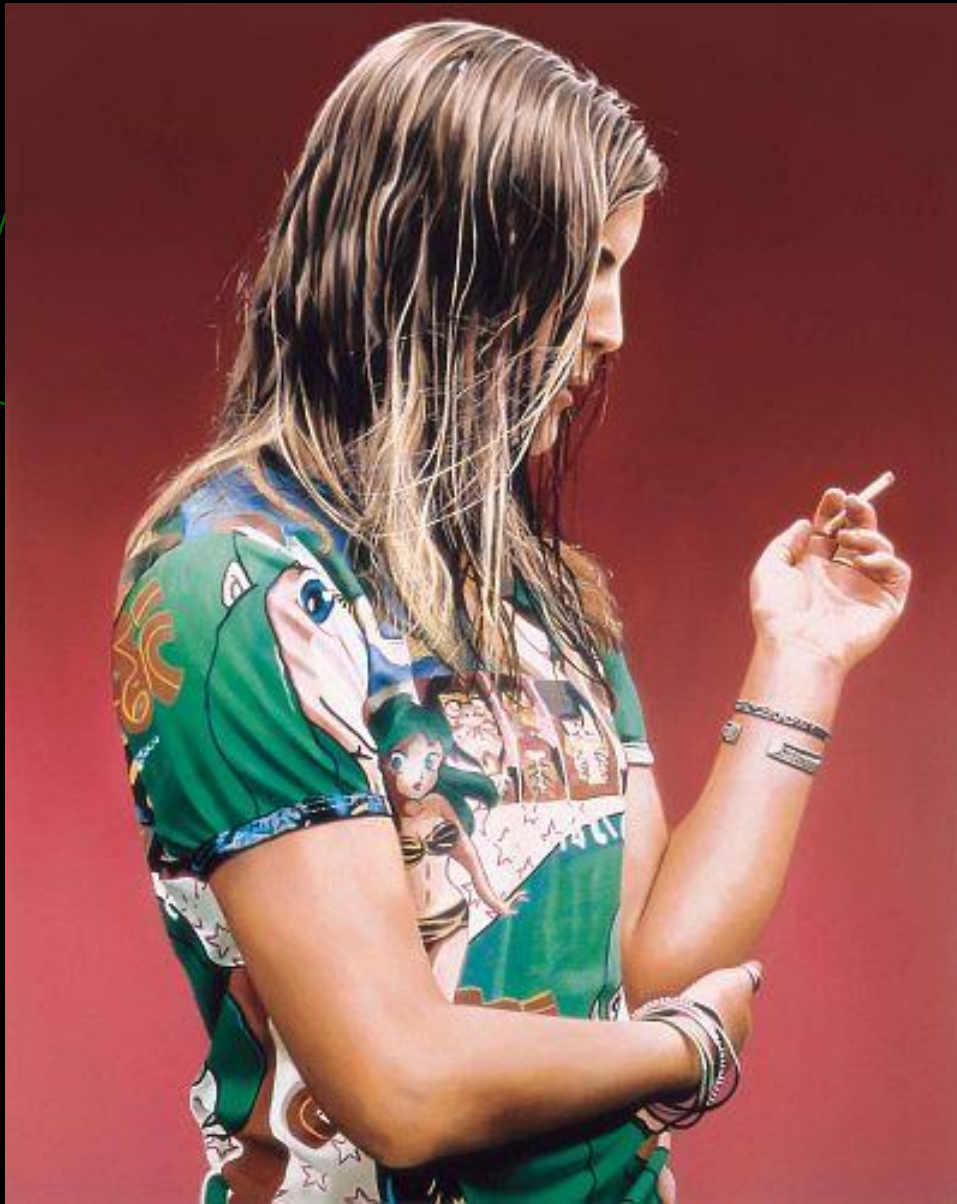


# Realismo Aparência



# Texturas





Jan Nelson - 2002





# Animação

- ◆ Modelar Ações dos objetos, ou seja, como objetos se MOVEM
- ◆ Como representar movimento de objetos?
- ◆ Como especificar movimento (interativamente ou através de um programa)?
- ◆ Animação Baseada em Física/regras
- ◆ Atores Autônomos
- ◆ Captura de movimento
- ◆ Onde a IA encontra a Animação?

# Exemplos Monstros, Shrek



**MEDIA | DOWNLOADS**  
GALLERY | VIDEO CLIPS | TRAILERS

1 2 3

THE STORY MEET THE CHARACTERS MEDIA AND DOWNLOADS FUN AND GAMES BEHIND THE FAIRYTALE

Princess Fiona (CAMERON DIAZ) nervously introduces her new husband Shrek (MIKE MYERS) to her parents, King Harold (JOHN CLEESE) and Queen Lillian (JULIE ANDREWS), the rulers of Far Far Away, in DreamWorks Pictures' computer-animated comedy SHREK 2.

Register

HAPPILY EV... INGREDIENTS

**SHREK 2**  
ON DVD & VIDEO  
FRIDAY NOVEMBER 5TH

Close Book

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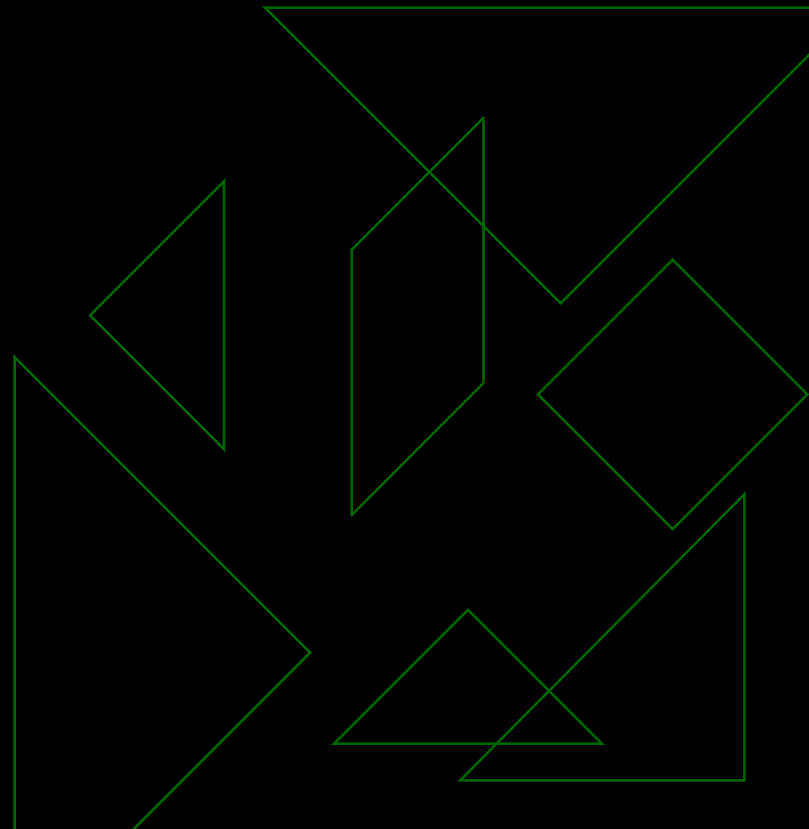
ENTER SITE

WATCH TRAILERS



**“Like nothing Pixar, or anyone else, has ever done before.”**  
 Leonard Maltin, ENTERTAINMENT TONIGHT

- ◆ <https://youtu.be/cPAbx5kgCJo>
- ◆ <https://youtu.be/YeYW8TIWLG8>



# Mais informações...

◆ Old, very old.... In Brazil...

◆ Pixar in box!

<https://www.khanacademy.org/partner-content/pixar>

# *Atualidade com motion capture*

<https://youtu.be/TigXhqERjY0>

<https://www.youtube.com/watch?v=5DwHjNenAmw>



# Interface HC/RV

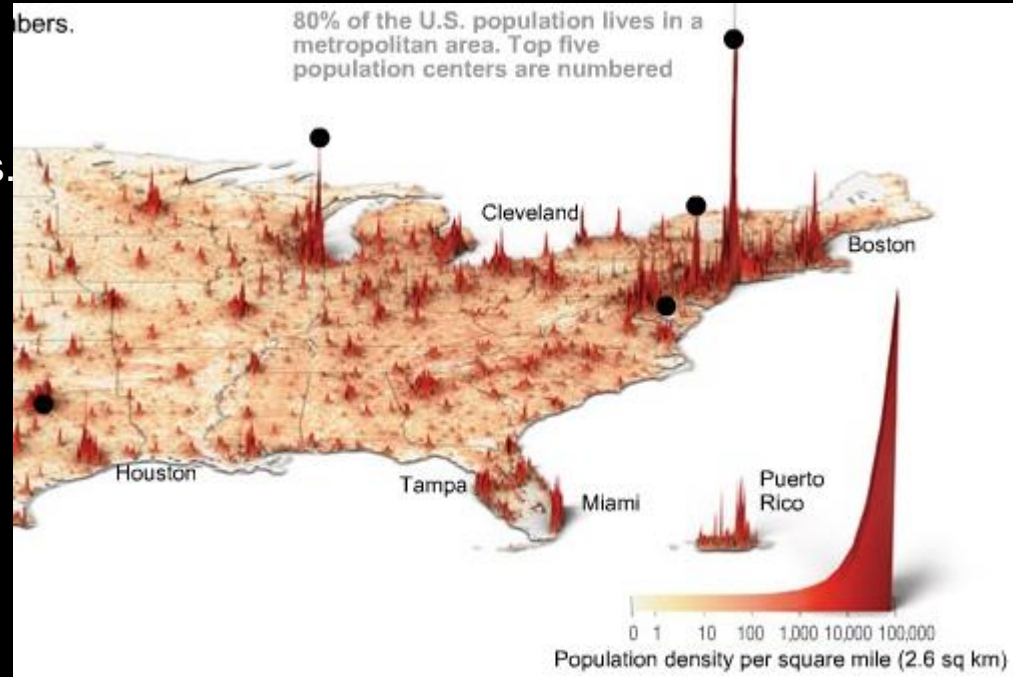
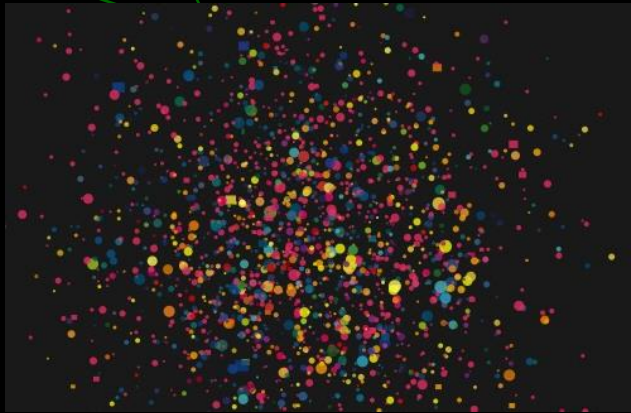
- ◆ Técnicas para facilitar o uso de computadores por nós, seres humanos
- ◆ Trabalho interdisciplinar, normalmente envolvendo cientistas da computação, psicólogos, lingüistas e outros
- ◆ Projeto e teste de novos dispositivos
- ◆ RV



# Visualização

[Time Magazine](#) uses visual hills (spikes) to emphasize the density of American population in its map.

[We Feel Fine](#) shows human feelings, calculated from a large number of weblogs.



[Amaztype](#), a typographic book search



