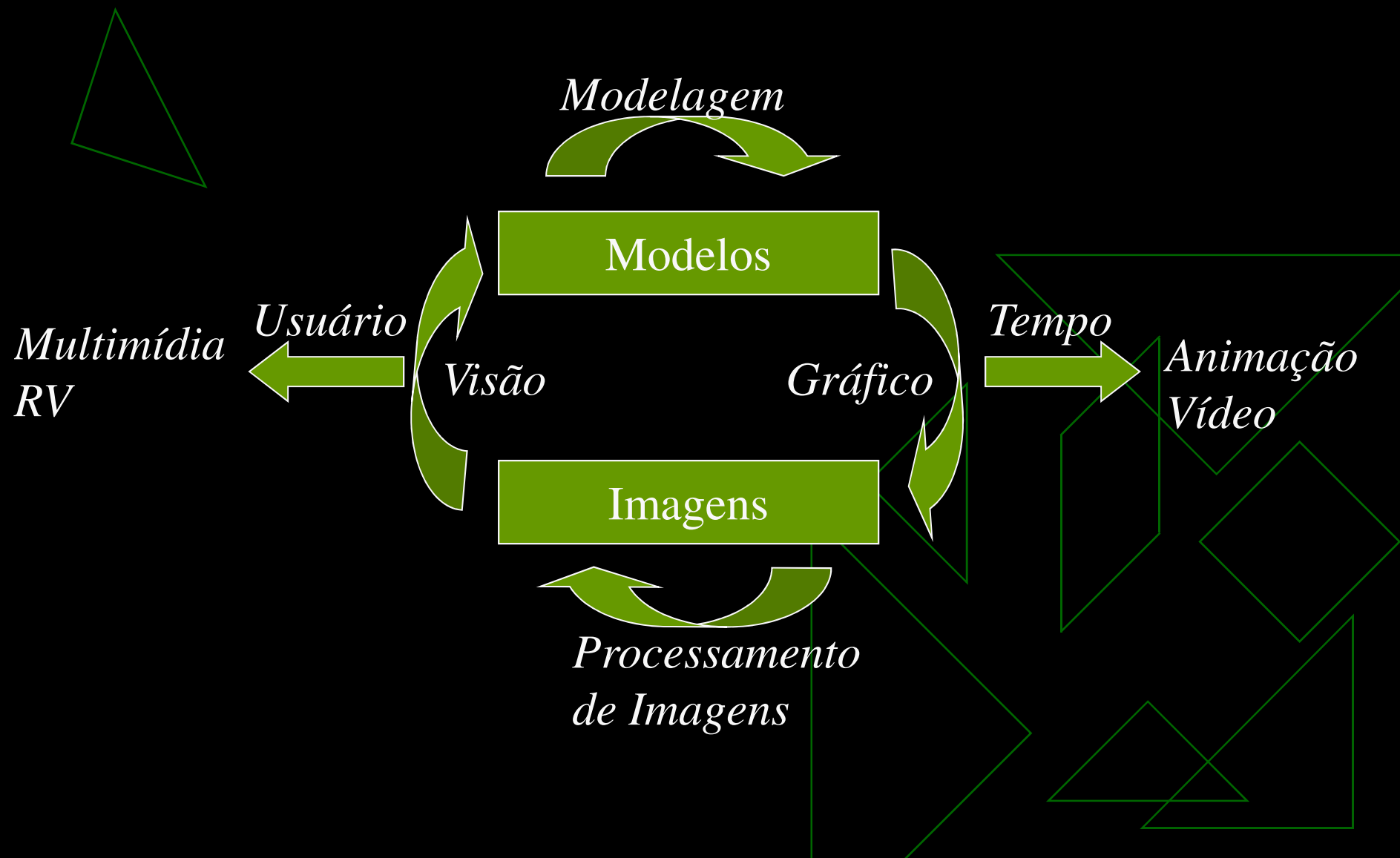


# *O que é CG??*



Soraia Raupp Musse

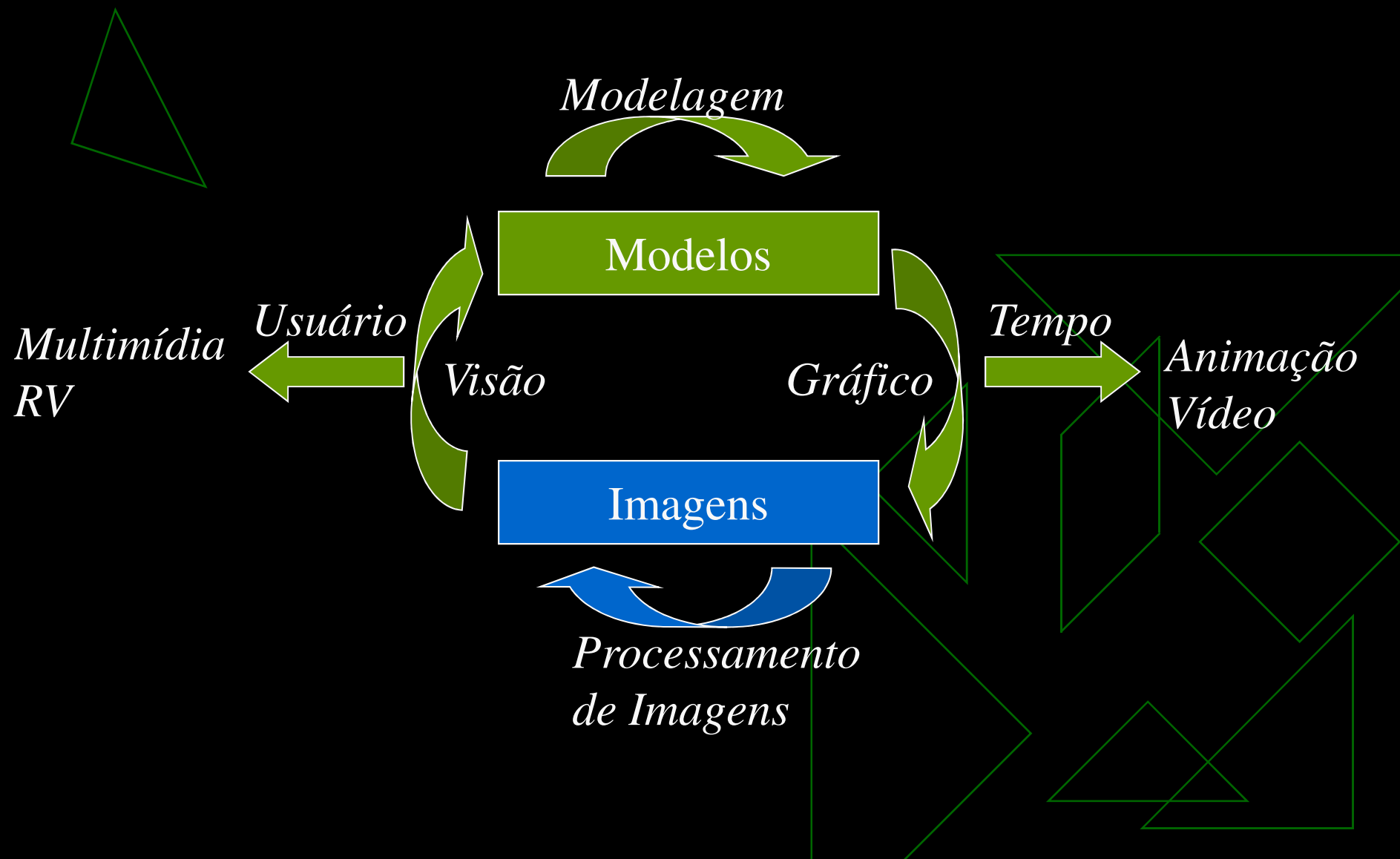
# Processamento Gráfico



*O que NÃO é CG??*



# Processamento de Imagens



# Restauração de Imagens



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

- **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

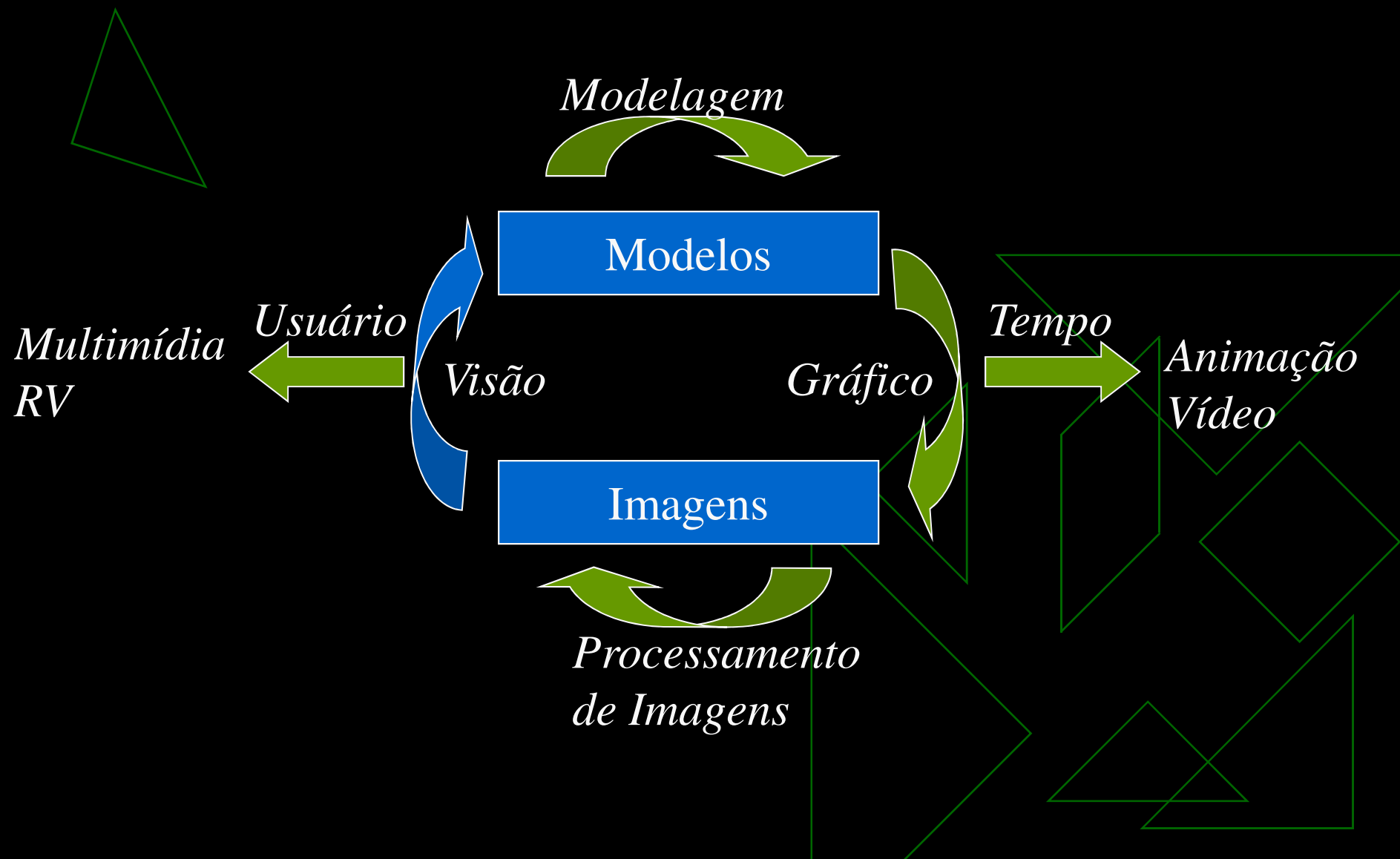


JPEG - 3 KB



JPEG - 2 KB

# Visão Computacional



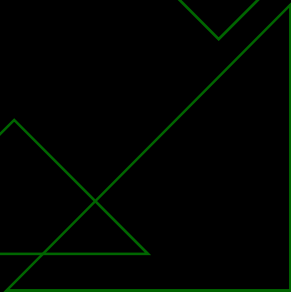
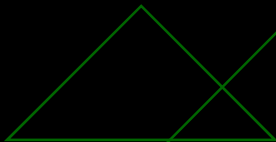
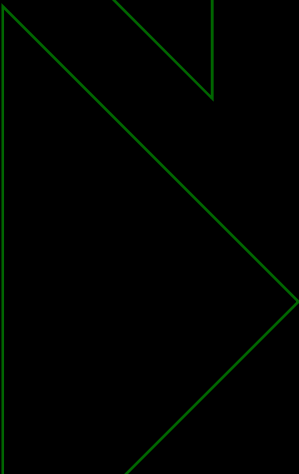
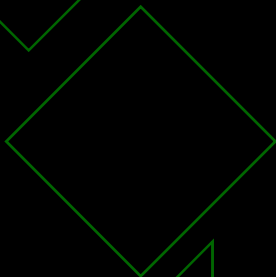
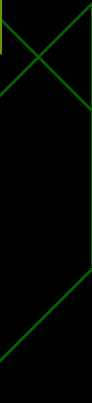
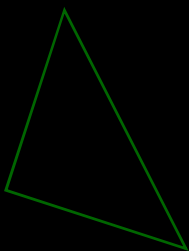


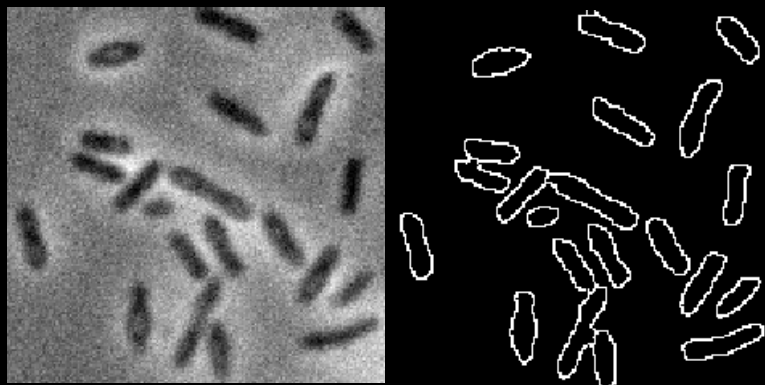
Image denoising and enhancement



Rectangle detection

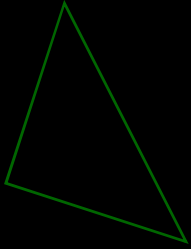


Image Segmentation



People tracking





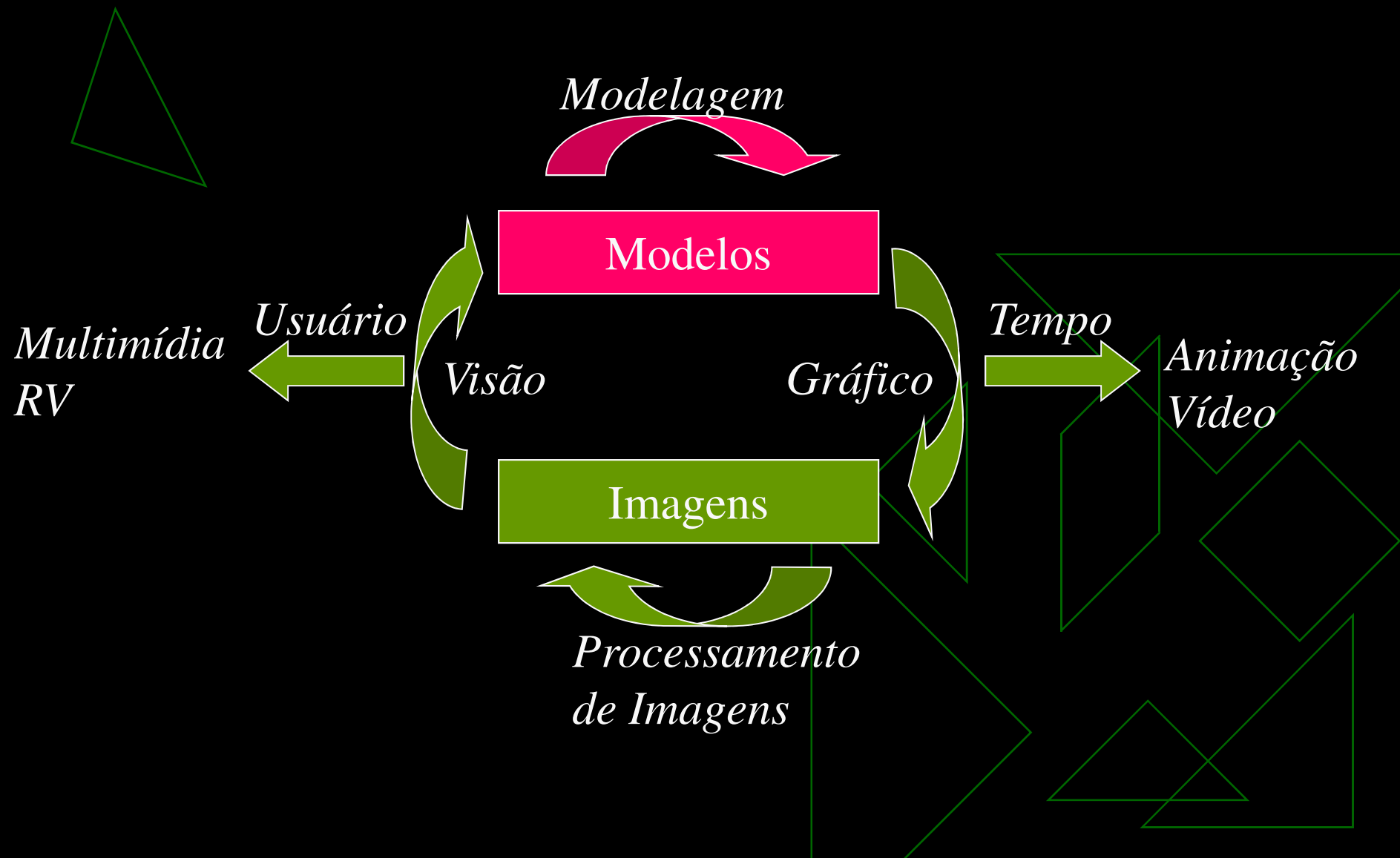
*Tá, então o que é CG??*



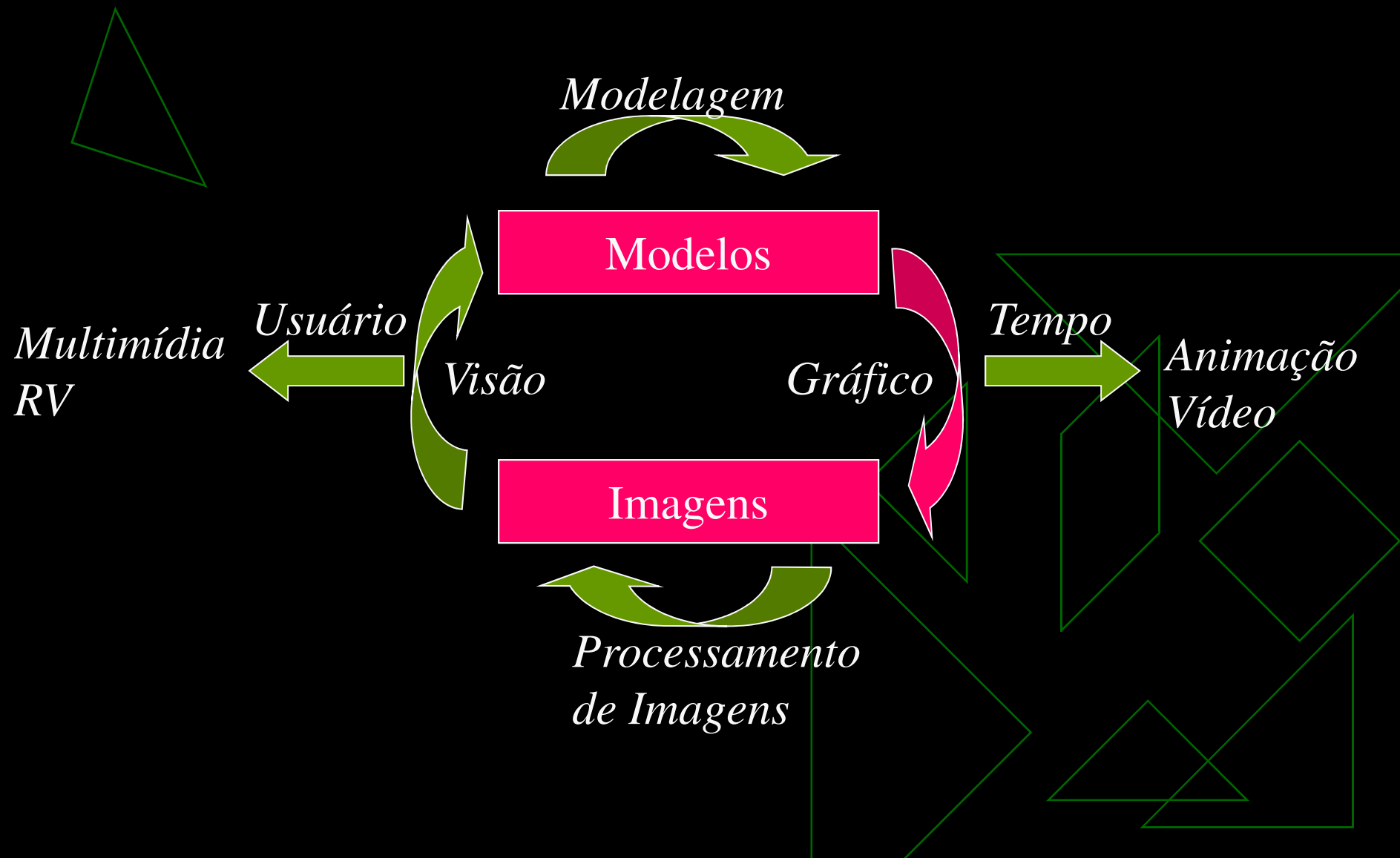
<http://www.youtube.com/watch?v=JtbDDqU3dVI>

<http://www.youtube.com/watch?v=joOVlx6VxBU&feature=fvwrel>

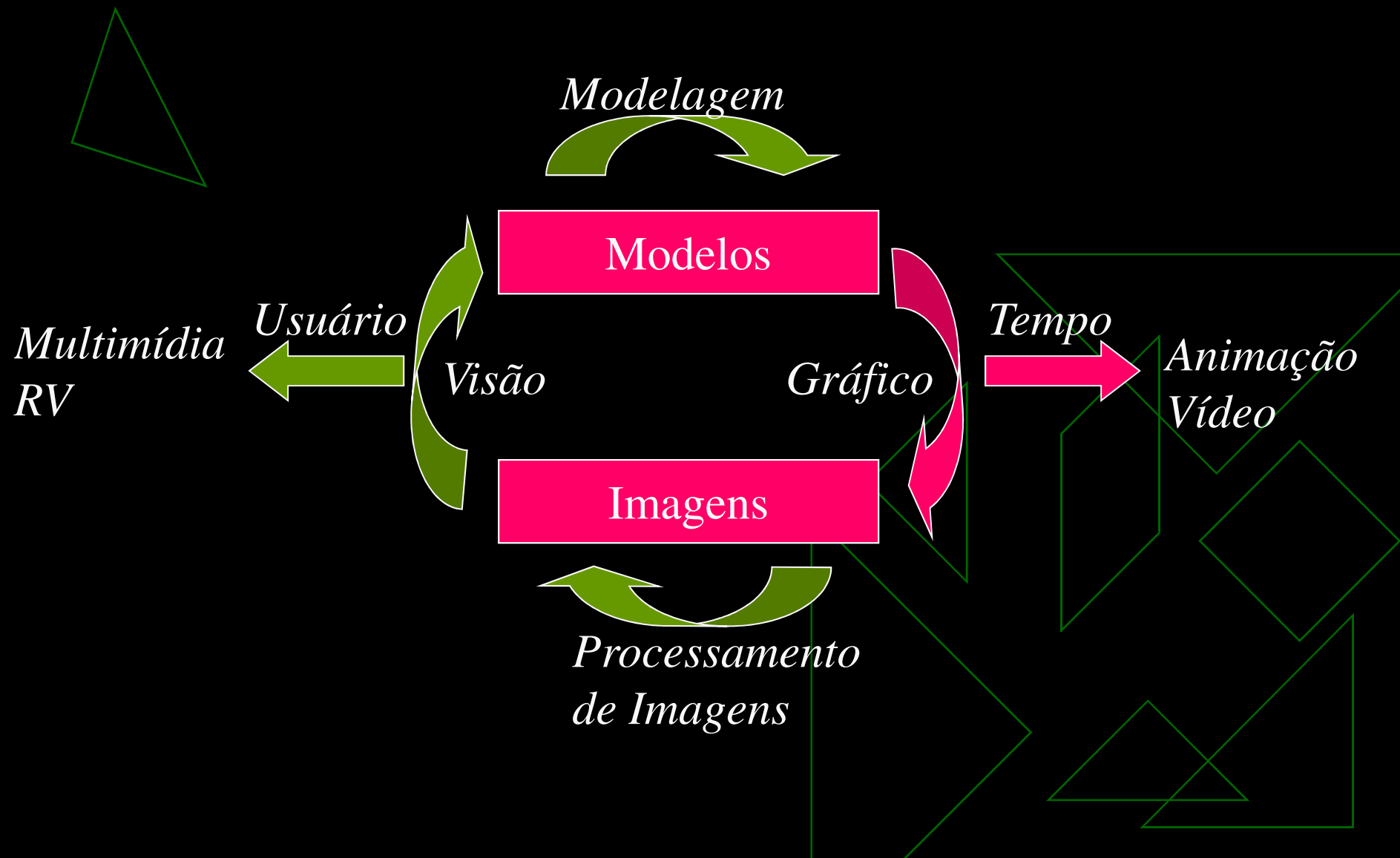
# Modelagem Geométrica



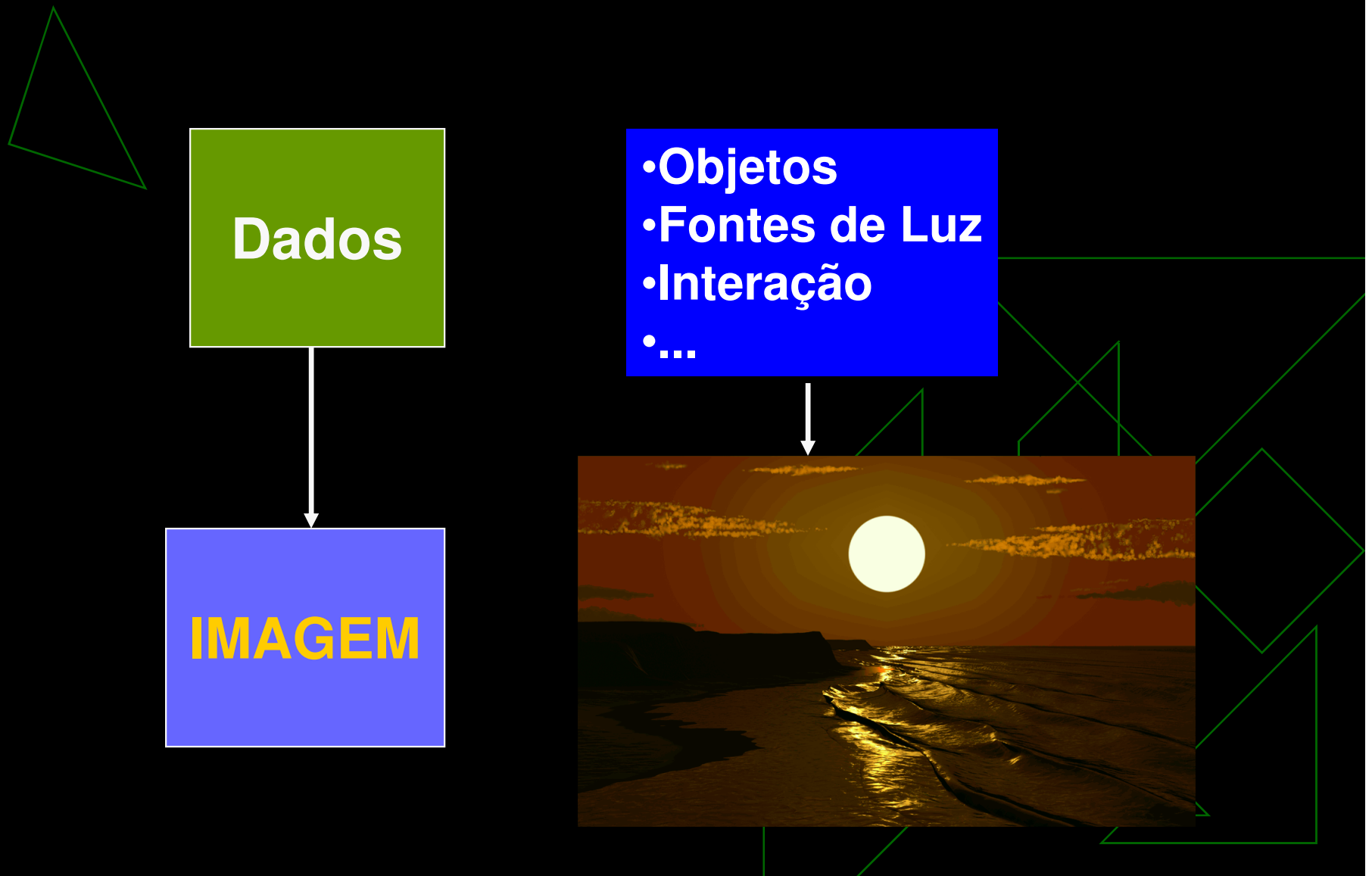
# Renderização



# Animação



# O que é Computação Gráfica?



# Temas da Computação Gráfica



Forma

Modelagem Geométrica

Aparência

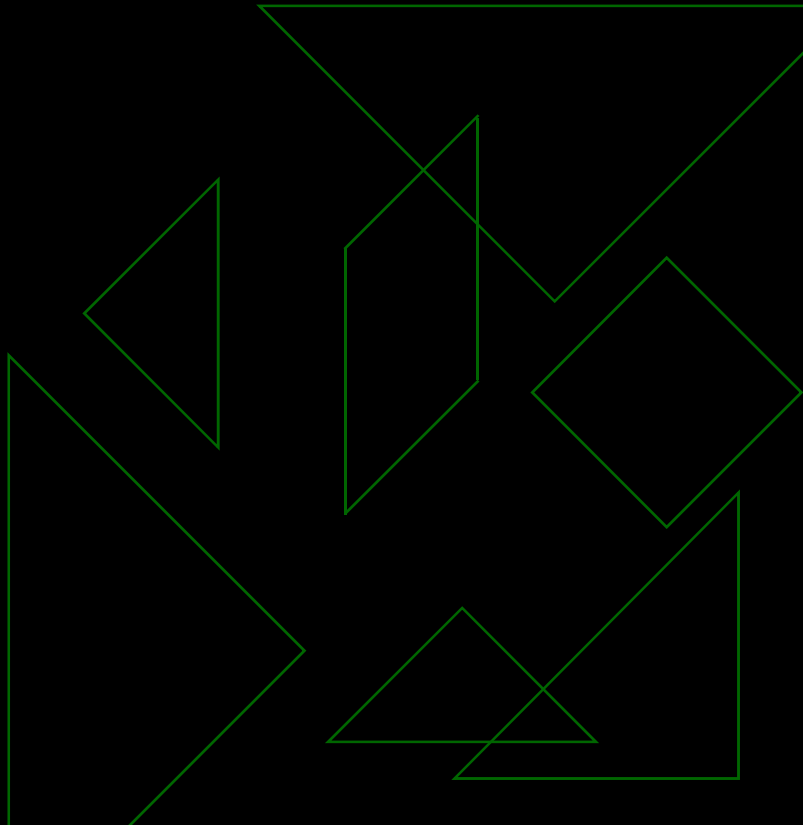
Renderização

Ação

Animação

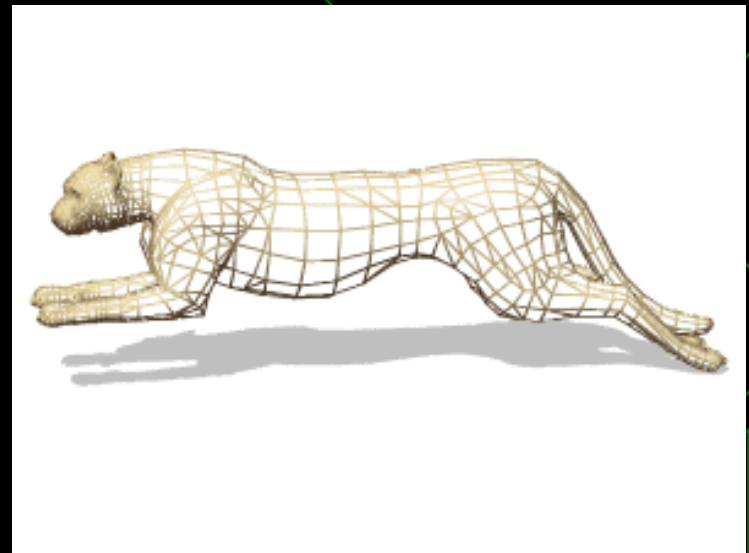
Interfaces

RV



# Modelagem Geométrica

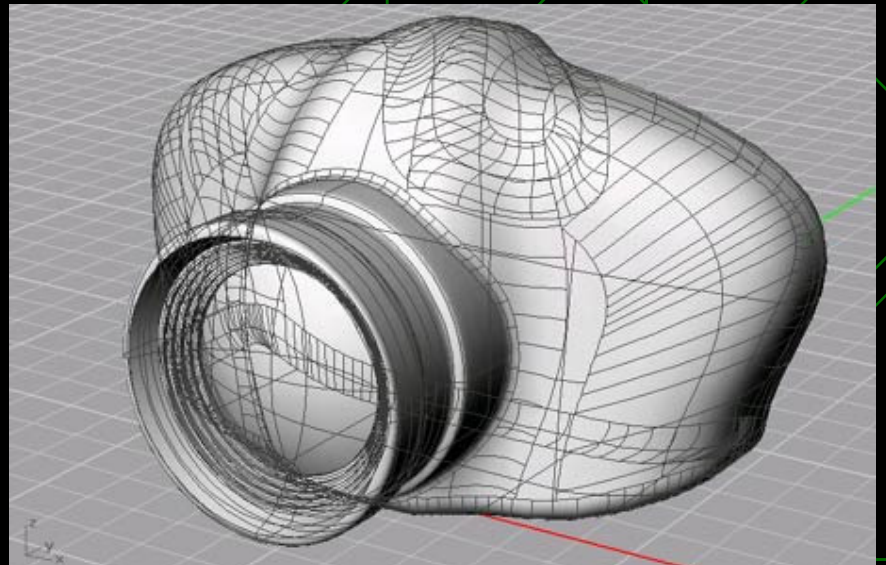
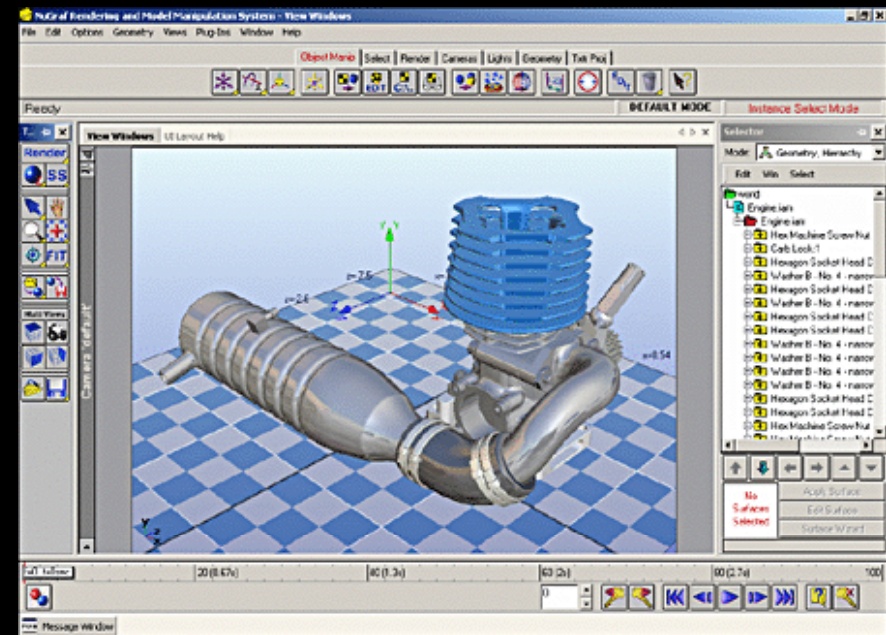
- ◆ Como criar/projetar/representar objetos
- ◆ Como representar coisas e ambientes complexos (um bicho de pelúcia é complexo?)



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?



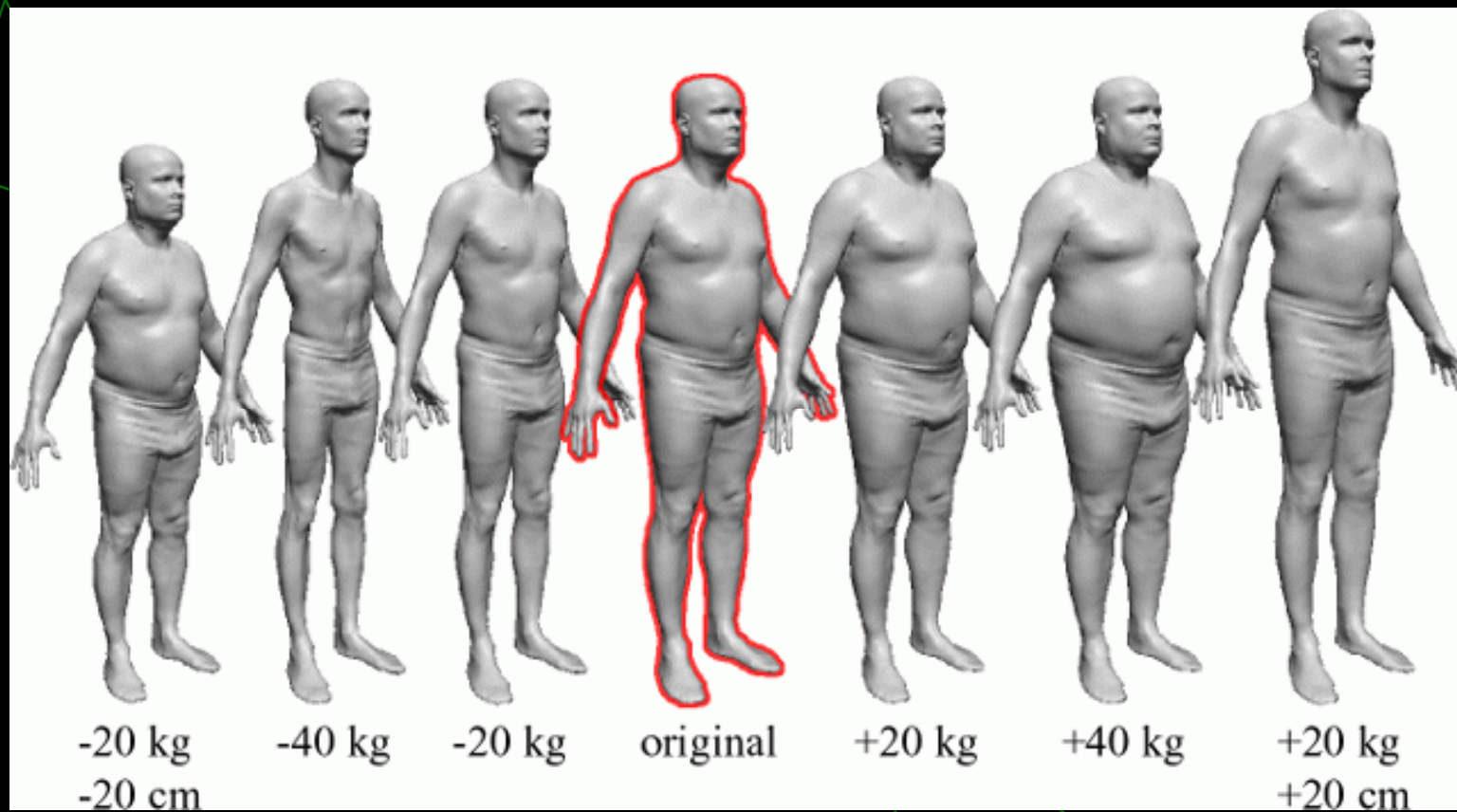
# Realismo da Forma

- ◆ Métodos Matemáticos
  - Polígonos
  - Curvas e Superfícies Paramétricas



3D Studio Max

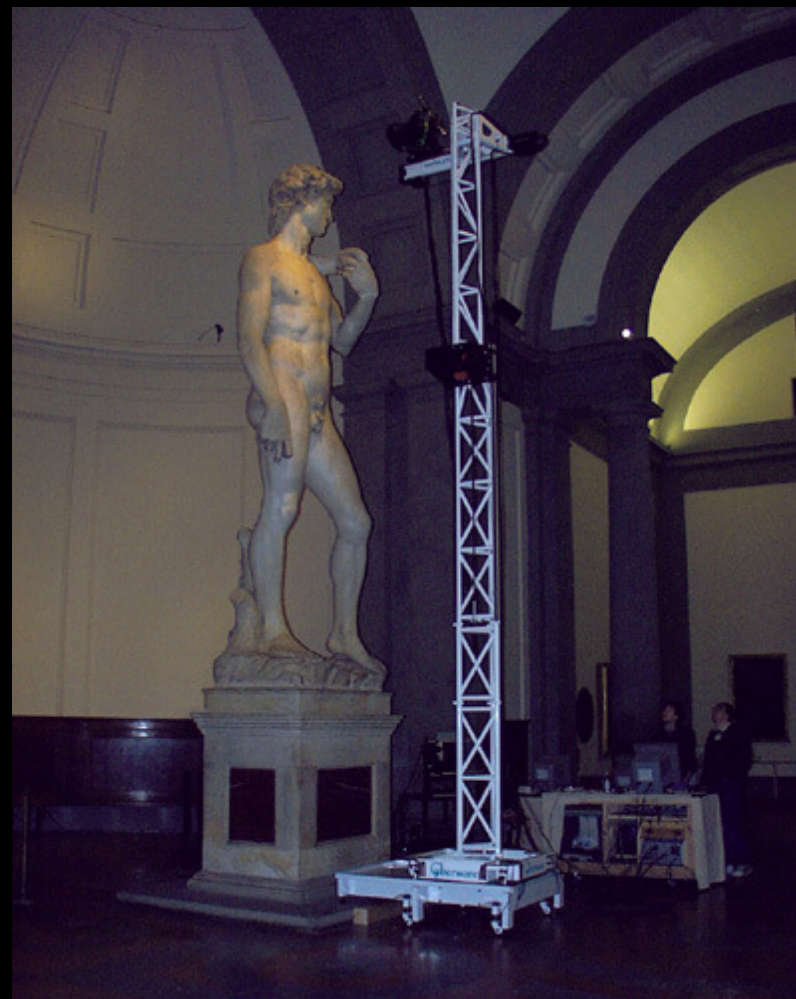
# Digitalização 3D



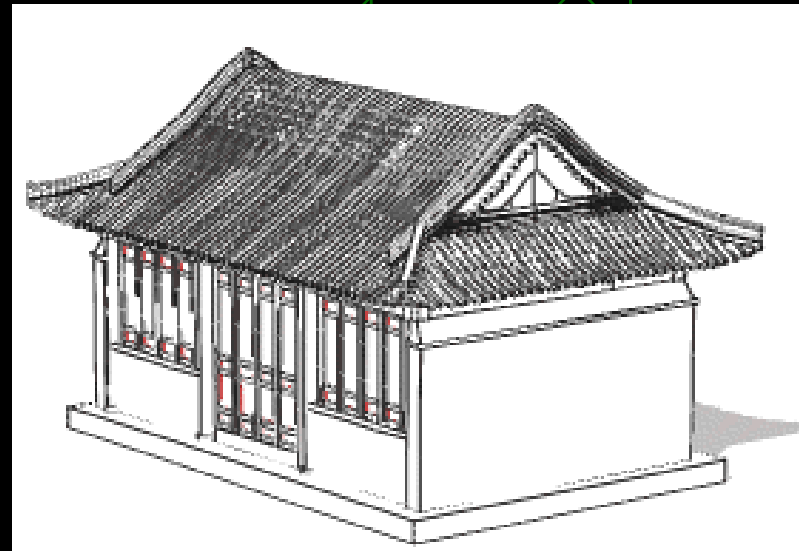
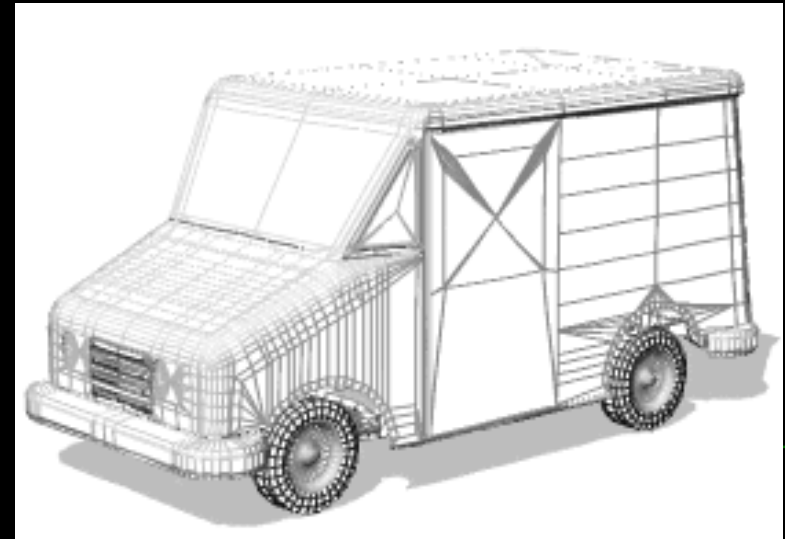
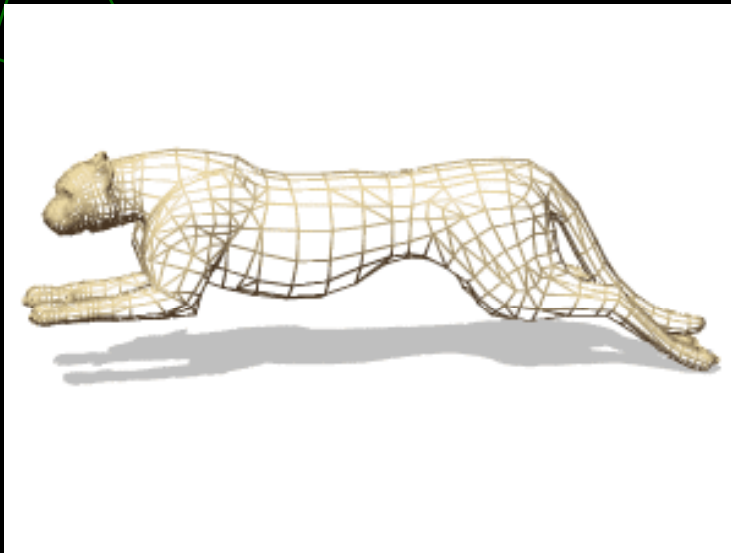
# Digitalização 3D



Porque digitalizar?



# Exemplos



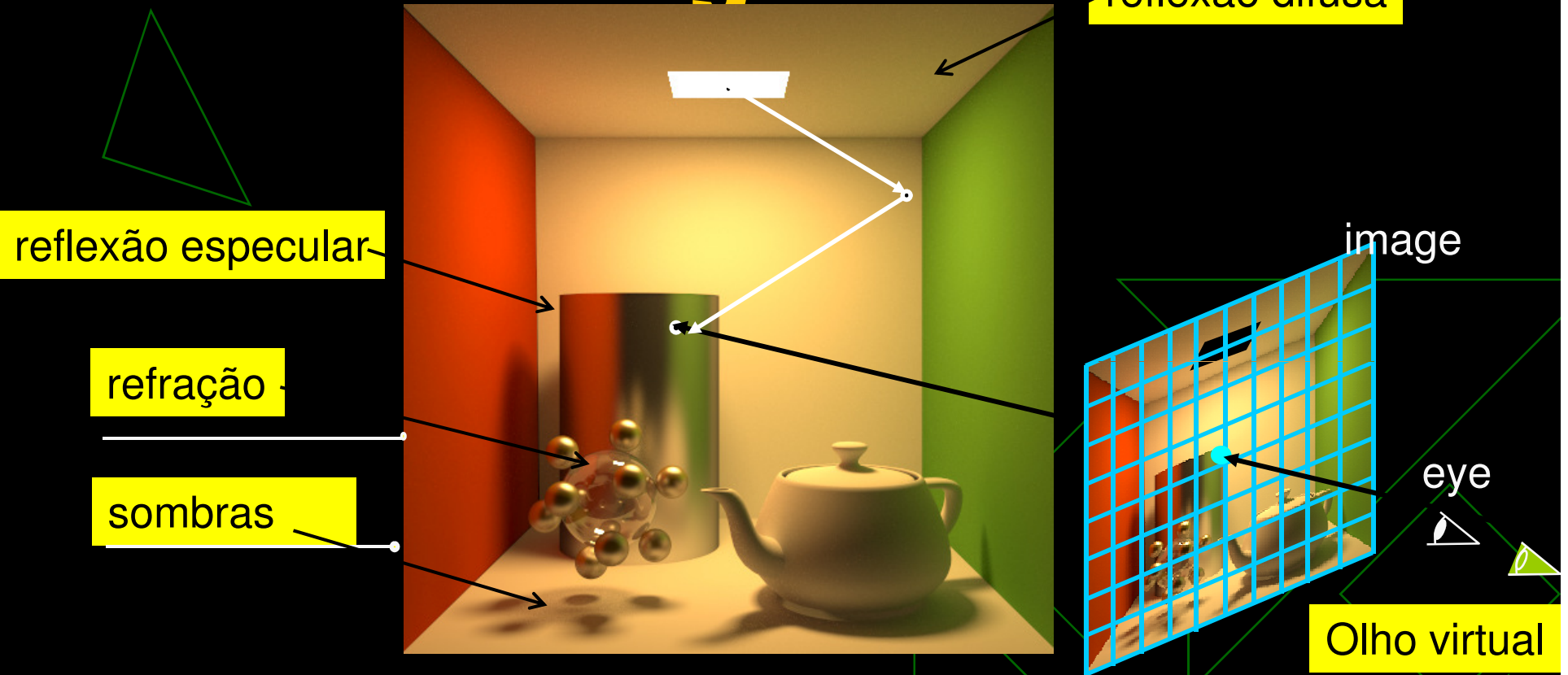
# Exemplos



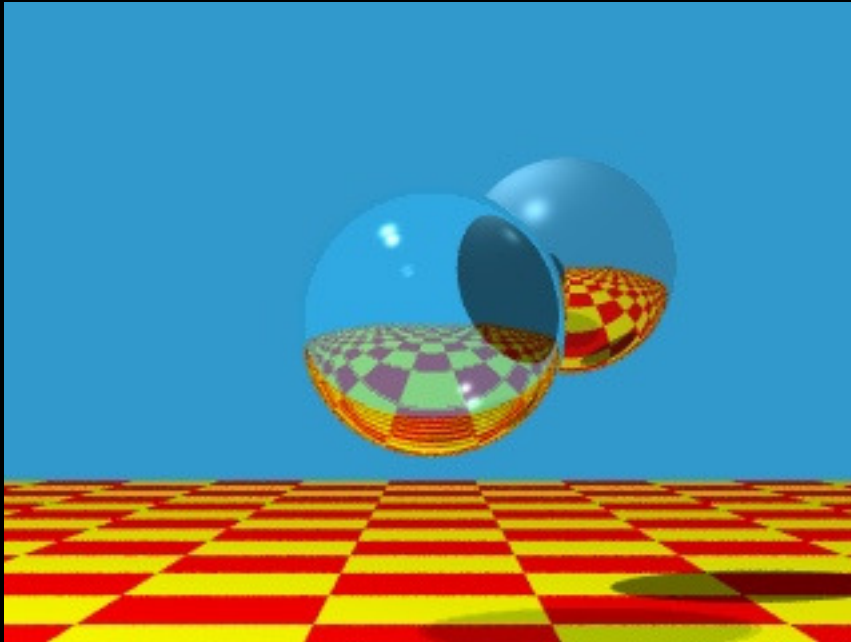
# Renderização

- ◆ 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!!

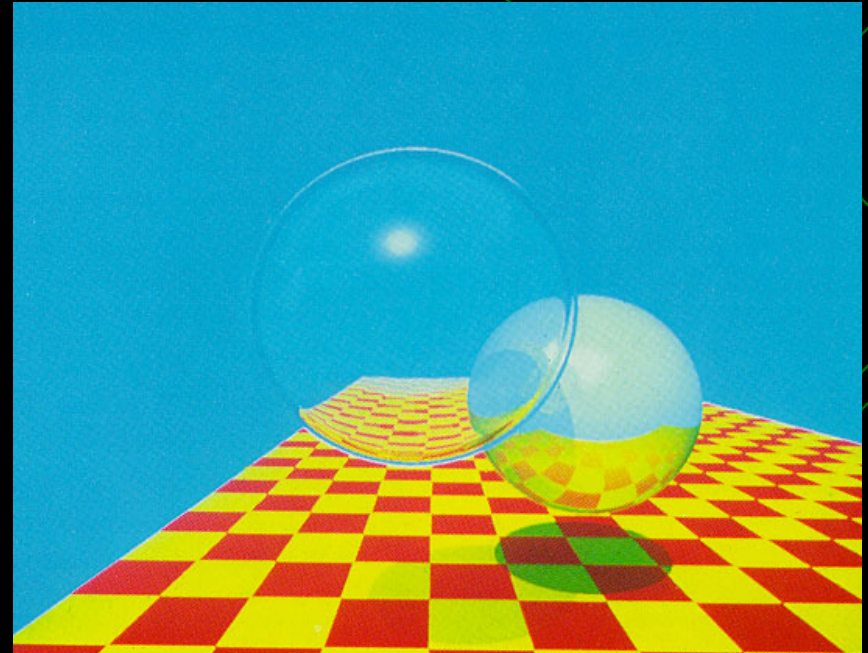
# Rendering



Principais fenômenos que podem acontecer na interação entre luz e objetos



**Década de 80...**



# Exemplo – *Ray Tracing*

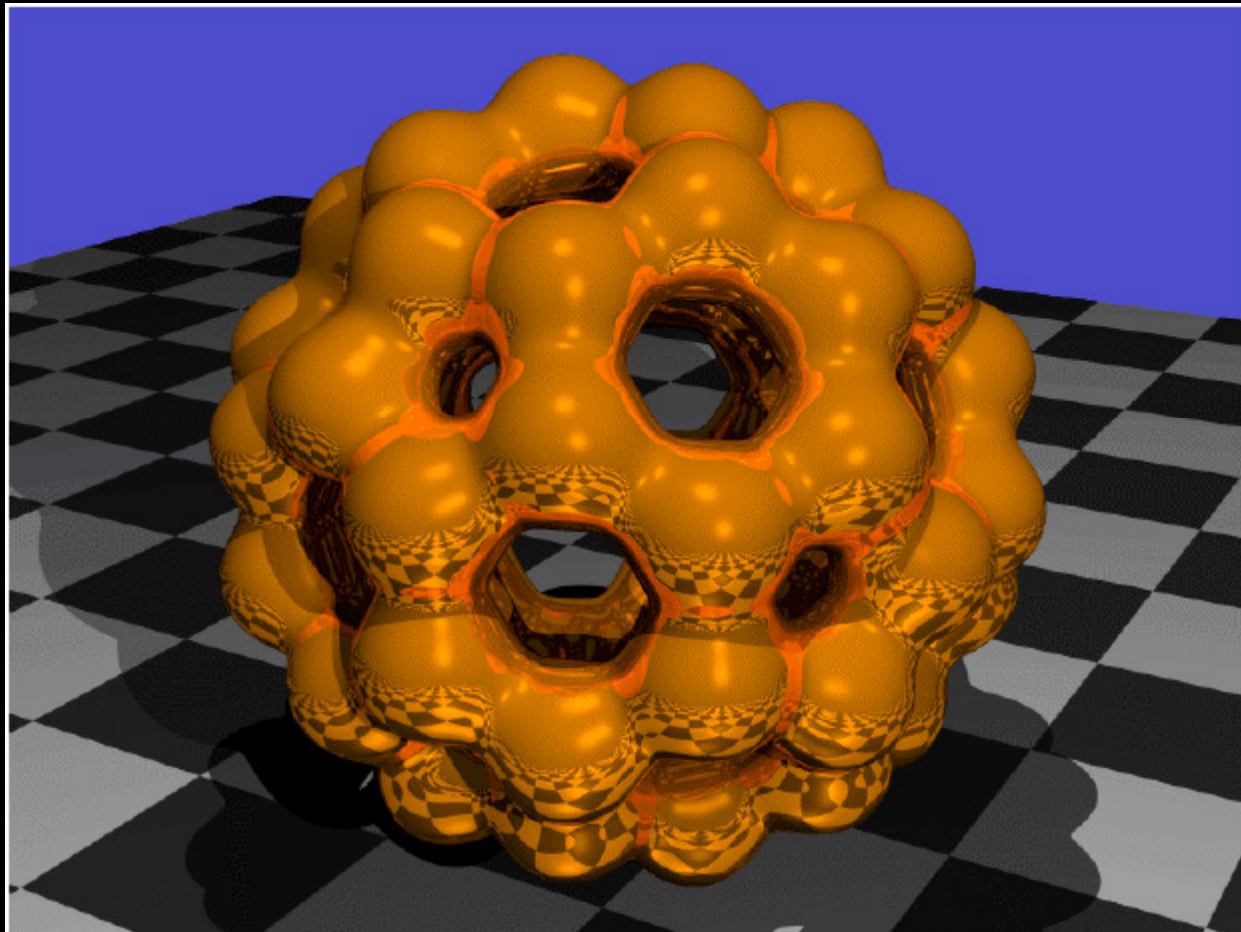


*Kirschner, Andre*

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?

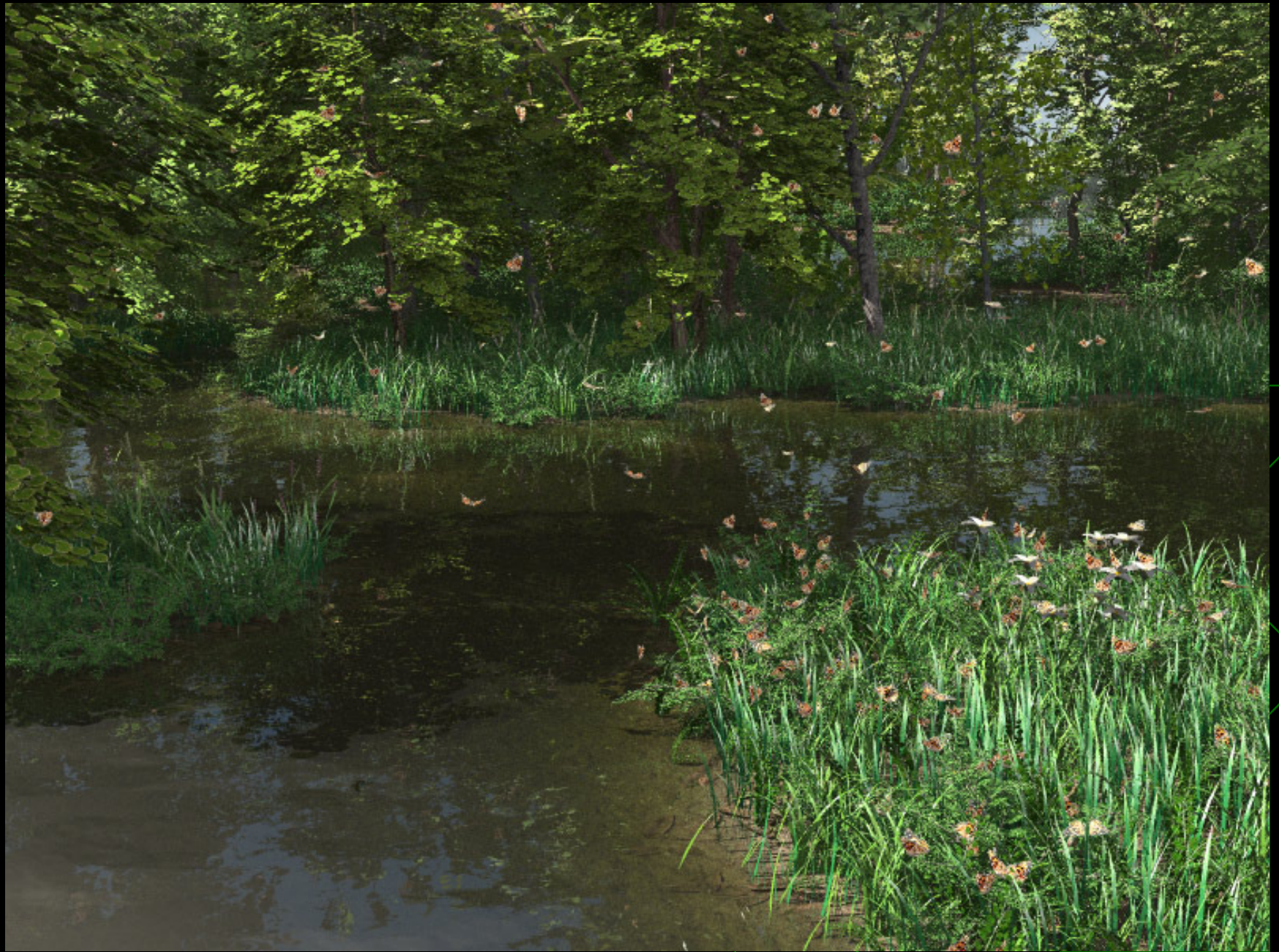


<http://area.autodesk.com/fakeorfoto/challenge>

# Real ou Computação Gráfica?







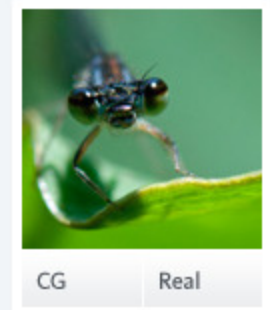
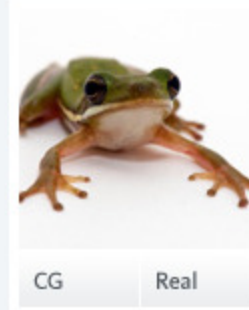
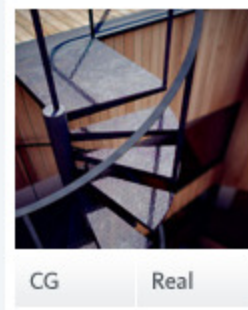
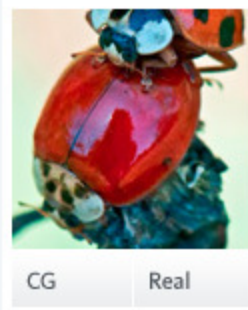
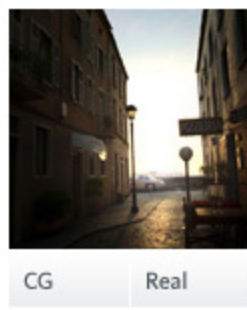
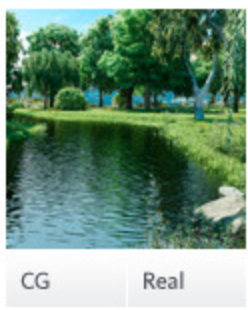
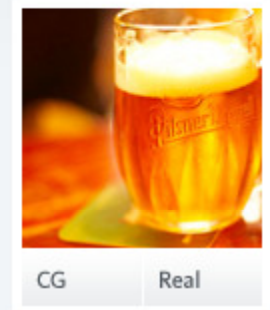
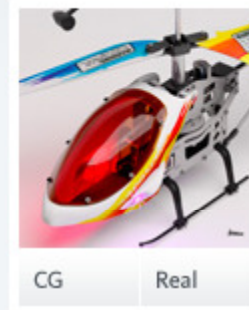
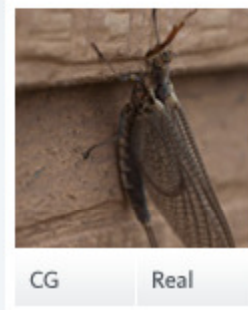
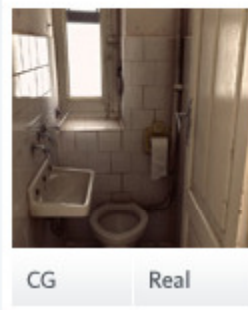
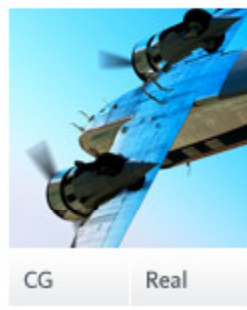
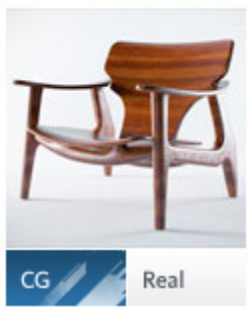
# Real ou Computação Gráfica?



Image courtesy of Glenn Melenhorst/Zephyr Animation

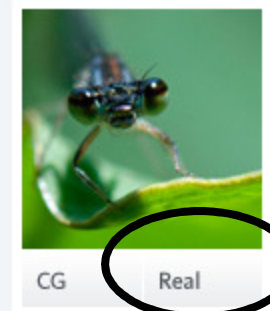
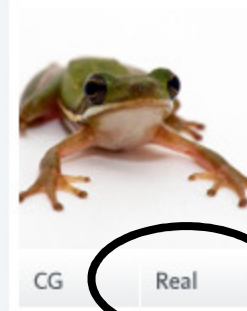
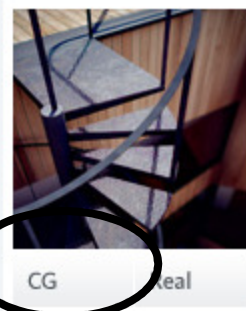
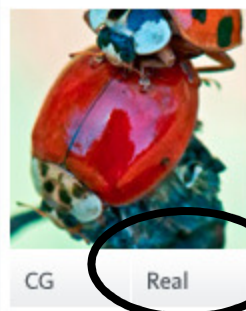
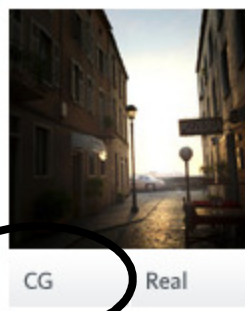
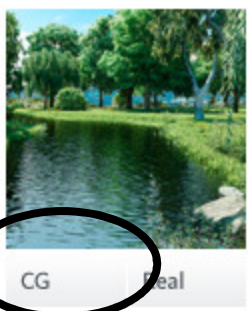
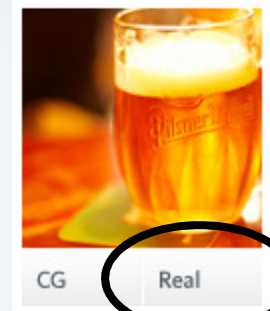
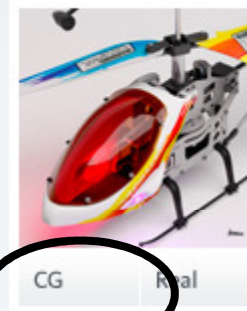
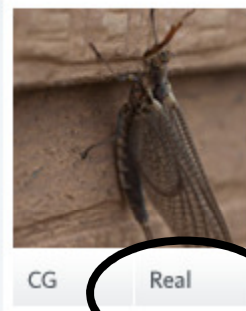
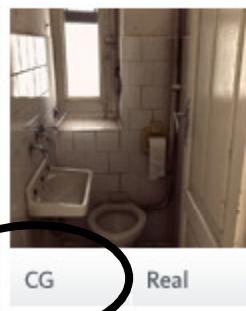
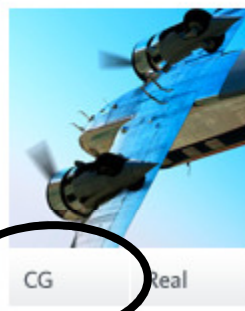
# Photo or CG

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

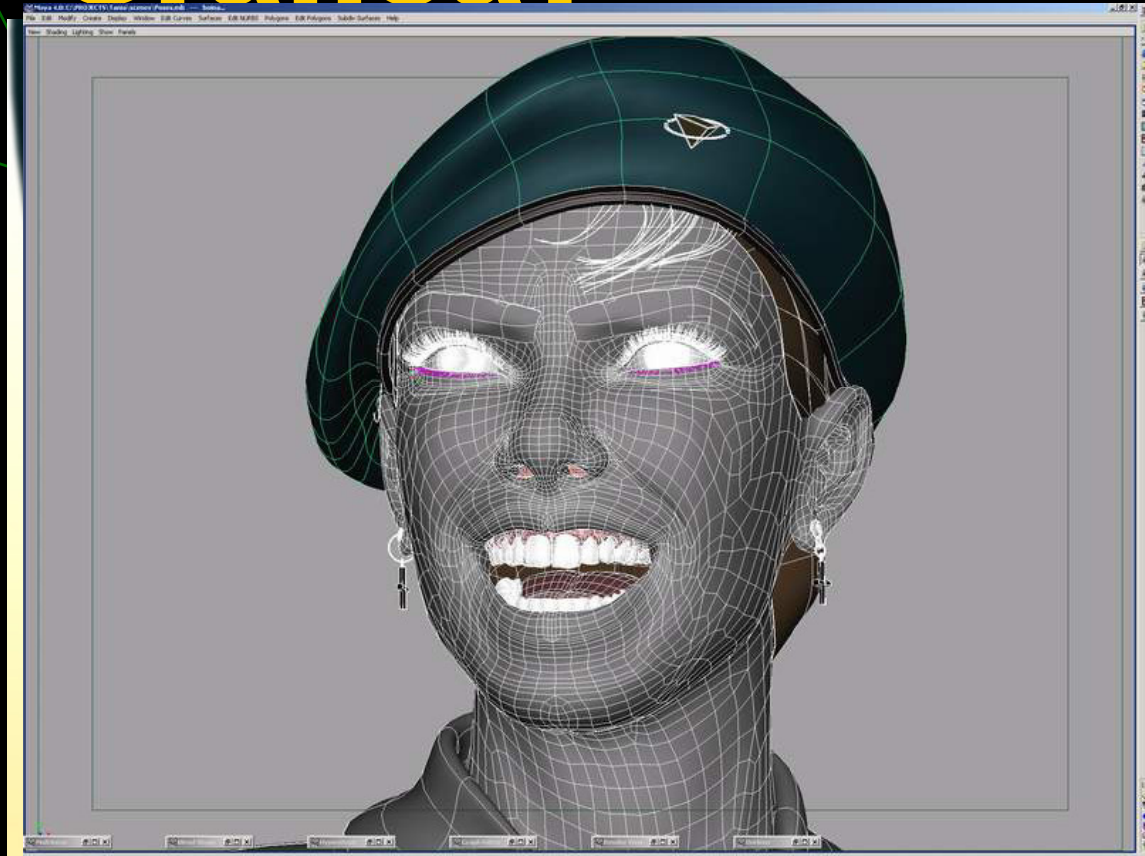


# Photo or CG

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

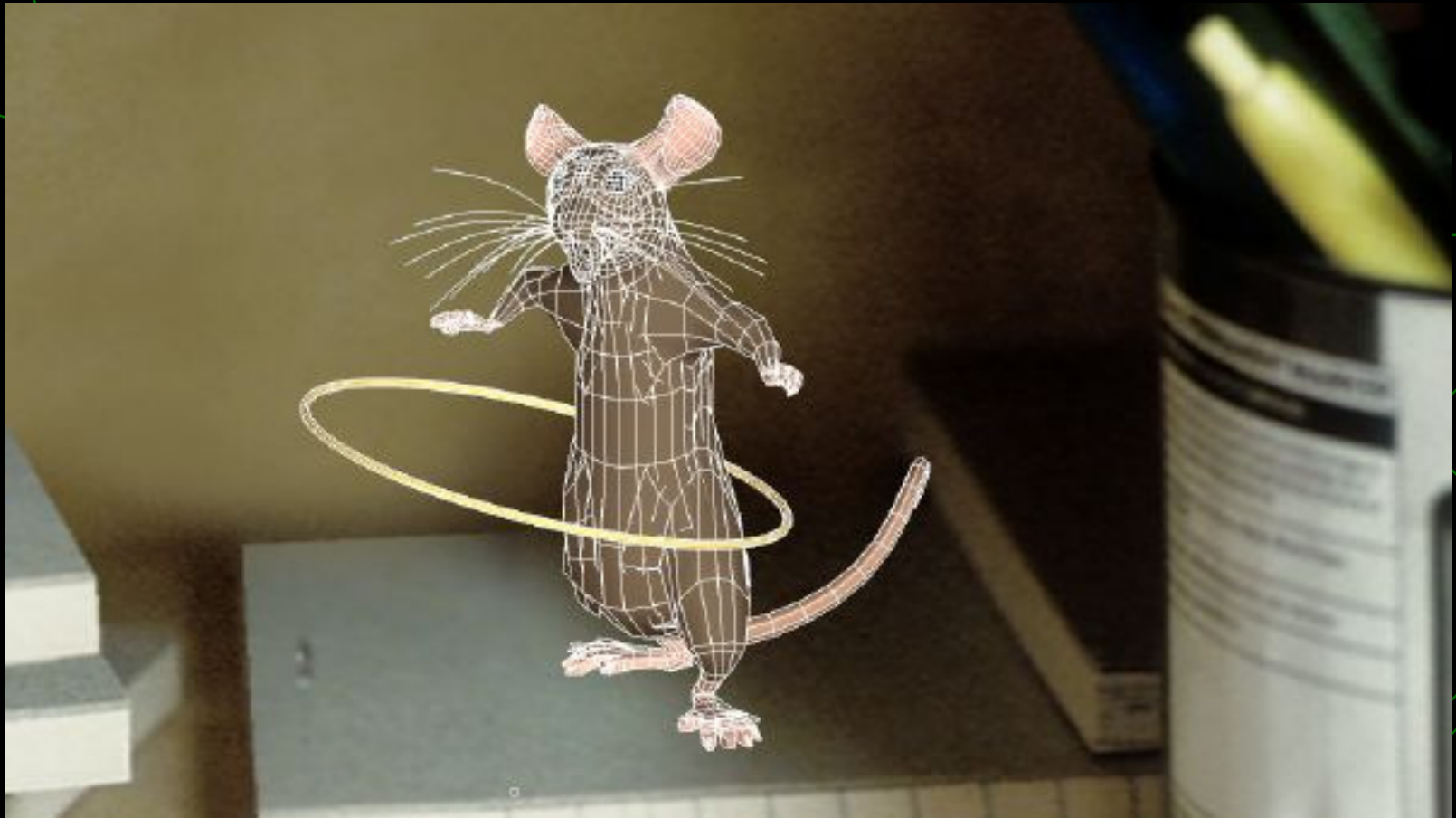


# Real ou Computação Gráfica?



Alceu Baptista  
Vetor Zero

# Detalhes



# Realismo Aparência



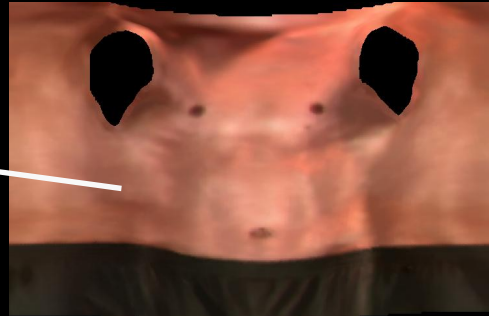
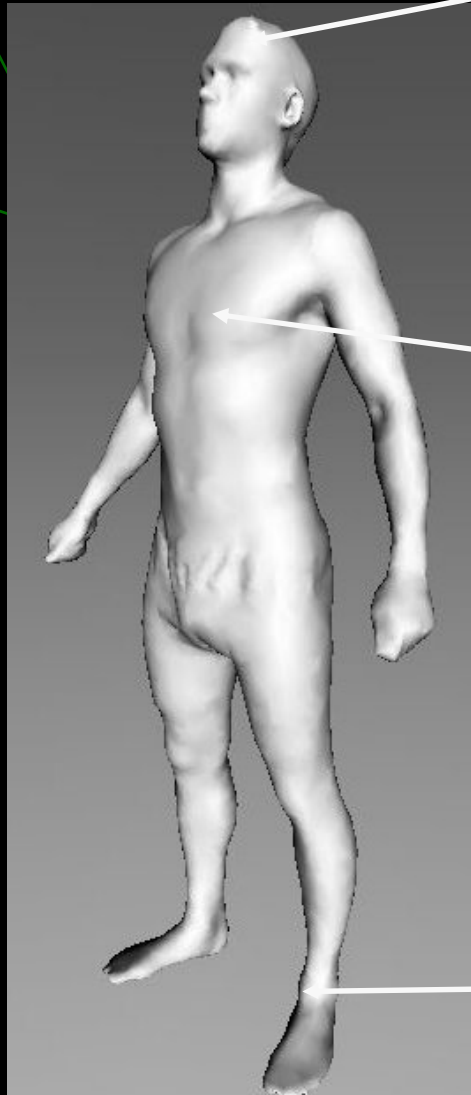
# Realismo Aparência

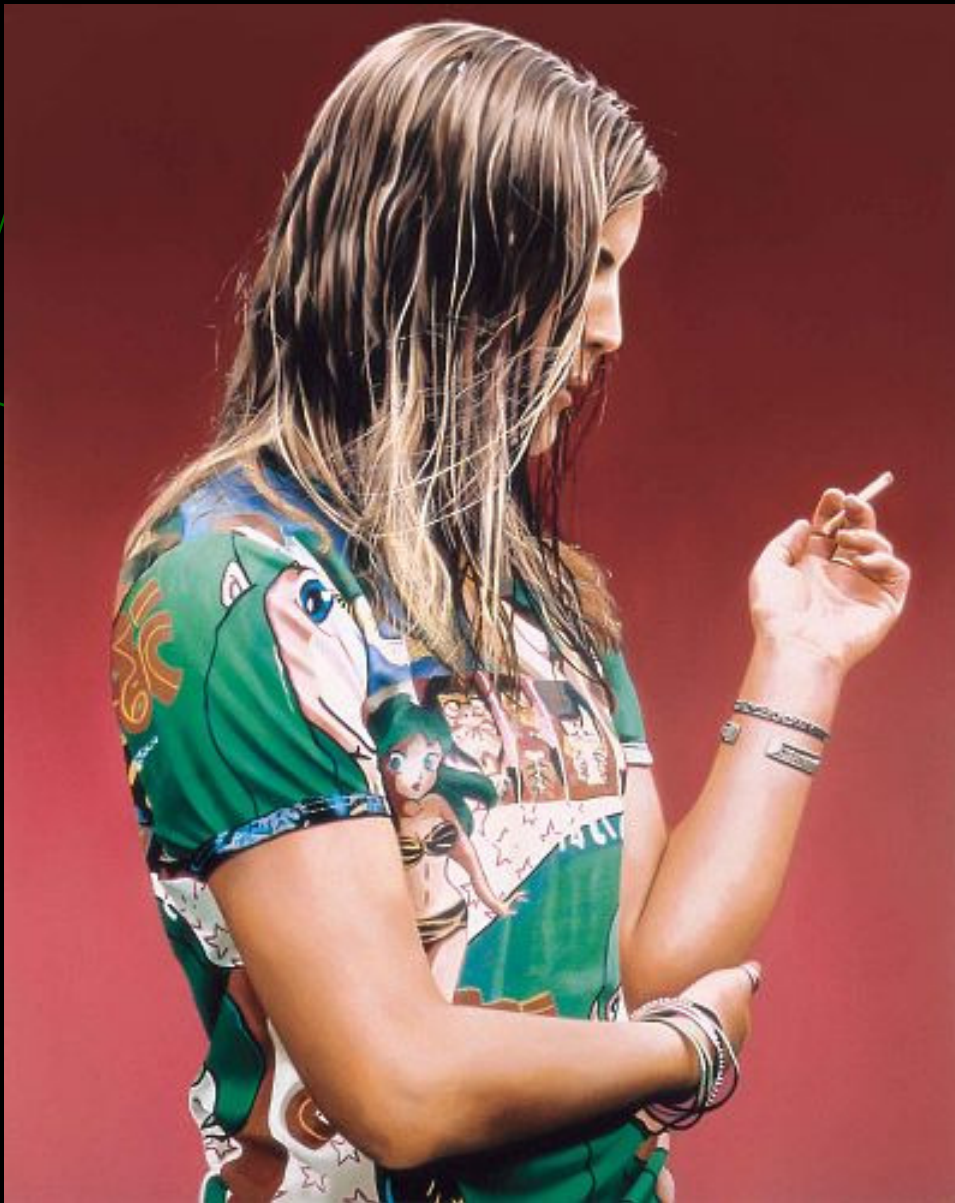


# Realismo Aparência



# 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



**SHREK 2 - Microsoft Internet Explorer**

## 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*

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

**CLOSE**

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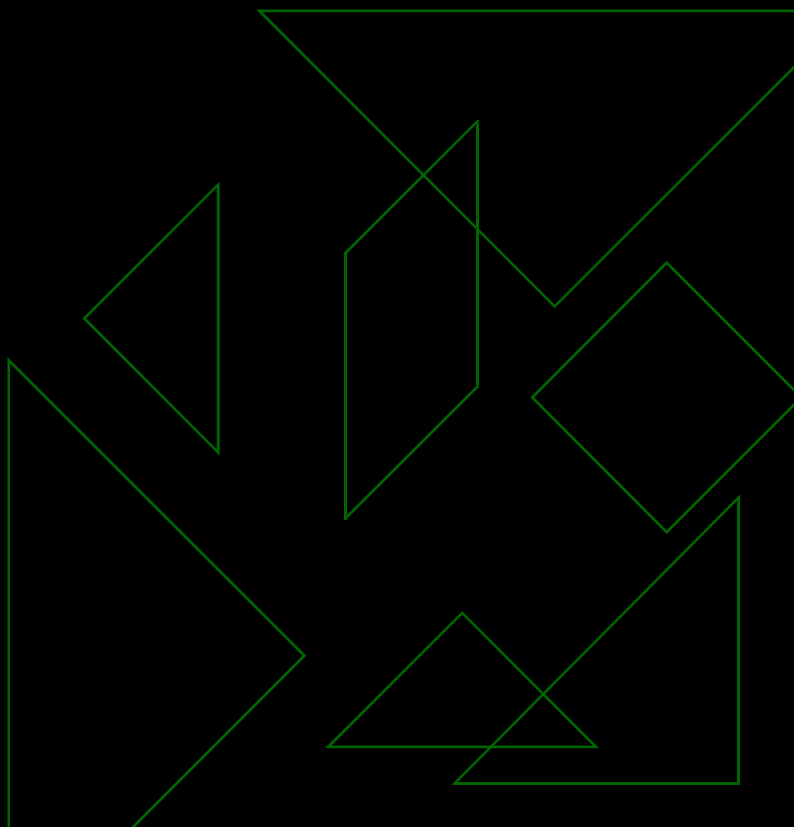
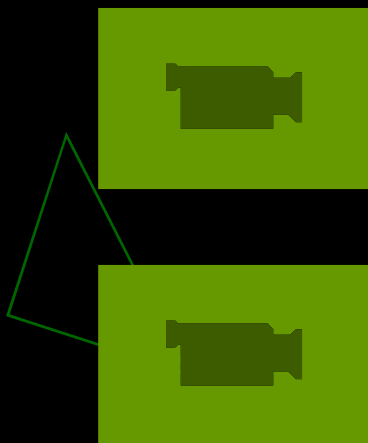
ENTER SITE

WATCH TRAILERS



"Like nothing Pixar, or anyone else, has ever done before."

Leonard Maltin, ENTERTAINMENT TONIGHT



# 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

[http://www.youtube.com/watch?v= ET6Pq  
ZtYd4](http://www.youtube.com/watch?v=ET6PqZtYd4)

