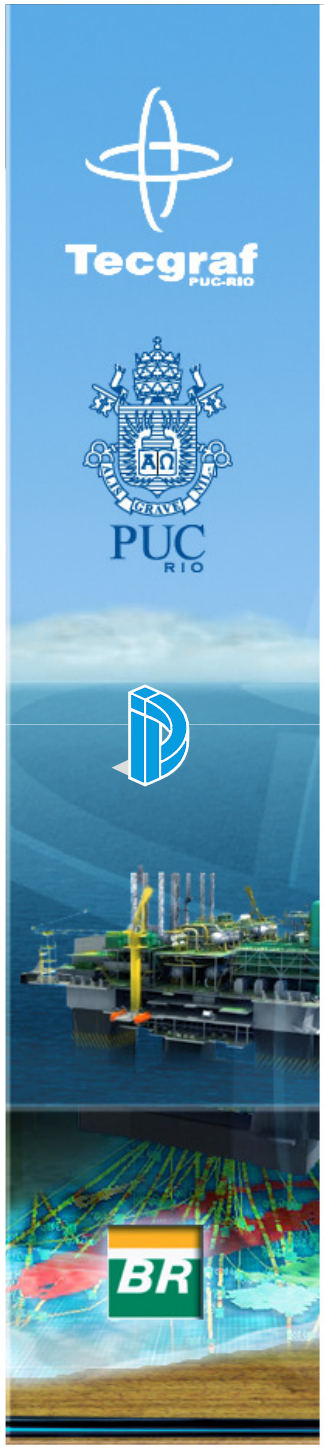
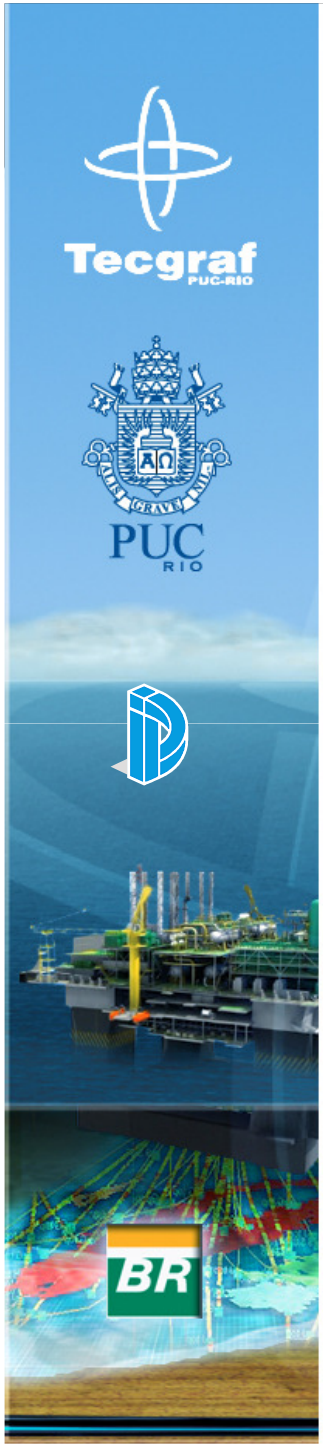


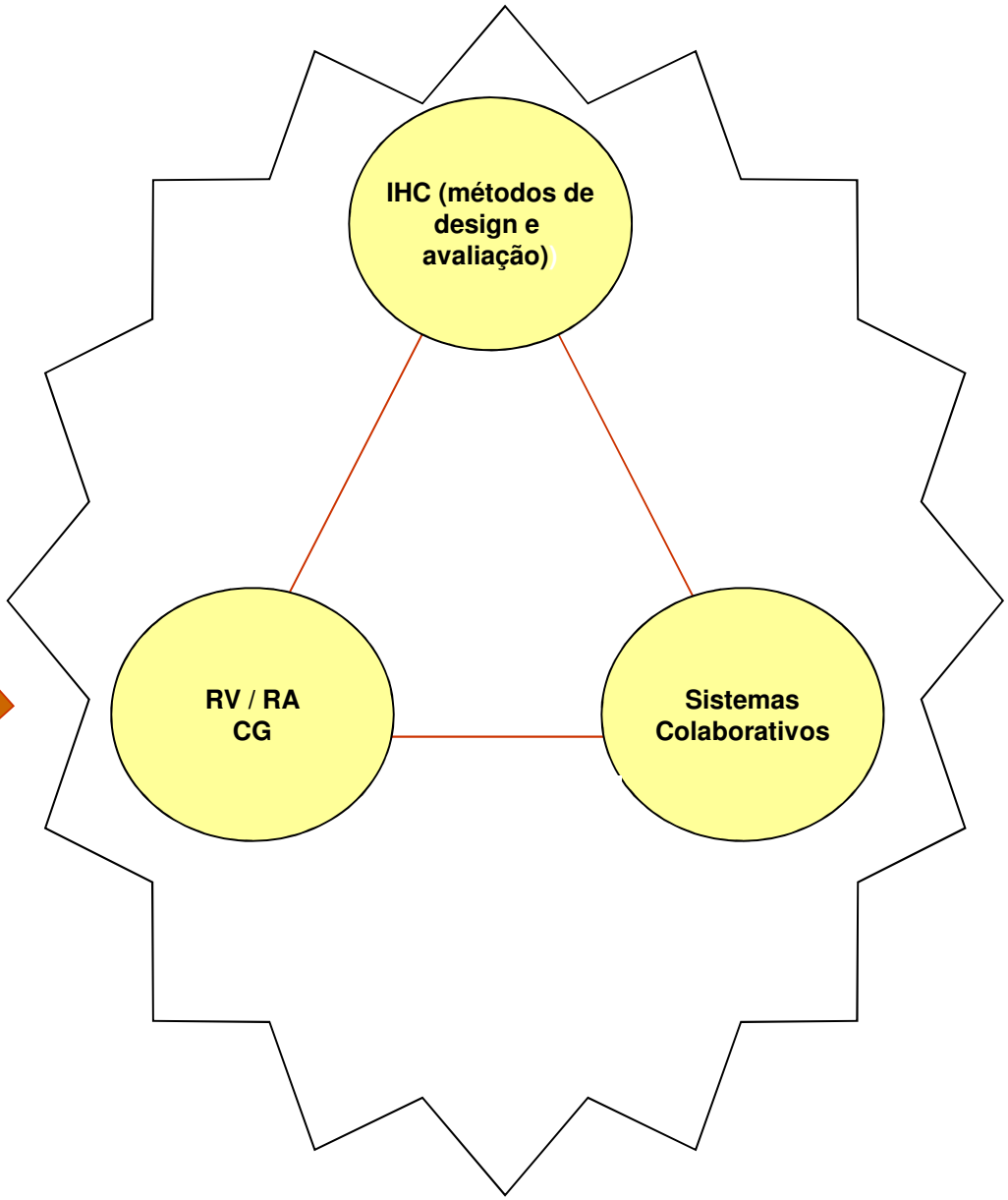
Alberto Raposo

Departamento de Informática,
Pontifícia Universidade Católica do Rio de Janeiro

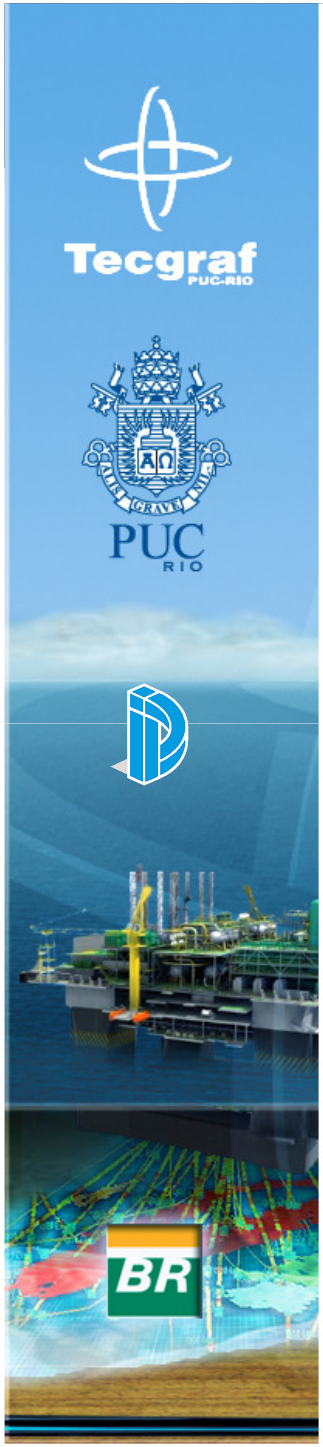
http://www.inf.puc-rio.br/~abraposo
abraposo@inf.puc-rio.br

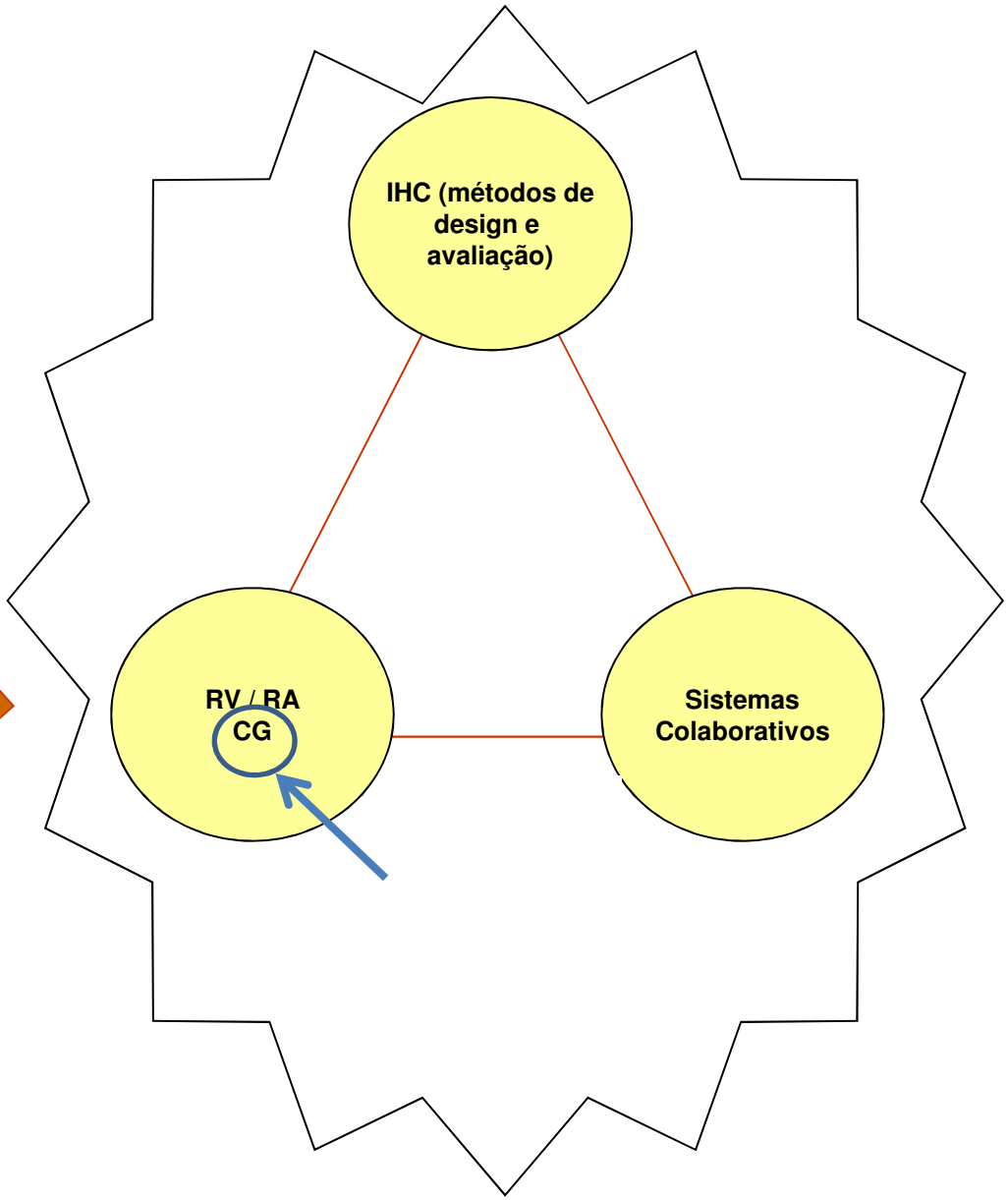
Sala 417 - RDC



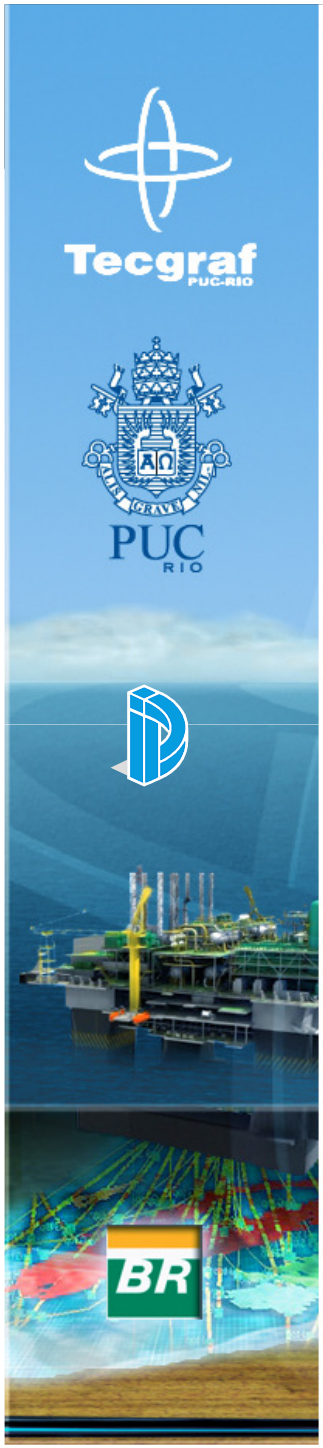


Engenharia, Geociências => Oil & Gas





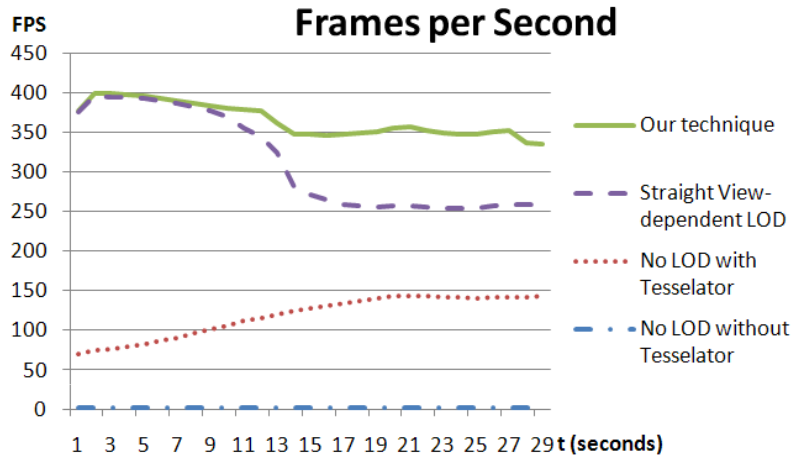
Engenharia, Geociências => Oil & Gas



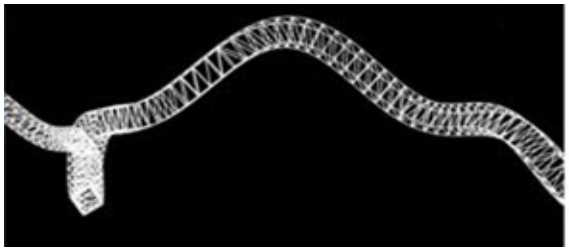
Dissertação Gustavo Bastos (Ago/2011)

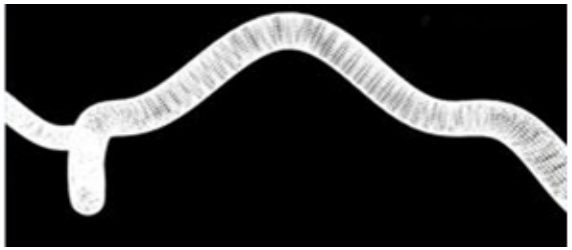
- **Uso do novo pipeline gráfico (DirectX 11)**
- **Renderização de modelos com mais desempenho e melhor qualidade**
- **Exemplos:**
  - **Terrenos**

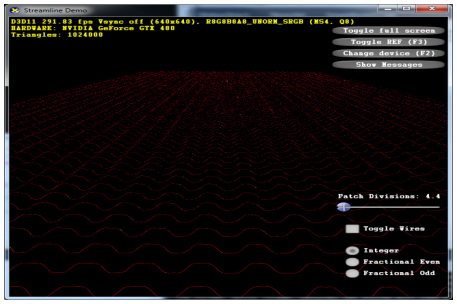
2010-07-14 Terrain LOD w Grad Map.wmv

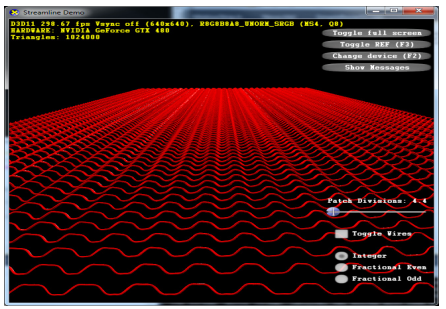


- **Tubos**









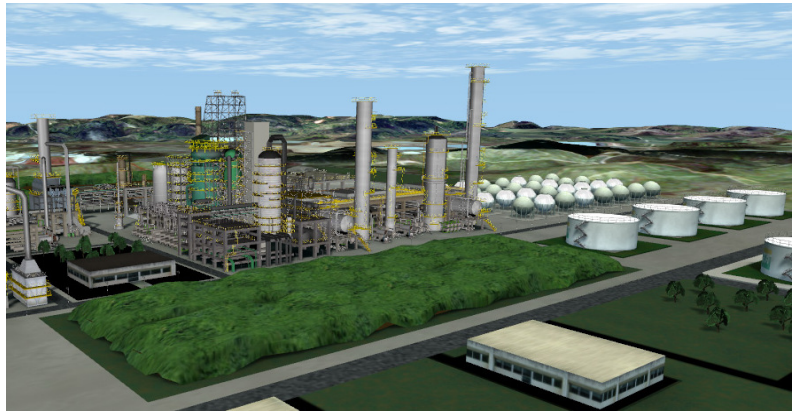
Video_Streamline_paper.wmv

NVIDIA Academic Partner

VALDETARO, A., NUNES, G., RAPOSO, A., FEIJÓ, B., de TOLEDO, R. LOD terrain rendering by local parallel processing on GPU. SBGames 2010 IX Simpósio Brasileiro de Jogos e Entretenimento Digital, p. 169-176.

ENVIRON: Modelos Massivos de Engenharia

INF 2063 – Tópicos em CG II

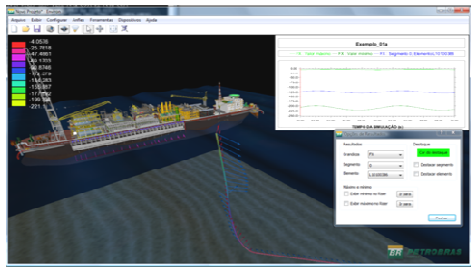


Desafio: modelos muito grandes – de 1 milhão a 1 bilhão de triângulos

"Naïve rendering" não é rápido o suficiente

Principais Recursos do ENVIRON

- Visualização em Tempo Real de Modelos Massivos de Engenharia
  - Otimizações
    - Capacidade de visualização de modelos cada vez maiores
  - Interoperabilidade
    - Facilidade para conversão CAD ↔ RV
    - Visualização de informações dos BD do CAD/CAE

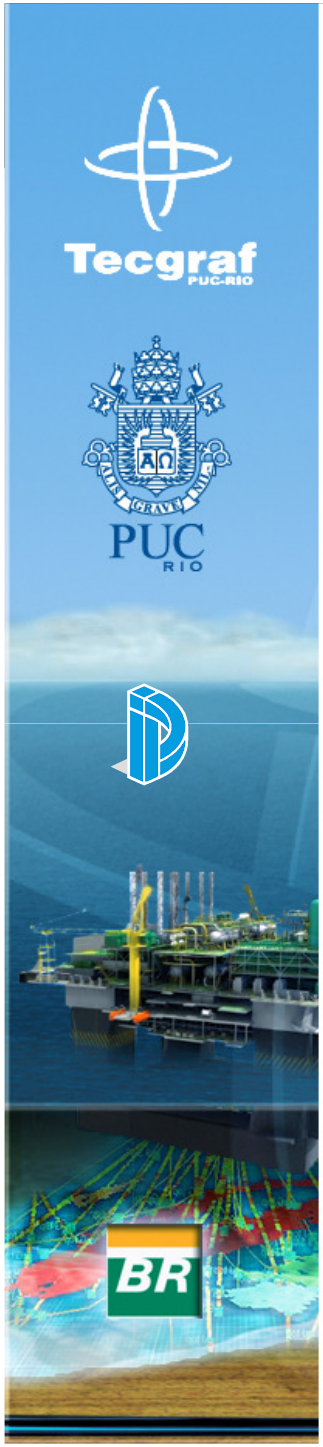


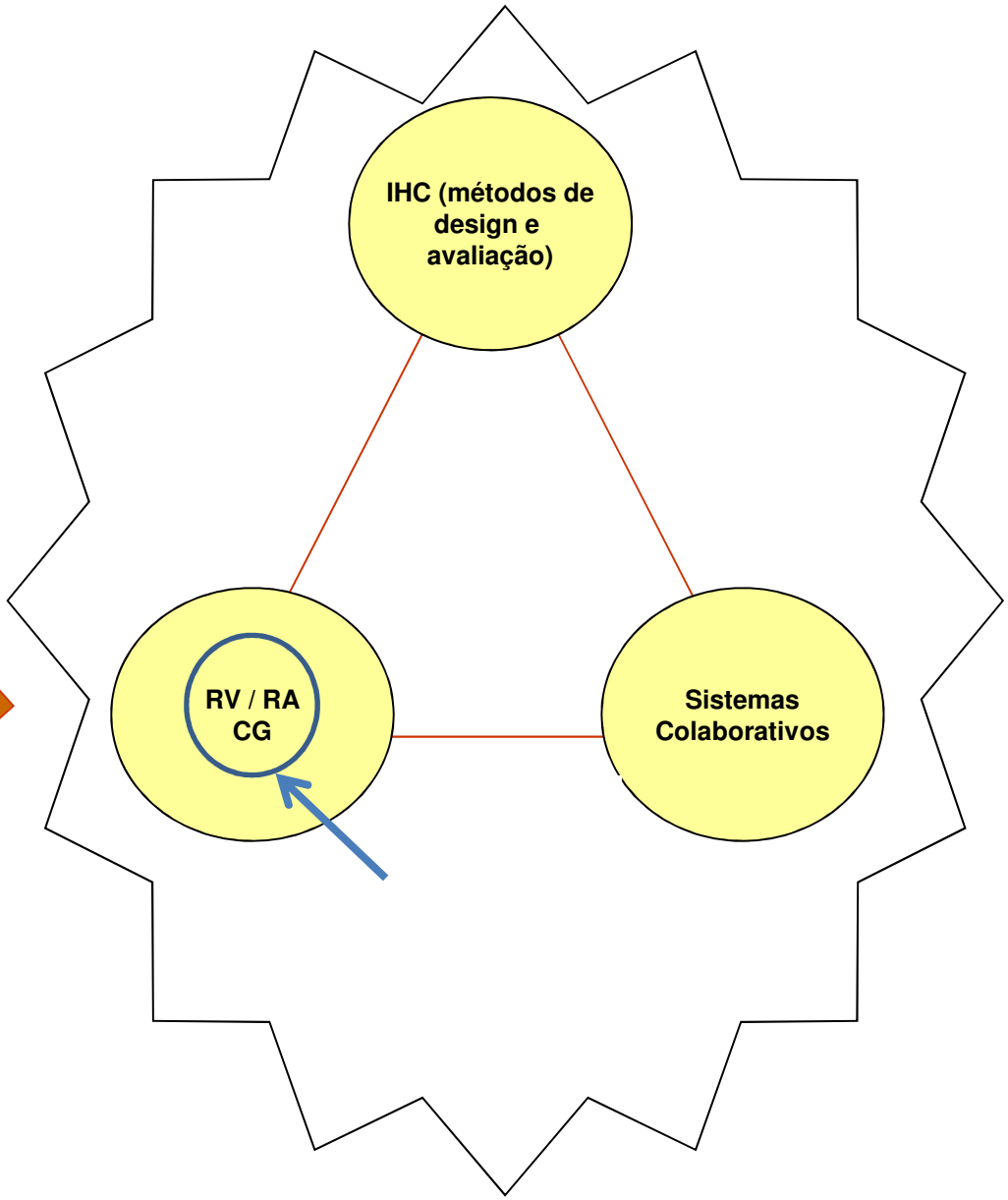
- Foto-realismo
  - Efeitos de Ambiente 3D, sombras, shaders, etc
  - Foto-realismo associado as informações de projeto agregam valor ao entendimento no processo de engenharia

- Visualização Imersiva
  - Suporte a visualização estéreo
  - Dispositivos de tracking
  - Suporte a interação 3D – VRInput/VIRAL e VRPN

- Manipulação de objetos

RAPOSO, A., SANTOS, I., SOARES, L., WAGNER, G., CORSEUIL, E., GATTASS, M. Environ: Integrating VR and CAD in Engineering Projects. IEEE Computer Graphics & Applications, v.29, n.6, p.91-95, 2009.





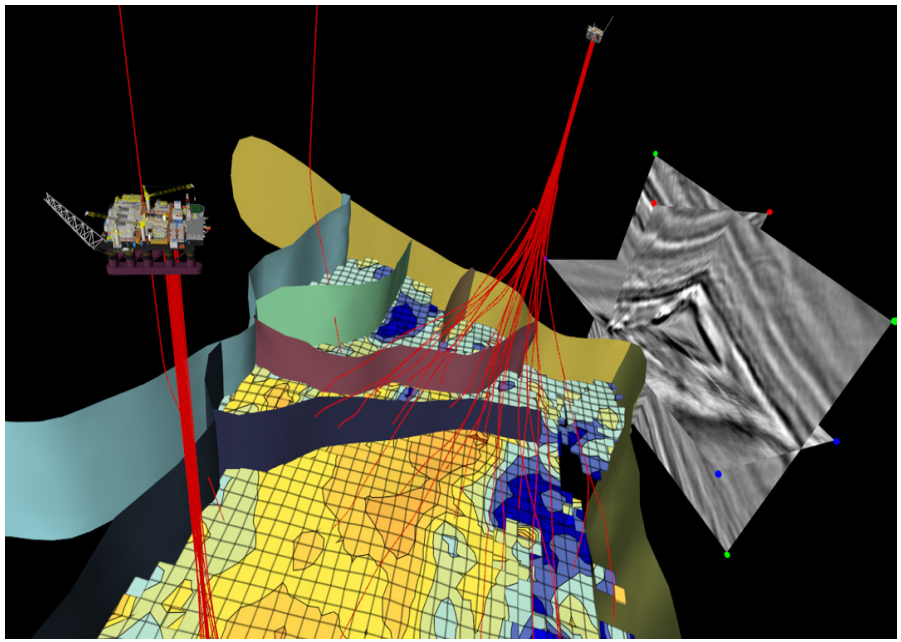
Engenharia, Geociências => Oil & Gas

Siviep: Modelos Multi-escala

SiVIEP – Sistema de Visualização Integrada em E & P

Ambientes Multiescalas: a informação pode existir em vários níves de detalhes – por exemplo, a cena pode conter objetos que vão desde um pequeno parafuso até campos de exploração de petróleo.

Siviep_2010.mov

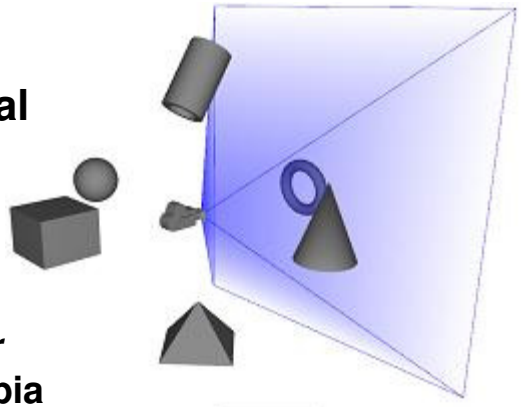


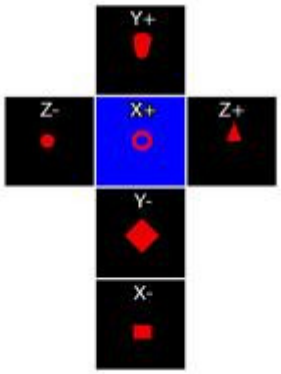
- Reservatório
- Falhas e Horizontes
- Sísmica
- Poços

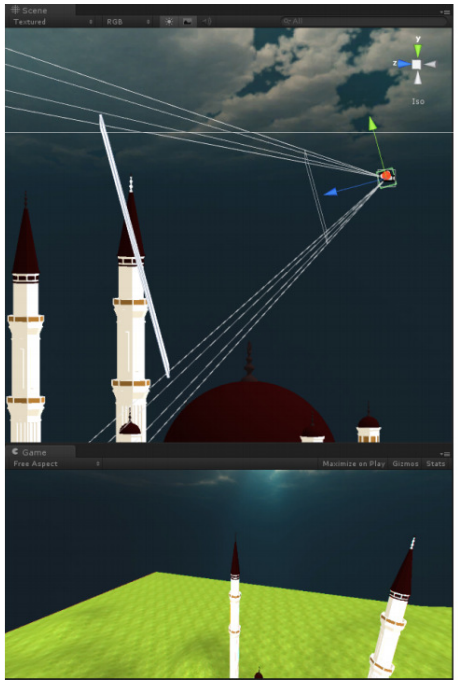
- Plataformas
- Risers
- Completação submarina
- Ancoragem

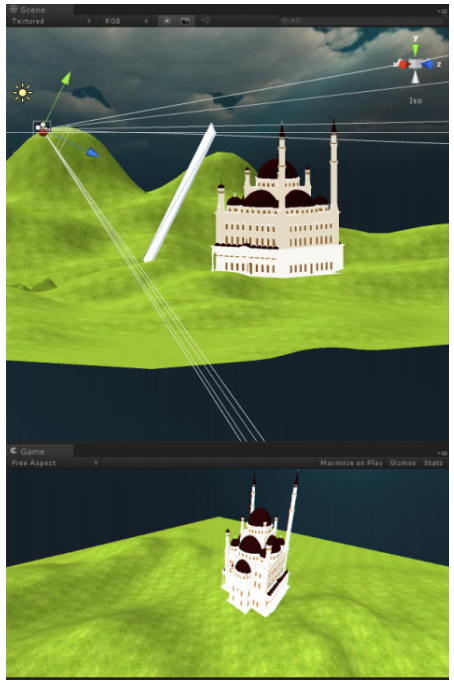
Dissertação Daniel Trindade (Mar/2010)

- **Cubo de distâncias como estrutura fundamental**
- **O cubo fornece dados para**
  - **Ajuste automático de velocidade de navegação**
  - **Tratamento de colisão**
  - **Ajuste automático de centro de rotação**
  - **Ajuste automático dos planos de corte *near* e *far***
  - **Ajuste automático de parâmetros de estereoscopia**









artigo_acm.wmv

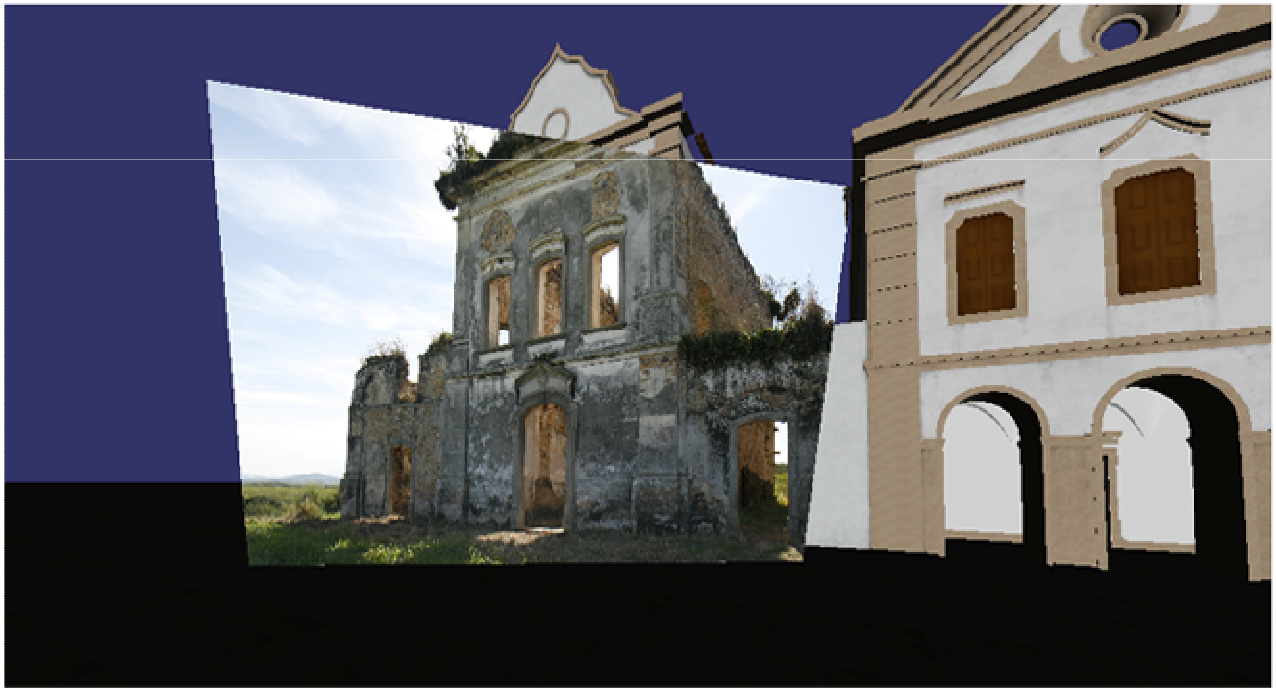
TRINDADE, D., RAPOSO, A. Improving 3D Navigation in Multiscale Environments Using Cubemap-based Techniques 26th ACM Symposium On Applied Computing – SAC 2011. Taichung, Taiwan.

CARVALHO, F. G., TRINDADE, D. R., DAM, P. F., RAPOSO, A. B., SANTOS, I. H. F. Dynamic Adjustment of Stereo Parameters for Virtual Reality Tools. XIII Simposium on Virtual and Augmented Reality – SVR 2011, CD-ROM. Uberlândia, MG, 2011

Dissertação Pablo Elias (2008)

- **Album 3D (localização e posicionamento automático da câmera em um modelo 3D)**

dissertacaoPablo_reduzido

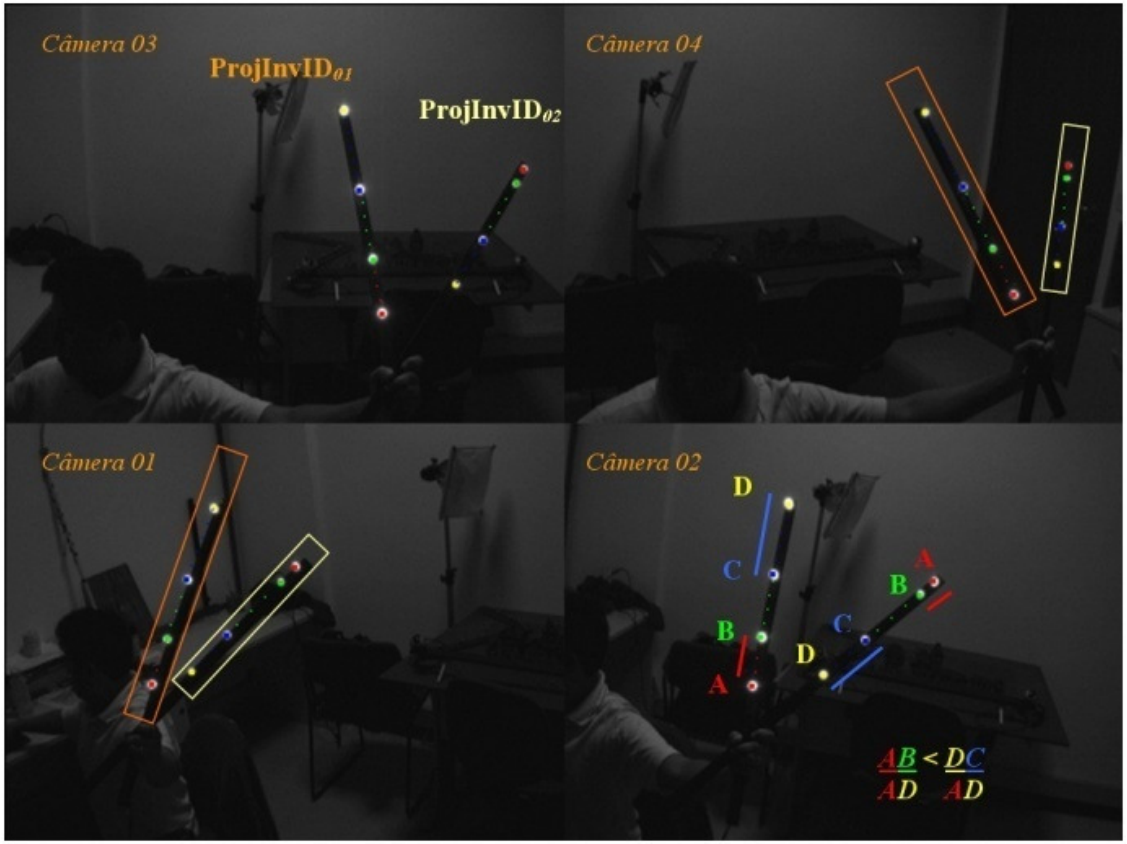


ELIAS, P. C., SÁ, A. M. , RAPOSO, A. B., CARVALHO, P. C., GATTASS, M. An Augmented 3D Album based on Photos and Building Models. 14th International Conference on Virtual Systems and MultiMedia - VSMM 2008 – Full Papers, p. 303-310. Limassol, Chipre.

P. C. ELIAS, A. SÁ, A. B. RAPOSO, M. GATTASS, P. C. CARVALHO. Navegação 3D a partir de Fotos de Edificações e Modelos CAD. XXIX CILAMCE - Iberian Latin American Congress on Computational Methods in Engineering – 2008

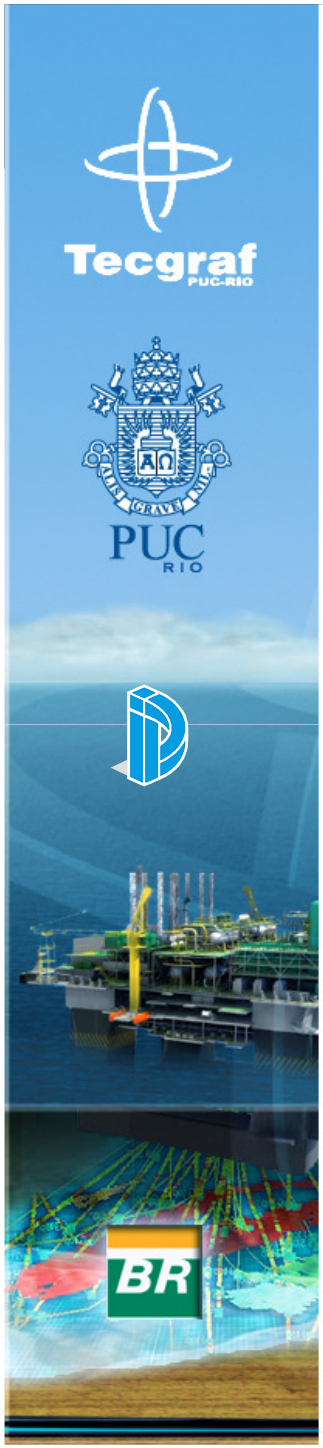
Tese Manuel Loaiza (2009)

- **Novo padrão de calibração de câmeras para rastreamento baseado em projetivas invariantes**



LOAIZA, M. E., RAPOSO, A. B., GATTASS, M. Multi-camera calibration based on an invariant pattern. Computers And Graphics, v.35, n.2, p.198-207, April 2011.

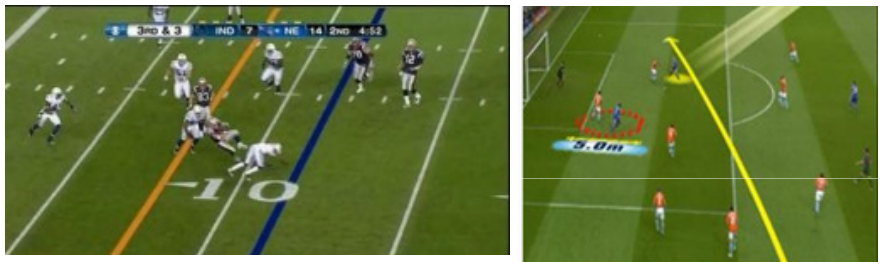
TEIXEIRA, L., LOAIZA, M., RAPOSO, A. B., GATTASS, M. Augmented Reality Using Projective Invariant Patterns. 4th International Symposium on Visual Computing ISVC 2008 (Advances in Visual Computing - Lecture Notes in Computer Science, vol. 5358), Las Vegas, Nevada, EUA., p.520-529. Springer-Verlag, 2008.



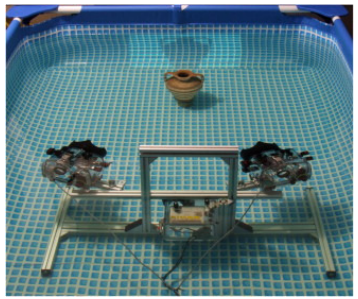
NVIDIA Academic Partnership

NVIDIA

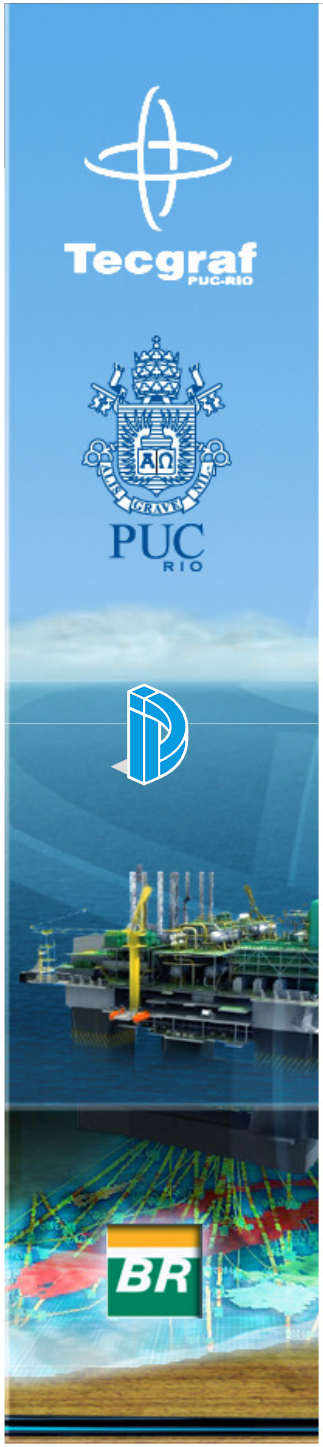
- **Playback of 4K stereo movies**
- **Panoramic Tracker in High Definition Images**

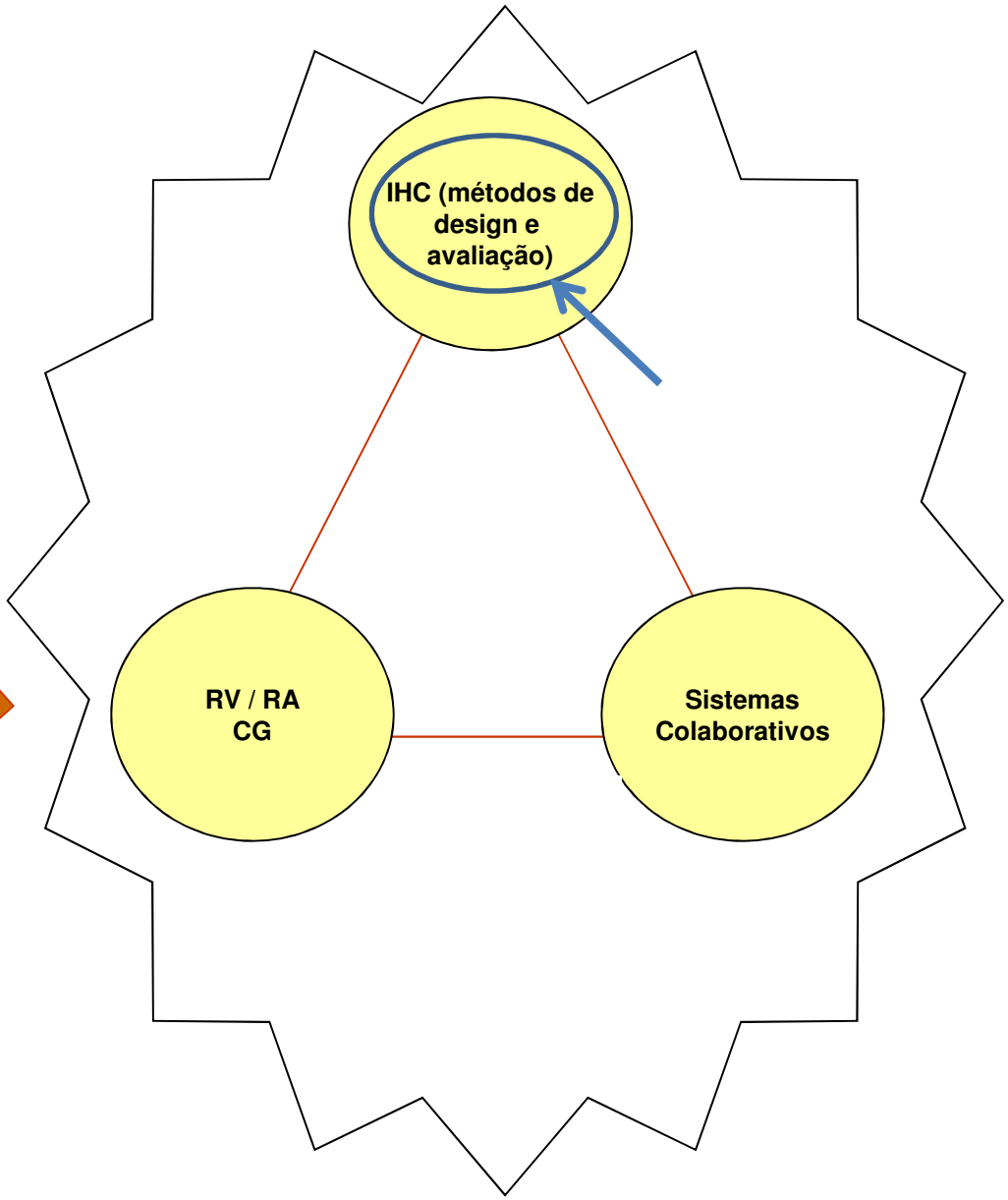


- **Analyzing images in real time to support underwater inspection**



- **3D Parallel Reconstruction on GPU**



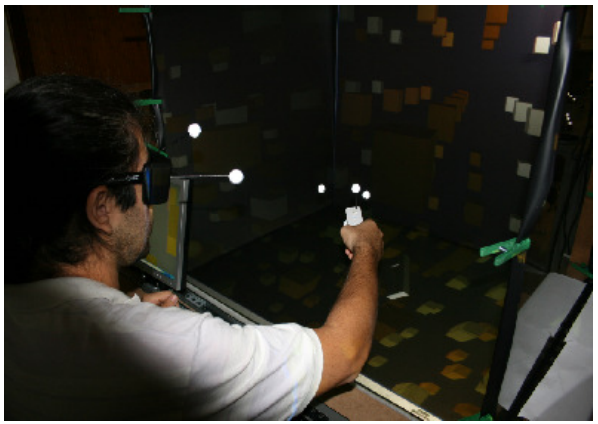


Engenharia, Geociências => Oil & Gas

Tese Felipe Carvalho (2009)

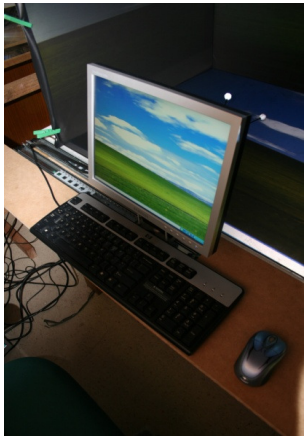
VRCAI2009_HybridDesk_Environments

- **Hybrid Desk**
  - **Novo dispositivo de interação (HUI – Hybrid User Interface)**
  - **3 modos de interação**

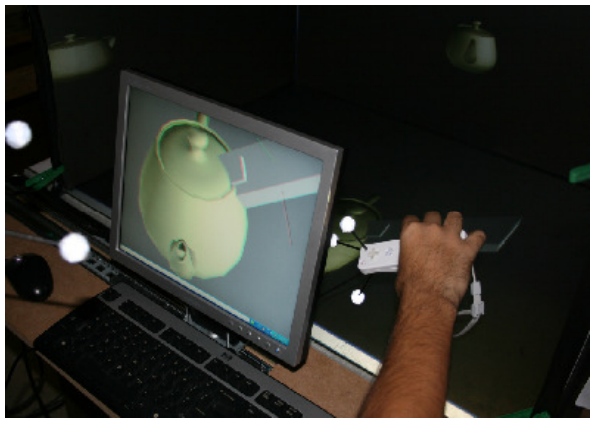


✓ **VR-Nav - Navegação e Seleção**
- Mini-CAVE
- *Wand* Rastreada
- Óculos Estéreo Rastreado

✓ **VR-Manip - Manipulação**
- LCD
- Wand Rastreada
- Óculos Estéreo Rastreado

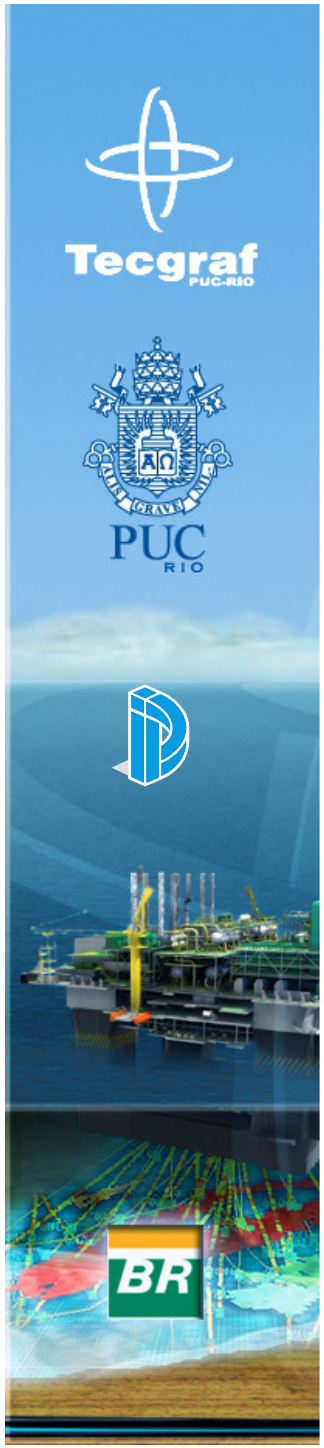


✓ **WIMP - Anotação**
- LCD
- Teclado
- Mouse



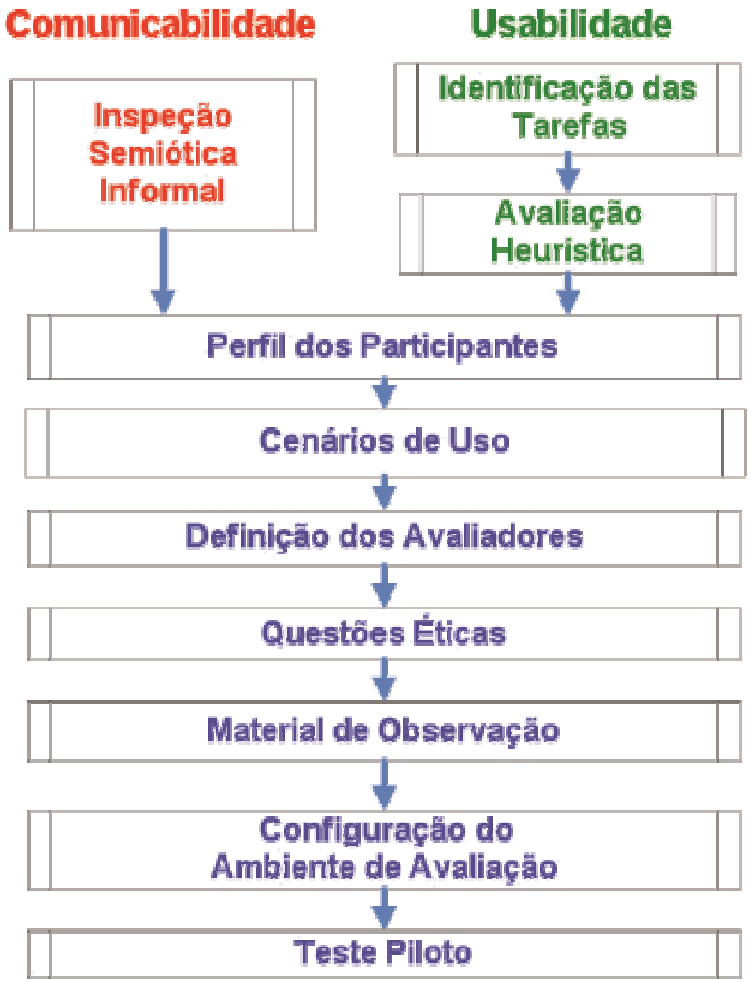
TREVISAN, D., CARVALHO, F. , RAPOSO, A., FREITAS, C., NEDEL, L. Exploring the Design of Transitional Hybrid User Interfaces. JIS - Journal of 3D Interactive Systems, 2011.

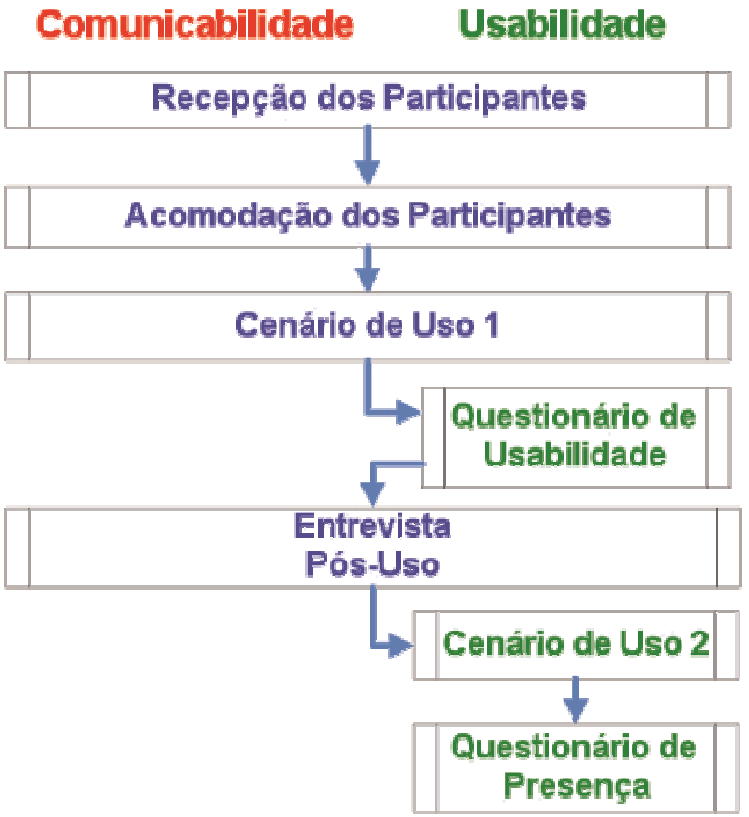
CARVALHO, F. G.; RAPOSO, A.; GATTASS, M. Designing a Hybrid User Interface: A Case Study on an Oil and Gas Application. VRCAI 2009 –8th International Conference on Virtual-Reality Continuum and Its Applications in Industry, p. 191-196. Yokohama, Japan, 2009



Dissertação Marcus Alencar (Ago/2009)

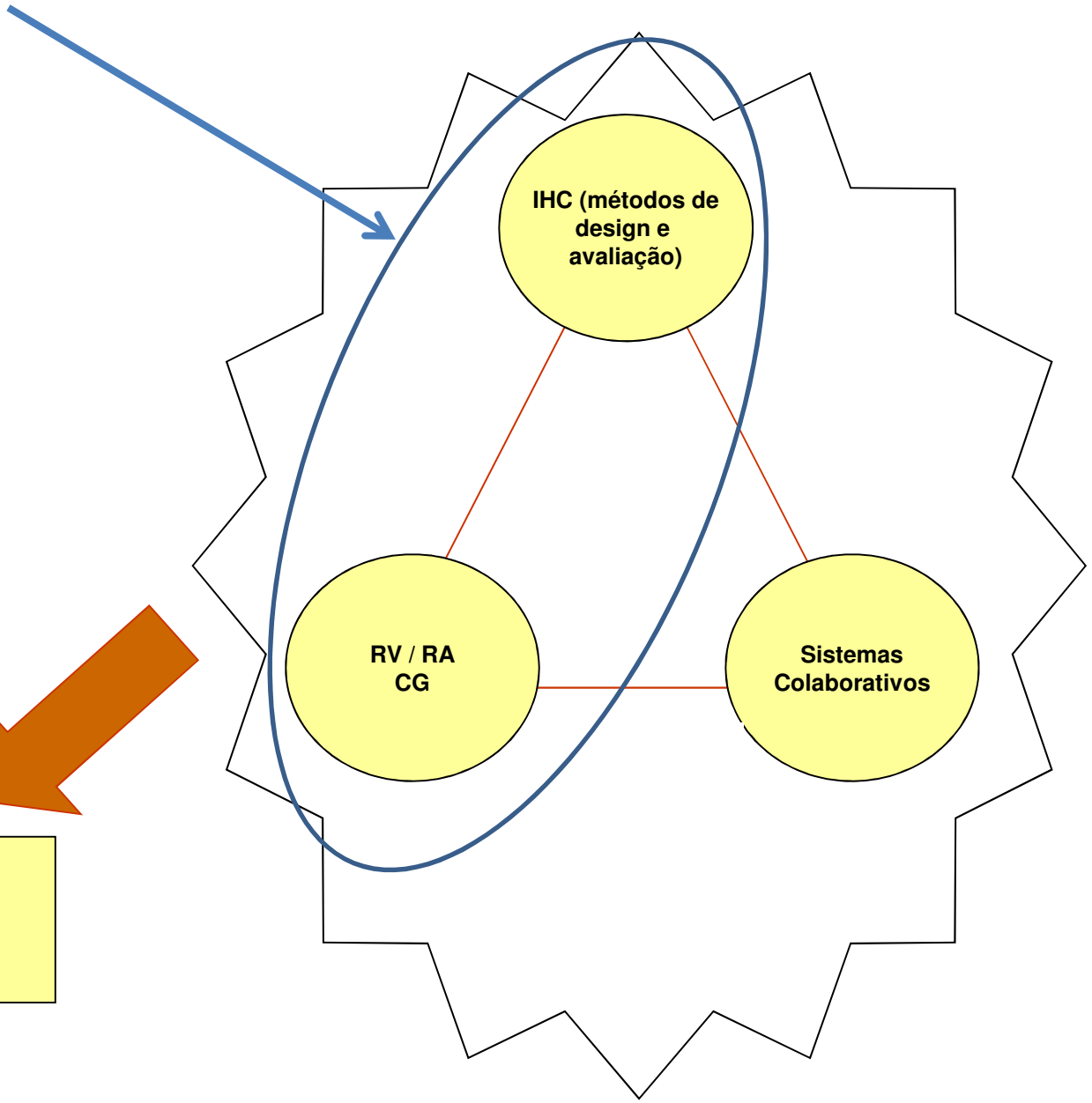
- **Conjunção de metodologias de avaliação de IHC para avaliação da Hybrid Desk**





ALENCAR, M., RAPOSO, A., BARBOSA, S. D. J. Composition of HCI Evaluation Methods for Hybrid Virtual Environments 26th ACM Symposium On Applied Computing – SAC 2011. Taichung, Taiwan.

3DUI – 3D User Interaction



Engenharia, Geociências => Oil & Gas

3DUI – 3D User Interaction

INF 2792 – Tópicos em IHC III

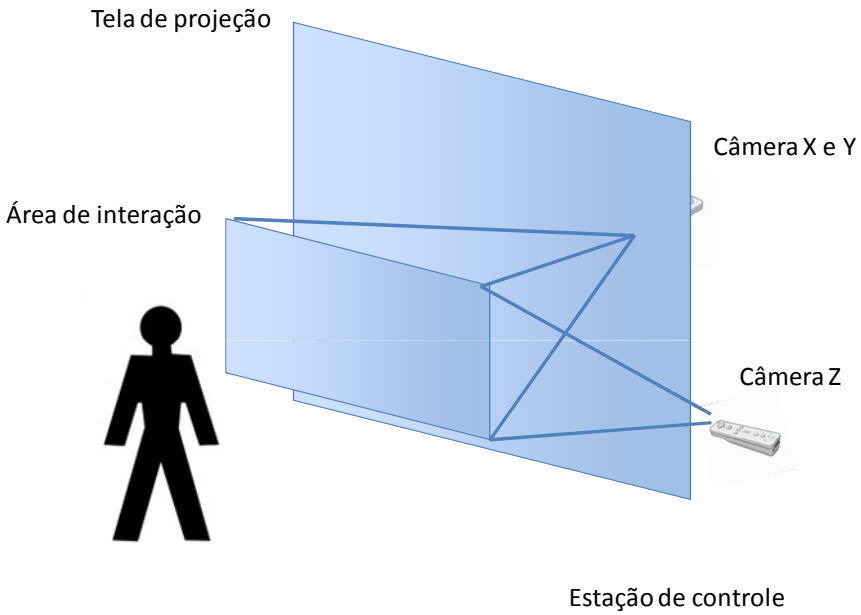
3DUI: Relaciona o uso de tecnologia 3D como uma interface entre o usuário e o computador, como entrada, saída, ou ambos.

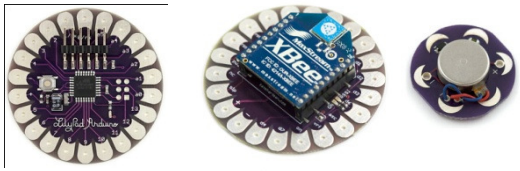
FAAST_controleMouse.avi

reconstrucao3D.avi

Dissertação Paulo Gallotti (Abr/2011)

- **V-glove: luva com feedback tactil para interação em ambientes imersivos**



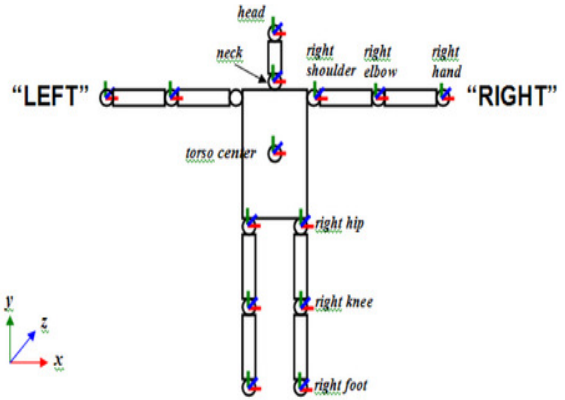


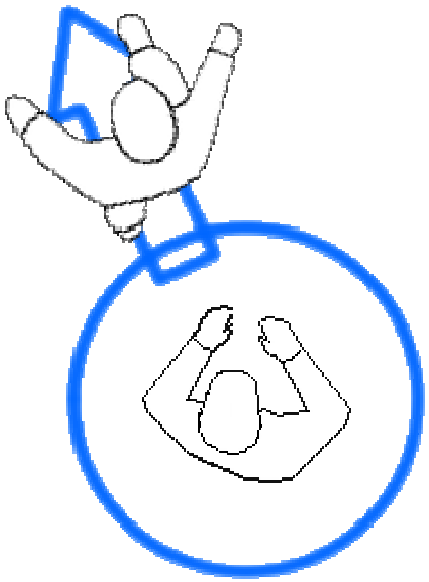
FilmeVGlove.mov

RODRIGUES, P. G., RAPOSO, A., SOARES, L. P. v-Glove: A 3D virtual touch interface
XIII Simposium on Virtual and Augmented Reality – SVR 2011

Dissertação Peter Dam (2011.2)

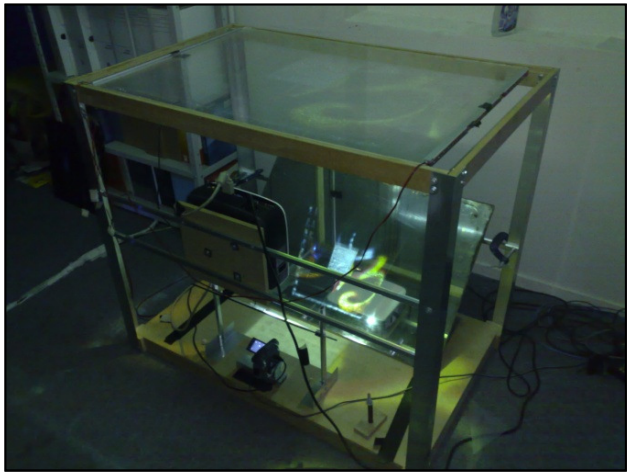
- **A Study of Device Contact-Free Gesture-Based VR Interaction Techniques using Kinect**





Peter_Selecao.avi

Mesa Multi-toque

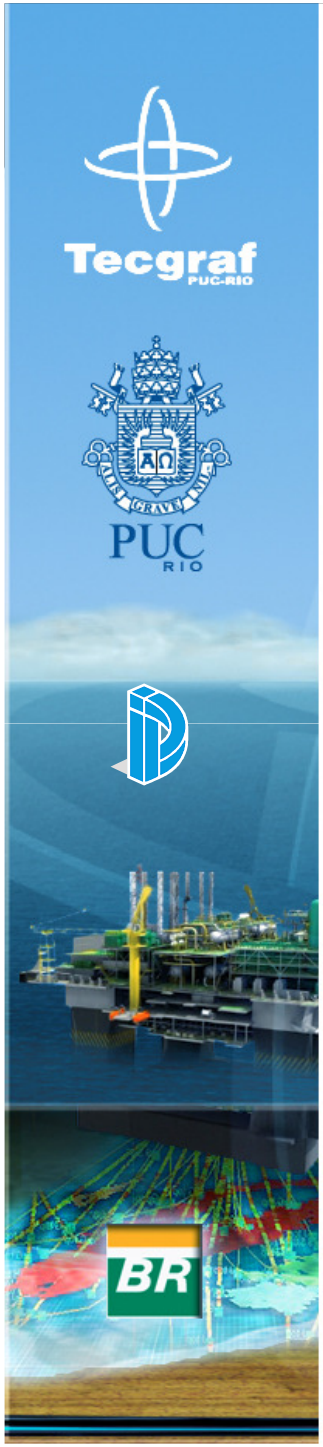


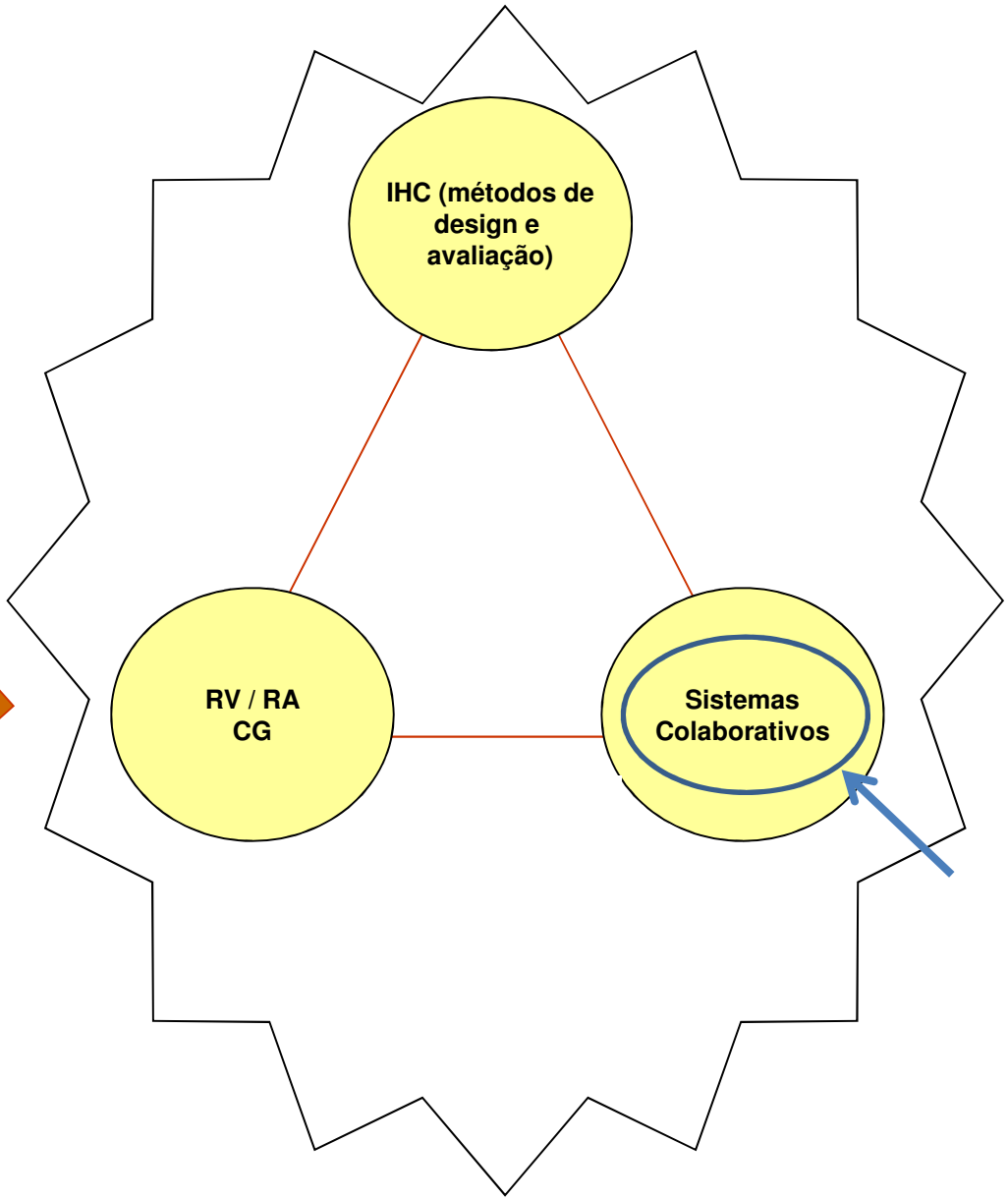
Interatividade Digital

mesa_dez2010.wmv

PUC 70anos.avi

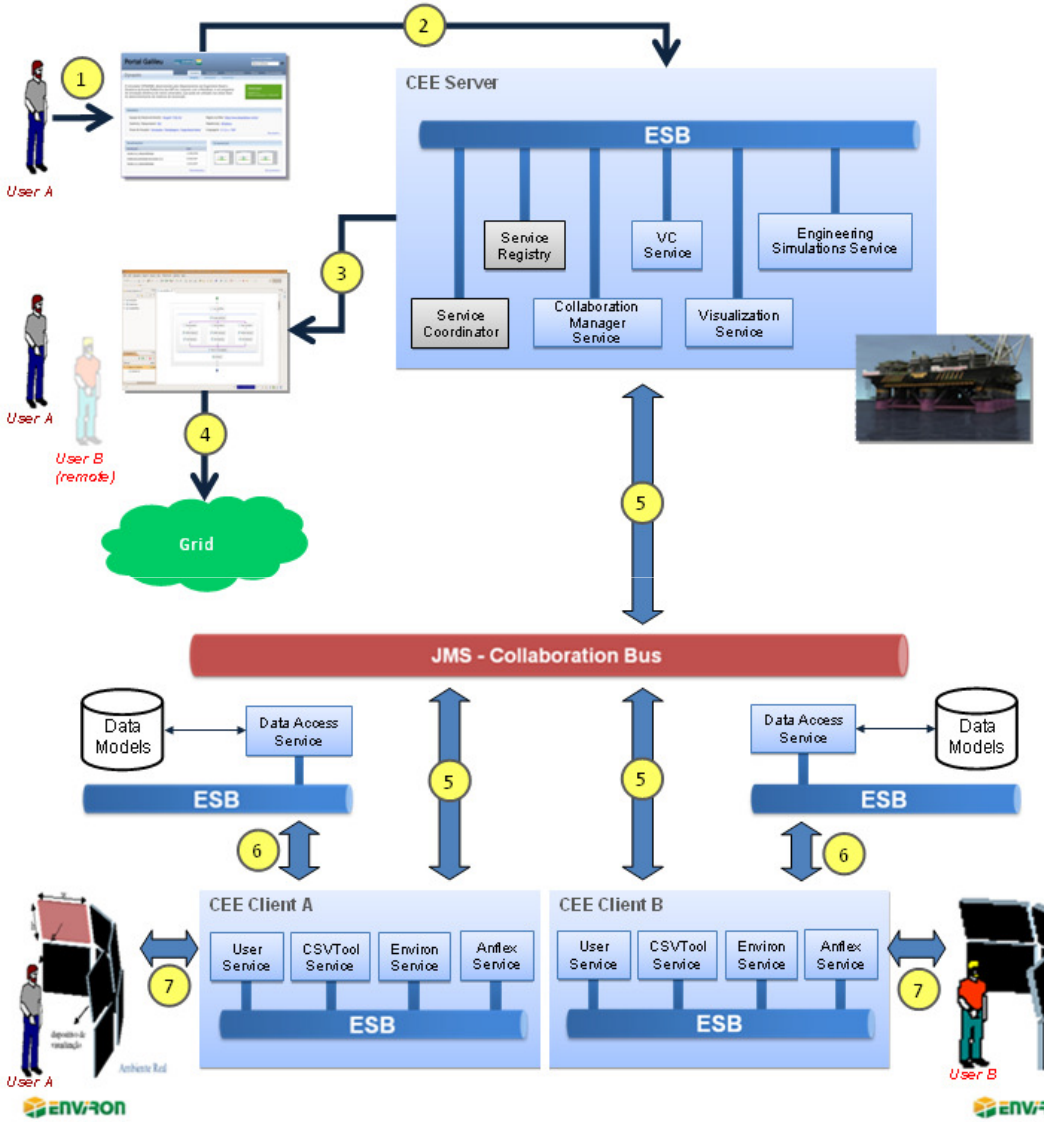
PUC 70anos RJTV.avi





Engenharia, Geociências => Oil & Gas

Tese Ismael Santos (2010)



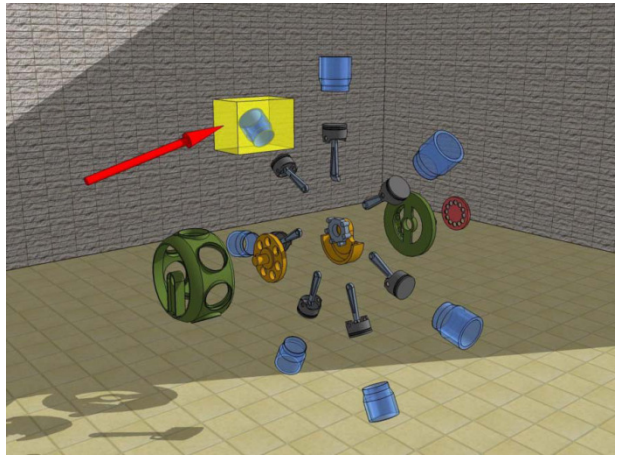
CEE – Collaborative Engineering Environment

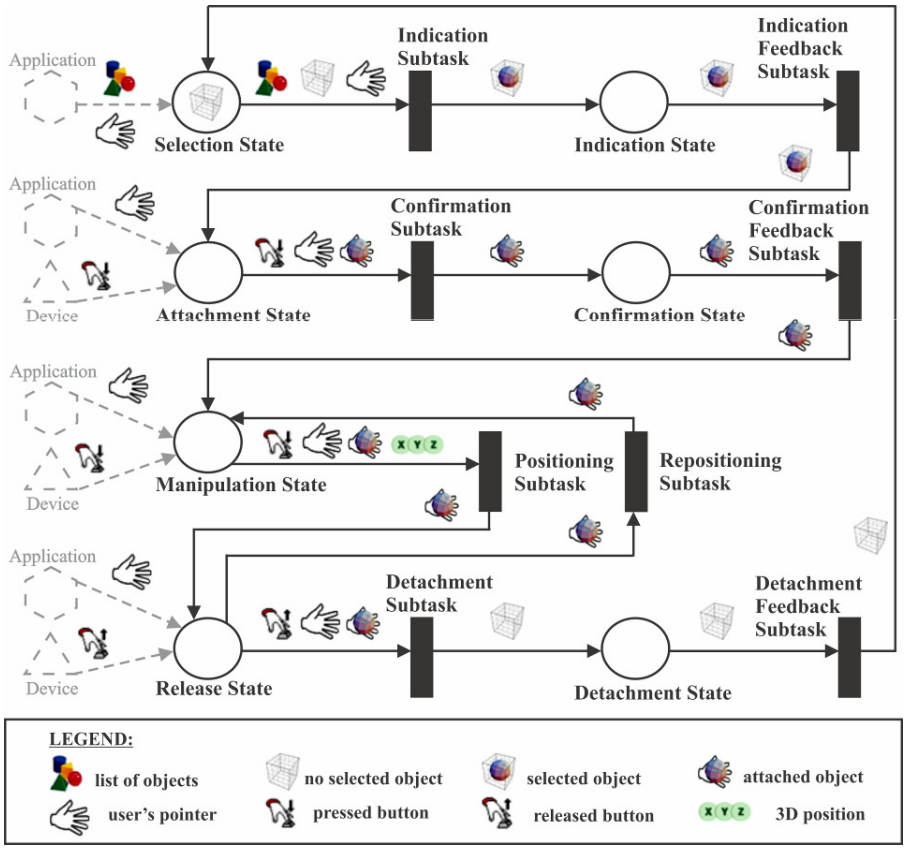
colaboracao remota.wmv

SANTOS, I. H. F., RAPOSO, A., RODRIGUES, P., SOUZA, R. P., AMARAL, W. G., A Collaborative Environment for Offshore Engineering Simulations. Collaboration and Technology, 17th International Conference, CRIWG 2011 (Lecture Notes in Computer Science, v. 6969)

SANTOS, I. H. F., RAPOSO, A. B., GATTASS, M. Integrating VR in an Engineering Collaborative Problem Solving Environment. ICEIS 2009 – 11th International Conference on Enterprise Information Systems, Volume HCI, p. 124-129. Milan, Italy, 2009.

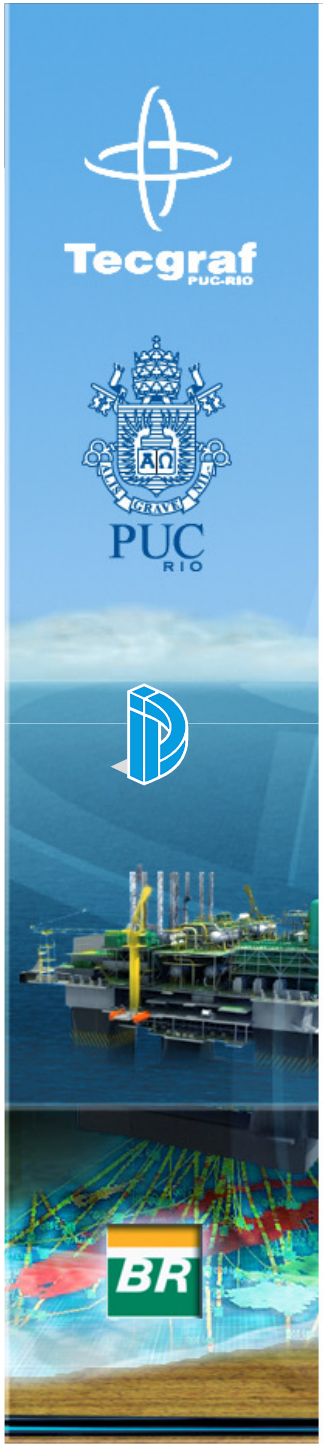
Petri Nets e Colaboração



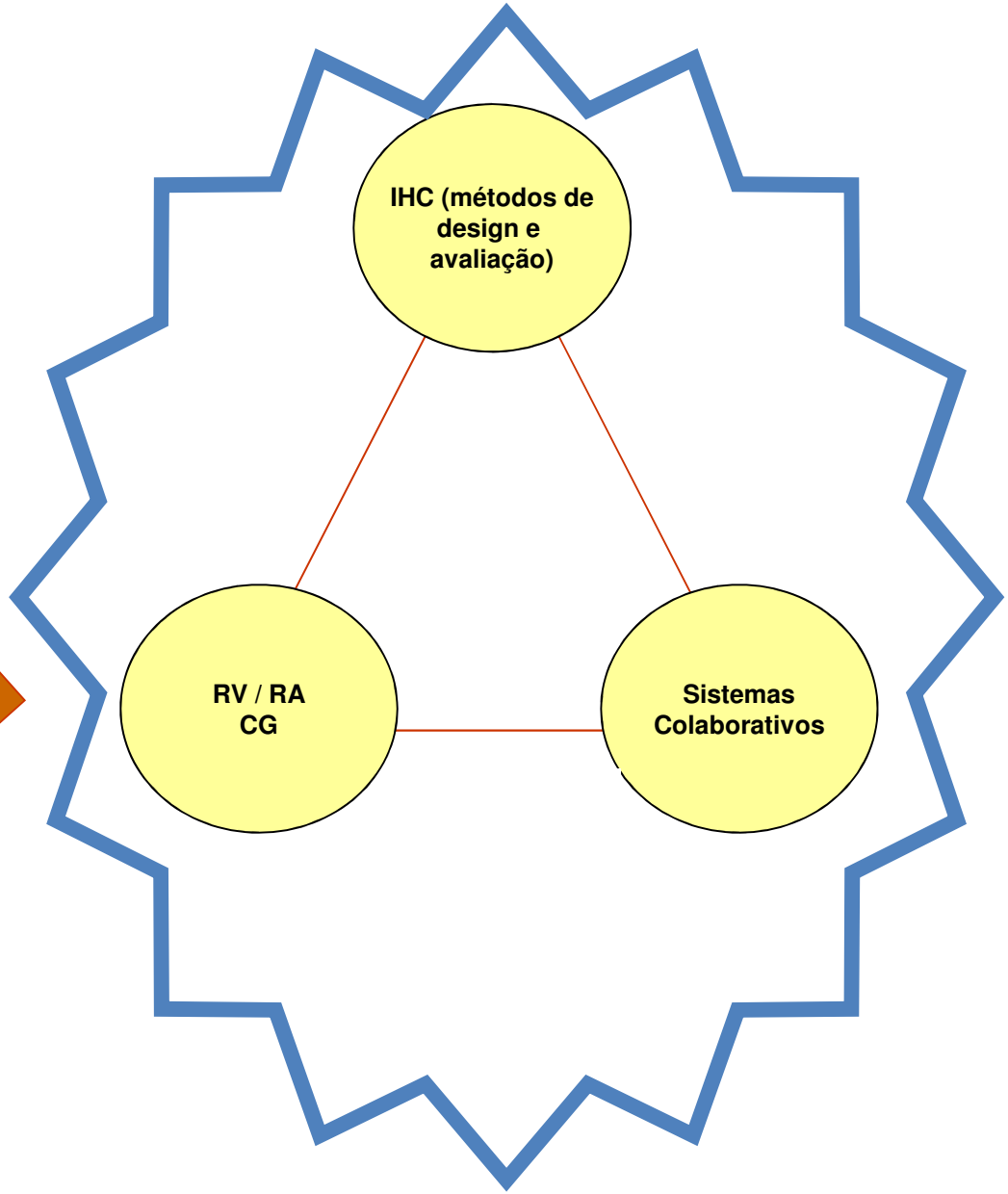


RIEDER, R. ; PINHO, M. S. ; RAPOSO, A. A Petri Nets based Approach to Specify Individual and Collaborative Interaction in 3D Virtual Environments. Journal of Universal Computer Science , v. 17, n. 2, p. 243-260, 2011.

RIEDER, R., RAPOSO, A. B., PINHO, M. S. A methodology to specify three-dimensional interaction using Petri Nets. Journal of Visual Languages and Computing, v.21, n. 3, p. 136-156, June 2010.



Onde tudo isso nos leva ?



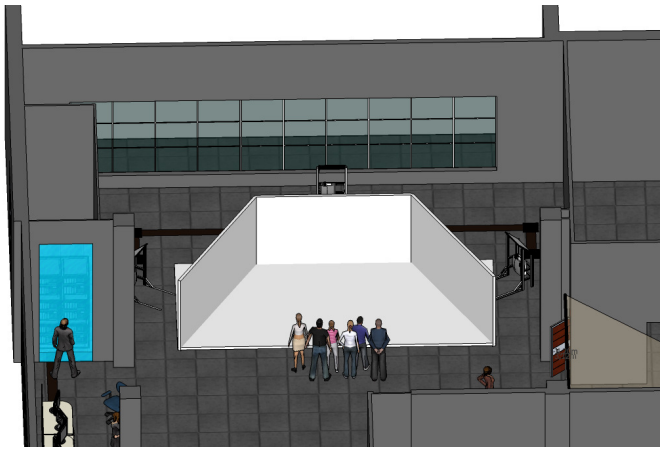
Engenharia, Geociências => Oil & Gas

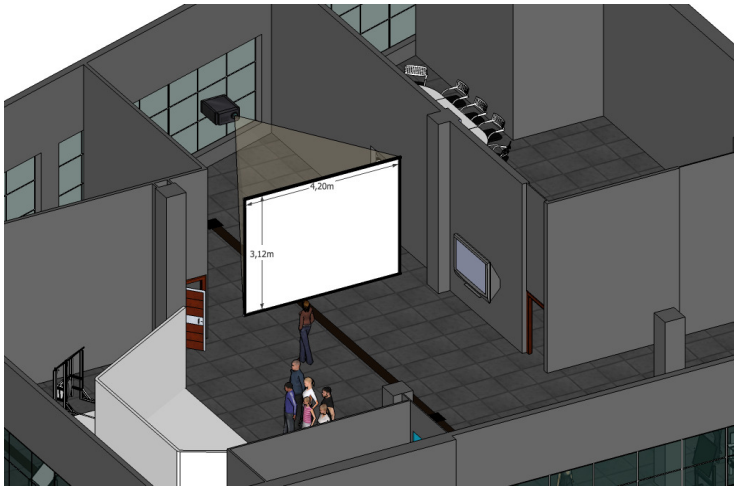
Interatividade Digital

COMPERJ_Expo_3D.avi

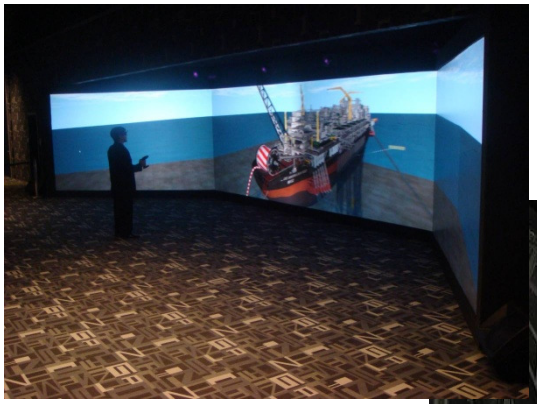
Centros de Realidade Virtual

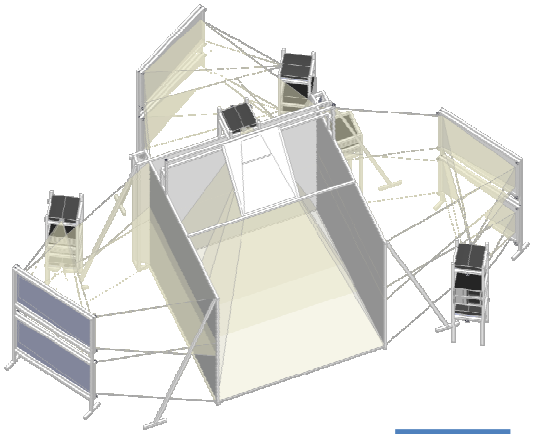
7º andar novo prédio PUC-Rio





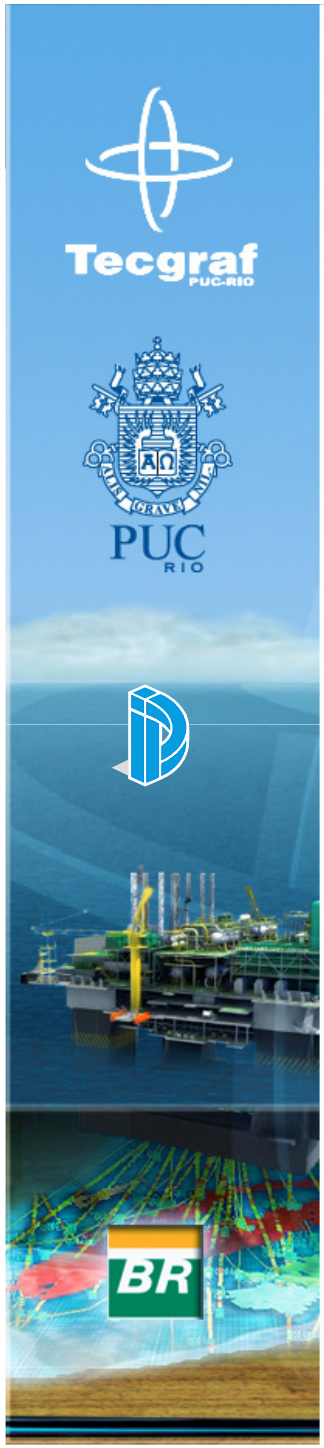
NVC – Núcleo de Visualização e Colaboração – CENPES/Petrobras





edicao globo cenpes.avi

EnvironHeadTrackingCAVE_NVC



Obrigado!

Alberto Raposo

Departamento de Informática,
Pontifícia Universidade Católica do Rio de Janeiro

http://www.inf.puc-rio.br/~abraposo
abraposo@inf.puc-rio.br

Sala 417 - RDC