About Fido VFX

Largest 3D Facility in Scandinavia
Dedicated R&D department
Workshop
40 artist today, 100 by the end of 2012
Academic program (2D 3D R&D)
High-end pipeline

We’re working together with some of the biggest VFX facilities in the world

Robust pipeline that is built to handle big and complex commercials and feature films from all over the world

World renowned VFX Supervisors and lead artists

Our artists has been working on Tintin, Harry Potter, Spiderman, Narnia, King Kong and many more.
Collaboration with leading Universities

Master Thesis
Lectures
Internships
Fido Technology and R&D

State of the Art Research & Development

- Software development
- Published at Siggraph 2010 and 2011
- Collaboration with leading software vendors
- High-end hardware
SpeedFur

Accepted for Siggraph 2011 in Vancouver Canada

- State of the art Fur & Hair system
- A lot of attention from world leading studios
SpeedSPH

Accepted for Siggraph 2010 in Los Angeles, USA

- Faster fluid simulation
- Cut production times
Ocean Toolkit

Our first in-house development project

- Similar system to what much bigger studios develop in-house
- We still use this tool
Workflow & Asset Management System

[fido logo]
Workflow & Asset Management System

The team behind FTrack has more than 10 years of experience for Visual Effects and R&D and more than 20 years of experience for Content creation, Game development and Management at industry leading studios around the globe.

Peter Levin, CEO       Fredrik Limsäter, CTO       Michael Hjort, Board Member       Cantus Invest
Workflow & Asset Management System

We’re looking for developers

- Python
- Javascript (EXT JS)
- Part-time / full time
- On-site / off-site

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call me...
Difference between SFX and VFX

- **SFX - Special Effects**
  In-Camera effects, usually done on location

- **VFX - Visual Effects**
  Digital Effects, done in post
1890s

- Motion Pictures are invented
- 1895 The Lumière Brothers debut the cinématographe
- 1895 The first Special Effect appears in The Execution of Mary Queen of Scots, the substitution shot
- 1898 French Magician George Méliès, the grand father of special effects
The Execution of Mary, Queen of Scots
August 28, 1895
Edison Laboratory
History

1910s

• 1916 Travelling matte system is invented. The technique is later refined as blue-screen photography.

1920s

• 1924 The Thief of Bagdad, this early film used state of the art, revolutionary visual effects
History

- 1925 The Lost World, pioneering film's first major use (primitive) of stop-motion animation in a feature film

- 1927 Fritz Lang's Metropolis featuring a dazzling array of state-of-the-art special effects techniques: miniatures, glass shots, mechanical effects, and animation.
History

1930s
The first Golden Age of visual effects begins.

- 1933 King Kong, a masterpiece of effects. Stop-motion animation, miniatures, rear projection and optical compositing artfully combine live actors, puppets, and miniatures.

- 1937 Snow White and the Seven Dwarfs, the first full-length, hand-drawn animation.
History
History

1950s

- 1952 Bwana Devil, noted as the first 3-D feature-length, commercially-released color film ever made.

- 1956 Forbidden Planet, one of the landmark science-fiction films of the 50s, a classic space adventure film.
History
History

- **1956 The Ten Commandments**, involving the most expensive special effect to date, a 32-foot high dam channeling tens of thousands of gallons of water. Cost approx $2 million

1960s

- **1963 Jason and the Argonauts**, spectacular stop-motion dueling-skeletons scene
History

- 1968 2001: A Space Odyssey, the most realistic footage of space ever created.

Models of spacecraft, computer-guided pre-motion control cameras, full-sized props or models, and other early techniques (such as a primitive type of "Go-Motion") were used.

It set a new standard for special effects.
History
History

1970s

- Close Encounters of the Third Kind, Star Wars, Alien, Star Trek: The Motion Picture

- 1971 The Andromeda Strain. This film contained possibly the first use of 3D rendering.

- 1977 Star Wars, featuring highly complex space battles made possible by electronic motion control, invented by John Dykstra. First extensive use of 3D-CGI.
1980s

- Computer graphics take starring turns in feature films


- 1982 Tron, first live action film with over 20 minutes of full 3D graphics and computer animation.
History

- 1983 Return of the Jedi, featured over 700 visual effects shots, the most in movie history at that time
History

- 1986 *Star Trek IV: The Voyage Home*, This was the first groundbreaking use of 3D scanning.

- 1989 *The Abyss*, the first example of digitally-animated, CGI water.

- 1989 *Back to the Future, Part II*, Computer-controlled camera work allowed three characters to match up and interact seamlessly in the same scene.
History
History

1990s

• 1991 Backdraft, First use of photorealistic CG fire in a motion picture.

• 1991 Terminator 2: Judgment Day, Most of the movie composited completely digitally. Use of refection mapping
History

- 1993 Jurassic Park, introduces the first CG live animals to the movies which are intercut with animatronic dinosaurs.

- 1995 Toy Story, the first entirely CG feature-length film.
History

- 1995 Waterworld, First realistic CG water.
- 1997 Contact, Powers of Ten - the longest single digital effects shot ever created
History

- 1997 Starship Troopers, first film to feature a large-scale CGI battle.

- 1997 Titanic, The most expensive film ever made - up to its time, and the highest-grossing film of all time worldwide.

- 1999 Fight Club, with extensive and revolutionary use of photogrammetry.
History

- 1999 The Matrix, the "flow-mo" and "bullet-time" effects, wall-scaling and other amazing visual effects.

- 1999 The Mummy, the most realistic digital human character ever seen in film, computer-generated layers of muscles, sinew and tissue.

- 1999 Star Wars: Episode I - The Phantom Menace, featured a completely CGI-generated fully-articulated main humanoid character.
Overview of the modern VFX pipeline
Workflow overview

Production Management System (FTrack, Shotgun, Tactic)
Bid

- Involves Producers and Supervisors
  - Producer - The money guy and negotiator
  - CG/VFX Supervisor
- Feature: Script breakdown
- Commercial: Treatment + Pitch
- Story Board - Sometimes
Conceptual Art
Previz
Research & Development

A very important part of production

• Takes time and cost money
• No “guarantee” of success

• Fluid systems
• Hair & Feather Systems
• Volume rendering
• Shaders
• Crowd systems
  ....
Research & Development
On-set (Integration team)
On-set (Integration team)

Camera/Lens information
Lens distortion
Light Information
HDRI
Promote
On-set (Integration team)

- Blue or green screen? Why not red screen?
- Creating mattes is called keying
- Chroma key
- Luma Key
- Difference matting
On-set (Integration team)
On-set (Miniatures & Models)

Have traditional models played their part?
Difficulties shooting models
Depth of field
Correct camera speed
Motion Control
On-set (Motion Controlled Camera)

Motion Control
Repeat pre programmed movements precisely
Stiller Studios
On-set (Motion Controlled Camera)
On-set (Animatronic)
Backplates
Rotoscoping, Wire Removal & Dust busting

Conversion Colorspace
DPX - Linear
Conform
Linear Workflow
Modeling

Tools
• ZBrush
• Mudbox
• Maya
• UV-Layout
• Wacom/Scanner

• Digital modeling
• Digitizing clay models
• 3D/Lidar Scanning
• Imagebased Modeling
• Procedual Modeling
Modeling
Lookdev

Tools
- Mari
- ZBrush
- Photoshop
- Maya + Slim

- Defining colors
- Textures & shaders
- Base light setup/look
Animation & Rigging

Tools
• Maya
• Houdini (rarely)
• Motion Builder

• Rigging and Skinning
• Technical & Complex
• Necessary functionality
Animation & Rigging
Animation & Rigging

Animating digital characters
• Keyframes, keyframes, keyframes
• Blend Shapes
• Motion Capture
  Optical Motion Capture
  Magnetic Motion Capture
Animation & Rigging

Facial Animation
• Key frame muscle groups
• Performance Capture
• Blend Shapes
• Image Metrics /Debevec
Animation & Rigging

CG Skin and muscles

- Technology for deforming character skins, extension of cloth
- Volume conservation muscles, collision detection between muscles
- Sticky and sliding effects, skin jiggle, and relax/wrinkle ‘type effects
- CgCharacter, cMuscleSystem
FX Animation

Tools
• Houdini
• Maya
• Custom Software/plug-ins

Crowds
• Waterloo (1970) – 20,000 Soldiers
• Gandhi (1982) – The Funeral scene
• Seabiscuit (2003) used inflatable dolls.

Massive
Multiple Agent Simulation System In Virtual Environment
React
Reasonable Embodied Agents for Crowd Simulation
FX Animation
FX Animation

Procedural Animation
Complex form of animation
Define properties and behaviour of the object to animate

We used procedural animation for all foliage animation on Surf’s Up
FX Animation

Particle Systems, extension to procedural animation
Used to create and control a large number of objects.

Most cool effects can be done with particles
Water, fire, smoke, snow, sand, dust, crowds etc
Show: Surfs Up
Shot-Elem: ris15-rlo v3
JTS: 38009
Artist: John Clark
Date: November 18, 2006 17:34
Producer: Lydel Bottega/Chris Juan
VFX Sup: Rob Bredow
Anim Director: David Schindel
Length: 288 Output, 288 Total
Camera/Playback Speed: 24/24
Lens:
Comments: big POV drop in on a 30ft wave ramp into slow motion
FX Animation

Which movie is considered the first to have used particles in production?
FX Animation

fido
FX Animation

Rigid Body Dynamics (RBD)

- Simulate motion of three dimensional solid objects
- Bullet, ODE (and Algoryx)
- Often used to create shots that show the destruction of buildings
**FX Animation**

**Water**
- Difficult to create digital water.
- Ocean Surface
  - Fast Fourier Transforms and Phillips Spectrum
- Three dimensional fluid Simulation (CFD, Computational Fluid Dynamics)
- SPH - Smoothed-Particle Hydrodynamics
- FLIP
- Naiad (FLIP Hybrid)
FX Animation
FX Animation

Fire
Ghost Rider used a computational fluid simulation from Maya

Fire on the GPU
(Siggraph 2009)
FX Animation
Cloth, Hair and Fur

Tools
• Maya
• Houdini
• Syflex
• SpeedFur, Yeti, Shave and a Haircut
• Custom Software/Plug-ins

Cloth
• Usually a polygonal mesh connected with tiny springs
• In-house solutions
• Simple verlet integration model was implemented in React.
Traditionally hard to do
A single creature can have millions of hair driven by guide hairs
Mostly in-house solutions

Feather are even harder to control
No commercial systems available
Matte Paintings
Matte Paintings
Lighting and Rendering

Tools
• Maya
• Katana
• Houdini
• Renderman
• V-Ray
• Arnold
• Mantra

• The basic: key, fill and rim
• Global illumination
• Ambient Occlusion
• High Dynamic Range (HDR)
• Lightstage
Lighting and Rendering
Lighting and Rendering

Renderman
Mental Ray
Mantra
3Delight
Arnold
VRay
Compositing

Tools
• Nuke
• SynthEyes
• PFTRack
• Matchmover
• Mocha

• Compositing is the most important department
• All mistakes on-set and in 3D are “fixed in comp”
• Everything is faster in 2D than in 3D
• Everybody loves comp
Compositing

• Merge all elements for a shot
• Can be hundreds of elements
• Different lighting passes
• Fill lights, spec lights, diffuse, ambient lights, ambient occlusion, shadows, ID pass (z depth) etc.
Compositing

Set Extension
Compositing
Compositing

Bullet time or Time slice
Array of individual still cameras are positioned around the subject
Programmed to take a single shot simultaneously

The resulting still photographs are edited together to form a succession of images.
Compositing
Compositing

Crowd Replication
Same shot filmed a number of times and the small crowd move between every take.

Moving camera requires motion control camera
Compositing
Thanks...