

Authoring Physically
Simulated Destruction
with NVIDIA APEX

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Overview



- **APEX and Destruction Introduction**
- **Authoring with PhysXLab**
 - Creating chippables with cutout fracturing
 - Examples of slicing (complete fracture)
 - More features of PhysXLab
- **Unreal Engine 3 Integration**
 - Full workflow demonstration for Batman Arkham Asylum
- **Other APEX Modules**
 - Clothing, Turbulence, Vegetation, etc.

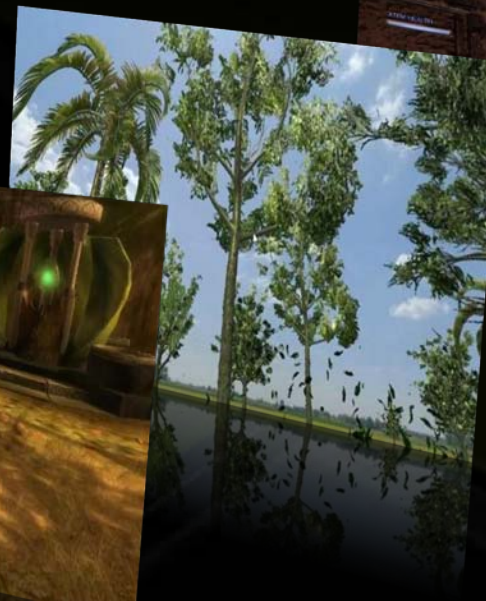
APEX – Scalable Dynamics Framework



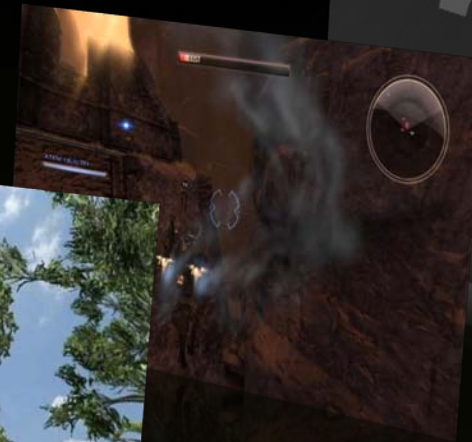
Destruction



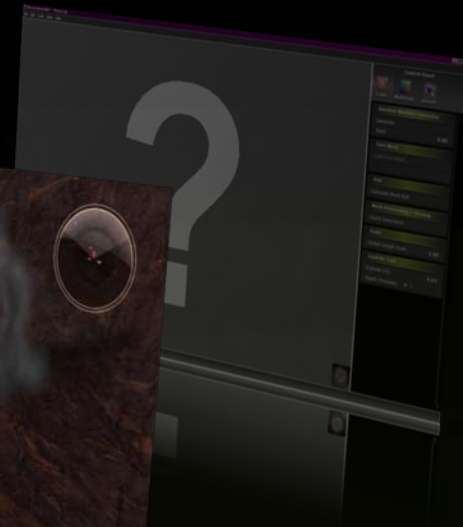
Clothing



Vegetation

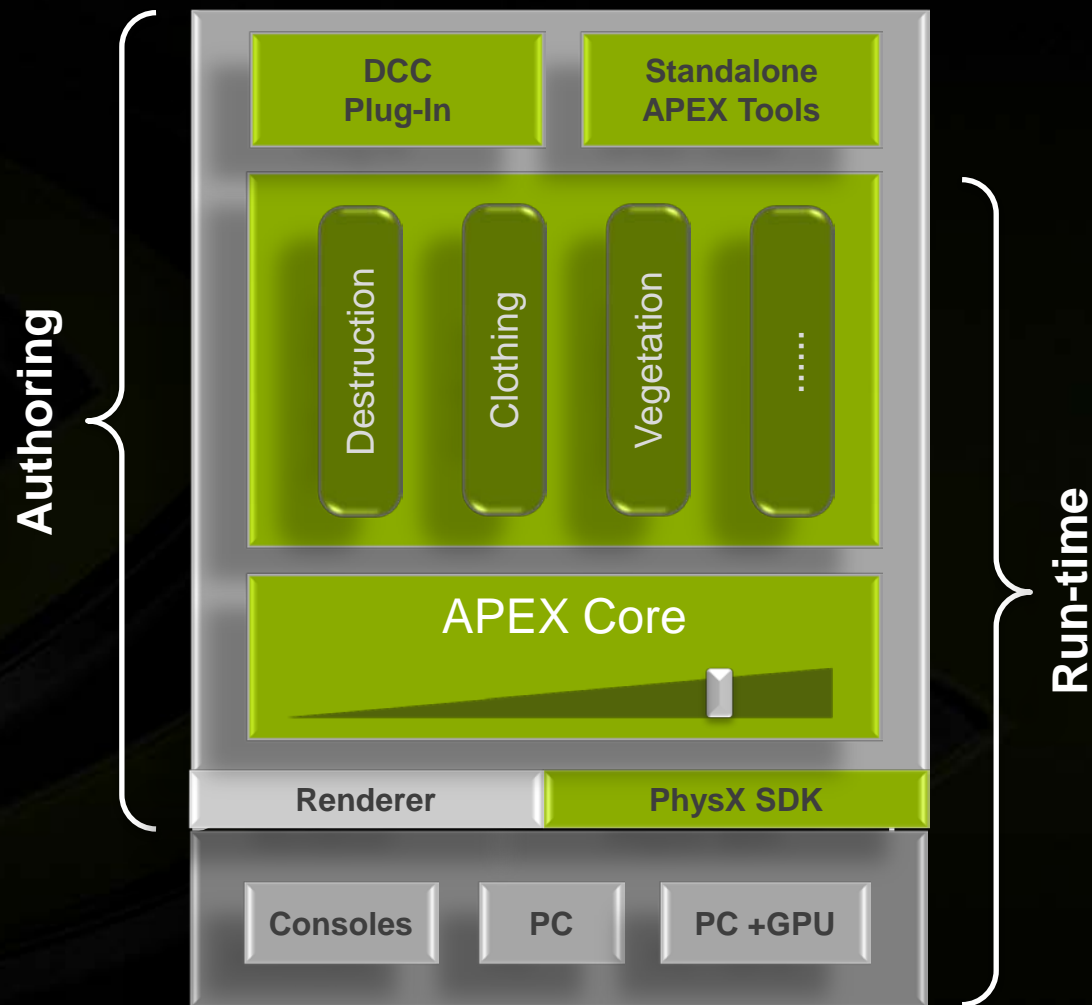


Turbulence



- **Goal: easier authoring of interesting behavior**
- **Problems:**
 - 1. Significant programmer involvement (bottleneck)
 - 2. Content designed to min. spec.
 - 3. Game engine performance limitations
- **To overcome these problems:**
 - 1. Give artists a “high-level” interface to content design, via powerful WYSIWYG authoring tools. Provide an integrate-once framework for programmers
 - 2. Scalability
 - Content adapts to different hardware capabilities
 - Artists only need to author once for many platforms
 - Scaling parameters can be set by artists
 - The game may override any of the parameters
 - 3. Rendering “fast path”

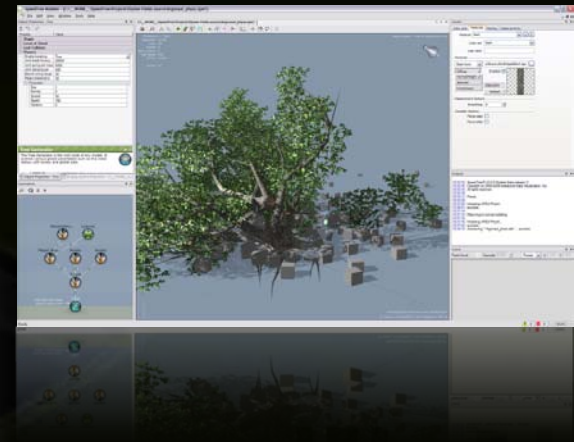
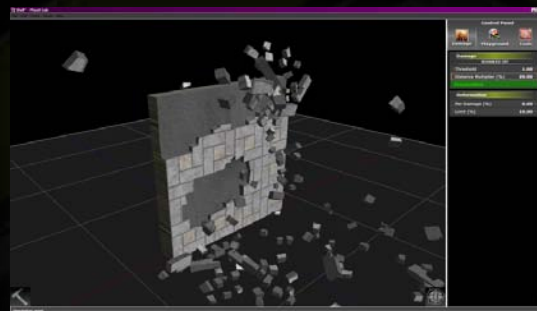
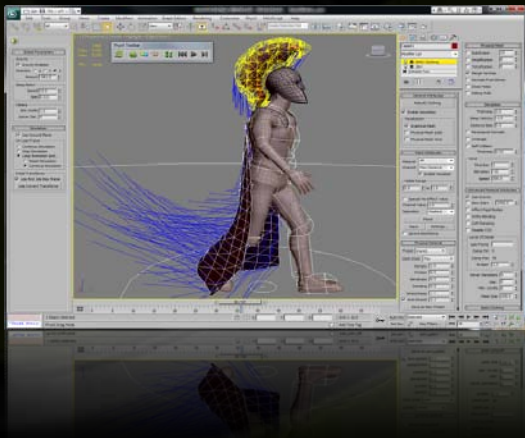
APEX Architecture



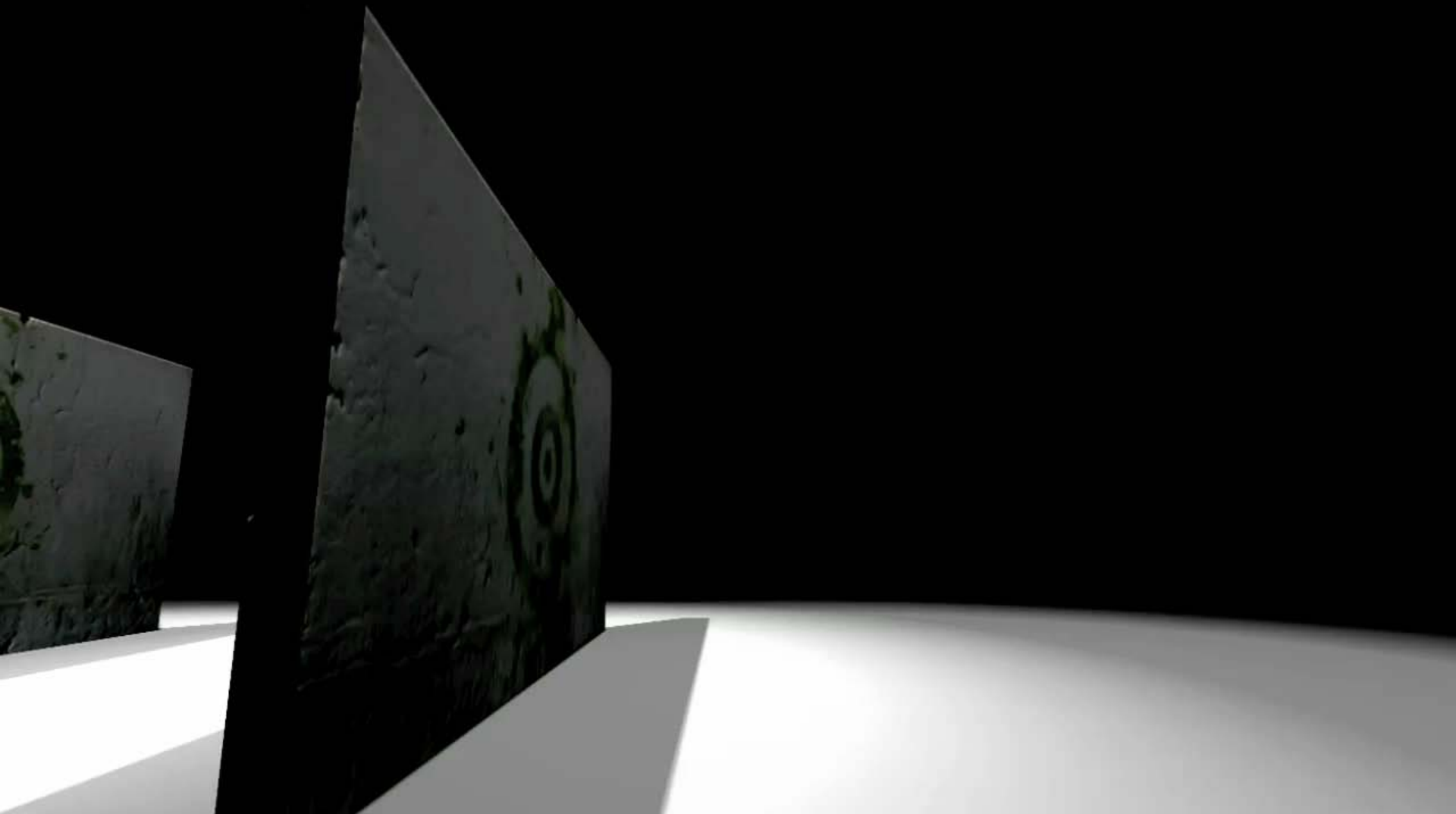
APEX is Artist Focused



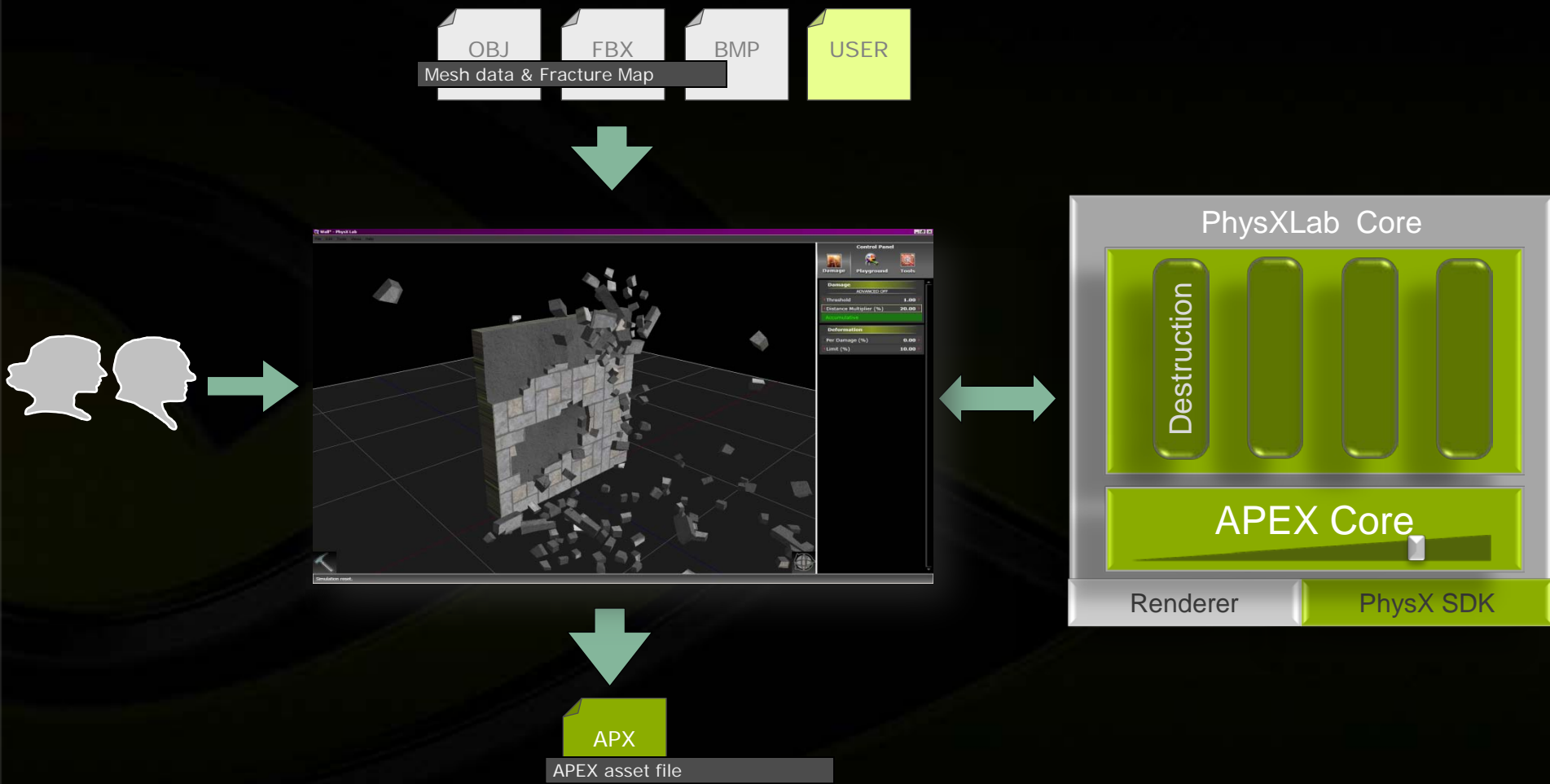
- Artist level abstractions of dynamic systems
 - “Destructible bunker” vs. “collection of bricks”
- Intuitive and easy to use



APEX Runtime Demo: *Dolls to the Wall*



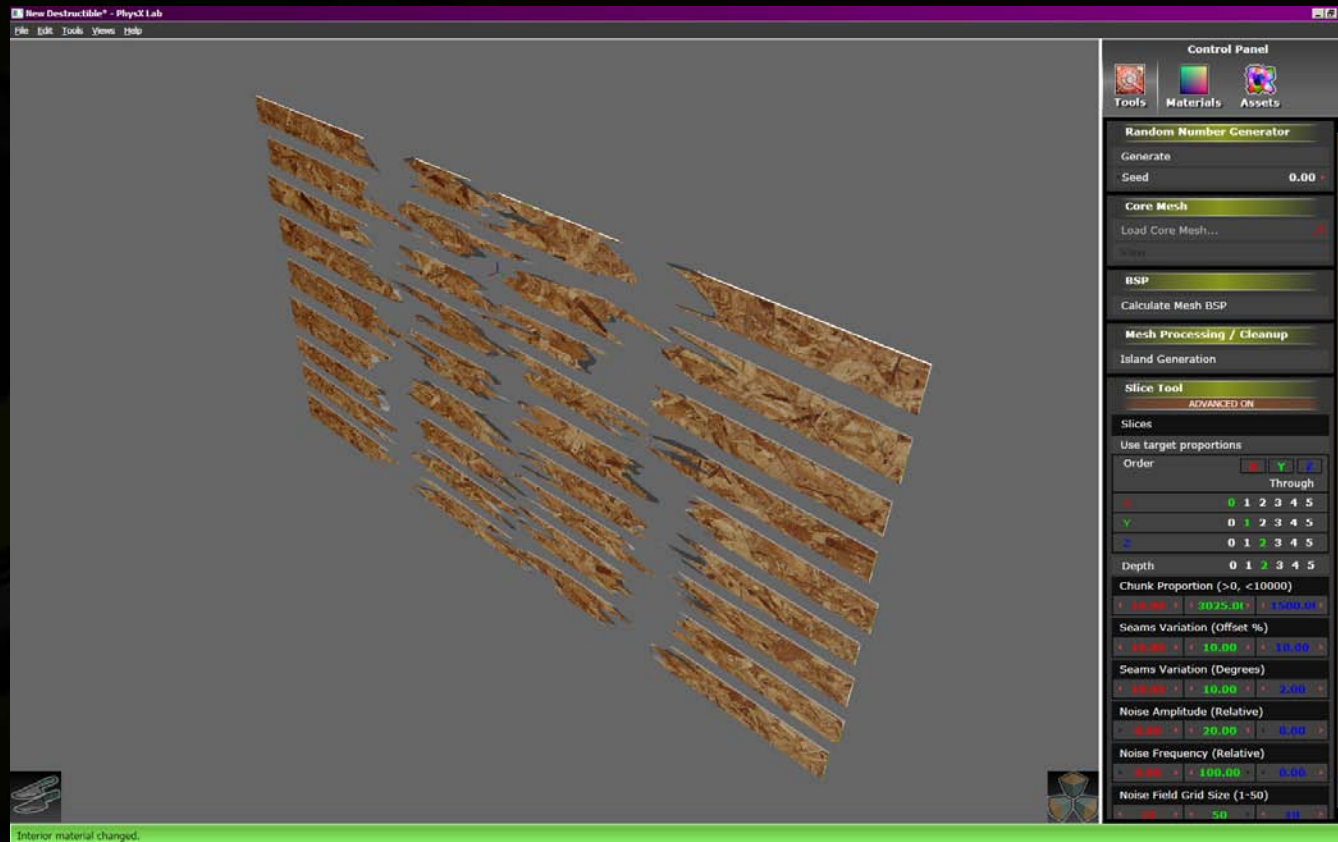
APEX Destruction



Destruction Authoring with PhysXLab



- Live demo



Unreal Engine 3 Integration – Batman Arkham Asylum

- Workflow
- Import / placement in game
- Game demonstration
- Asset Tuning

APEX Destruction

Batman: Arkham Asylum



- **Work Flow**

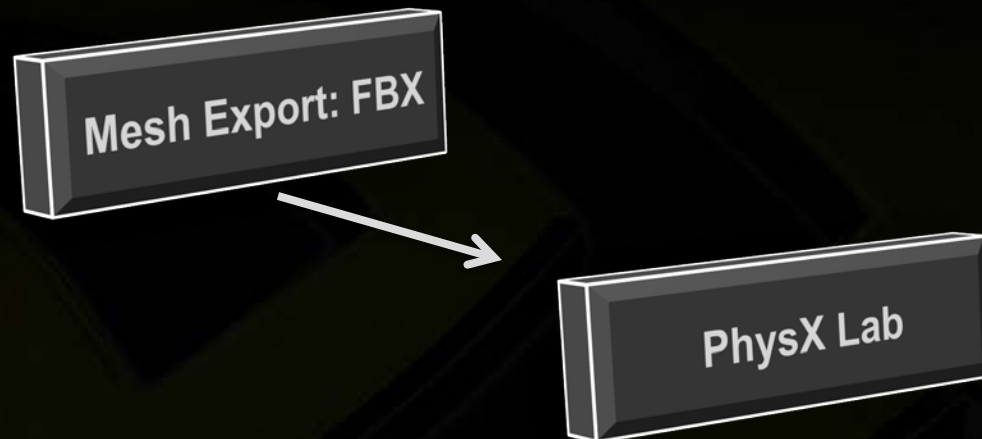


APEX Destruction

Batman: Arkham Asylum



- **Work Flow**

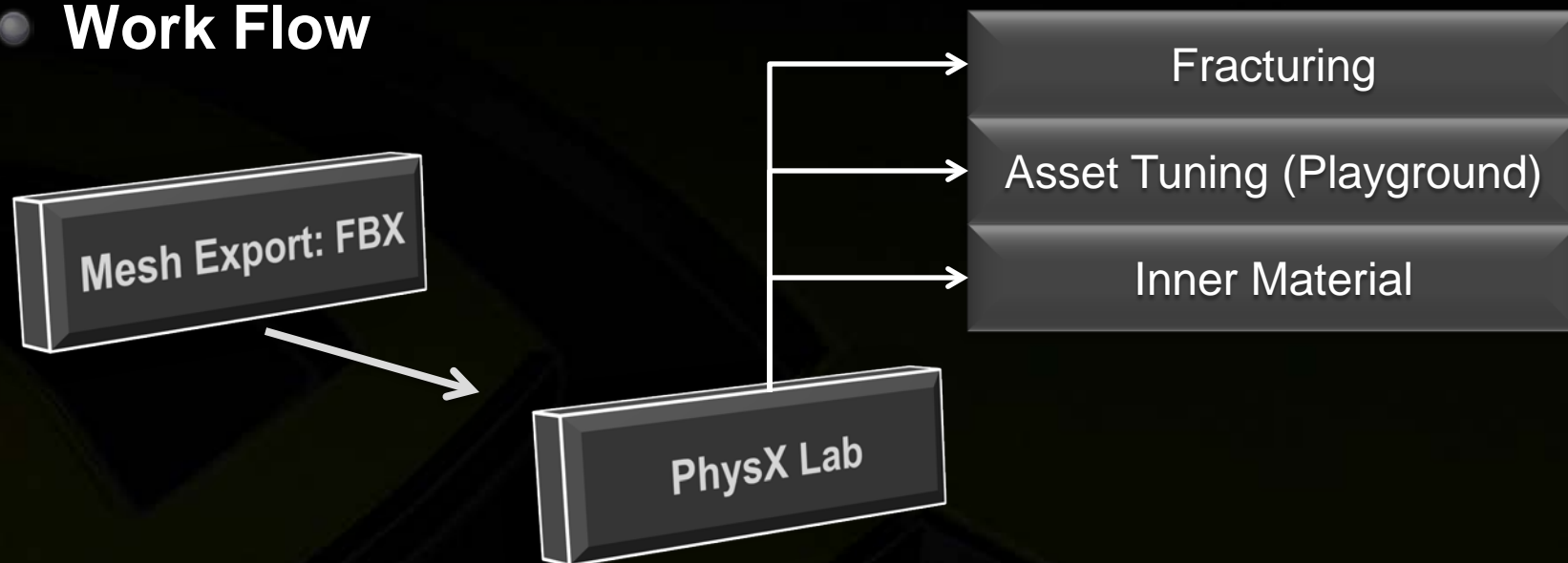


APEX Destruction

Batman: Arkham Asylum



● Work Flow

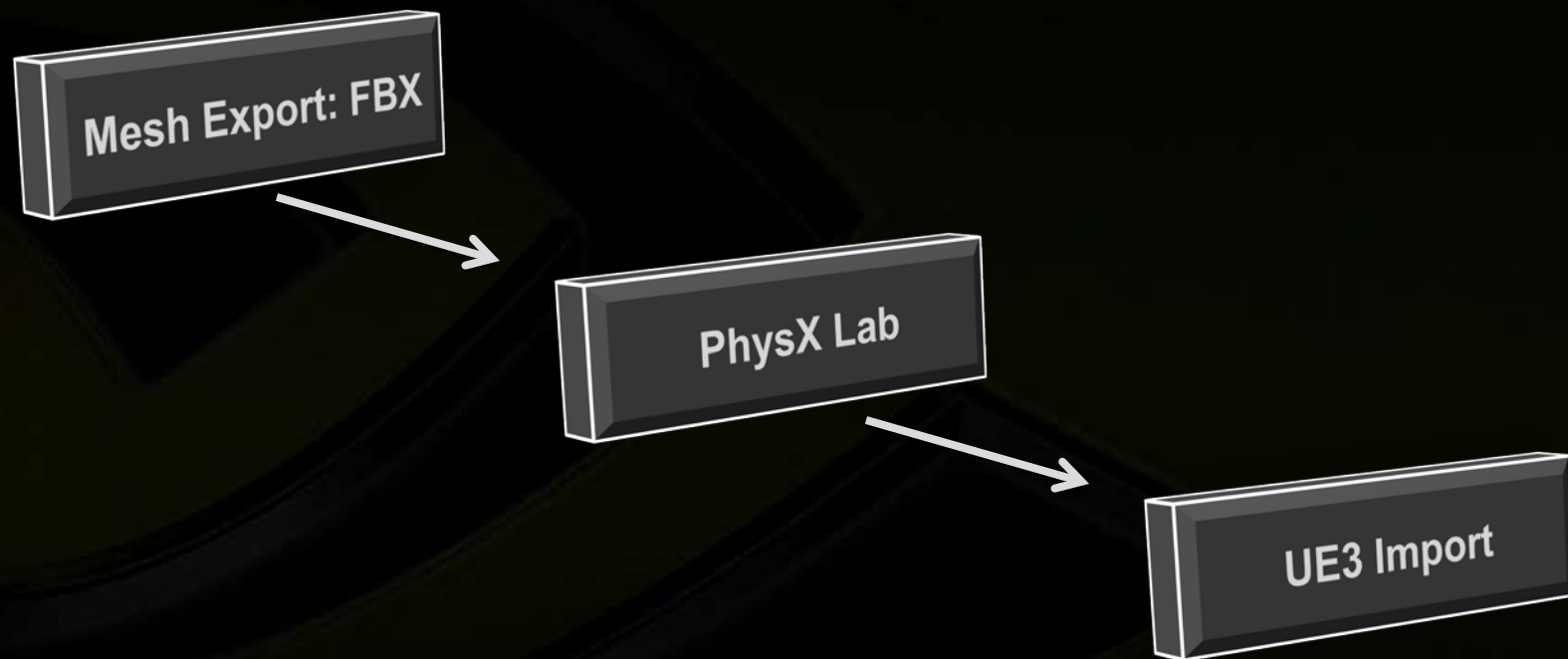


APEX Destruction

Batman: Arkham Asylum



● Work Flow



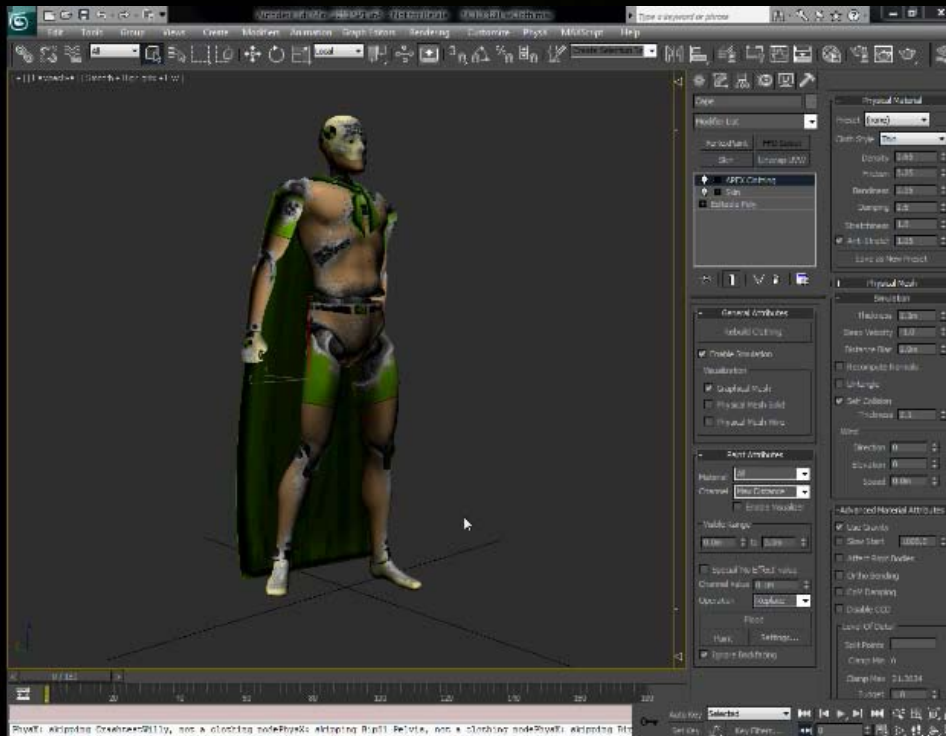
Other APEX Modules



- **Clothing**
 - Authoring Pipeline
 - CCP Demos
- **Turbulence**
- **Vegetation**
 - Authoring Pipeline
 - Tool Demo
- **Particles**
- **Force Fields**

APEX Clothing

Authoring Pipeline



APEX Asset file



APEX Clothing



- Hybrid of simulated and skinned clothing
- DCC tools with preview functionality
- Level of Detail (simulation and graphics)
- Animation blending
- Clothing constraints
- Scalability



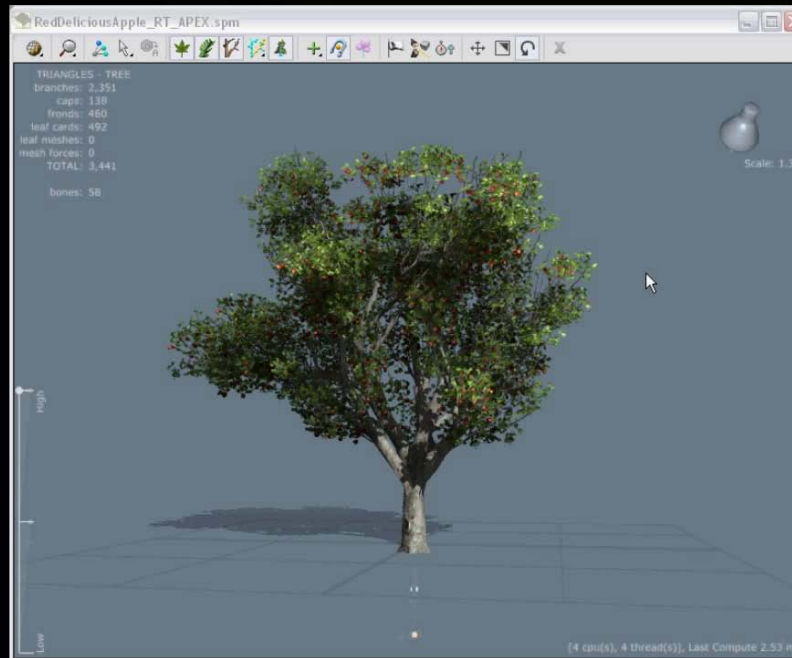
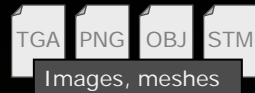
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APEX Turbulence



APEX Vegetation / SpeedTree

Authoring Pipeline



Procedural Files



Where To Find Us



- **During GDC**

- **NVIDIA Demos and Game Technology Theater: Main Expo Area, Booth 1702**
- **Theater:**
 - **Physically Simulated Clothing By CCP Using NVIDIA APEX (Fri. 1300-1400)**
 - **APEX Vegetation with the SpeedTree® Modeler (Fri. 1500-1600)**
- **Sessions:**
 - ***NVIDIA's New Game Development Environment: NVIDIA Parallel Nsight™* (Sponsored session, Room 310 South Hall, Thu. 1630-1730)**
 - ***Taking Fluid Simulation Out of the Box: Particle Effects in Dark Void* (Room 304 South Hall, Fri. 0900-1000)**

- **Online**

- **Twitter: [nvidiadeveloper](#)**
- **Website: <http://developer.nvidia.com>**

