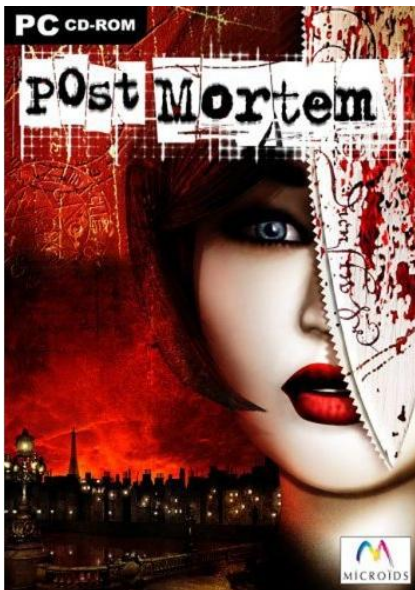
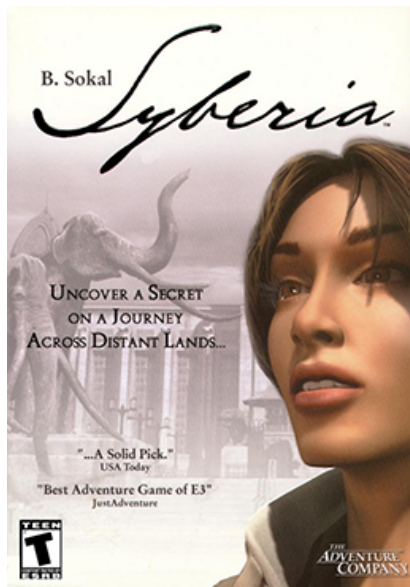


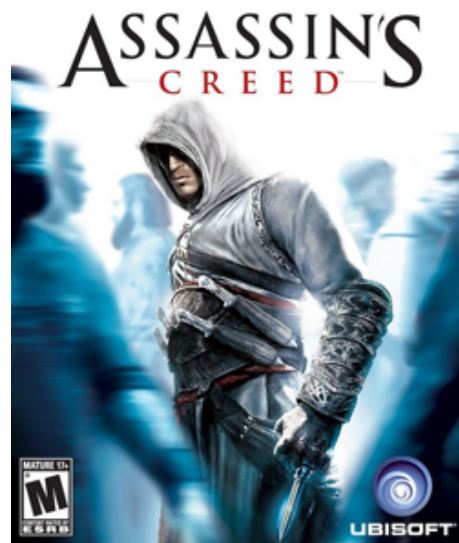


What Are You Driving At?: Vehicle AI in Assassin's Creed Syndicate

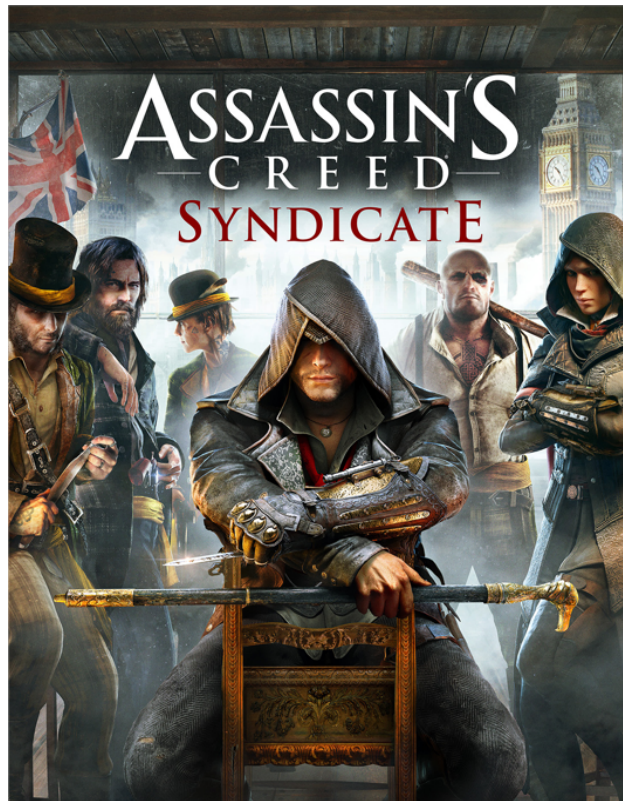
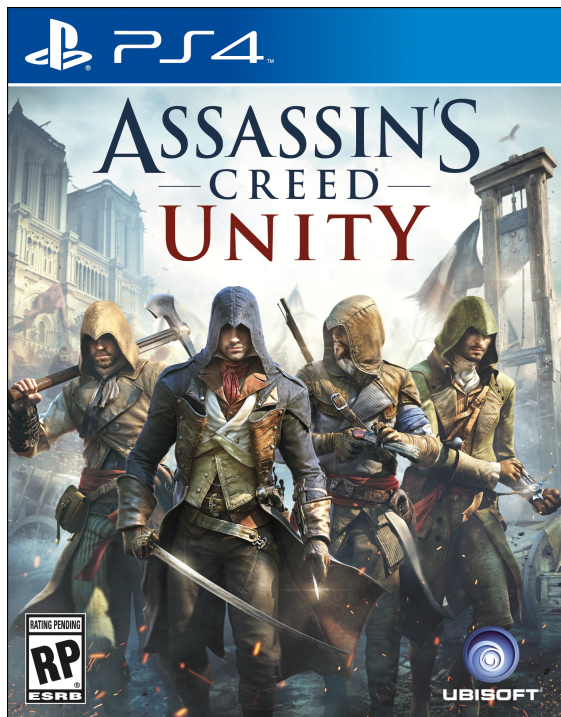
Eric Martel

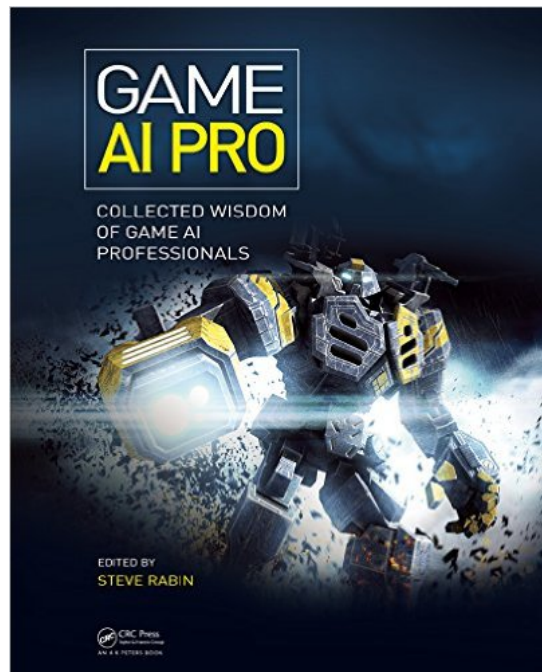
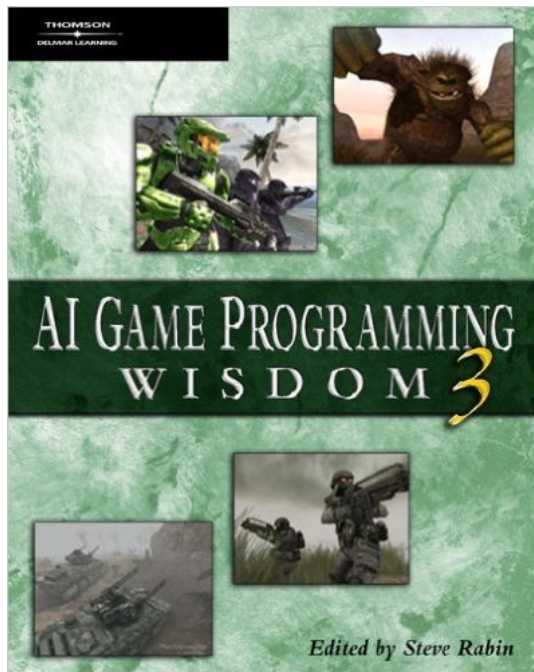
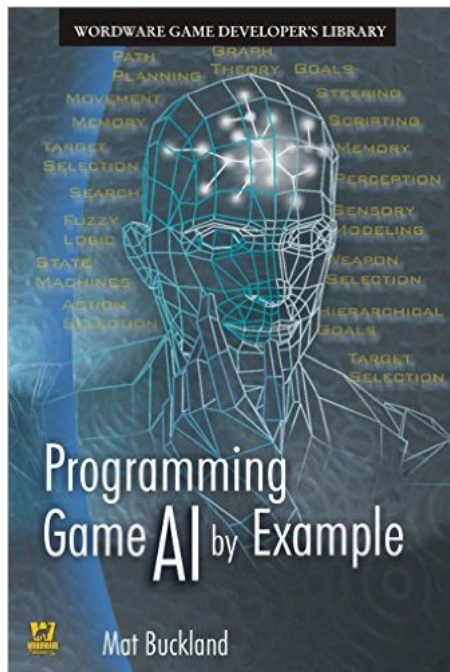
Lead AI Programmer
Ubisoft Québec

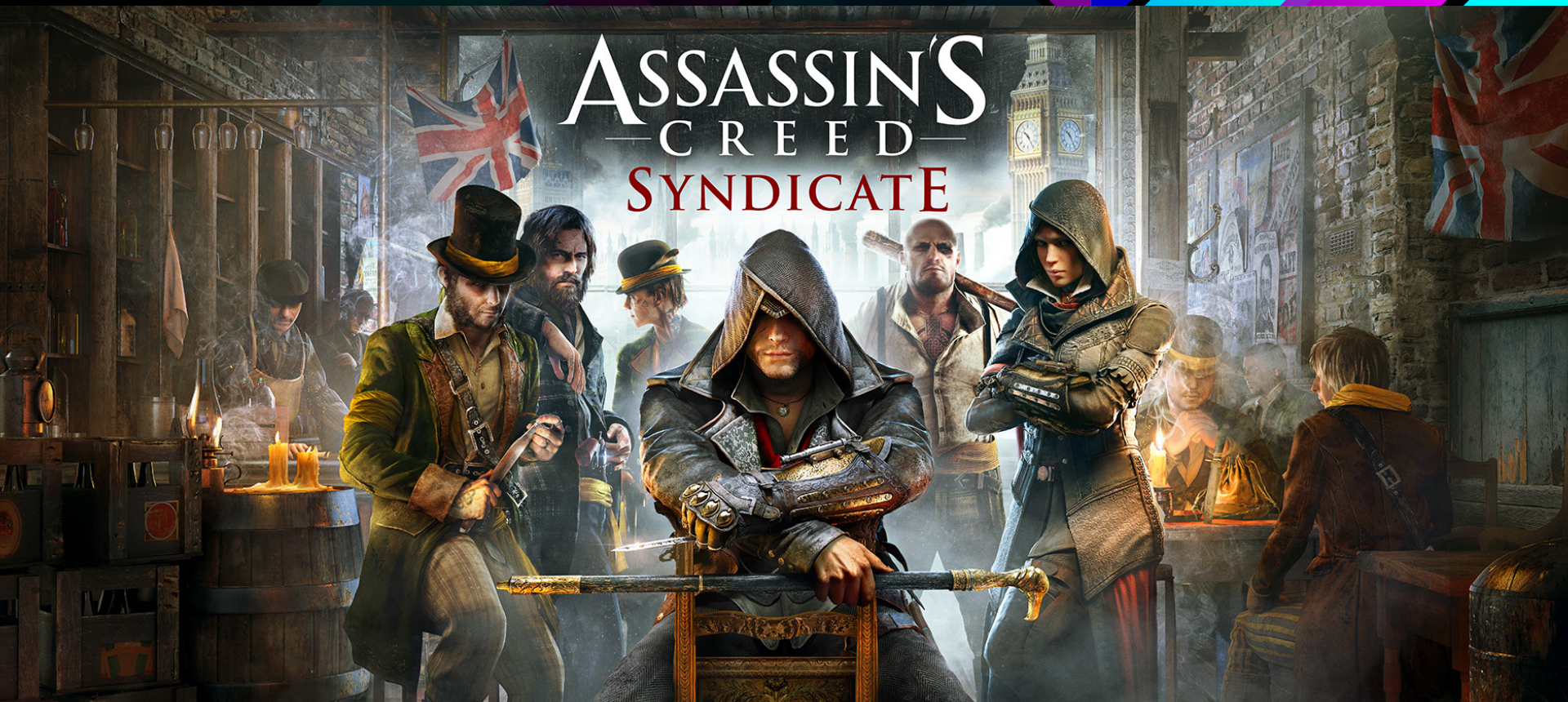












Assassin's Creed

- Navigation
- Fight
- Story
- Exploration
- Stealth

The Setting

- Victorian London
- Roads and Sidewalks
- Crowd and vehicles



Source: <https://www.youtube.com/watch?v=s2HPaJHiO1k>

Objectives

- Various types of carriages
- Road system
- NPC navigation using vehicles
- Fights on and with vehicles
- Support for carriages, trains and boats

Technological Prerequisites

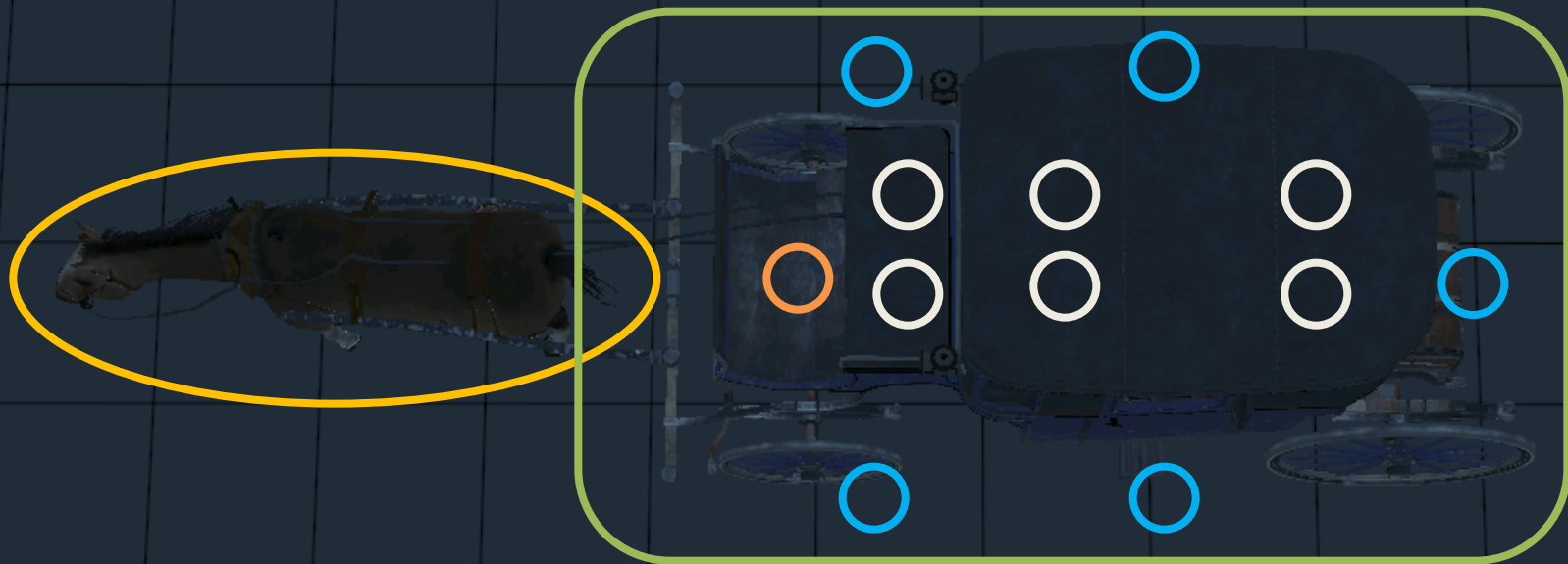
- Road network
- Physics based vehicles
- Reworked navigation mesh system
- Reworked steering system
- Reworked decision making
- Virtualization of NPCs

Topics Covered

- Navigation changes
- Behavioral changes
- Virtualization

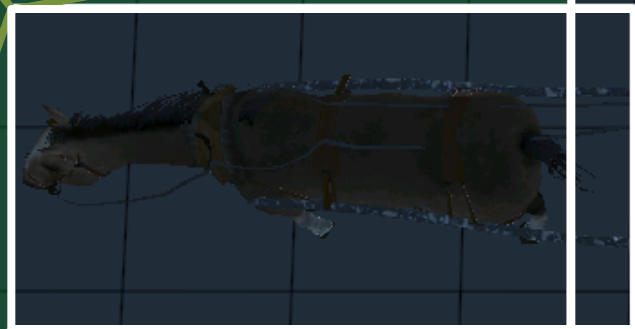
Navigation Changes





Navigation Mesh Patching

- What is patching?
- Why would you want to patch?
- What happens when a patch is applied?



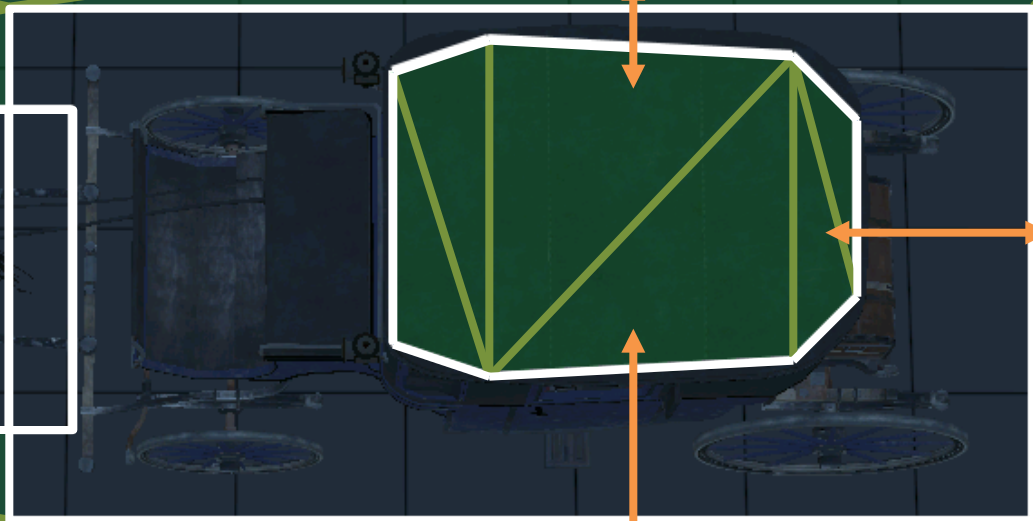
Navigation Mesh Patching

- Cap per frame
- Prioritized by distance



Whisker Links

- Connect static to dynamic navigation mesh
- Cat-like whiskers
- Executed with patching



Dynamic Links

- Specific to trains and boats
- Connection between dynamic navigation meshes
- Similar velocities only

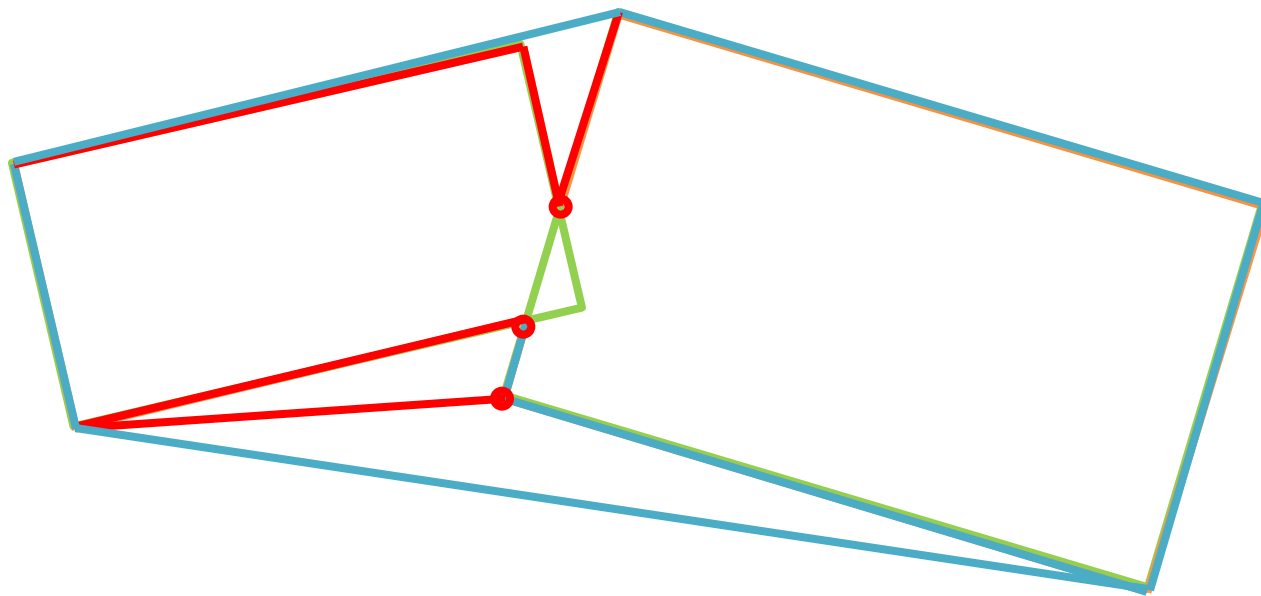
Steering Behaviors

- Radius based avoidance
- Carriage shapes
- Paths not looking realistic

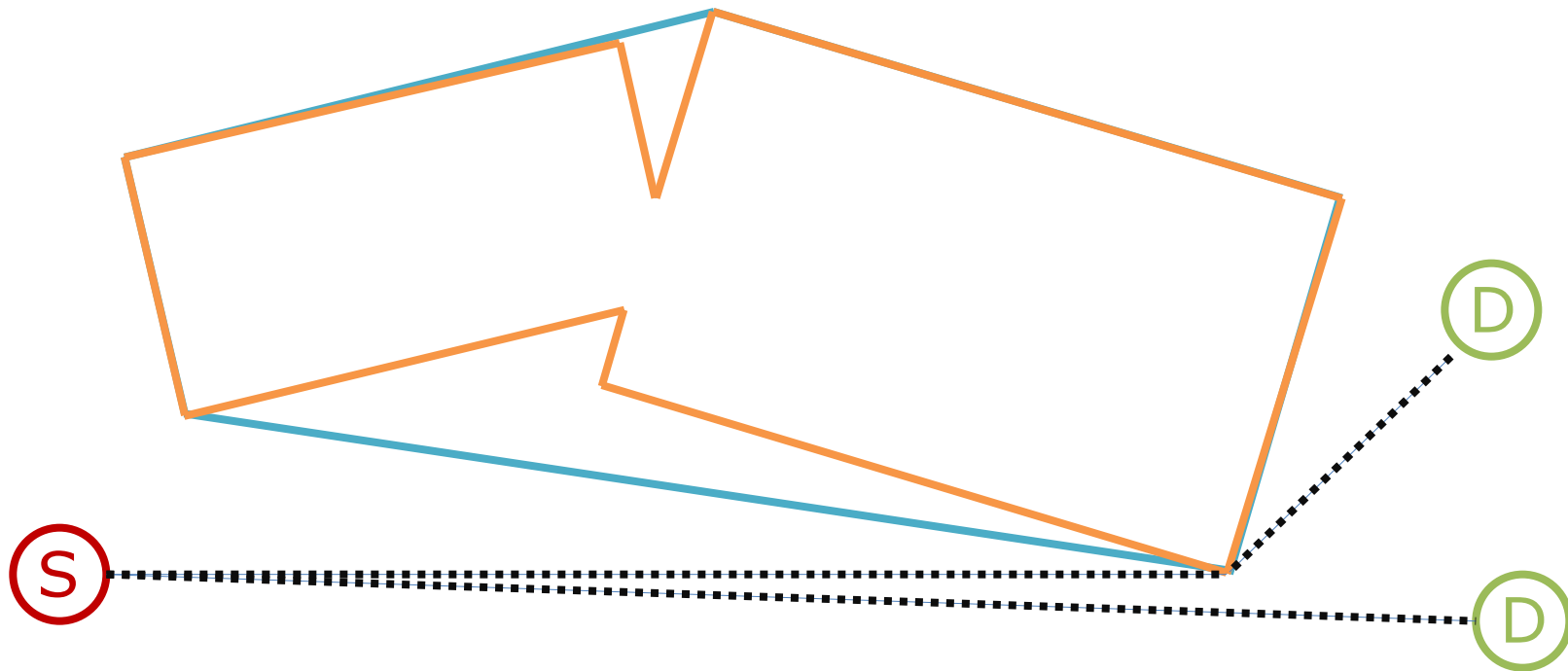


Convex Hull Steering

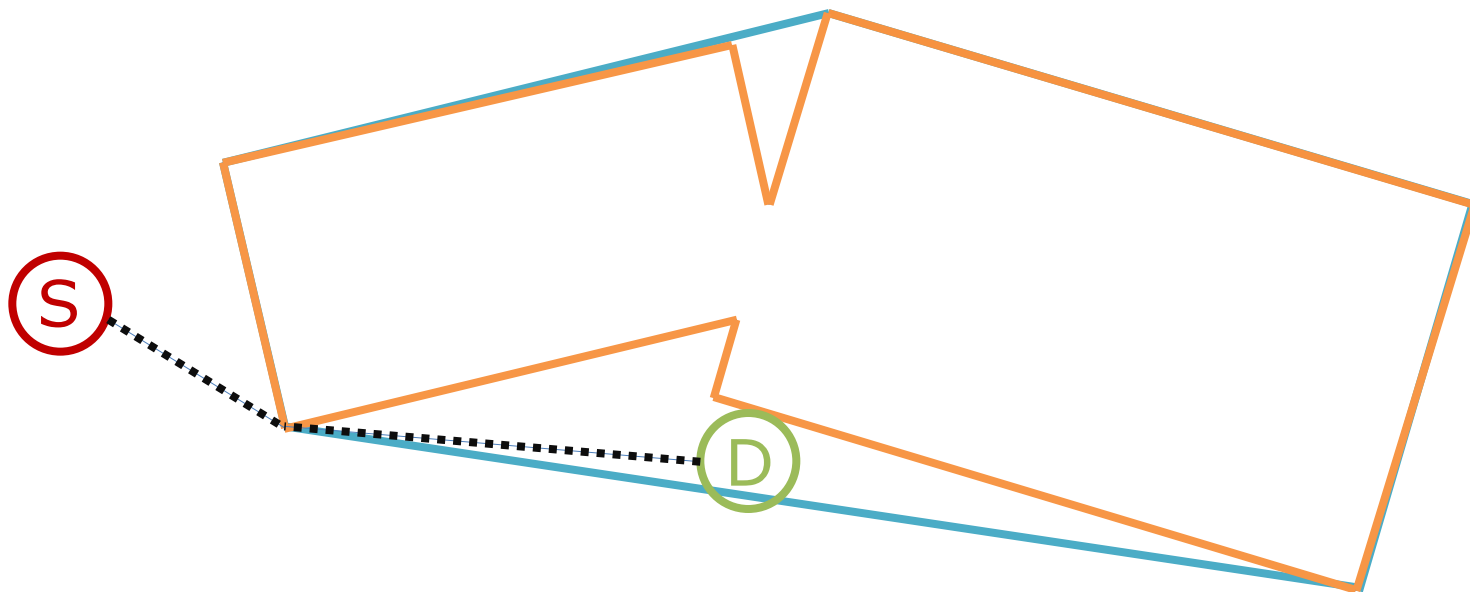
- Concave shapes
- Tractor variations
- Steering method selection



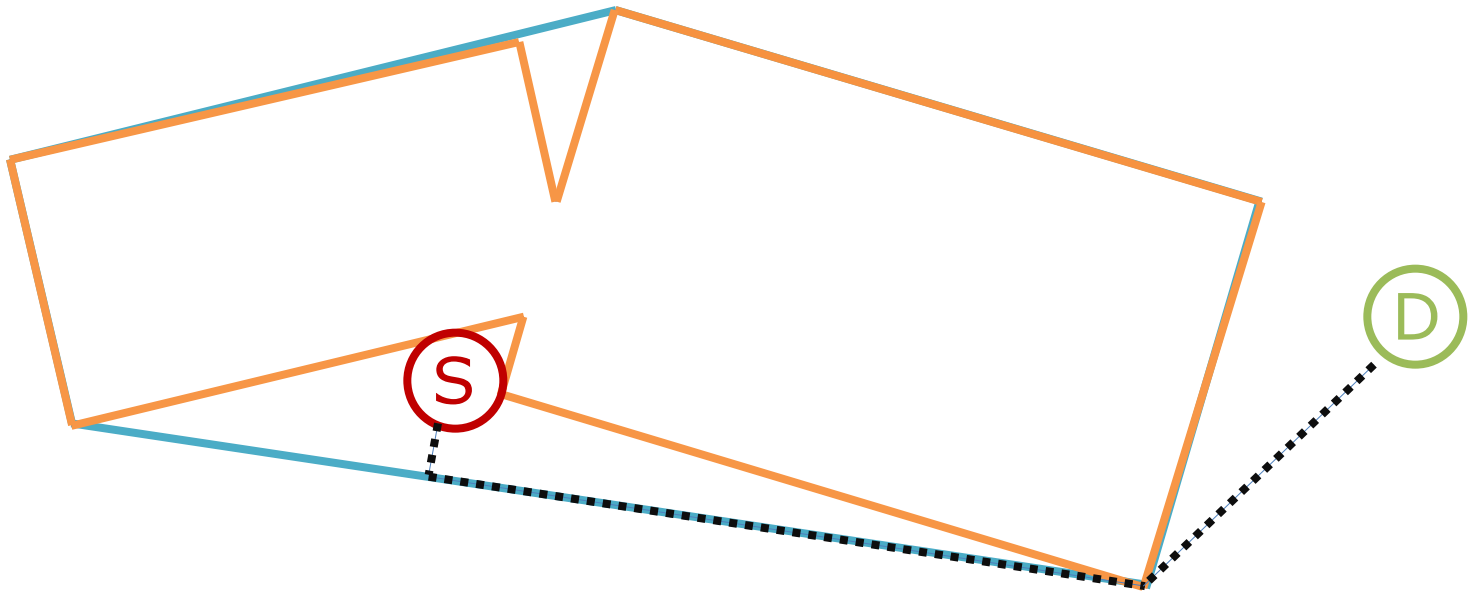
Outside - Outside



Outside - Inside



Inside - Outside

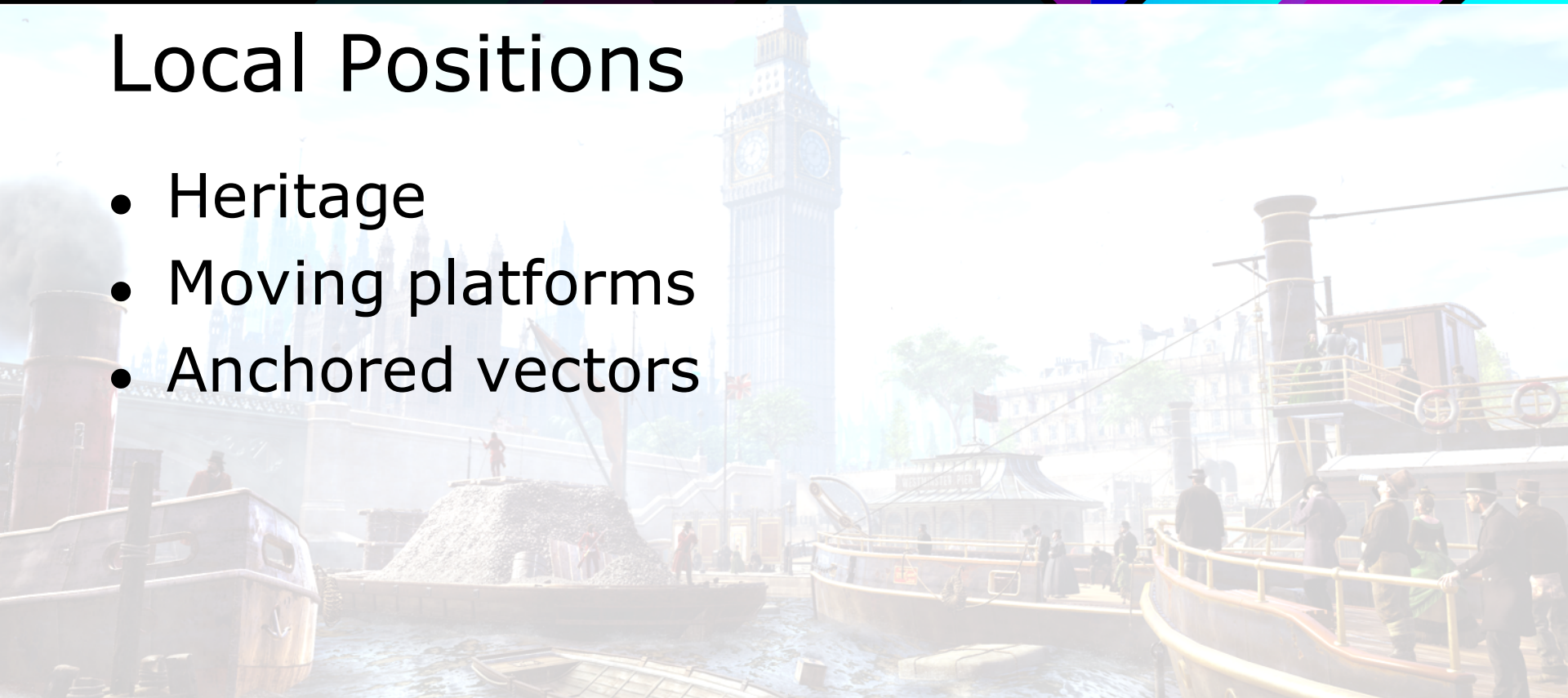




Behavioral Changes

Local Positions

- Heritage
- Moving platforms
- Anchored vectors



Combat

- New behaviors on foot
- Full combat loop on vehicles



On foot – Hijack

- [INSERT HIJACK VIDEO]









On vehicle – Blocking

- [INSERT BLOCKING VIDEO]



Virtualization

Loading Bubble

- NPC lifetime around the player
- On foot vs vehicles
- Navigation and interaction time

Virtual Vehicles

- Reduced amount of vehicles
- Faction grouping
- Health, visuals and target persistence

Virtualized Behavior

- Simplified Chase
- Simplified Search
- Coming back to the player (allies)

Devirtualizing

- Proximity based
- Surrounding traffic analysis
- Combined spawning

Wrap Up

Wrap Up

- Navigation problem
- Build on your existing systems
- Work around your engine limitations





Questions?

Contact

- Wrap-Up Room
- eric.martel@ubisoft.com
- @emartelAI

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MORE QUESTIONS?

MEET ME ON THE UBISOFT LOUNGE

on **TUESDAY** from **11AM** to **12AM**

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- Simon Girard
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Thank you!