

Toward directable autonomous crowds



Clodéric Mars – R&D Software Engineer – Golaem

Populate virtual environments



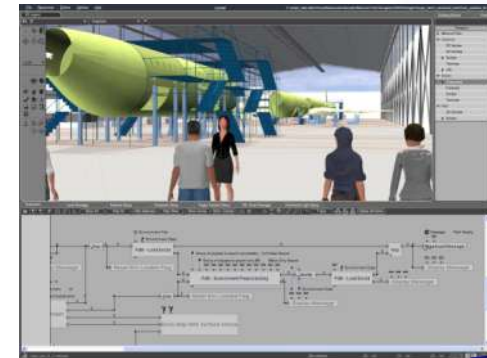
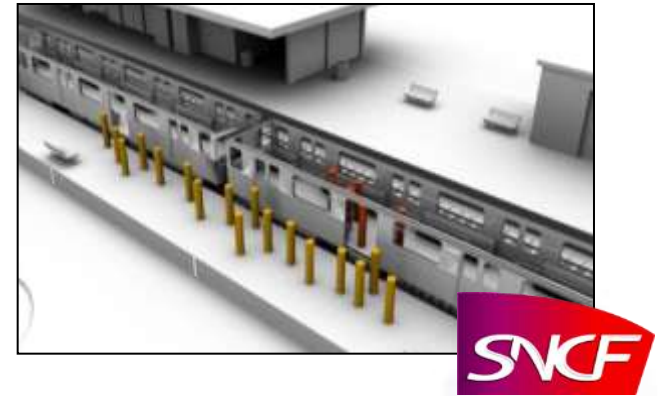
- ✧ Mainstream in animation/vfx
- ✧ Trend in video games
- **Crowds must be believable & directable**

Autonomous entities



- ✂ Manual authoring
 - ✂ Long (read expensive)
 - ✂ Difficult
- ✂ What is autonomy ?
 - ✂ Handle high level orders
 - ✂ React to events
- **How tools can direct autonomous entities?**

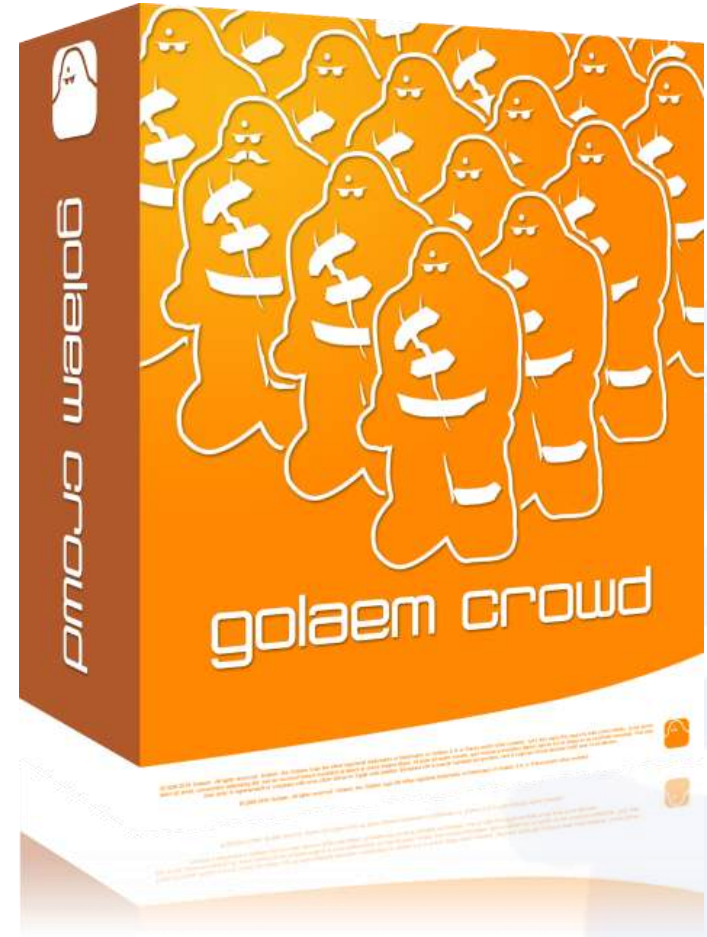
- ✧ Software company
 - ✧ INRIA's spin-off
 - ✧ Founded in 2009
- ✧ Virtual humans in 3D worlds
 - ✧ Animation
 - ✧ Navigation
 - ✧ Behaviors



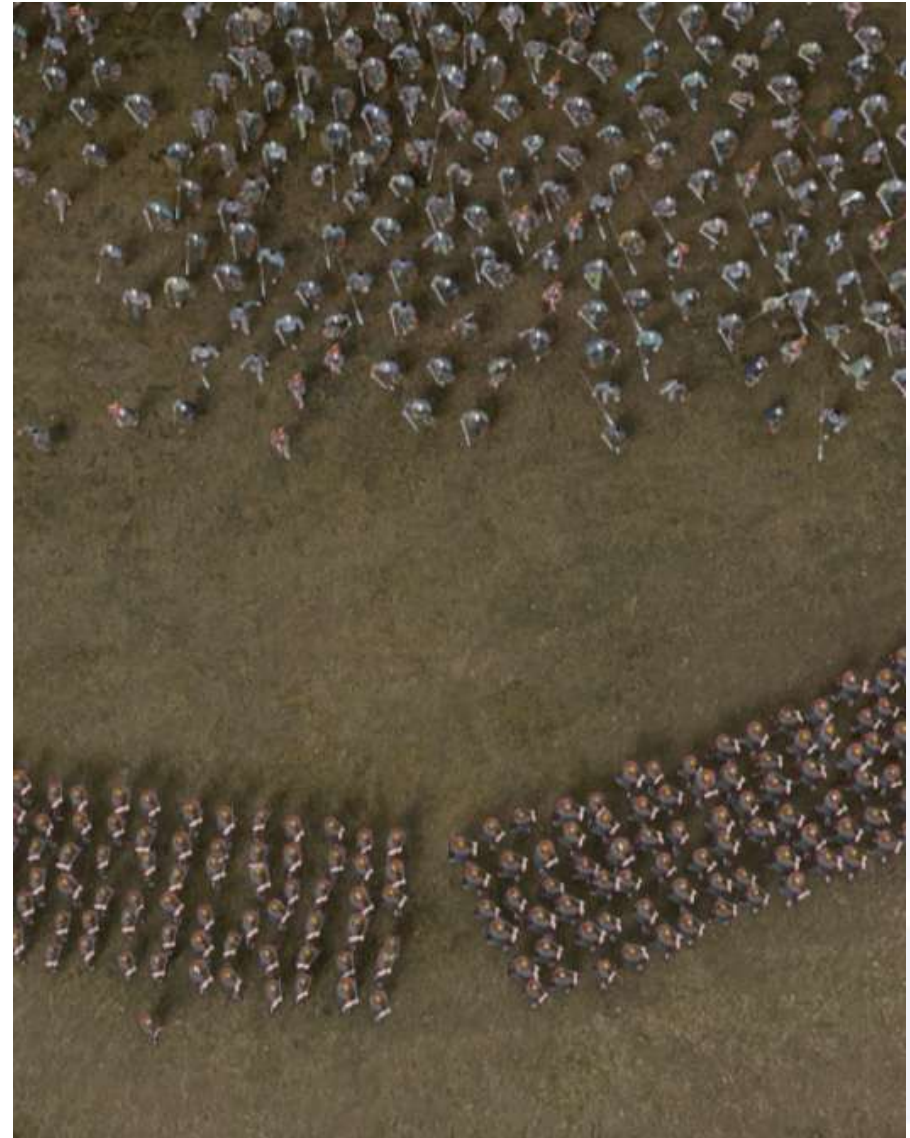
- ✧ Post-production studio
 - ✧ France, Belgium & Luxembourg
- ✧ Special effects for commercials and features films



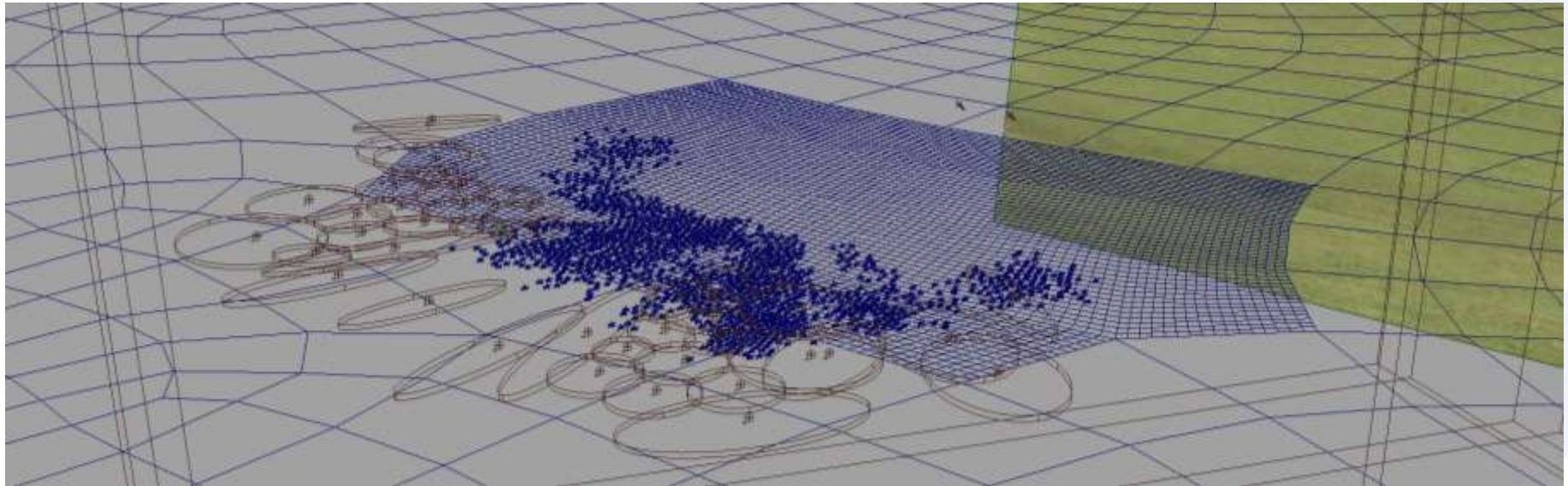
- ✘ Known host tool
 - Plugin for Autodesk Maya®
- ✘ Respect existing production workflow
 - Designed with professionals
- ✘ Rely on Golaem SDK
- ✘ Focus on users needs
 - Limit exposed features



- ✧ How the entities move in the environment
 - ✧ As a whole
 - ✧ At the entity level
- ✧ Usually created using particles and fields
- **How to introduce autonomy?**

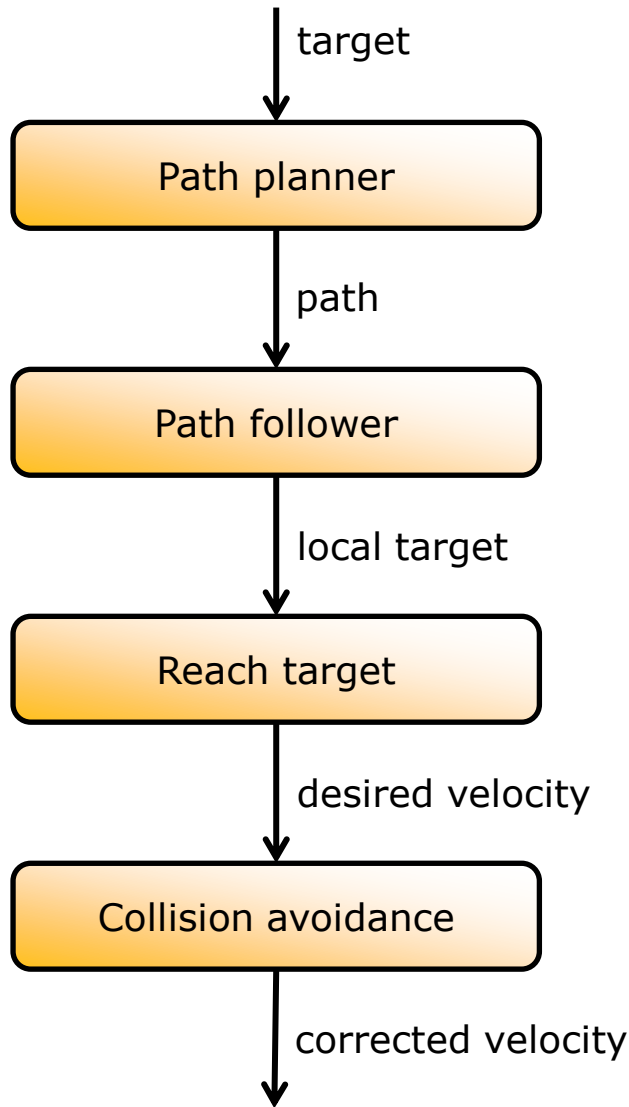


- ✘ Explicit setup
 - ✘ Localized fields
 - ✘ Keyframed forces
 - ✘ Separation forces
- ✘ Difficult to tune
- ✘ Impossible to reuse



Force fields

Autonomous navigation



✂ Rely on Golaem SDK

✂ Navigation mesh & roadmap

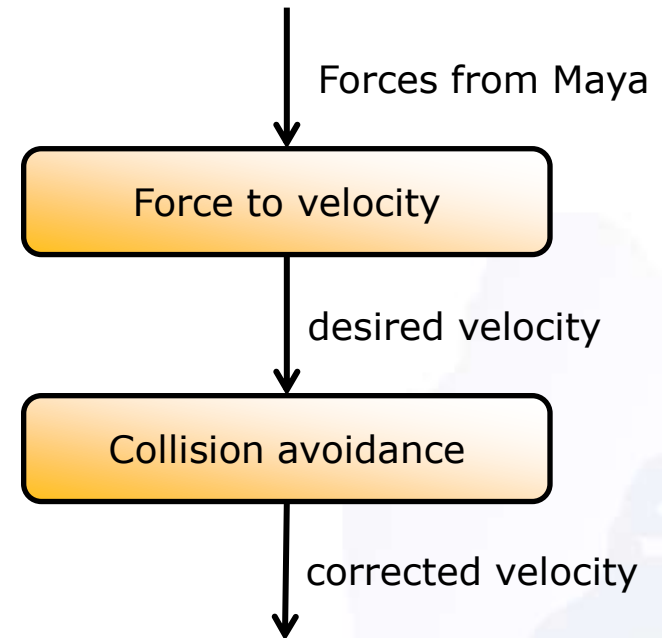
✂ Configurable navigation
pipeline

✂ Algorithms handle complexity

➤ **What tools to direct ?**

Provide « goto » targets

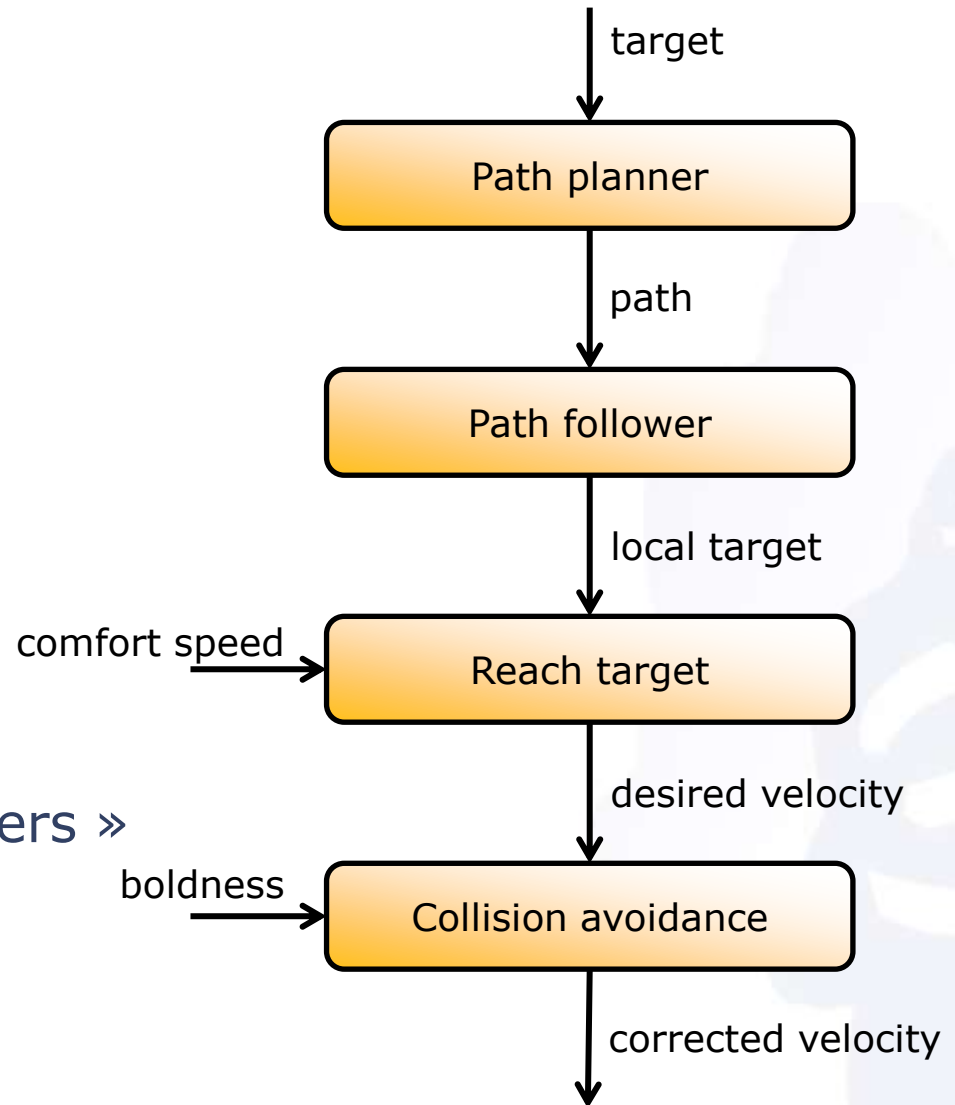
- ✘ Force fields as input
 - ✘ Theory: best of both worlds
 - ✘ Practice: so-so
- ✘ Manual control of some entities



Mix with manual

Expose parameters

- ✘ Parameters musts
 - ✘ Understandable
 - ✘ Visible influence
 - ✘ No « wrong » value
- ✘ Comfort speed
- ✘ Boldness
 - ✘ « I don't care about others » factor



Expose parameters

✂ Groups

- ✂ Cohesive flocks and formations
- ✂ Sketching

✂ Navigation fields

- ✂ Allow to navigate around obstacles toward a goal
- ✂ Easy to mix with authored fields
- ✂ « *Directing Crowd Simulations Using Navigation Fields* » - Sachin Patil et al.



- ✂ Innovative tool
 - ✂ Change of habit
 - ✂ New direction possibilities
- ✂ Convince animators to use it
 - ✂ Useful and simple
 - ✂ Lack of real production feedbacks
- ✂ Applicable for game designer tools ?

It's question time !



www.golaem.com

mail: cloderic.mars@golaem.com

twitter: @clodericmars

Rendered pictures extracted from:

« Alesia, le rêve d'un roi nu »

Production : Agat Films et Cie

Scenario & direction : Christian et Gilles BOUSTANI