**The RAGE project**
- H2020 Research and Innovation Action in advanced gaming technologies (ICT-21)
- Partners from:
  - Games Industry
  - Research
  - Education and Training
  - Business Innovation

**RAGE reusable game software components**
1. **Data analysis**
   - Data tracking
   - Learning analytics
   - Sensors
   - Emotion detection
   - Competences
   - Assessment
   - Evaluation
2. **Game intelligence**
   - Social agents
   - Natural language
   - Dialogue management
   - Game balancing
   - Storytelling
   - Procedural animation
   - Gamification

**Starting points**
- Applied games (serious games) are useful
  - Societal problems, health, education, training
  - Driving creativity and innovation
  - Creating jobs
- Applied games are typically "low budget, low tech" ("poor cousins" of the leisure game industry)
- Applied game industry is highly fragmented
  - >3000 small companies across Europe
  - No key players
  - Limited knowledge sharing
  - Plenty of re-inventing the wheel

**What new technologies?**

**Coping with technological diversity**

**Portability/Interoperability**
RAGE Client-asset architecture

- Avoid dependencies of external software frameworks/libraries.
- Based on established software patterns and abstraction.
- Avoids any interference with the user interface.
- Principal client-side code bases: C# and TypeScript.

Examples

- Emotion recognition
- Natural language processing
- Performance statistics
- …

Example 1: Real-time emotion recognition

1. Face detection
2. Facial landmarks (37-64 points)
3. Emotion extraction
   - Training data set
   - Fuzzy logic rules
   - Accuracy ~80%

Example 2: Natural language processing

Multiple choice:
1. I cannot speak English
2. I can speak English
3. I can speak Dutch

Communication training

Job seekers interview training
Example 2: Natural language processing

- RAGE readerbench services (RESTful)
  - Textual cohesion
  - Textual complexity
  - Semantic annotation
  - Sentiment analysis / opinion mining
  - Essay grading
  - Conversation summar

Readerbench.com (English, French)

Example 3: Natural language processing

Readerbench output

Example 3: performance statistics

- Exploring the players data trails:
  - Which data to select?
  - Which statistical procedures to use?
  - How to apply and interpret the statistics?

- Population statistics
- Normality check
- F-test/T-test comparisons

Goal:
- Provide teachers with reliable statistics on student performance in serious games and protect teachers against making interpretive mistakes.

Approach:
- Send student scores from a client side game to a server-side analytics system.
- Compare student scores to group scores.
- Present visualizations of performance when requested by the teacher.

Interpretation:
- Include interpretation info and possibly a warning for misinterpretations.

Job seekers interview training

VIBOA: Environmental policy

IT system development

Example performance visualization

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- Approach:
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  - Compare student scores to group scores.
  - Present visualizations of performance when requested by the teacher.

- Interpretation:
  - Include interpretation info and possibly a warning for misinterpretations.
  - Note: the collection contains only 3 data points for this trial, therefore these scores may not represent the population performance! For a more accurate estimate, wait until more students have played the game.

\( N = 3 \)