

# The Jomini Engine: a historical MMORPG framework

**Hans-Wolfgang Loidl**

Heriot-Watt University, Edinburgh EH14 4AS, UK

[H.W.Loidl@hw.ac.uk](mailto:H.W.Loidl@hw.ac.uk)

**Sandy Louchart**

Glasgow School of Art, Glasgow G51 1EA, UK

[S.Louchart@gsa.ac.uk](mailto:S.Louchart@gsa.ac.uk)

## ABSTRACT

This short paper discusses the design of the [JominiEngine](#), a serious game engine for massive multi-player online role-playing games (MMORPG), designed as an educational tool for the learning history. The main design principles of the game engine are *accuracy* in the historic model, *flexibility* in the scope of content modeling and cover a wide range of historic periods, *cooperative team-play embedded in a competitive game* in order to reflect historical context, and high *security* in the interaction with the underlying game engine.

## Keywords

Serious Games, Game Design, Historical Games, MMORPG

## INTRODUCTION

The learning domain of history is attractive to a wide range of audiences, from young school children to senior citizens and most find particularly strong resonance in the U.K. where high quality TV productions often attract significant interest and shape a well informed audience. The means for transferring knowledge, however, hasn't changed much over the past decades and often rely on instructional approaches in which interaction is limited. In this context, we advocate a new approach to learning history focused on the notion of "*interactive history*" and the provision of an interactive framework in which the player can interact with a precisely modeled world, and explore causal relationships between the actions of the player and their consequences on the modeled world.

We have designed a game engine for MMORPGs that can serve as a platform for interactive history. Its first instantiation lets the player take on the role of a noble in Britain between 1194–1214, manage his/her estate, interact with other players, and perform sieges and battles. In our game and system design we followed the following overall design principles. *Accuracy* of the world model is crucial in order to provide a convincing environment that reflects core concepts of society in a certain time period. *Flexibility* is generally important for a game *engine* that should be able to model a range of different time periods allowing for very different game mechanics. Additionally we believe that it would be core to the learning experience to embed *co-operative* team-play into a game engine that largely based on historical events along with a *competitive* model, in order to learn about social interactions and dynamics, but also about limitations to communication, in the particular time period. And finally on the system side, we emphasize a high level of *security* that needs to be built into the core game engine, securing the communication between server and clients, and preventing players from corrupting game data.

## BACKGROUND

Our approach to historical games can be summarised in Kirschenbaum's (2011) words (on historic wargames) as "a vehicle for its participants, either through role-playing or the arbitrary rule-based constraints of the game world, to critically examine their own assumptions and decision-making processes". This covers historical games, as well as classical wargames and increasingly also a broader class of simulations in the domains of management and cultural heritage. Anderson (2010) investigated the use of serious games in the field of cultural heritage and drew attention to the increasing provision of modding tools as an intrinsic part of many commercial games, allowing for them to be adapted for educational purposes (i.e. Serious Mods). In our case we emphasize accuracy and flexibility of the game, and therefore opted to build a game engine from

scratch in order to be able to modify all components.

The design of our game engine and its historical accuracy has been strongly influenced by the design of the *The Hundred Years War* by Dunnigan and Nofi (1997). This game features an entire on-line academic textbook providing historical background for the game. Furthermore, Dunnigan (2000) whilst arguing for realism in historical wargames, also makes the case for balancing historical accuracy with fun gameplay and promotes the notion of “dynamic potential”, i.e. mechanisms through which the player might interact with the game world in order to alter history, in order to better integrate both aspects of the design. Sabin (2014) argues even more strongly for simplicity in conflict simulations, and focusing on a manageable subset of game mechanics in what he calls micro-games.

Several modern, commercial games demonstrate the feasibility of building an accurate game model: Paradox’s (2016) ClausewitzEngine in *Crusader Kings* provides an impressive NPC database with detailed family connections, and emphasizes role-playing elements that reflect historical reality, such as the importance of family management and its interaction with the larger political process.

## GAME DESIGN

The aforementioned game design principles are motivated by our long-term vision of a game engine for playing “interactive history” and capture diverse aspects related to socio economics and politics and the dynamics of conflicts. In this project we aim to gain flexibility over these aspects through the abstraction of concrete game mechanics and structures towards the design of bespoke case studies in historical or idealized contexts.

Flexibility, in such an approach, is however a source of inherent tension in dealing with accuracy, realism, playability, or player/learner engagement. We have opted to focus on accuracy and develop solid foundations for the support of the modeled world’s dynamic. However, in an effort to balance world modeling and game play, we do not expect all of the underlying details to be accessible, or even directly visible, to the player. We therefore focus on simple, high-level game mechanics (at player level) which are part of a more complex system of configurable rules which will drive the historical simulation. It also allows us, as game designers, to re-visit the low-level rules, in an effort to improve the model and understand the characteristics of the domain without necessarily disrupting high-level game mechanics. As McCarthy (2004) states when describing wargame simulations, “Unfix [the terms of engagement] . . . and the simulation becomes a modeling exercise. Thus simulation crosses over into modeling when the constants of the system become variables.” This highlights an important long-term issue for this work. The game engine can be used not only as a vehicle towards interactive teaching, but also as the object of study itself by providing insights on historical modeling and, from a systems point of view, practical lessons in the design of large-scale software.

We chose a *role-playing game* in order to place players within an immersive historical setting and encourage player interaction. Given the potential for large scale activity, such as a siege for instance, players would need to interact and form teams, with the team leader, often the King, having to ensure loyalty. To this end, we classified the available resources along several dimensions, such as (non-)transferable, (non-)replenishable etc, and we provide a hierarchical model of player characters in the game, typically with the King at the root of the hierarchy. Game resources are allocated asymmetrically to player characters on different levels of the hierarchy. To compensate for the “unfairness” in this allocation, a prestige-system is used in the game to track a player’s achievements, separately from tracking the accumulation of tradeable resources.

In the current design, the JominiEngine takes a *strategic view* (or macro-history view) of the world, modeling mainland Britain as a hex-map of 207 fiefs, and providing an NPC database with 1889 entries. In this view, resource management issues and conflict resolution take primary roles, as expected from a historical simulation. However, we also put strong emphasis on the household and family management component, to give the player a more tangible concept at the centre of the planning, and to highlight the issue of dynastic planning over a longer time frame. This strategic view should in the long-term be complemented with a more tactical view that should allow the player to “zoom in”, for example into a particular fief, in order to manage the planning of its development in more detail, or into a battle between two armies, to influence its outcome not only based on the skill levels of the NPCs, but also taking in decisions about actions in several phases of the battle.

Crucial to the success of such a game engine as educational tool will be the balance between learning objectives in the domain of history, and player engagement facilitated by historical narratives, a diverse range of player actions, and the graphical interface provided to the player. The core narrative is, at the moment, fairly loose and focused on empire and domain building, taking a macro-history view, and including a tunable notion of prestige. We however plan to complement this with aspects of micro-history, to allow the player to see the wider societal context of the world. Furthermore, we plan to further develop the Jomini engine in relation to its potential use with class plans and education programs and develop a better understanding of its relevance from the perspective of the educator. On the client side our current implementation provides a fairly basic interface. However, by building the game client on the Unity framework, it has a lot of potential in making it more attractive.

## CONCLUSION

We have discussed the long-term vision and the main game design aspects in developing a game engine as an educational tool for the learning domain of history: the [JominiEngine](#). At this stage, we have a working prototype of a core game engine, as well as an instantiation of the game that models mainland Britain as 207 fiefs on a hex-map and is populated with a realistic database of 1889 PCs and NPCs. The current implementation covers core game concepts of finance management, household management and conflict management, and is set in the time period from 1194–1214. The technical details of the game engine are discussed in more detail in (Bond et al. 2015) and the [web page](#) for this initiative provides more background information.

We view such a flexible game engine, that can model different time periods and can focus on different aspects of the game world, as a useful complementary tool in history education, making the learning process more interactive and driven by the learner. By choosing a specific time period and a topic, such as noble interaction in a feudal society, the teacher can describe the general framework for the learning experience, and select from a range of available narratives to guide the student towards the intended learning outcome.

A focus for future development is an extension of the rule-based low-level game model, content authoring of a precise historical game world, adding core concepts such as religion, and to improve the interface of the client to make it more attractive for players. By designing a flexible, OpenSource game engine from scratch we also want to provide a “motherboard” for further studies in using specific game mechanics in this engine, and we invite interested researchers to cooperate in this process (H-W. Loidl et al 2016).

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