

Power Scheming

Creating a Data Approach to Playful Politics

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Abstract

Political activity is a fundamental human process and a common theme in games. This paper explores and evaluates the creation of a general data framework for representing political processes in games. The major dimensions of playfulness, politics, and data are first framed in relevant and contemporary research, which inform the establishment of a data framework as three data types with specific relations to each other: Character, Material and Institution. An application is built around this framework, presented, and used to evaluate this prototype as a first step in an iterative design process through recreation of two distinct historical-political settings. The framework proves flexible in a variety of use cases, and several approaches are identified for expansion and focus.

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Introduction

His princely power makes him more noble as a man, and we behold him fairer exercising rule than when he functioned as a common citizen.

Xenophon, 2008 [474 BC]

What does it mean when a political figure 'has power' or 'is powerful'? In Machiavelli's *The Prince* (2003 [1532]), a seminal work on the acquisition and navigation of political power, the word is used 54 times but never explained or qualified. The term might intuitively be understood as a fundamental measure of social control and comparison that is inherent in (primarily) human collectives, ranging from the smallest tribes to the largest empires. Not every human necessarily participates in formal political activity, but few people escape the consequences of social power dynamics.

It is no surprise that the topic is a common theme in modern entertainment media. Movies and TV shows will often feature some expression of power dynamics, and popular shows like *Game of Thrones* and *House of Cards* offer all kinds of political intrigue. Series and shows might be outnumbered by games in which power dynamics are part of peripheral or central game mechanics and themes. While games are typically playful products, their educational power across different fields has been increasingly studied and observed in recent decades (Caldwell et al, 2017). Their inherent playful qualities offer avenues for engagement on topics such as political power: games invoke curiosity even towards complicated topics - perhaps especially for complex social topics (Gómez Maureira & Kniestedt, 2019).

Every game that employs political institutions and processes, from big budget productions to small hobby projects, will have their own internal data representation of these political systems, tailored to whatever stories, goals and interactions the game offers. This project investigates the construction of a data solution for representing fundamental aspects of political power in digital form: the foundation for a tool that a creative developer might use to represent political objects and dynamics in their software.

What might a digital framework look like that could serve a wider range of games and general playful and educational solutions? Is it possible to arrive at a configuration that is sufficiently powerful and usable - and how do you evaluate these qualities? These questions together are formalized in the following research question.

Can the essentials of political power be represented in a flexible digital platform that allows playful exploration of the concept?

This is a broad question with some important definitions to clarify. The Methodology section, below, will explain the approach this project takes: through research and framing into prototyping and evaluation.

Methodology

This research question contains several terms that will be clarified in Sections 1, 2 and 3, which together create a 'context' for both development and evaluation of a data framework. Section 1 approaches 'playful exploration' from both academic and practical perspectives. Section 2 establishes 'essentials of political power' from a perspective of political theory and in the context of digital entertainment. Section 3 investigates what it means to construct a 'flexible digital platform' that incorporates these concepts. As well as relevant academic and digital theory, a set of three politically-themed games will serve as use-cases for analysis. These three games will be introduced below, before the three context sections.

These three context sections cover broad topics that can be approached in many different ways - so how can they lead to a set of relevant, precise data structures? The approach taken in this project is to compile relevant findings into a 'Blue Card of Power': a template of goals and characteristics for the framework that is updated at the end of each of the context sections. This Blue Card is then employed as a starting point for an iterative design process, the first step of which is the prototype that this paper describes.

The data framework will consist of a set of specifically-defined data objects that are flexible in representing concepts identified as relevant to the discussion of power, as well as specific rules for how these objects can relate to, and operate on, each other. Informed by the Blue Card for these definitions, the framework should ideally be flexible in translating any distinct political setting into a virtual model.

Following theory and analysis, an overview of the data structure will be given in Section 4: Object Definitions, where each of the core data types and its attributes are motivated and explained. To operate on the framework beyond theoretical exercises, an application is built to operate on it, which will be presented to the reader in Section 5: Application and Calculation. This application allows manipulation of the framework through a set of actions, described in Section 6: Framework - Actions, that have been identified in the context Sections as desirable or relevant to the framework's goals.

It is through these actions that the framework can be tested and evaluated. Political power has an inherent quality of hierarchy: where one actor can be said to have more power than, or power over, another. By focusing on the effects of specific actions on the power hierarchy of a given situation, results can be compared to expectations that have parallels in actual history. This testing and comparison is done in Section 7 - Test Cases. Here two distinct settings are given a short historical introduction, translated into core objects, then acted on through 'dynamics': a series of actions that reflect major changes in these historical settings.

The validity of the framework will be assessed through the investigation of resulting power and hierarchy changes, which are compared to historic expectations. In the process, three key categories of challenge and improvement - Scope, Implementation, and Completion - will be used for categorization that is discussed in Section 8: Evaluation. Although the working of the application is integral to the testing sequence, the application itself is not central to this project's exploration: the framework's aim is to allow integration into different types of playful applications.

Further evaluation of the framework will be of a primarily qualitative nature. How well is its limited set of data objects able to represent complex political settings across histories and cultures? What are clear limitations of the framework as become evident through the testing, and which of those limitations might the framework be able to accommodate if it were to be extended? And finally, how does the framework perform in the context of the research question and subsequent discussed theory: is it flexible and usable enough for the context of playfulness that was established?

"Somewhere – or Nowhere, perhaps – there is a society ruled by philosophers. They have clean hands and pure hearts. But even in the metropolis of light there are middens and manure-heaps, swarming with flies. Even in the republic of virtue you need a man who will shovel up the shit, and somewhere it is written that Cromwell is his name."

Mantel, "The Mirror and the Light", 2020

Tomas Cromwell, English minister to king Henry VIII, is the chief protagonist of Hilary Mantel's Wolf Hall trilogy. Look out for relevant quotes from the series, and this political setting features as the first test case in Section 7.

Subject Games

Research on the topics of play, politics or simulation is plentiful, but research specifically on digital translation of political power for playful purposes is not abundant. For this reason, the context sections will combine academic and technical insight with analyses of data organization, playfulness, and representation of power within three modern games. These games are chosen to represent a broad subset of games, through their variety in structure and political emphases.

Crusader Kings II

'Crusader Kings II' (CKII) is a grand strategy game where you manage a dynasty and its political standing on a world map. Choosing a game from its developer, Paradox Interactive, for analysis seems responsible because their games represent political systems and its operation through intricate control of characters, their relations, policies, and resources. CKII has a special focus on political dynasties and is therefore chosen over other plausible options such as 'Europa Universalis', 'Victoria' and 'Hearts of Iron'.



Figure 1. CKII World Screen

Democracy 3

'Democracy 3' (D3), created by Positech Games, is a strategy game of political policy making. It is a simulation of modern political systems with clear cause-and-effect relations. Whereas CKII employs political systems as an engine for a wider variety of play (such as economy management, military campaigning, etc.) D3 focuses on political processes: managing taxes, budgets, cabinet members and population groups. The game employs a neural-network-based system for managing the attitudes and responses of many different but overlapping voting groups.



Figure 2. Democracy 3 Main Window

Dungeons and Dragons

'Dungeons and Dragons' (DnD) is a slightly older game of social pen-and-paper roleplaying. Players imagine adventures together as a group ('party') in a world that is created and narrated by a player that directs the game ('dungeon master', DM). Freedom of action is at the discretion of the DM and codified by dice-based-rules set out in various editions of the game published by its owner, Wizards of the Coast. DnD is about fantasy, action, exploration, freedom and fun - it has less of a political focus than the previous two games. But in a world where anything is possible, politics is an exciting dimension to employ and explore. As a solid foundation of and representation for the fantasy genre, both in gaming and general entertainment media, DnD offers a wider lens for political settings than the 'historical' games above. Besides being historically asynchronous, DnD stands apart as an analog game (even if plenty of digital tools exist for specific DnD solutions). While the project's aim is to create a digital platform, the line between digital and analog is not entirely distinct in games: as will be discussed below, one can inform the other, and each can utilise some of the same basics of architecture.

1. Context - Playful Exploration

Power and its digital translation is to be explored from a playful perspective - but how should such 'playful exploration' be understood? This section offers a broad view of significant academic approaches to the concept of play, with emphasis on two significant scholars of play theory: Johan Huizinga and Roger Caillois. These findings will be framed towards contemporary, then digital, then game-specific definitions. Observations are joined with analysis of the Subject Games to investigate qualities and user interactions that the framework should aim to allow.

Johan Huizinga is an early-20th century historian who formulated a theory of play that is deeply embedded in human nature and customs. In his main work on the subject, *Homo Ludens*, he posits play as not just some feature of civilization, not even as something that informs or drives civilization, but as its most essential force: "[civilization] arises in and as play, and never leaves it" (Huizinga, 1970). Philosophy, po-

etry, warfare and politics are all structured in, and formalized through play. Among the most enduring of such expressions he counted the noble conduct and brutal violence encoded in the concept of chivalry: “*Chivalry was one of the great stimulants of medieval civilization, and however constantly the ideal was belied in reality it served as a basis for international law, which is one of the indispensable safeguards for the community of mankind.*” The end of chivalry was an end to one of the ultimate forms of play, one that would continue to inform the written and unwritten rules of (at a minimum) Western political thought. The fascist takeovers of Europe Huizinga saw in his time were a construction of such ideas and ideals taken to an extreme purpose, a “*perversion of play*” (Huizinga, 1936).

“Chivalry’s day is over. One day soon moss will grow in the tilt yard. The days of the moneylender have arrived, and the days of the swaggering privateer; banker sits down with banker, and kings are their waiting boys.”

Mantel, “*Bring up the Bodies*”, 2012

More specific theories of play that go beyond Huizinga’s vision of play as fundamental human activity should be useful in further qualification of the framework’s goals and operation. Huizinga’s approach to play has not been fundamentally reshaped in consequent decades, but it has seen rigorous reexamination and refinement. Sociologist Roger Caillois questioned how human civilizational activities could be considered both playful and serious. In his attempt at refining a definition for play he categorized four types of play: *agon* (contest), *alea* (chance), *mimicry* (role play), and *ilinx* (‘vertigo’) (Caillois, 1961). While the latter relates to physical activity and so can be disregarded for the digital purposes of this project, the former three types will be analysed below in the context of digital systems.

How can play be bridged from a fundamental human activity to a specifically digital context? Thomas Henricks’ contemporary overview of Caillois and other scholars’ approaches to play offers an anchor for digital considerations: “*Modernity’s formally organized games and forms of media play confront age-old issues. Of critical importance is the way in which we frame the activity and the sources we use for that framing*” (2020). This framing, he states, is ultimately done by the individual, and in its fullest expressions, “*these participants configure the spaces in which they operate.*” What does this configuring mean in a modern digital context? Miguel Sicart’s reframing of Huizinga’s ludic drive for the ‘Information Age’ establishes play as a “*world-creating activity*” (2019), and a way of engaging with the world through technology: “a way of creating forms of order in the world”.

Games are an important medium for this activity, as tools of engagement that allow players to express themselves and impose order on fictional worlds. Jesse Schell, in *The art of game design: A book of Lenses* (2008), defines play for the purposes of game design. The language, he states, is subordi-

nate to the process: “*It is not a matter of knowing the vocabulary of game design—it is a matter of knowing the ideas of game design—what we call them matters little.*” But he does proceed to establish some formality of terminology. After examining the shortcomings of several straightforward definitions of play, he arrives at his own: “*Play is manipulation that indulges curiosity.*” Schnell’s subsequent definition of the word ‘game’ establishes playfulness as a core dimension of games’: “*A game is a problem-solving activity, approached with a playful attitude.*”

Which practical mechanics can help achieve such ‘playful attitude’? Caillois’ categories of play, mentioned above, offer context for analysis of the Subject Games.

Play can be found in conflict and contest, as in his **agon**. All three Subject Games exemplify some measure of this through various types of ‘plots’ that can be made by and against the player. In DnD, actual combat is a staple of the game: usually between the players and monsters, and not necessarily of a political nature. Direct combat or, on a greater scale, warfare, is a feature of human political conduct but clearly not the only type of conflict that games might employ. Violence can be of a smaller scale, and one example of this is seen in all three games: the possibility of destruction of characters and material through violence. A useful first action is thus identified for operating on the future framework: the destruction of world elements.

Alea, chance, is a staple of games, old and new, analog and digital. The endurance and popularity of a game like chess proves that it is not some inescapable requirement for games, but it does offer clever and cheap strategies for increasing replayability, simulation, and enjoyability. It is not unreasonable to claim that most modern games of advanced complexity include various and significant elements of randomness. Each of the Subject Games incorporates chance in different ways. In some cases, numbers of probability are explicitly provided: plots and schemes as well as combat in CKII offer an exact probability of success. DnD’s success- and damage calculations are explicitly tied to dice rolls. A great bulk of probability, however, tends to happen under the hood. CKII has ‘random events’ that are not explicitly predictable but can greatly aid or harm a player’s plans. D3’s events can randomly pop up and affect your game, and the weight of randomness in the game’s neural network calculations is unlikely to be zero. Chance can altogether be identified as a useful mechanic that should be employed where a system requires it and where it can support playful interaction with that system.

Mimicry, or role play, is the name of the game for DnD: it’s a pen-and-paper role playing game, where players inhabit the skin of their character as far as they are comfortable or able to, in order to affect the world (and other players) around them. CKII offers a variation on the role playing genre, where the player represents a dynasty rather than a specific character. D3 is not branded as a role playing game, but the narrative still frames the player as a president-or-similar-title in charge of making policy decisions. All of these games operate on

a timescale where it is realistic to represent a character, but this is not a necessary quality for the employment of mimicry. Even in a game that goes ‘through the ages’, such as the popular Civilization series, players are represented by an in-game ‘leader’, such as Genghis Khan or Elizabeth I, whose awkward immortality has never offered a serious problem to immersion. Role play is clearly a common and valuable technique to engage players with their subject-play-material, but it is not a prerequisite for users to engage with playful systems such as the ones described here.

One common thread to these three categories of play is a dynamic seen in all three Subject Games: the management of **resources**. D3 offers Political Capital as a representation of accumulated power that can be spent on policy changes and reflects how well you perform as a leader. DnD has a trusty system of currency: 10 copper equals 10 silver equals 10 gold, and this currency is an important mode of interaction for the players with the world they inhabit. CKII has three main currencies: Gold or Wealth, as a payment material; Prestige, as the political standing of a Character; and Piety, for its religious standing. A significant dimension of playfulness in these and many other games is the management of these resources. Some manipulation of material elements should be actionable in a future framework.

Summing up the first part of this section: playful exploration in a modern digital world might be defined as *an activity inherent in many aspects of life, and a core component of games, which should allow people to make sense of, and bring order to, complicated topics, in a way that invokes curiosity*. This brief analysis of Caillois’ relevant game categorizations further informs that *playful systems generally employ conflict as a driver of game action; randomness is a welcome and useful tool; and the option for players to be represented as some human-relatable entity should ideally be kept open*. Finally, two significant categories of operations have been identified that should inform the types of action that can be employed on the framework for testing purposes: *destruction* and *resource management*.

This summary offers just one of many potential approaches to the topic of play as relevant to this project; different key points and theories could result from a similar discussion. The same is true for summaries in the following two context sections. It is implausible that every relevant topic or angle might be covered; but one needs to start somewhere, and a systems design challenge like this is an iterative process. Start with a set of relevant assumptions that inform a prototype, then reflect and revise. In this case, above summaries offer relevant pointers for the framework and a subsequent prototype that can test it: the first step of such a design process. The summaries can be formalized into the first part of the Blue Card of Power as follows.

A Playful digital system aims to

- Make sense of complicated topics
- Allow the player to establish some form of order, as a world-creating activity
- Invoke curiosity in the player

Through means that include

- Some measure of contest or conflict
- A potential for randomness, offered to the player implicitly and/or explicitly
- Some identity for the player to inhabit

User action should allow

- Some method of destruction of elements
- Some method of manipulation of material goods

2. Context - Essentials of Political Power

An approach to playful exploration has been established, but what exactly is being explored? What are these ‘essentials of political power’ - and what definition of political power is operated for it? This section aims to provide a starting point for further analysis by investigating power as part of political systems: can political power be approached as a distinctly measurable process, or is it an inseparable quality of the political framework that it is embedded in?

The term ‘Power’ will henceforth refer specifically to ‘political power’.

The definition for ‘political system’ from dictionary.com provides a starting point: “*a coordinated set of principles, laws, ideas, and procedures relating to a particular form of government, or the form of government itself.*” For the discussion at hand, ‘government’ will be understood as a policy-making body within a given area. Can Power be defined within such a non-specific context? The same dictionary’s definition for Power proves less workable: *1 ability to do or act; capability of doing or accomplishing something. 2 political or national strength*: ‘Ability to do or act’ is nonspecific, and ‘political strength’ leaves a desire for clarification on what strength means in a political context - an answer that circles back to its original question. Human beings, in many cases, do not need an exact definition for an intuitive understanding of complicated topics and processes. Human academics, of course, appreciate just such challenges. Talcott Parsons, an American sociologist of the 20th century, noted in his *On the Concept of Political Power* (1963) that “*in spite of its long history, there is, on analytical levels, a notable lack of agreement both about its specific definition and about many features of the conceptual context in which it should be placed.*” Parsons creates his own context to then establish a definition: conceiving Power “*as a circulating medium, analogous to money, within what is called the political system.*”

Power as a form of currency is a straightforward and potentially convenient approach for a digital system that includes resource management and aims at some sort of hierarchy ranking. Reducing power to a single actionable currency is a

distillation that fits the objective of reducing to essentials, and this approach will be incorporated in the Blue Card. Two important questions remain: how would this Power-currency be generated, and how might it be spent?

In *Notes on the Observation and Measurement of Political Power* (1953) Herbert Simon proposes to use Lasswell and Kaplan's (1950) definition of Power as an "influence process" which "consists in affecting policies of others than the self". One would observe this influence of A over B, says Simon, "by noting the differences between the way B actually behaves and the way he would behave if A were not present (or if A's desires changed)". Franz Neumann, in *Approaches to the Study of Political Power* (1950), further categorizes this influence process: explaining that Power "Embraces two radically different relations: control of nature, and control of man". Focus here is on the social arena: the control of man which, Neumann claims, compels rulers to "create emotional and rational responses in those whom they rule, inducing them to accept, implicitly or explicitly, the commands of the rulers". He clarifies how rulers might create such responses: "Three basic methods are at the disposal of the power group: persuasion, material benefits, violence."

These three categories offer approaches to both the generation and spending of Power-as-currency, the latter two in sync with interaction types that have been identified as relevant to playfulness in the previous section ('destruction' and 'resource management'). Barnett & Duvall's (2012) definition of Power aligns with Neumann's influence paradigm: "the production, in and through social relations, of effects that shape the capacities of actors to determine their circumstances and fate". In specifying how Power relates to individuals, they offer an approach for relating Power to its political context: Power as "either an attribute of particular actors and their interactions, or a social process of constituting what actors are as social beings, that is, their social identities and capacities." These social identities and capacities, they go on to explain, are embedded in the institutions that make up a political system. 'Institution' lends itself as a useful term that is broad and general in what it might refer to while easily understandable as part of political contexts. Barnett Duvall go on to "carve power at its joints" to create a taxonomy of four types of Power: Compulsory, the quality of influence that has been described so far; Structural, which relates to actors' places within institutions; and Institutional, which relates individuals to each other through their institutional positions. His fourth type of Power, Productive, is a combination of these three that might be translated as 'inter-institutional'.

The essential qualities of Power discussed so far can be summarized as: *the capacity to effect change in behavior of others, through social persuasion, economic incentive, and violence or the threat of it; expressed as some attribute of individuals and operating as a kind of currency, which values are determined through a combination of the qualities and relations of individual actors, the institutions they operate in, and their position within those institutions.*

The relation between institutions, and between characters and institutions, appears to be a significant determinant whose mutability should ideally be actionable in the framework.

The Blue Card of Power can now be updated to include essential characteristics of Power.

Power is the ability to have commands accepted by others by

- Creating Emotional Responses
- Creating Rational Responses

Which are effected through

- Social Persuasion
- Material Incentives
- Violence or the Threat of it

Power might be expressed as

- A currency that relates to the context it operates in

Determined by a combination of

- Individual actors' qualities
- The institutions they operate in
- The actors' positions in these institutions
- Inter-institutional relationships

Power can be made playful through a digital framework that aims to

- Make sense of complicated topics
- Allow the player to establish some form of order, as a world-creating activity
- Invoke curiosity in the player

Through means that include

- Some measure of contest or conflict
- A potential for randomness, offered to the player implicitly and/or explicitly
- Some identity for the player to inhabit

User action should allow

- Some method of destruction of elements
- Some method of manipulation of material goods

"The world is not run from where [Henry] thinks. Not from his border fortresses, not even from Whitehall. The world is run from Antwerp, from Florence, from places he has never imagined; from Lisbon, from where the ships with sails of silk drift west and are burned up in the sun. Not from castle walls, but from counting houses, not by the call of the bugle but by the click of the abacus, not by the grate and click of the mechanism of the gun but by the scrape of the pen on the page of the promissory note that pays for the gun and the gunsmith and the powder and shot."

Mantel, "Wolf Hall", 2009

3. Context - A Flexible Digital Platform

The Blue Card now offers an approach to translating Power concepts in a playful context - but what might the ‘digital platform’ that aims to represent these qualities look like? An overview of simulation history within the social/political sciences, particularly that of emergent behavior, will be followed by a brief analysis of the Subject Games’ data structures to investigate core practical necessities in data translation as relevant to this project.

The term ‘data object’ will be used frequently henceforth. It refers to any digital representation of any given object: while language- and technology dependent, this is generally understood as a defined template with attributes defined through *variables* and operability defined through *functions*.

John von Neumann, as a physicist and mathematician, provides a scientific definition of modeling: *“The sciences do not try to explain, they hardly even try to interpret, they mainly make models. By a model is meant a mathematical construct which, with the addition of certain verbal interpretations, describes observed phenomena.”* (1995) Models help explain phenomena across all sciences: breaking down and codifying complex topics through model construction, and simulating them through model operation. A hard-science model that simulates gravity would look very different from one explaining suicide patterns in specific age groups: the latter has (at least from a language perspective) a more layered set of definitions to deconstruct.

Simple models have been in use for decades as simulation games in classroom-type settings to educate and inspire students on political topics (Oberle et al, 2020). These simulations might be mostly conversation-based, or operate on theory and writing; or they might take a more gamified / rule-based approach, such as Glasgow (2015)’s team-square-game that presents a condensed simulation of political cooperation and the creation of civil society.

Education and elucidation is one significant dimension of political simulation - another is the study and testing of theory through emergent behavior. Emergence-based simulations are typically more complex, and rely on individually-crafted agents that in combination with their environment and each other create non-specifically-crafted outcomes that aim to be measurable and hope to be insightful. This is an important methodology in the field of social sciences, as evidenced by Gilbert’s (2004) in his evaluation of modeling practices: *“There are many examples of emergence in social systems; indeed, it may be that almost all significant attributes of social systems are emergent.”*

Complex emergent behavior would be an interesting and potentially valuable capability for the platform; but as this is an exercise in conceptualizing, it should not be a primary consideration: translation comes, in this case, before advanced functionalization. Nevertheless, the existence and value of emergence practices within the wider gaming sphere is evident. Eve Online, a space-based Massive Multiplayer Online Game (MMORPG) that has been going strong since 2003,

exemplifies the excitement and value of emergence: as a joint player-developer political oversight platform (Schießel, 2007); as real-world skills and lessons that follow from in-game complexity (Nuttall, 2007); and as wars, crime and political drama that are, for their complexity and experience, as real as life (MacDonald, 2012). Emergence is an exciting and valuable property of wider simulation practices, and the framework’s potential for it will be examined in the Future Development part of the Evaluation section.

How might complex social interactions be expressed without specifically aiming for emergent behavior? Some reliance on emergence might anyway be hard to avoid, says Gilbert: *“One reason why human societies are complex is that there are many, non-linear interactions between their units, that is between people. The interactions involve the transmission of knowledge and materials that often affect the behaviour of the recipients. The result is that it becomes impossible to analyse a society as a whole by studying the individuals within it, one at a time. The behaviour of the society is said to ‘emerge’ from the actions of its units”*. He does point out some benefit to this inescapable complexity: *“An advantage of using computer simulation is that it is necessary to think through one’s basic assumptions very clearly in order to create a useful simulation model. Every relationship to be modelled has to be specified exactly. Every parameter has to be given a value, for otherwise it will be impossible to run the simulation.”*

Small beginnings and explicit definitions should thus inform the first iteration of the framework. Diallo (2019) offers language of framing and some direction for implementation. His *referent* is the concept that is represented, here Power, and “the process of reducing a referent to a simplified form using a set of assumptions is the beginning of the modeling process and ends with a reference model.”

A *reference model* in this discussion thus roughly equates to the definition of Power assembled so far. Following the reference model, *“A conceptual model is the subset of the reference model that answers the modeling question.”* The modeling question in this project refers back to the process of creation itself - how to model this model - but Gilbert offers an out: *“For most referents, it is often very difficult to directly derive a conceptual model that satisfactorily answers the modeling question. One trick commonly used in MS is to simplify the referent into a system. A system is a collection of connected parts that transform a set of inputs into a set of outputs.”*

In other words: another approach to working a conceptual model is to configure the reference model into a compartmentalized system for inputs and outputs. Diallo’s modeling classifications offer some qualification to such a system: *“A live simulation is the execution of a model by humans. A virtual simulation is the execution of a model using a combination of humans and computers. A constructive simulation is the execution of a model using only computers.”* In serving as a tool for playful exploration aimed at human interaction with digital products, the proposed framework would employ

a *virtual* simulation.

A final note on design theory is perhaps the most ubiquitous warning across this and other simulation theory, here as quoted by Robinson: *“The overarching requirement is the need to avoid the development of an overly complex model. In general the aim should be: to keep the model as simple as possible to meet the objectives of the simulation study.”*

What kind of data practices might a super-simple, virtual, deterministic system employ when its primary operational purpose is that of playing with concepts of Power? An overview of the primary data objects of each of the Subject Games will help clarify how data objects serve playful purposes.

Crusader Kings II Data Structure

Character: as in DnD, a core data object in the game. But in CKII, no lowly barbarian can call themselves a Character: only the ranked and titled may carry the name. The primary objective of Characters in CKII is to rule, or to support other rulers. Approaching CKII’s Character as a data object: they have object-specific qualities: name and age, a set of Traits and a set of Skills. And they have qualities expressed through a series of distinct data objects: Claims, Titles and Ambitions (examined below). They can also be part of collective data structures, such as Family (or Dynasty), Councils, and Court (also examined below). Each Character in CKII has an opinion of each other Character in the game (as far as they have interacted with, or at least know of each other). This opinion is not formulated as a data object - on the exterior, at least: it is well possible that hidden internal data objects are used in code architecture.

Holding: Land, or terrain, is explicitly organized in CKII. The most basic land unit is the Holding (or Settlement), of which are three data objects: Castle, City and Temple. Multiple Holdings together combine into the first tier of what CKII calls Realms: the smallest form being a County. The County is the data object that holds information about terrain: climate, defensive bonuses, etc. Counties can be part of a Duchy. Duchies can be part of a Kingdom. Kingdoms can be part of the highest realm tier, Empire.

Levy: A core combat data object that can be several different fighting objects, and multiple levies compose an Army that can be sent around to siege and conquer these pieces of land.

Family: The player’s true mimicry domain. As your game progresses, your main Character will inevitably die, but their Dynasty hopefully lives on.

Title: Can be honorary / minor, which bestow relational and economic benefits, or they can be landed: a tiered system that determines the political position of Characters,

in order (and not including cultural variations): Baron, Bishop or Mayor at the head of a Holding; Count, for County; Duke, for Duchy; King, for Kingdom; and Emperor, for an Empire.

Claim: An assertion or declaration that a Title (and therefore one of above territory objects) should belong to a Character. Claims are further categorized as weak or strong, inheritable or non-inheritable.

Council: Contains five positions that Characters can fill, as appointed by the player. Councillors relate to major categories of governance, such as military and religion, and each councillor offers advice, one passive ability, and 3 active abilities, each of their strength determined by the sum qualities of the Character that inhabits the position.

Court: Another collection of Characters: in this case, the retinue of / courtiers to another (higher titled) character.

Law: Operates on various levels in CKII. Succession laws determine the process of inheritance; crown laws relate to the authority of specifically kings and emperors in a Realm; and demesne laws are of a more local level, determining the relation between ruler and their vassals.

Democracy 3 Data Structure

Policies: Packaged-together governing decisions that have a cost (in resource: Political Capital) and effect (on certain measurements, and/or on specific voter groups). They fall into six categories: Transport, Law & Order, Public Services, Tax, Economy, and Foreign Policy. So that policy: ‘Healthy Eating Campaign’ has a positive effect on a nation’s health level, while ‘Maternity Leave’ increases the happiness of voter group ‘Parents’, but decreases the nation’s productivity level.

Data: A specific category of statistical data, representing such topics as ‘Crime’ or ‘Bus Usage’, each with specific causes and effects, and can only be interacted with only indirectly through Policies.

Situation: Events that have start and stop triggers, specific causes, and specific effects (positive or negative). So that ‘Brain Drain’ triggers from a combination of tax effects and has bad effects on the GDP measurement and Capitalist voter group

Connection: A visual and informational aid that showcases how Policies and Situations affect Data and each other. D3 manages to group complex topics under one name or category by explicitly defining their causes and effects and relations with other topics. Its data objects are of a ‘larger’ sort: featuring not individuals but voter groups; not a specific law on a specific topic but broader policies under categorized headers. There is no reason to assume

that a future general framework could or should operate on such a broad level, but the advantages are evident in its ease of use and lack of a need of specification-for-everything.

These causes and effects are formalized through Connections: a separate data object that structures as well as visualizes relations between other data objects, and so seems useful in terms of both structure and accessibility.

Dungeons and Dragons Data Structure

Characters: They are central to DnD games. Players inhabit their skins, and interact with Non-Player Characters throughout their adventuring. Characters are categorized through identifiers of **race** and **class**, which can be templated from standard material or customized by the players. They are further defined among several numerical axes: a Character's **level**, increased through experience, determines their overall capability; their **primary attributes** of Strength, Dexterity, Constitution, Wisdom, Charisma and Intelligence, are a commonly sight in modern role playing games.

Items: Complement Characters' innate strength and standing in their world. **Money** is divided along a (by now) classic 100 Copper = 10 Silver = 1 Gold; **Weapons** and **Armor**, along with **Spells** and various artifacts equip Characters for their inevitable combat encounters.

Creatures: Or monsters, usually in antagonistic roles, are principal adversaries for player Characters, and they operate on a similar template of attributes and items.

Data Structures - Summary

CKII clearly has a complex set of interrelated data objects that go well beyond the keep-it-super-simple objective of a future flexible framework. Their data objects are tailor-made for the game's operation and the players' interaction with its systems. 'Character' is here, as it is in DnD, a central operational component that needs some place in a flexible system. And just as DnD has a material focus, CKII has a subset of data types that could be gathered under a Material header: mainly, all of the realm and land subdivisions. For some CKII's abstract-collective concepts - Court, Family, Council, Levy - the word Institution would serve as a general header. The flexibility of this term in the context of political systems has been noted before; some potential for its use as a main data object seems evident from this current analysis. Characters as central operating actors, Materials as umbrella term for anything physical that is not a Character, and Institution for various types of collectives: these three data types cover a broad range of the content seen in the Subject Games.

A final expansion of the Blue Card of Power incorporates the findings of this section.

Power is the ability to have commands accepted by others by

- Creating Emotional Responses
- Creating Rational Responses

Which are effected through

- Social Persuasion
- Material Incentives
- Violence or the Threat of it

Power might be expressed as

- A currency that relates to the context it operates in

Determined by a combination of

- Individual actors' qualities
- The institutions they operate in
- The actors' positions in these institutions
- Inter-institutional relationships

Power can be made playful through a digital framework that aims to

- Make sense of complicated topics
- Allow the player to establish some form of order, as a world-creating activity
- Invoke curiosity in the player

Through means that include

- Some measure of contest or conflict
- A potential for randomness, offered to the player implicitly and/or explicitly
- Some identity for the player to inhabit

User action should allow

- Some method of destruction of elements
- Some method of manipulation of material goods
- Some method of defining relations between institutions and characters

The framework

- Takes Inputs and provide Outputs
- Offers virtual simulation capabilities
- Is as simple as possible!

Its data structure includes three core object types

- Character
- Material
- Institution

"The king's body is borderless, fluent, like his realm: it is an island building itself or eroding itself, its substance washed out into the waters salt and fresh; it has its shores of polder, its marshy tracts, its reclaimed margins; it has tidal waters, emissions and effusions, quags that slough in and out of the conversation of Englishwomen, and dark mires where only priests should wade, rush lights in their hands."

Mantel, "The Mirror and the Light", 2020

4. Framework - Object Definitions

Overview

How do you go from a bullet-point list to a complete functioning technical framework? Some details of construction will be necessarily omitted here, but the core of the framework follows the Blue Card directly: three useful data types were identified as able to cover a wide range of content and potential for interaction. With no direct indications of unrepresented entities or requirements for additional types, simplicity dictates an effort to start with just these:

- Character (CHA)
- Material (MAT)
- Institution (INS)

These objects, which allow the framework to represent the entities that operate in a given political setting, need certain qualifiers to be distinguishable and operable. The motivation behind these configurations was informed through a combination of the types of interaction that the framework should offer (as identified in the Blue Card) and technical design considerations and limitations.

One important such technical consideration is how to relate these objects to each other - who owns what Material, and what Characters are member of which Institution? There are different technical approaches to defining these relations. For reasons of flexibility and control, a fourth data type will be introduced below: Relation. This object will not be separately defined when creating a setting, but is instead inferred from ownership values for each of the three core object types.

Each of the four object types will be introduced below: a short summary of the motivation behind them, followed by their database definition.

4.1 Character

Represents any individual actor.

The concept 'Character' featured prominently as a core operational data type from games analysis and represents, of course, the human factor in politics. Unless an application operates on a very large scale, such as with D3's voting groups, Characters will typically take center stage in digital political representations. Along with Institutions, Characters are the primary political actors in this framework.

They are defined through a database as follows:

- **ID** and **Name**[TEXT] are identifiers: the former primarily for database and code linking, the latter for human readability.
- **Charisma**, **Capability** and **Coercion** [INTEGER] correspond with the Blue Card's three power-effector types: respectively Social Persuasion, Material Incentives, and Violence or the Threat of it. Capability as such refers to general leadership capability that will reward its followers with tangible effects.

- **OwnsMaterials**, **OwnsInstitutions**, **CoopsInstitutions** and **OwedByInstitutions** [TEXT] indicate the Relations that a Character has with other objects, as is explained in the Relation object section below.
- **Wealth** [INTEGER] takes a numeric value that generates a Material of the framework's base currency type at runtime, of the specified amount, and owned by the Character.

4.2 Material

Represents any physical object that is not a Character.

Economics feature prominently in dynamics of Power, and between resources, land division and powerful items, it is clear from games analysis that physical objects need a digital representation. For such a broad term as Material there are many approaches to further qualification and quantification, and some need for this is obvious: in terms of power, a single sword is on a different scale than a capital city. Three core Supertypes of Material were established in the early creation of the framework:

- **Constructive**: generates economic power
- **Destructive**: offers a capability of destroying objects, or forcing shifts of ownership
- **Commercial**: represents a medium of exchange

Through continued testing and iteration of the framework this classification was expanded to include several specifically-named Material Subtypes, each still classified under one of three main Types:

- **Constructive**: Settlement, Estate, Building, Tool
- **Destructive**: Arms
- **Commercial**: Nugget

These particular choices of Subtype were circumstance-dependent: in this case, a set of test-settings that required some particular flexibility and specificity. The arrival at a 'core system' for Material, if indeed such an approach is possible, would have to be determined through extensive testing of different settings and applications.

Material objects are expressed as follows in the database:

- **ID** and **Name**[TEXT] as identifiers.
- **Supertype** and **Subtype** [TEXT] corresponding to one of the framework's current Material definitions
- **MaterialCollection** [TEXT] is for a straight quantity, so that one Material object may represent multiple instances of its type. An exception is the Settlement type: where BaseAmount represents population amount.
- **BonusCoercion**, **BonusCharisma** and **BonusCapability** [INTEGER] empower the respective attributes of whichever Characters owns the Material: a particularly nice outfit might empower a Character's public image.

Power-related values for each Material type are, for practical purposes, encoded in the application (discussed below) rather

than the framework itself. This is a practical consideration with no clear imperatives: these values could also be stored in a separate table as part of the framework structure.

4.3 Institution

Represents any collective association or political organisation.

‘Institution’ has appeared both as a potential classification for political organisations, and as a useful denomination for determining Power. In the framework, it represents any form of political activity that goes beyond an individual: from a small group of bandits to a political faction or even the entire government of a city or state.

Unlike the Material object, no attempt was made at classification or categorization of this data type. While it is tempting to investigate potential subcategories or even separate core objects for such things as leadership positions, political purpose, organizational focus, etc., the dictates of simplicity have in this framework informed Institution as a general, flexible concept. Apparent limitations and potential for expansion will be discussed further in the Evaluation section.

Institutions are defined as follows in the database:

- **ID** and **Name**[TEXT] as identifiers.
- **Supertype** and **Subtype** [TEXT] corresponding to one of the framework’s current Material definitions
- **MaterialCollection** [TEXT] is for a straight quantity, so that one Material object may represent multiple instances of its type. An exception is the Settlement type: where BaseAmount represents population amount.
- **BonusFear**, **BonusCharisma** and **BonusSkill** [INTEGER] empower the respective attributes of whichever Characters owns the Material: a particularly nice outfit might empower a Character’s public image.

OwnsMaterials, OwnsInstitutions, and CoopsInstitutions can hold one or more references to these respective objects, specifying Relations. The three Generic fields count for Characters that are not explicitly defined in the Database, but might still be part of larger Institutions: such as soldiers in a militia, or farmers toiling for a landowner. Henceforth these are distinctive from Named characters, which are explicitly defined in the database and so have a data object representing them. Wealth is the same as in the Character table, where it creates an appropriate Material owned by the Institution. Equipped can hold a Material Subtype that is auto-created for each named and generic Character that is owned by the Institution: such as Arms for soldiers in a militia or Tools for farmers toiling for a landowner.

4.4 Relation

Specifies a connection of cooperation or ownership between two objects.

‘Relation’ is the only of the four data types that does not represent any physical or conceptual entity within a given setting. Relation objects function to define interactions of ownership and cooperation between the other three core data types.

Relations store and connect a PrimaryDataObject and a SecondaryDataObject. This distinction matters in case of an Ownership relation (below): the Primary has ownership of the Secondary.

Relation objects can hold references of one INS and another INS, but not for CHA-CHA or MAT-MAT. The latter is not necessary for operation, and relations between Characters are left out of the Framework due to the imperative of simplicity. This is an important consideration that will be discussed more in-depth in the Evaluation section.

Relations can be either of two specific categories:

- **Ownership:** Specifies that one object ‘belongs’ to another
- **Cooperation:** Specifies a measure of cooperation between two entities

Relations between CHA and INS are defined as follows:

- A CHA can own an INS
 - This indicates a leadership position
 - Multiple CHA can own the same INS, in which case one of them is primary leader: a distinction that grants them a larger share in Power calculation.
- A CHA can cooperate with an INS
 - This indicates a semi-leadership, or mutually beneficial relationship
 - Potentially translating as: a high ranking official, or a commercial dealing
- An INS can own a CHA
 - This indicates a subordinate position: a worker that adds some form of value to the INS but has no leadership function

Relations are not separately defined in a database table: they are auto generated when the database is first loaded, based on the relational fields in the Character and Institution tables.

5. Framework - Application and Calculation

Overview

The database that allows definition of the framework's content has three tables, shown above, for the three core object types. One saved copy of a database in this way holds data that together represents a political setting. In the course of constructing and testing this framework, this data has been entered and edited using a lightweight database editing tool, DB Browser for SQLite. Other database editing would work equally well, as long as they support SQLite databases. SQLite is a database management system, here chosen for its compatibility with the software engine that loads, interfaces and operates on the framework: Unity3D.

Using this configuration, the database tables offer templates for each of a setting's objects, and a Unity project creates the objects from these database table values.

In the application that is presented here there is no functionality for writing back to a database once objects have been altered, but this is a potential extension that could be added without issue once it is required.

The Unity application presents an interface to the user that allows various ways of organizing and viewing all the objects present in a setting. Source code and documentation for downloading and executing the application can be found on the project GitHub page.

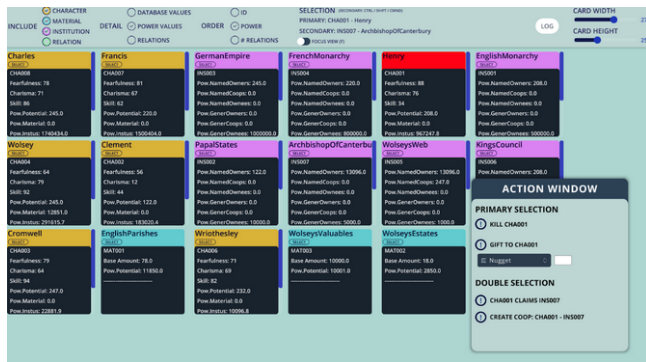


Figure 3. Unity Application Interface

Besides providing a method for creating objects and presenting them to a user, the Unity application can calculate Power values and hierarchies and manipulate them through a set of potential actions. Before relating this set of actions, an explanation of the calculation of Power will follow next.

Power Calculation

In this execution of the framework through the Unity application, Power is represented by a single numeric value property of non-Relation objects. This value, equated with the 'Power as currency' idea as recorded in the Blue Card, is primarily of a comparative nature for establishing differences in power between Character and Institution objects. For reasons of calculation, it does have an absolute value that corresponds

with a single unit of exchange Material. In its current iteration, this Material Subtype is called 'Nugget'. The Material Power values are:

- **Settlement:** 300
- **Estate:** 150
- **Building:** 50
- **Tool:** 15
- **Arms:** 20
- **Nugget:** 1

These values provide a rough reflection of difference of Power potential between different types of generic objects. Values balancing will be reflected on in the Testing and Evaluation sections.

The Blue Card identified the following four determinants for Power:

- Individual actors' qualities
- The institutions they operate in
- The actors' positions in these institutions
- Inter-institutional relationships

Power is calculated in a series of ordered steps based on these dimensions. A total of five additional heuristic values are mentioned in this process as detailed below and will be incorporated in relevant future discussions. They will be bolded and their pretest values added in [] symbols.

1. Each Character's individual totalPower is calculated
 - Sum the values: Charisma, Fearfulness and Capability with equal weight
 - Add Character Base Value Power[10]
2. Each Material's power value is calculated
 - Multiply Material's BaseAmount with Subtype Power value
 - Exception for Subtype Settlement: this is handled two steps below
 - Add bonus values for Charisma, Fearfulness, Capability
3. Each Character's Material Power Bonus is added
 - For each Material owned by Character, add Material's Power to Character's Power
4. Handle the exception from two steps above
 - Institutions receive generic owned Characters equal to Settlement baseAmount (representing population) multiplied by **Population Power Contribution Proportion** [0.4]
5. Institutions get Power from each member Character
 - Character's Power value is added
 - All Owners, Cooperators, and Owned, both Named and Generic
6. Institutions get Power from each owned Material
 - Owned Material's Power value is added
7. Institutions get Power from each Cooperator

- Cooperators are Institutions and Characters
 - Add their Power value multiplied by **Institution Cooperation Factor** [0.1]
 - Value is stored in a separate variable to avoid data contamination
8. Each Character is empowered through each Institution they operate in
- Owner Characters get a major share
 - If there is one owner: They get the Institution's power valued multiplied by **Institution Leader Power Proportion** [0.5]
 - If there is more than one owner, the primary owner gets the same share as above; the rest of the owners share the remaining Power
 - Cooperative Characters get a significant share
 - Divided equally as Institution's Power multiplied by **Institution Cooperative Power Proportion** [0.2]
 - Owned Characters receive a tiny power fraction
 - Divided equally as Institution's Power multiplied by **Institution Cooperative Ownee Power Proportion** [0.01]
9. Each Character is empowered through each Institution they own through other Institutions
- Scan each INS owned by CHA for INSEs owned by that INS
 - Loops to a maximum depth of 5

The calculation of Power as developed and presented here is based on these qualities. This does not mean that the current implementation is the only or the optimal approach to calculating Power. Combined with the chosen core object types, however, it offers a straightforward and not overly complicated execution of these determinants. The quality and potential extension of this calculation will be further discussed in the Evaluation section.

6. Framework - Actions

Objects and their Relations can be manipulated through a set of actions that have been referenced in the Blue Card as useful or desirable. Its three general types of interaction have been translated into the following system of actions and consequences.

Destroy Object (/Kill / Disband / Remove) *Destruction method with a different name for each object type*

- Destroys the object in-code, along with any Relations that involved the object
- Inheritance for Character objects:
 - Its owned Materials get a new owner
 - * Goes to the most powerful INS that the CHA owns, otherwise
 - * Goes to the most powerful INS that the CHA coops, otherwise

- * Goes to the most powerful INS that owns CHA, otherwise
- * Material is destroyed
- Its owned Institutions get a new owner
 - * Goes to the most powerful co-owner CHA of the INS, otherwise
 - * Goes to the most powerful coop CHA of the INS, otherwise
 - * Goes to the most powerful owned CHA of the INS, otherwise
 - * INS is disbanded
- Inheritance for Institution objects:
 - Its owned Materials get a new owner
 - * Goes to the most powerful CHA owner of the INS, otherwise
 - * Goes to the most powerful INS owner of the INS, otherwise
 - * Goes to the most powerful coop CHA of the INS, otherwise
 - * Goes to the most powerful coop INS of the INS, otherwise
 - * Goes to the most powerful owned CHA of the INS, otherwise
 - * Goes to the most powerful owned INS of the INS, otherwise
 - * INS is disbanded

Gift Material *Create a Material with ownership Relation for Primary Selected Object*

- Available for CHA and INS objects
 - If An INS is selected, an optional toggle appears that allows the new Material to be gifted to each member CHA of the INS instead
- A dropdown is offered to select one of six Material Subtypes, and an input field for entering a custom amount (empty defaults to 1)
- A Material object of the chosen Subtype and amount is created
- An ownership Relation is created for the selected CHA or INS with the new Material

Claim Ownership *Create an ownership Relation between Primary and Secondary Selected Object*

- Destroys previous ownership Relations involving claimed object
- CHA can claim MAT and INS
- INS can claim CHA and MAT and INS

Create Cooperation *Create a cooperation Relation between Primary and Secondary Selected Objects*

- CHA can cooperate with INS
- INS can cooperate with CHA and INS

Break Cooperation *Destroy a cooperation Relation between Primary and Secondary Selected Objects*

7. Framework - Test Cases

With the framework structure and its methods of calculation and interaction explained, it can now be put to the test. In this section, two different historical settings will be presented, translated, then manipulated through the framework application. A ‘setting’ in the context of this project is a representation of a given political situation through its relevant elements as defined in database tables. This representation has to fit the structure of the data framework: so that anything that is included is either a Character, Material, or Institution.

Each setting will be introduced with a general synopsis and note on historical basis, followed by an identification of the ‘core objects’ that are needed to represent it in the framework. The two settings, centered on the English Reformation and Fall of the Roman Republic, have respectively three and two ‘dynamics’ where a series of events is translated through a set of actions. A list of expected relevant results is provided in each of these dynamics.

The tests are related to the reader through a series of test-result tables, each of which is followed with one or more observations. For the first dynamic in each series this means three tables are presented: one for pre-action values, one for action effects, and one for post-action values. Subsequent dynamics in each test case contain two tables, where the pre-action hierarchy is the same as the post-action hierarchy in the preceding dynamic.

The immediate effects of these actions on Power values, as well as the changes in Power hierarchies as a result of these actions, together with a reflection on these expected results, frame the observations and conclusions that inform the Evaluation section that follows.

These key evaluation reflections will be grouped under one of three evaluation categories: **Completion**, which refers to how well settings are captured through their objects; **Implementation**, which refers to the current application’s techniques and the framework’s current potential for action; and **Scope** of the framework in the types of political dynamics that it can and could potentially represent.

The exact definition of the settings can be found in the Appendix section. The project GitHub page has instructions on how to view and load each of the settings’ databases, and how to create your own.

7.1 Test Case: Wolf Hall

Overview

King Henry VIII of England is pressured by societal and, no doubt, biological imperatives to produce an heir for the kingdom. Pope Clement VII will not permit him to break his marriage contract with Catharine of Aragon to remarry the more promising Anne Boleyn. The spark of the English Reformation shines bright, and flames are fanned by master administrator Tomas Cromwell.

History

This setting is based on Hilary Mantel’s retelling of Tomas Cromwell’s navigation of 16th century English and European power structures. The primary characters of this story are all rooted in historical fact: it is their motivations and inner lives that required invention.

Core Objects

Which of the many characters, places, and collectives should be part of the setting? Any future game or application operating on the framework would include anything relevant to story and mechanics. For the testing purposes in this section, it is necessary to involve the main political players: heads of the major political structures, high-ranking English officials that have a role in the story, and the major Institutions they operate in. In the list of Characters below, only Cranmer and Wriothesley fall outside this scope: they are useful mid-level Power players that can serve for comparison. Materials that are directly acted upon through actions will be incorporated in this setting: Wolsey’s possessions for Dynamic I, and the English parishes that are linked to the Roman Catholic church.

Characters

- King Henry VIII, owner of the English Monarchy
- King Francis I, owner of the French Monarchy
- Emperor Charles V, owner of the German Empire
- Pope Clement VII, owner of the Papal States
- Thomas Wolsey, cardinal, owner of Wolsey’s Web and the Archbishopric of Canterbury
- Tomas Cromwell, servant of Wolsey
- Thomas Cranmer, priest
- Thomas Wriothesley, courtier

Materials

- English parishes, owned by the Papal States
- Wolsey’s Estates
- Wolsey’s Valuables

Institutions

- English Monarchy
- Papal States
- German Empire
- French Monarchy
- Wolsey’s Web
- King’s Council
- Archbishopric of Canterbury

Dynamic 1 - The Fall of Wolsey

Synopsis

Cardinal Thomas Wolsey is the country's primary statesman operating under - and, arguably, alongside - king Henry. His inability to provide a solution to Henry's marriage deadlock and the wiles of Anne Boleyn lead him to fall out of Henry's favor - and lose everything. He dies of illness on the road to, most likely, the Tower of London. His rising star-servant Tomas Cromwell is in imminent danger of falling after him. Thomas Cranmer takes his place as the next Archbishop of Canterbury.

Action Set

- English Monarchy CLAIM Wolsey's Web
- Thomas Cranmer CLAIM Archbishop of Canterbury
- DESTROY Wolsey
- DESTROY Wolsey's Web

Expectations

- The English Monarchy loses Power in international politics with the loss of Wolsey's diplomatic skills and networks
- Tomas Cromwell, as a free agent that was previously under protection of Wolsey's Web, becomes significantly less powerful
- Thomas Cranmer gains significant Power through the seat of Archbishop of Canterbury

Table 1. Wolf Hall Dynamic 1 - Hierarchy pre-Actions

Rank	Type	Name	Power
1	CHA	Charles	1740434
2	CHA	Francis	1500404
3	INS	GermanEmpire	1160289
4	INS	FrenchMonarchy	1000269
5	CHA	Henry	874066
6	INS	EnglishMonarchy	530778
7	CHA	Wolsey	515218
8	CHA	Clement	187071
9	INS	ArchbishopOfCanterbury	133853
10	INS	WolseysWeb	130125
11	INS	PapalStates	124633
12	INS	KingsCouncil	51794
13	CHA	Cromwell	13259
14	CHA	Wriothesley	10591
15	CHA	Cranmer	68

- The hierarchy has a reasonable overlap with expected rankings. Cranmer is at this point a minor ecclesiastical functionary, and in this setting not related to any INS, so that all his Power comes from his (unimpressive) personality attributes.

- Pope Clement stands out as clearly misrepresented. The Power of his INS, the Papal States, has not been captured to a complete enough extent in the framework.

Table 2. Wolf Hall Dynamic 1 - Actions

Type	Name	Change	Power
EnglishMonarchy CLAIM WolseysWeb			
CHA	Wolsey	-	217967
INS	WolseysWeb	-	48711
CHA	Henry	+	21421
INS	ArchbishopOfCanterbury	+	15715
INS	EnglishMonarchy	+	12971
CHA	Clement	+	39278
CHA	Cromwell	-	7584
INS	PapalStates	+	2619
Cranmer CLAIM ArchbishopOfCanterbury			
CHA	Wolsey	-	231914
CHA	Cranmer	+	230347
CHA	Henry	+	23593
INS	EnglishMonarchy	+	14419
INS	WolseysWeb	+	14405
INS	ArchbishopOfCanterbury	+	3996
CHA	Cromwell	-	636
DESTROY WolseysWeb			
CHA	Henry	-	31617
CHA	Cranmer	-	23572
INS	EnglishMonarchy	-	19768
INS	ArchbishopOfCanterbury	-	15715
CHA	Wolsey	+	15385
CHA	Cromwell	-	4790
DESTROY Wolsey			
CHA	Cranmer	-	45254
CHA	Henry	-	31834
INS	ArchbishopOfCanterbury	-	30169
INS	EnglishMonarchy	-	19889
CHA	Clement	-	4002

- The dissolution of WolseysWeb seems beneficial to all non-member parties
- The claiming of the Archbishop of Canterbury seat has a primary winner in Cranmer, and primary losers in Wolsey and his servant Cromwell
- Wolsey's empire dissolution and him gaining Power from it is problematic, and happens due to Material ownership changing from his previous INS to himself: a technical challenge for the framework to overcome that will be discussed below.
- Taking these two actions together, of course Wolsey loses all Power (of life), and Henry loses considerable power as the INS he controlled disappears.

Table 3. Wolf Hall Dynamic 1 - Hierarchy post-Actions

Rank	Type	Name	Power
1	CHA	Charles	1740679
2	CHA	Francis	1500624
3	INS	GermanEmpire	1160289
4	INS	FrenchMonarchy	1000269
5	CHA	Henry	855628
6	INS	EnglishMonarchy	518511
7	CHA	Clement	186998
8	CHA	Cranmer	161588
9	INS	PapalStates	124584
10	INS	ArchbishopOfCanterbury	107680
11	INS	KingsCouncil	51769
12	CHA	Wriothesley	10586
13	CHA	Cromwell	247

- The top scorers of the hierarchy remained unchanged, as this was primarily a domestic affair.
- Cromwell sinks to last place with the disappearance of the INS he operated in.
- Cranmer has become much more powerful as new Archbishop of Canterbury. His outranking pope Clement is potentially problematic, whose deficient Power level has been discussed before and is highlighted just below.

Expectations Reflection

- *The English Monarchy loses Power in international politics with the loss of Wolsey's diplomatic skills and networks*

The English Monarchy actually has a small net gain of Power, due to inherited Materials, and their ranking relative to the French and German institutions did not change. The current application of the framework does not emulate this higher-level layer of political abstraction.

- *Tomas Cromwell, as a free agent that was previously under protection of Wolsey's Web, becomes significantly less powerful*

Cromwell lost nearly all his power and dropped to the bottom of the ranking.

- *Thomas Cranmer gains significant Power through the seat of Archbishop of Canterbury*

Although not as powerful as Wolsey was in the same position, due to his extended networks and ownerships, Cranmer gained considerable Power as result of his new ownership of the archbishop Institution.

Key Evaluation Points

- Papal States are not represented well in their power level. Although the nature of the papacy's power might in some ways be more complex to translate than that

of a nation's ruler, for reasons of its particular religious and diplomatic weight, this problem is now primarily still one of **completion**: an expanding of MATs to own and INSes to own and coop would translate to a more powerful papacy.

- Material ownership should translate through to the highest owner - so that Wolsey does not become more powerful when the Material he already owns 'officially' becomes his when his INS is disbanded. This kind of change seems within the bounds of the current framework, and will be listed under the category **implementation**.

Dynamic 2 - The English Reformation

Synopsis

The schism between the Papal States and English Monarchy widens as the Pope staunchly refuses Henry's solutions to his marital situation. English parishes are eventually brought back under full dominion of the English crown.

Action Set

- BREAKCOOP between English Monarchy and Papal States
- English Monarchy CLAIM Material: Parishes

Expectations

- The English Monarchy becomes more vulnerable to German and Spanish aggression as their alliance with the Papal States is broken
- The English Monarchy becomes more powerful through the acquisition of parishes and resulting income, which would previously have flowed to the Papal States

Table 4. Wolf Hall Dynamic 2 - Actions

Type	Name	Change	Power
EnglishMonarchy BREAKCOOP PapalStates			
CHA	Clement	-	76958
INS	PapalStates	-	51305
CHA	Henry	-	3295
INS	EnglishMonarchy	-	2197
EnglishMonarchy CLAIM EnglishParishes			
CHA	Henry	+	17775
CHA	Clement	-	15997
INS	PapalStates	-	10665
INS	EnglishMonarchy	+	10665
CHA	Cranmer	+	3555
INS	ArchbishopOfCanterbury	+	2370
INS	KingsCouncil	+	1185

- Henry, his monarchy, and affiliated INSEs and their CHAs gain a clear advantage through the confiscation of papal property.

Table 5. Wolf Hall Dynamic 2 - Hierarchy post-Actions

Rank	Type	Name	Power
1	CHA	Charles	1740679
2	CHA	Francis	1500624
3	INS	GermanEmpire	1160289
4	INS	FrenchMonarchy	1000269
5	CHA	Henry	870107
6	INS	EnglishMonarchy	526979
7	CHA	Cranmer	165143
8	INS	ArchbishopOfCanterbury	110050
9	CHA	Clement	94041
10	INS	PapalStates	62613
11	INS	KingsCouncil	52954
12	CHA	Wriothesley	10823
13	CHA	Cromwell	247

- The difference in Power level between the German/French rulers and Henry is too large to be affected by Henry's Power gains through these actions.

Expectations Reflection

- *The English Monarchy becomes more vulnerable to German and Spanish aggression as their alliance with the Papal States is broken*

The schism between the English and Catholic church offers no winners in this version of the story. But in history, where there are losers, there are usually winners: the other great rulers of Europe, king Francis and emperor Charles, are now dealing with an England no longer protected by the Catholic church, its implications representing a type of power shift that this framework currently does not represent.

- *The English Monarchy becomes more powerful through the acquisition of parishes and resulting income, which would previously have flowed to the Papal States*

The Power of these Materials is now added to the English Monarchy's Power score.

Key Evaluation Points

- There is Power in potential: in this case the new realities of inter-European diplomacy that arose from the English split with the Catholic church. This type of complex geostrategic Power is, in its current execution, outside of the **scope** of the framework, and will accordingly be compiled under that evaluation category.

Dynamic 3 - Rise of Cromwell

Synopsis

Tomas Cromwell, through skill, experience, and force of character, manages to become indispensable to king Henry for affairs of state as well as personal matters. In the process he collects a wealth of official titles, such as Lord Privy Seal and Master Secretary.

Action Set

- English Monarchy CLAIM Tomas Cromwell
- Next: English Monarchy CREATECOOP Tomas Cromwell

Expectations

- Cromwell becomes a major Power player in the English government, surpassing in Power courtiers such as Thomas Wriothesley.

Table 6. Wolf Hall Dynamic 3 - Actions

Type	Name	Change	Power
EnglishMonarchy CLAIM Cromwell			
CHA	Henry	+	407
INS	EnglishMonarchy	+	247
CHA	Cranmer	+	74
INS	ArchbishopOfCanterbury	+	49
CHA	Clement	+	37
EnglishMonarchy CREATECOOP Cromwell			
CHA	Cromwell	+	105450
CHA	Henry	+	37
INS	EnglishMonarchy	+	24

- Cromwell first joins the EnglishMonarchy as an owned Character, and gets little for it: only the new INS owner and affiliates get a minor Power boost. In history, however, Cromwell falling under the protection of the English Monarchy offered important protections to his person from would-be enemies.
- As he rises the ranks of the Monarchy however, here represented through becoming a cooperator, Cromwell does gain tremendous power.
- No one loses any Power in this process - which, from a historic perspective, might be argued against: as some people rise in favour and capability, others lose it both.

Table 7. Wolf Hall Dynamic 3 - Hierarchy post-Actions

Rank	Type	Name	Power
1	CHA	Charles	1740679
2	CHA	Francis	1500624
3	INS	GermanEmpire	1160289
4	INS	FrenchMonarchy	1000269
5	CHA	Henry	870552
6	INS	EnglishMonarchy	527251
7	CHA	Cranmer	165217
8	INS	ArchbishopOfCanterbury	110099
9	CHA	Cromwell	105697
10	CHA	Clement	94078
11	INS	PapalStates	62638
12	INS	KingsCouncil	52979
13	CHA	Wriothesley	10828

- As this particular history of the Wolf Hall story wraps up, the Power relations on a domestic level appear well-represented. Cromwell is now more powerful than the included courtier, Wriothesley, outranked only by Cranmer, who is of less forceful character but now holds a powerful position as Archbishop of Canterbury.
- International Power relations have not changed, except for the papal states falling even more behind.

Expectations Reflection

- *Cromwell becomes a major Power player in the English government, surpassing in Power courtiers such as Thomas Wriothesley.*

Cromwell's Power is significantly boosted through his new Institution relations.

Key Evaluation Points

- There is more to Institution membership than raw Power gains: similar to the complexities of global diplomatic strategy established in Dynamic 2, physical protection on a more personal scale falls outside the current **scope** of the framework.
- Cromwell was either a nobody or a major player, in the transition from owned to cooperating. In reality, an Institution such as the English Monarchy is massively complex, as are the different positions that Characters might take in them. The expanding of Institutions and potential positions is an interesting challenge of **scope**.
- Cromwell rose in no small part due to his knowledge, diplomatic skill and administrative skill; but these were only allowed application through Henry's grace, which was fostered through their personal relationship. Relations between Characters are explicitly omitted from the current framework, but are clearly a central dynamic to stories of Power, and as such another important **scope** consideration.

- While Tomas gained Power, nobody else lost any: another challenge of **scope** is that of approaching Power, in some situations, as similar to a zero-sum game where one CHA or INS's increase in Power comes at the cost of another.
- Cromwell, in the course of his rise, was granted a series of significant titles, such as Master Secreter and Lord Privy Seal. Titles have a clear use case, as seen from this history and from analysis of CKII's data structure. How such a concept might be incorporated in the framework is another question of **scope**.

7.2 Test Case: The Fall of the Roman Republic

Overview

A gifted and ambitious politician that survived the perilous world of Roman politics finds great Power through his conquest of Gaul and, eventually, Rome itself. Having crossed the Rubicon, and with the Roman senate, led by Gnaeus Pompey, evacuating the city, Caesar's First Legion conquers the Roman city of Ariminum on the way to the open gates of Rome.

History

Caesar's exploits and the turbulent final years of the Roman Republic survive to us through ancient writers - Caesar's own (highly political) account of these wars, *Bellum Gallicum*, and the works of Roman historians including Sallust, Livy, and Tacitus.

Core Objects

The focus in this story is on the main political figureheads, and their shifts in Power as Material and Institutional ownerships change. Relevant Material here includes settlements, four of which are featured as objects, as well as the Institutions that are linked either to government or to conquest of these settlements.

Characters

- Julius Caesar, owner of the First Legion
- Marc Anthony, cooperater to the First Legion
- Gnaeus Pompey, owner of the Roman Senate
- Vercingetorix, owner of the Arverni Tribe

Materials

- Rome, a Settlement
- Alesia, a Gaulish Settlement
- Ariminum, a Roman Settlement
- Capua, a Roman Settlement
- Spoils of Gaulish Conquest

Institutions

- Caesar's FirstLegion
- Senate's RomanLegions
- Roman Republic
- Roman Senate
- The Arverni Tribe

Dynamic 4 - The Conquest of Gaul**Synopsis**

Over the course of several years, Caesar manages to find pretensions for, and success in, subduing Gaulish tribes and territories. His positions both as a leader of the First Legion and as a Roman public figure become increasingly strong as the riches of conquest flow in both these directions.

Action Set

- FirstLegion CLAIM Alesia
- KILL Vercingetorix
- GIFT Caesar 50000 Nuggets
- GIFT First Legion 20000 Nuggets
- GIFT RomanRepublic 20000 nuggets

Expectations

- Caesar's leadership position in the First Legion is significantly strengthened
- Public opinion of Caesar amongst the people of Rome improves

Table 8. Caesar Dynamic 1 - Hierarchy pre-Actions

Rank	Type	Name	Power
1	INS	RomanRepublic	1829300
2	CHA	Pompey	1619545
3	INS	RomanLegions	1407025
4	CHA	Caesar	423765
5	INS	FirstLegion	282323
6	CHA	Vercingetorix	89273
7	INS	Arverni	59349
8	CHA	Anthony	1351
9	INS	RomanSenate	753

- The most Powerful Character is Pompey, who owns the RomanSenate which owns the RomanRepublic which owns the RomanLegions. The fact that the RomanSenate is less Powerful than the RomanRepublic it owns is a result of the final step of Power Calculation: only CHA have indirect INS ownership counted. This is a design choice made to avoid cumulative Power-stacking, and not inherently problematic: the RomanSenate itself holds very little Power; it is through its Relations that it offers significant Power to its owners and cooperators.

Table 9. Caesar Dynamic 1 - Actions

Type	Name	Change	Power
FirstLegion CLAIM Alesia			
CHA	Caesar	+	13650
CHA	Vercingetorix	-	13650
INS	FirstLegion	+	9100
INS	Arverni	-	9100
CHA	Anthony	+	35
DESTROY Vercingetorix			
No Changes			
GIFT to Caesar: Nugget (50.000)			
CHA	Caesar	+	125000
INS	FirstLegion	+	50000
CHA	Anthony	+	196
GIFT to FirstLegion: Nugget (20.000)			
CHA	Caesar	+	30000
INS	FirstLegion	+	20000
CHA	Anthony	+	78
GIFT to RomanRepublic: Nugget (20.000)			
INS	RomanRepublic	+	20000
CHA	Pompey	+	10000

- Caesar conquering Alesia corresponds to some extent with historic expectations: he and his legion gained significant Power, while the losing tribe and their Leader lost an equal amount.
- In reality, this amount would never be equal: a captured settlement provides a very different power to its conqueror than it would to its previous, culturally-aligned owner.
- Caesar's personal wealth gain from the 50,000 nugget loot gets effectively counted 2.5x as is evident from his 125.000 Power gain. This is a consequence of stacked Power calculation: as he becomes more Powerful due to his gains, so does the Institution he owns; which, in turn, gives its owner more Power.
- The wealth gained directly by his FirstLegion also gives him a multiplied amount of Power: from 20,000 to 30,000. While this could favorably be interpreted as: his Power grows through increased loyalty due to reward; it is simply a direct result of Material Power calculations. If the FirstLegion had come into this wealth through another, non-leader Character, Caesar would have gained the same benefit.
- Finally, Caesar's gift of wealth to the RomanRepublic has gained Pompey a chunk of Power while, in reality, such was a calculated political move to increase his popularity at home.

Table 10. Caesar Dynamic 1 - Hierarchy post-Actions

Rank	Type	Name	Power
1	INS	RomanRepublic	1849300
2	CHA	Pompey	1629545
3	INS	RomanLegions	1407025
4	CHA	Caesar	592415
5	INS	FirstLegion	361423
6	CHA	Anthony	1661
7	INS	RomanSenate	753

- While Caesar and his FirstLegion have become significantly more Powerful, the gains were not big enough to create a shift in Hierarchy: Pompey, after all, still owns the RomanRepublic.

Expectations Reflection

- *Caesar's leadership position in the First Legion is significantly strengthened*

The framework currently does not reflect intricacies of inter-Institutional opinion or Character-Institutional Relations.

- *Public opinion of Caesar amongst the people of Rome improves*

Same limitation as in the expectation above.

Key Evaluation Points

- A significant proportion of the plunder gained in the conquest of Gaul was in the form of slaves; in this digital recreation, this is simplified to acquisition of Exchange Material. Here comes a consideration of **scope**: the framework's data structure is organized so that objects can only be of one data type. This limits the ability to represent Characters to be treated as Material.
- The culture and alignment of a settlement should significantly impact the Power it bestows on its (new, conquering) owner, but in this recreation, it gave Caesar the exact same Power amount that it gave to Vercingetorix. Another dimension to this discussion could be of a strategic nature: conquering a specific settlement might prove much more Powerful for reasons of strategy than for population or wealth amounts. Both of these represent a challenge of **scope**.
- Caesar's Power increase from his Material wealth gain was disproportionate due to being counted extra through his consequent Institutions' Power gain. A more accurate approach to such Power calculation should be possible as a matter of **implementation**.
- Caesar gained a double-dose of Power from his FirstLegion receiving plunder. While this corresponds with actual historic results, this is a lucky circumstance of representation. While systems of loyalty indicate a challenge of **scope**, the first step would either way be to remove this stacked calculation: a challenge of **implementation**.

- The wealth flowing from Gaul into Rome was here received by the RomanRepublic, which benefited only the Character Pompey. In reality, this was a calculated political move to increase his own popularity. A Relation of this type, typifying the loyalty and popularity of a leader with an Institution, and similar to the observation right above, is outside the current **scope** of the framework. Another dimension of this challenge is a matter of **completion**: the 'people of Rome' might be added in as a separate Institution from the RomanRepublic.

Dynamic 5 - The Conquest of Rome

Synopsis

The opposing Roman elite greatly overplayed their hand in pressuring Caesar. Pompey and his allies flee Rome, leaving it open for the taking, and Caesar conquers several Roman cities on the way there.

Action Set

- FirstLegion CLAIM Ariminum
- RomanSenate CLAIM RomanLegions
- REMOVE Relation: RomanRepublic coops RomanLegions
- REMOVE Relation: RomanSenate owns RomanRepublic
- Caesar CLAIM RomanRepublic

Expectations

- Caesar gains significant Power as the Roman Republic's first dictator
- The Roman Senate loses significant Power through loss of ownership of Rome

Table 11. Caesar Dynamic 2 - Actions

Type	Name	Change	Power
FirstLegion CLAIM Ariminum			
CHA	Caesar	+	28050
INS	FirstLegion	+	18700
INS	RomanRepublic	-	18700
CHA	Pompey	-	9350
CHA	Anthony	+	73
RomanSenate CLAIM RomanLegions			
INS	RomanLegions	+	183060
CHA	Pompey	+	161881
INS	RomanRepublic	+	140702
DESTROY Relation: RomanRepublicCOOPRomanLegions			
INS	RomanLegions	-	183060
CHA	Pompey	-	161881
INS	RomanRepublic	-	140702
DESTROY Relation: RomanSenateOWNRomanRepublic			
CHA	Pompey	-	915300
Caesar CLAIM RomanRepublic			
CHA	Caesar	+	2821320
INS	RomanRepublic	+	50280

- Caesar's taking of a minor Roman city increases his and his legion's Power at the cost of Pompey and the RomanRepublic's.
- The next two actions cancel each other out in terms of net Power change: the increase in Power was due to a default setting of creating a cooperative Relation whenever a CHA or INS loses ownership of an INS; but in this case, this is clearly not desirable, and so it is cancelled out by removing that Relation.
- By removing the RomanSenate's control of the RomanRepublic, Pompey loses a great amount of Power.
- Caesar's claiming of the RomanRepublic adds an amount to his Power that is roughly three times greater than the Power lost by Pompey's ownership of that same INS. This outcome corresponds satisfyingly with Caesar becoming a dictator in actual history: as a sole ruler, he would generally have more Power than someone who operates through another Institution. At the same time, this is more by luck than through design: an actual representation of this kind of shift would ideally correspond with a change of the Institution itself, such as from a republic to some flavor of tyranny / dictatorship / monarchy / empire.

Table 12. Caesar Dynamic 2 - Hierarchy post-Actions

Rank	Type	Name	Power
1	CHA	Caesar	3441785
2	INS	RomanRepublic	1880880
3	INS	RomanLegions	1407025
4	CHA	Pompey	704895
5	INS	FirstLegion	380123
6	CHA	Anthony	1735
7	INS	RomanSenate	753

- Caesar has become the most powerful Character of this story through his ownership of INS and MAT.

Expectations Reflection

- *Caesar gains significant Power as the Roman Republic's first dictator*

Caesar's Power gains a huge boost from his new Institutional control as he gains the number 1 ranking.

- *The Roman Senate loses significant Power through loss of ownership of Rome*

The Senate loses a lot of Power - perhaps too much, as its absolute value is relatively very low now. They would have still had a considerable network of support and strength, from objects that are not included in this setting.

Key Evaluation Points

- An important **implementation** change became evident when the RomanSenate took the RomanLegions out of Rome: automatic cooperation on new Institution leadership should become a toggleable option for that action.
- Considerable change to the leadership and organization of the RomanRepublic - in historical terms, the fall of the Roman republic - is somewhat translated through Power gains but otherwise entirely lacking representation. Some way of changing the nature of Institutions, as well as some core set of characteristics that would be changed in this way, could be changed in the **implementation** of the framework.

8. Framework - Evaluation

By examining the framework through a series of actions that aimed to emulate real-world historic events, then interpreting resulting net and hierarchical changes in Power values, a range of impressions on the performance of the framework has been compiled and discussed. In this Evaluation section, these key points will first be discussed under the headers Completion, Implementation, and Scope. These specific findings will be followed by considering the framework through the lens of the Blue Card of Power, followed by a discussion on potential future development of the framework.

Completion

How complete were the test settings for the framework, and how strong was the ability of the framework to capture complex settings through the core data structure of Character, Material and Institution?

The two tested settings both represented politics on a relatively grand level: covering a lot of land and many people. While the core actors in these settings were represented to a somewhat complete extent, it was clear that there were significant elements that were not included in the setting, as was the case with papal Power and geopolitical relations in the Wolf Hall setting. Exactly how much of the world that is represented should be entered into a setting is a question that will have to be answered through increased testing of multiple types of settings at different ‘completion levels’. From the testing carried out in this project, however, it is apparent that a subset of a greater world can convey power dynamics with some accuracy of focus.

A consideration similar (or polar) to this is the performance of small-scale settings. The three Power-defining personality traits of Coercion, Charisma and Capability were insignificant in the Power calculations of the two tested settings that featured many thousands of (generic) Characters. A setting that focuses on one or several smaller Institutions and their interpersonal dynamics would be useful for further analysis of these small-scale dynamics. Such a small-scope investigation might then rely on an expansion of the concept of Character-Character relations, as discussed below in the Scope section.

The current structure of the framework proved intuitive and flexible in the creation of the test settings. While there are many options for additional data types and extension of the existing ones, especially that of Institution, all necessary elements could be clearly categorized.

One significant consideration that did come up while designing the Institutions was how to categorize governments and settlement ownership. In their current iteration an Institution, such as RomanRepublic, directly owned a settlement, such as Rome. Additional layers of representation and ownership would have been possible and, as evident in the discussion of loot sent from Gaul to Rome, potentially beneficial. This could mean separating into different Institutions, such as Plebs of Rome and Equestrians of Rome; or a more

generic Government of Rome, which is owned by other Characters or more specifically typed Institutions. For both these larger-scale and smaller-scale questions of implementation, a series of focused testing would help inform solid next steps of approach.

Implementation

How well did the technology and calculations behind the framework represent Power dynamics, and what are major areas of potential improvement?

The specific Power values that were assigned to the different Material types did not appear to have a significant impact on the calculations in the test settings. This is largely due to the nature of the relevant Material in the settings, which were settlements with large population sizes. Settings that are smaller, and feature certain types of Material more prominently, would need to determine appropriate value through approximation and repeated testing.

The six constant values for power calculations did not prove problematic during testing. Increased accuracy for these settings would depend on qualities of the setting that is represented, and could be achieved through structured testing of that setting.

The power calculation methods as operated in this iteration of the framework proved robust in calculating major shifts in Power. Several potential and relatively low-effort improvements were identified in the testing process:

- Material should count towards Power calculations for a Character when he owns it through an Institution, as with Wolsey’s valuables.
- Material should count towards Power calculations only directly for a Character, and not an additional time through the Institutions they own, as with Caesar’s acquired plunder.
- Not all Material that is owned by an Institution should count towards its owner’s Power, as happened with Caesar’s legion acquiring plunder. A distribution over the Institution’s Characters (including Generics) could be added as a minor additional complexity of data object and action.
- A change of leadership should not automatically create a cooperative Relation between the Institution and its previous leader, as was evident in the break between the Roman Senate and Republic: a toggle should be added for choice when taking this action.

The main dimension to the implementation of the framework was the calculation of Power: consisting primarily of its programmatic logic and the hardcoded incorporated values. The current iteration of this implementation proved sufficient for representing a majority of the Power shifts of the testing process. Further development of the process might require this system to be geared more specifically to the setting that is represented - how to do so while retaining the framework’s purpose of general flexibility is an important consideration.

Scope

Which topics have proven potentially relevant to the type of interactions and complexity should offer, and how, if at all, might the framework be extended to include these topics?

This category proved the most expansive in the course of the testing process. Those findings can be further divided into the following categories.

Data Object Definition

Data objects could have a secondary type, to allow such dual-type concepts as ‘slaves’. The downside to such a seemingly-simple expansion is one of increased complexity, requiring, for example, additional logic in how Relation rules function for multi-type objects.

Character-Character Relations

An Institution’s internal structure can be greatly dependent on interpersonal relations, which are currently only explicitly expressed through the three Character Power attributes. This is true for small-scale expressions, for example in hierarchy in a group of bandits or mutiny on a ship of war; but also for major expressions of Power, such as was the effect of Henry VIII favoring Tomas Cromwell on a quite personal level and so allowing his climbing the ladders of the English Monarchy. Interpersonal relations are significant in other ways, such as inter-Institutional relations. Altogether, this expansion seems to be one of primary importance but also one of significant additional complexity.

Character-Institutional Relations

Institutions can do much more for a Character than provide an arbitrary amount of Power. As has been noted in testing: they can provide protection, which is hard to express in numerical terms; and they might take Power away from a member as a direct but currently-incalculable result of another Character increasing in Power and rank. This process of increasing in standing is currently limited to the three Relational stages of owned, cooperating, and owning. The creation of an expanded system for determining Character positions within an Institution would offer a much greater breadth of variety in expressing political maneuvering.

Inter-Institutional Relations

The break between England and the Catholic church was simulated in testing through the removal of cooperative Power gains and the transfer of Material ownership, but had implications on a wider scale. Excommunication from the church had major significance for European geopolitical Power relations as England became much more vulnerable to attack from other major European powers. How might the framework begin to approach such dynamics? Relations between Institutions could be expanded to include a Hostile type aside from Ownership and Cooperative. This would provide more depth of simulation, but still fail to capture the nuances of international diplomacy, which is never quite black-and-white.

A significant additional factor would be projected strength. As a domestic quality: how many soldiers can (in this case) a country effectively deploy. And from international guarantees: how many allies can a country count on when it is attacked? Military or combat strength could be an important distinction from the single-type currency of Power that it is currently embedded in.

Complex topics

Several advanced topics related to Power and political processes have been highlighted in the context and testing sections, and these will be briefly discussed below.

Titles are not easily represented as data objects in the current framework. Their implementation would depend on how Character-Institutional relations, as discussed above, would be further defined.

Culture could be a cross-object-type quality whose implementation and function greatly depends on further expansion of the framework. An initial, simplified implementation could be to give Characters and Institutions a field for specific cultures, but how this quality would be used in Power calculation and actionability is not immediately evident.

Loyalty would be an important concept to investigate in inter-Character relations. As has been seen from Caesar’s conquests, it also has significance in Character-Institutional relations.

Laws have not featured in these test settings, but are an important concept in wider political discussion, and might be important for future applications, as evident from the Subject Games analysis. There is no obvious approach to implementing the concept in the framework, and it seems like any such step would depend on the intended use case of the framework beyond general representations of Power dynamics.

Religion/Family are more easily represented in the current framework, taking the shape of Institutions. Each of them does have a unique and potentially relevant quality to them, as was evident, for example, in the CKII data structure, which warrants further exploration of the topics.

Information is a final term to consider, and one that has not featured in the context or testing sections: but where Knowledge is Power, as the saying goes, including information either as a Material subtype or as (part of) some other data type is an interesting avenue to explore.

It is clear that there are many different leads, directions and challenges to solve in taking the framework through the next iteration. Their relative importance would be greatly dependent on the direction that the framework is aimed at: the types

of settings to be represented, the types of actions that are created and expanded, and the purposes of both of these.

The framework is at this stage in the discussion, of course, still aiming for breadth of use and flexibility. In this context, a major next step seems to be Character-Character relations, as they have shown to be both an essential part of Power dynamics and an important area of technical development that other types of expansion would rely on. Further defining of Institutions, especially the position that Characters can take in them, is another major question to solve both in terms of usability and further technical complexity.

Blue Card Reflections

The Blue Card helped inform the creation of the framework: below, several of its components can add to the framework's evaluation before a conclusion is offered.

A playful system should

- Make sense of complicated topics

Through the simplification of a wide range of different types of organizations into the single header Institution, the current framework offers some intuitive approach to simplifying complex topics. Concepts that might be more difficult to translate or operate have been listed just above.

- Allow the player to establish some form of order, as a world-creating activity

Manipulation of a given setting proves to be a significant feature of the application built around the framework. Different types of future applications could be built around various expansions of the framework, and even around its current iteration, to further enhance and present this capability.

- Invoke curiosity in the player

'What will happen to X if I do Y' is an important interaction question that this framework has shown to be able to represent. In its current iteration, and using the current application built around it, there is a lot of room to explore with the entering of different and more elaborate settings. Actual playful behavior is ultimately expressed in the applications that would integrate the data framework, but it is clear from this prototype testing that the framework offers potential for playfulness through this type of curiosity invocation.

Through means that include

- Some measure of contest or conflict
- Some potential for randomness, offered to the player implicitly and/or explicitly
- Some identity for the player to inhabit

All three of these relate to methods of execution of the framework. While the current application offers limited scope for each of these, its expansion to include them in technical terms is not necessarily one of great complexity in calculation, but would instead involve work on interface and presentation.

The framework

- takes Inputs and provide Outputs
- Offers virtual simulation capabilities

The framework allows input through both the creation of settings and through the application that is built around it. Outputs are currently provided in terms of Power values and rankings. How these outputs might be extended and employed for wider variation and systems, especially for simulation purposes, is a major question whose answer would require in-depth investigation of specific use-cases.

Future Development

The section on Scope has shown that there are several major and minor avenues to explore in extending the framework, its core data types, and their connectivity. These expansions, the most significant and immediately-impactful of which would be CHA-CHA relations, would ideally be paced through structured tests along different axes:

- Focus on larger and/or smaller-scale settings
- Focus on Material values and their implications
- Focus on Power calculation constant values

Regardless of how the framework might be further developed, it will only serve practical value through the tools that offer interaction with it. An application has been presented to perform basic operations on the framework, but there are many other approaches to interacting with such a framework.

An important dimension to this is the setting-creation process, which is currently performed through a database editor. An interface for this purpose could be offered to the user, either separate or integrated into an execution platform such as the one presented here. At the other end is the potential for an exporter tool built into the execution platform: to save changes and states back to a database. These extensions of application would together serve an important function in the potential of the framework as the basis for a simulation system. What such a system might look like, and what types of demands it would place on the framework, depends greatly on its purpose and context. Other interesting avenues of application of the framework could include:

- Auto-generation tools for creation of settings
- A timeline system, for creating different variations-in-time for a given setting
- A map importer and manipulator to give increased shape to a setting

The concept of **emergence** has been discussed in the context of digital systems, and reflecting on the framework's capabilities for emergence invokes the topic of simulation capabilities. While the focus of this project is the definition of objects and not their manipulation, the capability of acting upon them in a structured way has been demonstrated in the Testing section. Any significant steps in emergent behavior would be preceded by a consideration of an AI and/or structured simulation system that is designed around the framework's data objects and desired set of actions.

Conclusions

The research question as set out in the introduction of this project aimed to guide the creation and assess the implementation of a digital framework that could flexibly serve playful purposes.

The Blue Card of Power was a result of the analysis aimed at establishing what kind of shapes and purposes such a framework might take and serve. The primary objective of the resulting framework has ultimately been the aim of simplicity: for such a complicated topic as political power, there appeared great value in determining how far a framework might come at representing and manipulating relevant concepts and dynamics through a small set of mutable data types.

The framework has been tested using a custom-built application that allowed a subset of interaction found to be relevant to the purposes. These actions, and a logical, practical, Blue-Card driven implementation of their resulting effects, appeared to allow some measure of success in the framework's execution: for many of the actions taken, resulting Power and hierarchy shifts were in line with historical expectations. At the same time, various limitations as well as potential additions were found and categorized into the headers of setting creation and -completion, implementation of the framework through a technical application, and potential expansion of the scope of the framework. On top of these qualitative results, four separate criteria, which were identified as relevant tools of analysis for digital models within the social sciences, helped frame the discussion around the remaining criteria for evaluation as defined in the Blue Card. The framework showed no clear limitations on any of these criteria; for much of them, it left room for further development.

The distribution of its three core data types, Character, Material, and Institution, as well as the method of connectivity through the fourth type, Relation, have at no stage of development or testing proven fundamentally limiting: while they do not nearly represent all complexities of action and terminology within the realm of politics, they provide a useful base for dealing with each of these problems in a systematic way. The framework in its current definition provides a promising start to future development of a generalized, playful digital system that could serve a variety of political-playful purposes. Several subsequent directions for further development have been identified: more specific inventorization of such purposes; structured testing on a subset of settings, possibly related to such purposes; the expansion of the framework's core data expressions for general purposes; and the creation of tools that allow additional and improved interaction with the framework.

Can the essentials of political power be represented in a flexible digital platform that allows playful exploration of it? The parameters of Power identified in this project were made playable through a flexible data approach. This offers a promising start to a next iteration of a general data framework. Software products that might integrate such future versions will have their own approaches to Power and playful interac-

tion, and the framework's potential for offering an integrated data structure is a fascinating challenge to unpack through such future iterations.

When you are writing laws you are testing words to find their utmost power. Like spells, they have to make things happen in the real world, and like spells, they only work if people believe in them."

Mantel, "Wolf Hall", 2009

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Appendix

ID	Name	Charisma	Coercion	Capability	OwensMaterials	OwensInstitutions	CoopsInstitutions	OwensByInstitutions	Wealth
Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
CHA001	Henry	76	88	34	NULL	INS001,INS006	NULL	NULL	NULL
CHA002	Clement	12	56	44	NULL	INS002	NULL	NULL	NULL
CHA003	Cromwell	64	79	94	NULL	NULL	INS005	NULL	NULL
CHA004	Wolsey	79	64	92	MAT002,MAT003	INS005,INS007	INS001	NULL	NULL
CHA005	Cranmer	22	8	28	NULL	NULL	NULL	NULL	NULL
CHA006	Wriothesley	69	71	82	NULL	NULL	INS006	NULL	NULL
CHA007	Francis	67	81	62	NULL	INS004	NULL	NULL	NULL
CHA008	Charles	71	78	86	NULL	INS003	NULL	NULL	NULL

Figure 4. Wolf Hall Setting - Character Table

ID	Name	Type	Subtype	MaterialCollection	BaseAmount	BonusCoercion	BonusCharisma	BonusCapability
Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
MAT001	EnglishParishes	Constructive	Estate	NULL	78	NULL	NULL	NULL
MAT002	WolseysEstates	Constructive	Estate	NULL	18	NULL	NULL	NULL
MAT003	WolseysValuables	Exchange	Nugget	NULL	10000	NULL	NULL	NULL

Figure 5. Wolf Hall Setting - Material Table

ID	Name	OwensMaterials	OwensInstitutions	CoopsInstitutions	GenericsOwnerCharacters	GenericsCooperativeCharacters	GenericsOwneeCharacters	Wealth	Equipped
Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
INS001	EnglishMonarchy	NULL	NULL	INS002,INS005,INS007	NULL	NULL	NULL	50000	NULL
INS002	PapalStates	MAT001	NULL	INS001	NULL	NULL	NULL	1000	NULL
INS003	GermanEmpire	NULL	NULL	INS004	NULL	NULL	NULL	100000	NULL
INS004	FrenchMonarchy	NULL	NULL	INS003	NULL	NULL	NULL	9000	NULL
INS005	WolseyWeb	NULL	NULL	INS001	NULL	NULL	NULL	100	NULL
INS006	KingsCouncil	NULL	NULL	INS001	NULL	NULL	NULL	NULL	NULL
INS007	ArchbishopOfCanterbury	NULL	NULL	INS001	NULL	NULL	NULL	500	NULL

Figure 6. Wolf Hall Setting - Institution Table

ID	Name	Charisma	Coercion	Capability	OwensMaterials	OwensInstitutions	CoopsInstitutions	OwensByInstitutions	Wealth
Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
CHA001	Caesar	88	89	93	NULL	INS001	NULL	NULL	NULL
CHA002	Anthony	72	78	84	NULL	INS001	NULL	NULL	NULL
CHA003	Pompey	68	84	91	NULL	INS004	NULL	NULL	NULL
CHA004	Vercingetorix	81	82	76	NULL	INS005	NULL	NULL	NULL

Figure 7. Roman Republic Setting - Character Table

ID	Name	Type	Subtype	MaterialCollection	BaseAmount	BonusCoercion	BonusCharisma	BonusCapability
Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
MAT001	Rome	Constructive	Settlement	NULL	160000	NULL	NULL	NULL
MAT002	Alesia	Constructive	Settlement	NULL	2200	NULL	NULL	NULL
MAT003	Ariminum	Constructive	Settlement	NULL	4600	NULL	NULL	NULL
MAT004	Capua	Constructive	Settlement	NULL	40000	NULL	NULL	NULL

Figure 8. Roman Republic Setting - Material Table

ID	Name	OwensMaterials	OwensInstitutions	CoopsInstitutions	GenericsOwnerCharacters	GenericsCooperativeCharacters	GenericsOwneeCharacters	Wealth	Equipped
Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
IG0501	FirstLegion	NULL	NULL	NULL	NULL	50	8000	Arms	Arms
IG0502	RomanLegions	NULL	NULL	NULL	NULL	200	40000	Arms	Arms
IG0503	RomanRepublic	MAT001,MAT003,MAT004	INS002	NULL	NULL	10000	100000	Arms	Arms
IG0504	RomanSenate	NULL	INS003	NULL	20	30	Arms	Arms	Arms
IG0505	Armeni	MAT002	NULL	NULL	NULL	NULL	5000	Arms	Arms

Figure 9. Roman Republic Setting - Institution Table