Full Game Definition Draft

Imperialism Remake by Trilarion

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Abbreviations

$ <number>	amount of money, in the game a small icon will be used instead
AI	artificial intelligence
CAP	capacity
FN	Fractional number with one position after the decimal place
GP	Great power
IN	Integer number
LU	labour unit
MN	Minor nation
MP	multiplayer
MR	military reserve
W	worker pool

Content

1 Introduction

Imperialism: the creation and/or maintenance of an unequal economic, cultural, and territorial relationships, usually between states and often in the form of an empire, based on domination and subordination. (Wikipedia)

Setting

This turn based strategy game is about the era of imperialism where nations fought for strategic dominance by all means - of industrial, diplomatic or military nature.

You start as monarch of one of many grand nations which all aspire to rule the world. Your country is not yet developed: the industrial output is low, the military is weak and the diplomatic corps is lying idle. But you have a workforce willing to contribute to the industrialization and ultimately expansion of your nation.

Industrialization

What you could as a young leader is to modernize your country. Educate engineers which develop natural resources for you (like building mines for delivering coal) or build a nationwide transportation-rail-system. Command your workforce to produce higher-valued products from these resources. Then trade these away and make profit. With the new money you can extend your factories, feed a larger work force, trade or explore new resources, feed the people and finally make even more profit. Eliminate inefficiencies wherever they occur in order to maximize this profit.

Expansion

The time will come to invest in a military. Don't wait too long or you might find yourself to be the objective of your neighbors. Sure, they will build a military too. But with a strong industrial base, one can build a powerful military. In the end the most often sought way to expand your empire might be war. Choose your victim carefully and finally tell your generals to advance. The price will be an even larger empire with even larger industrial base and that in turn will boost your army. The sky is the limit.

Conflicts

However, going to war in a world where there are several other empires the size of your own is dangerous. Your neighbors will not like what you do and might form a hostile alliance. Be careful. Your diplomats will warn you. Either conquer them all, you old warmonger, or act diplomatic, promise enough to some of them to let them ignore your actions or make alliances too. A world full of alliances can make international relations complicated and refreshingly interesting.

With the right decisions, based on the actions of your opponents, with an efficient industrial base, clever diplomatic relations and a strong army, you'll have the best chances to build a lasting empire.

Strategizing

Typical for strategy games is balancing of different goals, making sacrifizes and balancing risks and

rewards. Even more, the optimal strategy dynamically depends on the behavior of the competitors thus creating a fascinating circle of strategies and counter-strategies. We therefore want to present to the player decisions that matter:

- Either create and arm a military now and conquer something or improve infrastructure and industrial base to support higher military later.

- Either sell goods where they give the highest profit or dominate specific markets and ensure political influence in these regions.

- Either invest in science to gain efficiency in military, industry in the future or invest money now.

This means the player has to set constantly monitor and adjust his priorities for selling goods, for production, for research, for improvement of infrastructure and industry.

1.1   Game philosophy

This project is a remake of the classic SSI game Imperialism in the wider sense. We want to capture the spirit of the original game by adopting a large number of original concepts but also by improving inferior original elements and by modest mixing in of elements of other successful modern strategy games or a few of our own ideas.

Although we value immersion into the historical context and try to avoid anachronisms this game is no historical and economical accurate simulation.

By this we want to create a unique deep strategy game that delivers a grand setting (achieving world domination) by optimal interplay of economy, diplomacy and military actions as well as a worthy successor of the original Imperialism game.

1.2   Programming philosophy

We aim for supporting many different operating systems as well as for easy to use and extensive customizability. We will use the tools for customization ourselves during the creation.

We demand the source code to be in a clean and understandable state at all times. Standard and well tested libraries should be used extensively.

1.3   Availability

The finished product of this project can be obtained for free (without any fees for the game itself). The source code will be published under a free, open source license, the art asserts under a similar license suitable for creative content.

2 General Settings

- 4 turns per year (seasons), earliest start 1814, usual end 1914 (400 turns) but the game continues running if players want to

- Great powers (GP) and Minor nations (MN); defines their behavior as AI; players can however choose to play any nation; playing a MN is not recommended though

- Limit of 10 GP and 20 MN per game

2.1   Map and Terrain

- Map: staggered layout (every second row is shifted by half a tile, so every tile has six neighbours: NW, W, SW, SE, E, NE) and no wrapping of the map

- Only a few basic terrain types: desert, plain, swamp, jungle, hills, mountains, tundra, coastal sea, ocean

- The water area on a map must be connected, i.e. each sea tile must have a connection to each other sea tile. This means: no inland sea. This is follows from: trade by sea only and to simplify warfare at sea.

2.2   Victory Conditions

- **Military victory:** 60% of provinces conquered (including colonies), the game immediately ends, MP or non-MP games can be continued if desired

- **Diplomatic victory:** Owning less than 60% of the provinces but being so advanced that the world admires you. Can be achieved during a "world congress". Each 10 years after the first 40 years there is such a congress where every province has one vote. With 60% or more of the votes a nation can also become winner. Each province votes with 80% chance for their owning nation (except provinces of MN). All provinces of MN (and of GP with a 20% chance) vote according to greatness of each GP. For this a normalized score is calculated for all GP (individual score = (diplomatic standing 30% (being peaceful helps here), military power 20%, owned territory 20%, industrial output 20% (smoothed over the last 5 years), tech advances 10%) divided by sum of individual scores of all GP) and the provinces vote then according to this chances.

3 Economics

The player needs income to pay for military, research, infrastructure and diplomatic actions. In this chapter it is detailed how to gain money by selling/trading goods. International trade is a key element of the game because

- increasing the base of your income allows larger investments in military and research

- increased trade improves international relations (see chapter Diplomacy)

- highly specialized economies are more productive

3.1 Demand (consumption)

- The population is willing to pay up to a certain amount of goods each turn. This is the demand.

- The demand of a single province can be normal (1.0x), poor (0.7x) or exceptional (1.5x).

- The base demand of a province is 1 unit of furniture and 1 unit of garment

- The base demand may increase with a certain absolute value X (0.01) per turn.

- For each marketplace the demand of all provinces belonging to this marketplace is sumed up.

- People will accept up to 150% of their demand if sufficient supply is present, but then the price will fall next turn. On the other hand if supply could not fullfill 100% of the demand, prices will increase. However never so that by keeping supply low and high alternatingly gives more profit than steadily supplying on an average basis.

- Base price of furniture and garment are ($300).

- Starvation: If the demand is not fullfilled during the course of several turns (less than 70% fullfillment on average of the last 4 turns) then production of goods is severely reduced (30% penalty).

3.2 Trade

- Tradeable basic resources: fish&meat, grain&apple, wood, oil, ore, coal, cotton&wool

- Tradeable advanced products: timber, paper, furniture, cloth, garment, steel, weapon, can of food

- Each tradeable item can either be bought or sold.

- The amount to be bought or sold is specified during each turn.

- A minimal account balance is given, i.e. during trade the account should never fall below this limit. A buying transaction that would let the account fall under the limit is immediately

canceled.

- Every nation including its colonies forms one marketplace.

- Each marketplace has it's own prices.

- The prices are calculated by trade activity (demand and supply) during the last years.

- The prices are remaining constant during one trade phase.

- Trade is performed simultaneously (all marketplaces one after another but with multiple rounds between them).

- Trade is done by trade agents.

- You can distribute trade agents freely onto different marketplaces and therefore increase or decrease competition. Exception is the home market where a minimal number of trade agents must be present.

- Trade capacity is important for sellers (sellers are responsible for delivery of the product). Selling transactions that would exceed the trade capacity are canceled.

- Subventions (15%, 30%, 50%) can additionally be placed on marketplaces, it means that the amount of product is adjusted, not the price. So as a buyer you get less units delivered that you paid for and as a seller you must deliver more units than you get paid for.

- Trade ends if nobody wants or can sell and buy anymore.

- During one trade round the marketplaces are executed in some random order. It doesn't really matter as long as there are several rounds (typically 5 – 10).

- On one marketplace, first all offers are collected, then these orders are ordered by best related nation to worst related nation, then all orders are partly fullfilled (not more than 2% or the demand per order)

3.3 Balance sheet

- **Income** results from sold goods and some diplomatic treaties

- **Exprenses** result from military upkeep, transportation network (railroad, merchant fleet) upkeep, buildings upkeep, construction costs, workforce salary, bought goods and from some diplomatic treaties

4 Industry and Infrastructure

4.1 Resources

- **Food Resources** orchard (on a plain) delivers apples, farm (on a plain) delivers wheat, cattle farm (on a plain) delivers meat, fishing ground (on coastal sea) delivers fish (fish and cattle meat are combined into one quantity for transport and further processing: fish&meat, the same goes for grain&apple)

- **Other Resources** forest or scrub forest (on a plain) delivers wood, oil sources (in swamps or deserts) deliver oil, mines (on hills or mountains) deliver ore or coal, silver mines (in mountains) deliver money (still must be connected), sheep farms (on hills) deliver wool, cotton farms (on plains) deliver cotton (cotton and wool is combined into one quantity for transport and further processing: cotton&wool)

- **Development** Every resource deposit exept fish has to be developed to deliver resources every turn (maximal development level is three)

4.2 Transportation

- Every nation has one port, the port of the capital that ideally should be located at a river mouth of a river that goes through this country. This port is the special port through which all the trade goes.

- Every resource has to be in the catchment area of a depot (capital counts as depot) or a lighthouse or a river port

- Every resource (except fish) delivers as many units per turn as their level is (1-3)

- Silver does not give a resource but money ($100) directly!

- Fish needs a lighthouse next to it

- Every depot must be connected by railway to the capital or to a port; Lighthouses and river ports are automatically connected

- Currently transportation cannot be blocked or intercepted in any way, that may change in future versions

- There are the following maintenance costs: XX

4.3 Development

- Every resource can be developed up to third level
- On each tile there can only be one resource development (mine, farm, ...) and one

transport development (depot, lighthouse, river port, port)

- You can only continue constructing railroads if they are properly connected (to another piece of railroad or to a depot).

- You can only build a depot if there is already railroad to that tile.

- Except for the capitals which already have a port and a depot.

- **Destruction:** Improvements can be destroyed for free but it will always take 2 turns time and will only be effective if the province owning this tile isn't captured in between (to prevent scorched earth tactics).

- To simplify the construction of railroads you can plan ahead and put orders for railroad construction in a pipeline/queue. You only have to specify the maximum number of construction teams. Provided the money and that all rules are obeyed (like connectivity to existing network) these jobs are processed then in the order of the queue.

4.4 Production

Raw materials to advanced products (conversion ratio)

Paper mill (wood to ..)

- wood (2) to timber (1)
- wood (2) to paper (1)

Furniture factory

- timber (2) to furniture (1)

Spinning mill

- cotton&wool (2) to cloth (1)

Clothing factory

- cloth (2) to garment (1)

Steel mill

- ore (1) and coal (1) to steel (1)

Tool&Weapon factory

- steel (2) to tool (1) or weapon (1)

Cannery

- grain&apple (2) and meat&fish (1) to can of food (1)

Refinery

- oil (2) to fuel (1)

Train station

- timber (1) and steel (1) to transport (1)

Use of these products: sell (trade), buy ships and military, extend infrastructure and industry.

4.5 Worker pool

- The worker pool (W) contains all workers (employed and unemployed, skilled and unskilled)

- A labour unit (LU) is what an unskilled worker can provide per turn

- Unskilled workers have a base productivity of 1 LU

- With paper and money ($100) an unskilled worker can be promoted to skilled worker

- A skilled worker has a base productivity of 2 LU

- With paper and garment and furniture and money ($500) a skilled worker can be promoted to expert worker

- An expert worker has a base productivity of 3 LU

- There is a special pool, the soldier pool (or military reserve MR).

- To add one unit (of trained soldiers) to the soldier pool take a skilled worker and a weapon and money ($200)

- Every skilled, expert or trained soldier can always be reduced to an unskilled worker without cost or delay.

4.6 Factories

- Paper mill (initial output CAP 4 units of timber or paper, requiring 4 LU)

- Furniture factory (initial output CAP 2 units of furniture, requiring 4 LU)

- Spinning mill (initial output CAP 4 units of cloth, requiring 4 LU)

- Clothing factory (initial output CAP 2 units of garment, requiring 4 LU)

- Steel mill (initial output CAP 2 units of steel, requiring 2 LU)

- Tool&Weapon factory (initial output CAP 1 unit of tool or weapon, requiring 2 LU)

- Cannery (initial output CAP 4 can of food, requiring 2 LU)

- Refinery (initial output CAP 1 unit of fuel, requiring 2 LU)

- Train station (initial output CAP of 2 transports, requiring 2 LU)

5 Diplomacy

The idea is that while you trade with minor nations and develop their infrastructure you fulfill their demands and also gain their trust. But you make them also dependent on you. They will know that their success depends on your power. A large military and hostile actions in the past can let you seem as a potential threat to their independence. However they want to keep their independence in a world that doesn't let them keep it, less and less and less. So they either end up conquered or they flee in the arms of a defender, someone who is sympathetic towards and wants them. Who will this be? Of course someone with a peaceful reputation, a large enough army to protect and many investments in the past.

Now for major nations, they all have the same goal, being the sole winner. So if one of them gets and advantage, they will start forming alliances. Alliances mean that they kind of either fight together against a common foe or that they agree to not fight each other or that they somehow adjust their plans on each other. How to make meaningful actions out of this... Difficult.

5.1 Diplomatic goals

- Get access to new markets to increase profit.

- Peaceful assimilation of minor nations. This requires befriending them before and defending them against an external threat.

- Declare war and seek peace. A peace treaty will last at least a fixed 5 years periods.

- Seek reassurance through non-aggression treaties.

- Seek alliances (common goals) against leaders with long duration and not terminable (or only against really high fee), they have a fixed goal (war in X year, at least Y % of territory gained, loss compensation)

- Increase influence nations (by offering money).

- Bully others around .

- Treaties with fixed duration (10 years or at least 5 years with 2 years cancellation time)

- War declaration could also need time (2 turns, but gives right to first strike)

- Gold is not everything: you can influence your partners by money but only a bit, sometimes they won't do it, not for all the gold in the world

- No new treaty is allowed to contradict earlier contracts (not even potentially only) - there in the design treaties with fixed duration is preferred

- It should be clear how each diplomatic action will influence the relations in a quantitative way.

- Breaking a treaty is either impossible or results in serious harm, whatever this means for now.

- Statistics are not incorporated here but in the Statistics section (however quick links between)
- Treaties are accepted if both have agreed on them. Need to define exact timing. Probably beginning of a turn.

5.2   Improving relations

Relations can be improved by

- every kind of trade
- subventions for developing their infrastructure (only towards minor nations)
- existing peace and alliance treaties
- propaganda (by secret organizations or by influencing the press)
- fullfilling wishes of minor nations

5.3   Alliances

- Based around similar interests/goals and trust (historic behavior, X turns of peace)
- Monetary benefits

5.4   Diplomatic influence

- Is kind of diplomatic currency, can be used for various things
- Is gained by trade

5.5   Role of Minor Nations

They could actively choose sides. They should not react too erratically but also there should be clever tactics that might change their course. Difficult.

Relations

- improve when extending their infrastructure
- improve when trading (effectively not only offering)
- improve upon fulfillment of wishes, being useful for them
- improve for treaties like a peace treaty and keeping them
- worsen if military is large enough and common border or many ships

Diplomacy

Peaceful assimilation

- Relation must be very good over a long history (maybe additive for whole history = trust) by trade or diplomacy

- No immediate threat: long running peace treaty or far away

- How peaceful you were in general, they like peaceful and cultural (large culture rating) nations

- Become status of close friend (public visible)

- Have a strong enough military, they feel attracted to very powerful nations, however first repelled

- Defend upon aggression of others, a threat by another nations give a big boost

- Trade and fulfill all demands wishes

- Buy any excess exports

- After certain time is gone -> assimilation festivities

- Secrete turnaround should be possible to pursue (not see with whom they trade maybe?)

- They could have special abilities (military, cultural, economic) that they give you, when you assimilate them.

- Invasion of new territory after assimilation should take some time.

6 Research

6.1 General aspects of research

- Research is only a minor aspect of the game

- Techs can be researched by investing money, the research of a tech takes 4 turns to complete

- All Techs require the current date to have passed a certain year and can require the research of some precursor techs

- After the starting year of the tech, the cost get exponentially cheaper with a half time of 20 years

- At most 2 tech projects at the same time, unless the College is upgraded to a University (then 4 tech projects at the same time).

- Techs are not tradable, there are additional discounts (~20% if all players have the Tech already)

- Exploring the country for minerals is also a research project – it will reveal some random resources. Can only be researched if there are resources to be discovered left. The resource to be discovered will not change upon reload.

- Different categories: militaristic, economical and cultural techs.

6.2 Militaristic Techs

- Rifles

More ground experience, kind of refueling after battle, higher morale

- Nationalism: Giving free unit?

- Gunpowder: Better weapons

- Canon, Artillery

- Geography and map making

- Construction of turbine propeller

- Colt gun

- Morse code

- Rifles invented: Infantry 2

- Internal combustion machine

- Diesel machine

- Machine gun: Infantry 3

- Higher limit on battlefield units.

- Telephone (better communication, efficiency)

6.3 Economic Techs

- Windmill: Farms can be upgraded

- Coal extraction: Better industrial research?

- Jenny Speed invented: Wool from sheep

- Better transport wagons: More efficient wagons

- Better pump for mines: More efficient mines

- Steam engine, high pressure: Enables railroad building

- Seed Drill: Improve grain farms and orchards to level 1

- Cotton Gin: Improve cotton plantations to level 1

- Iron Railroad bridge: Cross swamp, enable forester who can improve hardwood forest to level 1

- Feed Grasses: Enables rancher who can improve wool farms and livestock ranches to level 1

- Industrial revolution

- Better canned food

- Gas lamps: better mines and workers more efficiently

- Cement improved

- Electric generator: town upgrade?

- Chemicals for farmers

- Sewing machine

- Elevator: mines to level 3

- Oil drill

- Dynamite: Improved railroad

- Electric light: Mines and city upgrade

- Car with combustion machine

6.4 Diplomatic Techs

Higher tech efficiency, higher cultural ranking, more diplomatic influence

- Propaganda: Increases influences, gives special unit spy?

- India discovered: Bonus for first

- Radio 1901

- Better relation favors nations in trade

7 Military

Philosophy: The role of the military in this game is quite large, but not dominant. We should not forget that the game is also about industrial development and diplomacy, not only about war. Therefore battles must be complex and offer diversification, but on a simplified level. The battle and army model of Imperialism 1 needs to be extended without making it too complex. Some ideas from other games (like unit promotions) should be incorporated. The main points here:

- A strong military needs a strong industrial base for paying high upkeep

- It can be either defensively or offensively aligned

- Battles can take more than a turn, delaying action and allowing reinforcement.

- The number of units taking part in battle is limited (due to limited organization and area) but should seldom be reached.

- Healing is not for free, it may also take time.

- Battles are carried out on a detailed hex map and can take several turns per game turn. Panzer General like feeling.

- Terrain is determined by defending province (and specific for each)

- Maybe add training time (cheap units, short training time, long units, large training time) - during training will be shown in barracks of ministry of defense, deployed right after training

- Fortification should be expensive and less useful, so artillery orgies are not necessary.

- Militia might actually only be present in the defense case and tied to the province. This could be reflected by the naming also.

- Light and heavy cavalry (move and attack or heavy artillery attack only, or move attack and move on, light cavalry)

- Health status is displayed as a bar with green yellow and red (red is casualties, green is full morale) or so

What if two neighboring powers attack each other in neighboring provinces or even in a triangle. Who becomes priority? The one with largest, fastest army?

7.1 Land Units

5 types of units

- militia (stationed in provinces, number is limited per province, only good in defense)

- infantry (cheap, slow, short distance, good in defense and city attack)

- cavallery (expensive, fast, short distance, weak against cities)

- artillery (expensive, slow, large distance)

- officers (one per army, increases moral and attack of surrounding units)

Unit properties

- attack strength (IN 0 – 20), no separate defense strengthen: how strong a unit attacks

- unit strength (percentage 0 – 100%): relative amount of soldiers present in this unit

- range (IN 2 – 8): firing distance to target in tiles of the battlefield

- speed (IN 2 – 10): movement speed in tiles of the battlefield

- morale (percentage 0 – 100%): if morale is below 30% the unit will flee

- creation cost ($): amount of money to create from the soldier pool

- upkeep ($ and FN units of fuel): payment per turn for upkeeping this unit, also including fuel costs

- experience level (IN 1-5): experience increase efficiency and is gained by taking part in combats, is lowered when the unit is refilled

Production and Refilling after combat

- units can be produced from the soldier pool and need each one unit of soldiers and the indicated creation costs, next turn they are available at the capital province

- units with less than 100% unit strength can be refilled from the soldier pool without delay but at costs (equal to production costs of such a part of a unit plus a deployment fee ($20)) and experience is reduced

- units with less than 30% unit strength are liquidised to manpower pool

7.2   Land Units Strengths

Type	Attack	Range	Speed	Creation cost	Upkeep
Militia I	6	1	3	-	-
Militia II	8	1	3	-	-
Infantry I	8	1	3	1.0	1.0
Infantry II	10	1	3	1.4	1.0
Infantry III	12	1	4	1.8	1.1
Artillery I	14	3	2	1.5	1.3
Artillery II	18	4	2	2.0	1.5
Artillery III	22	5	3	2.5	1.7
Cavallery I	12	1	4	1.5	1.2

Type	Attack	Range	Speed	Creation cost	Upkeep
Cavallery II	16	1	5	2.0	1.4
Tank (III)	20	2	5	2.5	1.6+fuel
Officers	8*	-	4	1.0	1.0

*only defense

Creation cost is a multiplier on the base creation cost ($500).

Upkeep (per turn) is a multiplier on the base upkeep ($50).

- Special defence multiplier: Entrenched (Infantry +2 if it hasn't moved the last battle round) and Hills, Mountains, Cities, Over a river gives a cumulative +1 bonus on defense

- Promotion of Officers: Base is Lieutenant (attack +1 for 3 random units), Next is Colonel (attack +1 for 6 random units)

- Earliest time of introduction: Type I from 1814, Type II from 1850, Type III from 1880 (or make it a tech?)

- Movement limited to 2-3 provinces per turn, faster with railroads?

7.3 Land combat

Battlefield

- Hexagon of hex fields with 15 fields diagonal distance, city in the middle

Time

- 3 battle turns per game turn, if not resolved (city not occupied yet) continuation next round or abortion of fight if combat took place

Damage model

- Unit 1 attacks unit 2 with attack values of a1 and a2

- Strength of units are s1 and s2 respectively

- Damages to both units are d1 and d2

- Formula: $d(y) = c \cdot (s_x \pm \Delta) \dfrac{a_x}{a_y}$

- Different formula: dy = c * (ax * sx – ay * sy +/- delta) * 2 / (ax + ay)

- With constant modifier c ~ 0.5

- Gaussian random modifier +/- delta (which is adjustable)

- Damage cannot be higher than strength dx <= sx

- Damage is calculated and then subtracted from strength, also morale is adjusted

No auto resolution of battle

- Actually there is auto battle, you can let an officer take over which will use AI routines. But apart from that the real model is used – no other calculations.

Special bonuses

- Encirclement factor of provinces = Number of own surrounding provinces minus Number of provinces of the enemy divided by the sum of both gives up to 50% bonus for attacker or defender. Reason: avoid isolated provinces in foreign territory, favor straight front lines

- Sea invasion ignores Encirclement factor but gives fixed 20% malus to invader because it is more difficult.

- How to add all bonuses? Additive? Multiplicative? Limit?

7.4 Navy

basic properties

- upgrade means we basically buy a new ship but get some discount on raw material from scrapping the old vessel

- land invasion from sea over a certain number of provinces can delay the action, strong naval defense can delay it even further

possible actions

- defensive actions: guard trade in sea zone, secure landing operation

- offensive actions: interfere trade, engage enemy fleets, block ports

- default action is no other command is issued is: guard

4 types of units

- small and fast merchant ships (superior blockade runner, expensive in relation to cargo)

- large and slow merchant ships (inferior blockade runner, cheap in relation to cargo)

- light and fast war ships (efficient for merchant hunting, inefficient for naval battle)

- heavy and slow war ships (inefficient for merchant hunting, efficient for naval battle)

3 (merchants) or 4 (war ships) levels of improvement for each type where cargo and speed improves while upkeep stays constant

- small merchants: carrack, trader, clipper

- large merchants: fluyte, indiamen, freighter

- light war ships: frigate, raider, armored cruiser, battlecruiser

- heavy war ships: galleon, ship-of-the-line, ironclad, dreadnought

8 Combat

8.1 Strategic combat

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8.2 Tactical combat

*   Move and/or attack. Attack ends movement.

*   Responsive fire maximally two times per turn.

*   Entrenchment (defending bonus, if not moved last turn, only for infantry)

*   terrain hills, mountains, cities and across river give a +1 bonus each (cumulative) on defense strength (i.e. attack value when in defending position)

*

9 Scenarios

9.1 Europe 1814

- **Great Powers** France, Great Britain, Prussia, Austria, Sardinia, Ottoman Empire, Russia

- **Minor Nations** Portugal, Spain, Catalonia, Morocco, North Africa, Sicily, Egypt, Greece, Serbia, Switzerland, Bavaria, Hannover-Brunswick, Netherlands, Denmark, Sweden, Poland

- Spain united but weak

- North Africa split in Tunisia and Algeria, ready for colonizing

10 Statistics

We want that clever players can find out about their opponents plans and status to some extent if they are willing to read the stats. Also people love stats about their own empire and so on. So here is the place to think about what to give and when.

History for each turn in the past for each statistics?

General stats about your empire

- Number of provinces, Treasure, Military force, Tax rate

- Working population, Industrial output/productivity, infrastructure

Special stats about your enemy

- Rankings without absolute values every x years

- Diplomatic relations, what they think of you, how likely war is

11 AI

General requirements

- Three difficulty level: easy, normal, challenging

- Moderate thinking time

- Include elements of chance, but also predictable

- Some central switches: peacefulness, ruthlessness (diplomacy), special affections (technology, navy, ...)

- Memorize past actions during a game (maybe also between games but then can be turned off)

- Should communicate reasons for its actions

Minor Nations should

- act defensively (never wage war, not even on other minor nations)

- sell resources and buy consumer goods

11.1 Requirements

- Should have optional a personal flavor for each grand nation, definable by some sort of sliders (peacefulness, greediness, ...)

- Should have aims/goals like assimilation in X years, war in Y years and act according to these goals but also redefine them from time to time

- free parameters not determined by the goals are maximized for certain general criteria (money, military, industry)

- Military AI: takes roles (defender, attacker) but never defends completely, always at least tries to counter-attack

- Military AI: single provinces: rather defend (aggressive, cautious), rather attack(aggressive, cautious)

- Declare War, Beg for Peace and then shortly after Declare Ware again without rebuilding phase – this should not happen!

- As a inferior Nation an A.I should basically try to not attack meaningless but also not give in. Just concentrate on defending and surviving.

11.2 Liquid Feedback

I would like to test AIs fully automatic against each other. This means that I can adjust parameters and then let them run against each other. Ideally I would also get online feedback from players playing against the AI, probably more detailed than just who won. Possible benefits:

- Improve AI performance

- Find optimal parameters (preferences) depending on country and starting value

- Get fast feedback on new algorithms.

12 Multiplayer specifics

Requirements

- Soft time constraint (like a game clock that gets added a fixed amount for each turn)

- Slow mode like one turn per day (but how is tactical battle then incorporated?)

13 User Interface

13.1 Coventions

- Style: Water color or pencil drawings
- Standard graphics format is Portable Network Graphics (png) because of wide adoption, losless compression and transparency
- More editable files (PhotoShop, CorelDraw) including all layers can and should be saved too

13.2 Start Screen

Purpose

- New random scenario (picture of a globe)
- New historical scenario (European map)
- Load game (image of documents)
- MP joining a game (map with differently colored figure)
- Options (speech balloon with flags and names)
- Scenario-Editor (can edit every possible savegame)
- Exit (two wings of a door)
- Help/Credits (click on logo)

Comments

- Upon change of language, the program needs to restart, need notification about it.
- We start full screen and expect at least 1024 x 768.

13.3 Main Map Screen

- Tile size is 80 x 80 pixel
- Terrain view as background (showing provinces, units, military movements)
- One right side: mini-map
- Selected unit function box
- Menu toolbar (all the different dialogs and help)

Transport Dialog

- All, the dialogs (Transport, Industry, Trade) run in one Frame with top toolbar for other dialogs and help

- Listing for each commodity currently connected to transport network, slider bar representing the amount of each commodity to transport vs. total amount

13.4 Sound effects

- Click on a button

13.5 Various things

- There will be a real time clock in one corner of the screen, can be turned off in the options

- Do we want to have customized mouse cursors? Easy to implement, but is there any real benefit? Mouse cursors should indicate possible actions.

- Savegames should have a screen shown always.

- Inbuilt functionality to make screenshots.

14 Programming

14.1 Coding standards

For now as unordered list:

- Each (significant) submission will be reviewed by another team member who might modify it further.

- Tests have to be programmed for all major parts. Tests have to be performed regularly. (Jenkins/before submitting)

- Code that does not compile should never be submitted.

- Javadoc has to be added for all methods/classes/interfaces at submission level. At the latest when the class has matured extensive documentation is a must.

- Always add the GPLv3+ header to new files. Also add name and creation year. They indicate your consent to the open source license.

- A task driven development (using a Kanban board or similar) with short tasks (minutes to one hour) is preferred.

- If chats are conducted, the log will be archived online. Any private information will be deleted before.

- Everything is conducted in the most simple and straightforward way. If a well supported/mature library is available, which is not too complex or overpowered on it's own, we will always prefer it to coding self.

- Minor tasks will have minor priority. Top priority is always to make the game running, everything else comes later.

- We will not sacrifice clarity for a fast hack. A hack that works somehow but cannot be sufficiently explained or a hack that requires cumbersome or unmotivated modifications should be rejected and the code should be redesigned instead.

14.2 Algorithmic challenges

- Tile surveying

- Specialist movement and actions: tile improvement

- Railroad connection test, collection of resources

- Manufacturing of materials

- Military movement

Programming

- Help with crashes (auto send?)

14.3 Client Server Communication

The idea is to use a thin client, that has little to no knowledge about the game mechanics. Communication with the server is via TCP and messages. Messages are simple data structures that are being sent between client and server. They can also be seen as updates or events. The underlying library (kryonet) uses non-blocking transfer and serializes/deserializes the messages. Internally messages might be funneled into a chain of handlers.

The server listens on a port, each client is connected to the server by a connection. However clients could be disconnect(ed) during the process, so we must allow re-connection. For details see below.

14.4 Server

- Upon start the server binds to a port, then listens for incoming connections.

- Every new connection create a new ClientState object, immediately a AM.Validate message is send.

- State is Invalid until a TM.Version message arrives.

- If this message contains the right string, state changes to Valid, otherwise disconnect, send TM.Error message before

- Waits for TM.Register message or for NM.ID message.

- If TM.Register message arrives, change status to Registered, create new ID and return NM.ID message.

- If NM.ID message arrives, look up if there is other Client in state Disconnected with same ID and change this other client to connected with the actual connection. If there isn't another client, send TM.Error message and disconnect.

- If status is registered,

14.5 Client

14.6 Server/Client

- We will employ it, just because it will enable Multiplayer easily and because I want to learn it

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- We will employ [Thin Client Framework](#) to realize communication between Server and Client
- We will make sure we constantly monitor the quality of the connection between client and server.
- Also the server will have a GUI for monitoring it's status, etc.

Server

- Scenario rules (HashMap, read-only)
- Nation properties (HashMap, change value but not adding new values)
- Event: change properties: "key" new value

Enum: Client States

- Invalid: has not sent a correct version
- Valid: is client of the same version
- Registered

14.7 Savegames

Ever game data is stored in XML files. We have scenarios. Also saved games are also scenarios. There is automatic saving of course. Upon load some parameters can be changed, but not many.

Adjustable parameters

- Player nation
- Difficulty level of AI opponents

14.8 Scenario Editor

Can be edited completely with the Scenario Editor. Parameters should be soft coded. During development, need to update between versions. If a scenario file refers to sub-files, store a hash value to make sure the referred file is the valid one.

Scenario parameters

- Name of scenario
- Description of scenario
- Date (year, season), Turns, ...
- Map (see Map parameters)
- Major country description

- State of industry, work force, army, specialists for each country

- State of research, diplomatic relations, gold for each country

Map parameters

- Name

- Size

- Distribution of terrain, resources, infrastructure

- Borders, Provinces, Name of provinces

- Countries (Major, Minor)

15 Unincorporated ideas list

- Do we need a newspaper or advisers? Do they add to the game experience? Should not be only text, but also lots of graphical information.

- Military and Combat: Do we need it that complex? Is morale really adding to game experience? Is it balanced?

- Some educational/historic input. Additional to newspaper articles also great scientists (special specialists), great generals taken as historic figures. Maybe even historic database articles when clicking on a country or a province city?

- Should leaders provide special abilities? Use historic names and several choices per country. In order to be important this should have a distinct effect on the game, otherwise it would just add to complexity.

- Do we want to have products with different kind of qualities or only competition over price? In general it would it more realistic but also unnecessarily complex. Quantity as sign of dominance is enough.

- Small gimmick: special currency (just the historical name) for each nation?

- Different way of doing culture: having cultural background/predominance for each province and this then helps.

- Revolt risk in each province right after occupation, lowering productivity, destroying improvements, being suppressed by military presence.

- Define provinces as core provinces. Focus points for tension/aggression. But also ask for help others to regain your provinces which you would finally get, even when it is conquered by others.

- When signing an alliance (planning war against somebody) already divide the territory. This will be the plan for division later regardless who conquered what?

- Helping allies by sending troops to them and fighting or sending as a loan. (but not for free)

- Military: Units: Does automatic upgrades make senses? If the number of units gets large this would mean a lot of work for the user but the best way of upgrading is not clear.

- Resources appearing/disappearing by random?

- Railroad routes to neighbors necessary in order to have trad capabilities?

- Do we want Population as a real number? Currently only the number of provinces important for demand...

- Prestige staff like special buildings (Panama canal, Suez canal, Expeditions to South Pole, North Pole, Himalaya, Exploring Africa, .. giving a cultural boost.

- Instead of council of governors having a different score measure based on real assets.

- Enable power blocks: maybe by having open markets giving trade advantages only if there

is a peace treaty of all member for at least X years.

- Statistics with bars (relative numbers) or real numbers (absolute numbers)

- Have another extra consumer good next to clothes, furniture, tools.

- Have special infrastructure improvements for each province (like industrial zone, university, military academy, trade zone, shipyard, …) giving bonuses and specializing this province. They need a yearly budget to operate. This would make the provinces even more valuable. More to gain in war.

- Diplomacy: Specific contracts like junior/senior partner in alliance or give province X or war

- Diplomacy: Send Ambassadors to foreign countries giving special bonuses gaining experience with every action they can perform

- Diplomacy: Peace negotiations including money etc.

- Should towns grow with radius on map?

- More workshops: stone (to cement). salt (for canned food)

- Transportation system with capacity (goods / turn) and different kind of transport ways (road, rail, ...).

- Peaceful assimilation should units be taken over from assimilated nation?

- Diplomacy: Minor Nations: Maybe having the chance to deal with them exclusively for a certain period of time.

- With experience use resources more efficiently.

- Diplomacy: Minor Nations: Instead of assimilation give them state of colony - only limited influence. Supply workers, raw materials.

- Spy as special unit

- Privateer as naval action possibility

- More buildings to be placed on land tiles that give bonuses?

- If two GPs start war on the same Minor Nation and somebody wants to defend them he should end up in war with both. (bug from the original game)

- Intro movie – I would like it.

- Limit on how many units per battle/map.

- Industry: Improve towns to give free stuff depending on character of the province. Do we want that? Alternatives: Increased efficiency of main factories, free workers, increased resources, increased demand. = Industrialization of provinces

- Include weather conditions?

- Trade routes? Do we really need them? Do we need to obey them? See trade possible without port? What happens if all sea ports of a nation are conquered? Sea trade possible? (What ports to minor nations use? Is land route preferred?) Do we want to make the game

so complex at this position.

- No corruption, happiness, province improvements, religion or government types, civics as in Civilization and we like it.

- More internal, social modeling? More influence of historical leaders?

- Trading territory, buy or sell provinces?

- National meter for each province, also religions and bad economic state or nearby war have effect on social order or tax burdens. Finally can lead to revolution.

- Different types of government: Communism, Capitalism

- Naming Austria-Hungary also Habsburgian Empire? Event scripting to rename it and show it in a newspaper article?

- How long should it take for a unit to level up? Quite long. At least one or two wars? Maybe going down with time?

- Special unit: Medic/Field Surgeon (improves recovery?) or a hospital in the province or the general gets an upgrade.

- Upgrading a unit must be much cheaper than buying/training a new one!

- Should technology or general progress change unit abilities, e.g make cannon less good after trench warfare is invented?

- Military-Combat-Naval: Manual Naval battles? How many ship types (merchants, warships) and symbolized as symbols (if used for warlike actions) or just as a number (if used as trade capacity).

- If he end up with morale, do we want army wide morale like losses of provinces...

- Minor/Major: Only difference is that Minor is much weaker, cannot be elected in government council. However Minor can become Major and vice versa.

- Historical scenario: should they have historical aims?

- For world scenarios: other resources like silk, oil, spices (different names of factories too)

- Cultural victory via governors council? Increases your influence more and more? Or different victory?

- If several turns per year - need to write down the names of each turn (and localize them) like Seasons or months.

- What to do with isolated provinces???

- Automatic retreat from battlefield as convenience, immediately ending the battle but always resulting in losses. Every retreating units suffers a certain damage (either absolute or relative).

- Escape points on the battlefield? Or entrance areas? Fixed entrance areas?

- Height on each terrain tile during combat, influences bonuses?

Unincorporated ideas list

- Special bonuses in terrain? Ambush possible in forest. Artillery not in mountains, no entrenchment in mountains or yes? Swamp reduces movement, less defence and attack? Cities ambush.

- Minor powers cannot negotiate alliances or other important treaties or at least not as leading power?

- Diplomacy: Treaties secret or open to everybody or what should be secret? Or secret for some period?

- Diplomacy: Treaties only between two power, however include third power like being neutral to this power. Similar to Crown of Glory.

- Traveling with soldiers through friendly territory? Teleporting back in case of sudden war?

- Technology: Tech tree means that some will just look for the shortest route to some military techs. So not too many prequisites.

- Number of Techs somewhere between 35 techs (Imp1) and 108 (Imp2).

- Diplomacy: Spies could have a great potential. For trading relations but also for spying on military. To not abuse load/reload, a mission should always take several turns before a result is shown.

- All units: specialists/civilian, workers, military should use food.

- Diplomacy: Possible spy actions: steal money, mess troop movements, destroy improvements?, act as counter-defense, invoke rebellion?

- Random events like good harvest, harsh winter, earthquake, mining accidents, economic booms, nationalistic surges

- Selling of troops as an alternative to sending them to alliance partners.

- Recovery of units after battle takes long unless you have a medic/hospital nearby.

- Bonus if you hold all provinces from a certain territory.

- Instead of units of coal have real units: 1000 tons of coal?

- Kind of opinion of population: like is a war popular or not, is a decision popular – clear ways to get the approval of your own people, like having a good casus belli? Maybe as kind of popularity measure. Considering your power basis. Improve by payments or secret police?

- Multiplayer: Allow rejoining after crash, save always automatically to have entry points again, chat system

- Multiplayer: Should player be able to play minor nations. What is the limit of number of multiplayer players? Just the number of nations? What if someone quits?

- Scripting to have special events? Lua binding?

- Use nice open source font? Liberation or so?

- Modability: Make sure the engine works with any number of terrain types, military units, ...

Unincorporated ideas list

- Diplomacy: Can we tie economic power more closely to diplomatic power? Should be so that it would work also with human players, not only AI, so have to be automatic factor. For example during trading.

- Trade solely by merchant marine. Transport solely by railway transportation system.

- Cool historical regimental names instead of "1st Infantry Regiment" (for historical nations). Perhaps fictitious regimental names for random generated nations (Hackensack Regiment of Foot).

- In seaside towns and provinces could also be an opportunity to build coastal defenses to prevent the port blockades and invasions. Build time should be long-term and expensive.

- Splitting of nations, maybe as diplomatic mission, maybe as random event if national cohesion is weak (war) or maybe as scripted event (to achieve historical accuracy)

- Mobilization: costs time and higher keep-up costs but also higher effectiveness, clue is that other nations get to know if someone mobilizes but do not know against whom...

- If long periods of peace, culture and art flourishes in the capital and across the country – peace dividend

16 Ideas for the future

16.1 Military

Specialization

- Each unit can have one special trait, cannot be undone

- Unit must have at least a certain level of experience or there is a certain fixed chance after each kill/battle action to develop a special trait

- Upgrade anytime (not during combat) after the conditions are fullfilled

- Infantry: City attack (bonus on attacking in cities), Tough (bonus on defense)

- Artillery: Slow down (every attack slows a unit down one movement (not cumulative)), Defender (bonus on attack, malus on movement)

- Cavallery: Blitz (bonus on first attack), Fallback (certain chance of withdrawal instead of attack), Scout (can sneak through enemy lines)