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<p>Titel: Krigsspel valpåverkan – Ett seriöst inflytandespel för att lära ut koncept av kognitiv krigföring</p> <p>Sammanfattning</p> <p>Förvarsvilja är ett centralt begrepp i det svenska Totalförsvaret. Begreppet beskriver en individuell och kollektiv benägenhet att tycka eller handla i ett försvarsrelaterat syfte. Psykologiskt försvar skyddar förvarsviljan från främmande påverkanskampanjer som försöker urholka den. Denna uppsats syftar till att skapa ett seriöst spel för att lära ut element av förvarsvilja och drar slutsatsen att ett sådant spel är möjligt men utmaningar kvarstår i avdömningen av resultat av påverkansoperationer i seriösa spel och när det gäller att inkludera psykologiskt försvar i spelet.</p> <p>Aktuell forskning om förvarsvilja och psykologiskt försvar är begränsad till den svenska kontexten och har inte prövats i krigföring. Denna uppsats föreslår att kognitiv krigföring är ett relevant proxy-begrepp för moderna försök att urholka förvarsviljan och föreslår att valpåverkan är en relevant proxy-kontext för ett seriöst inflytandespel som syftar till att lära ut kärnbegrepp inom påverkansoperationer som syftar till att urholka förvarsviljan. En integrerad systemmodell för valpåverkan är sammansatt av befintlig vetenskaplig forskning och dess kärnelement är uppdelade i inlärningsblock. Slutligen utvecklas ett seriöst inflytandespel och metoder för effektiv avdömning i inflytandespel utforskas.</p> <p>Nyckelord: Kognitiv krigföring, krigsspel, påverkansoperation</p>	

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Thesis report

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<p>Title: Wargaming elections interference</p> <p>A serious influence game for teaching elements of cognitive warfare</p> <p>Abstract</p> <p>Will-to-defend (försvarsvilja) is central to the Swedish concept of 'total defence' (totalförsvar). It represents an individual and collective inclination to think or act in support of the defence of the nation. Psychological defence (psykologiskt försvar) shields will-to-defend from foreign influence campaigns that attempt to degrade it. This thesis sets out to create a serious game to teach elements of will-to-defend and concludes that such a game is possible but serious challenges remain with regards to the inclusion of psychological defence and in adjudicating the outcomes of influence operations in serious games.</p> <p>Current research into will-to-defend and psychological defence are limited to the Swedish context and have not been tested in warfare. This thesis proposes that cognitive warfare is a relevant proxy concept for modern-day attempts to degrade will-to-defend and proposes that elections interference is a relevant proxy context for a serious influence game that aims to teach core concepts involved in attempts to degrade will-to-defend. A systems integrated model for elections interference is composed from existing scholarly research and its core elements are decomposed into essential learning blocks. Finally, a serious influence game is developed and venues for effective in-game adjudication are explored.</p> <p>Keywords: Cognitive warfare, serious games, wargames, influence operations</p>	

Master's thesis
Systems Science for Defence and Security

Charles PERRING

Wargaming elections interference

Developing educational wargames for cognitive warfare

Swedish Defence University (FHS)
in collaboration with the Swedish Defence Research Agency (FOI)

Course: 2FS014

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1 Introduction

“We need these days to defend the minds of our peoples and protect our freedom to think and act” Sir David Omand¹ (2021)

“The recent explosion of information and communication technologies and options for influencing different groups has totally changed the philosophy of combat” Colonel Dr. Nikolei Stoianov² (2021)

Wargaming is a tool well suited to developing decision-making skills for environments with incomplete and imperfect information (Herman 2009).

“It has long been realised that the act of designing a wargame, whether board-game, miniatures rules or narrative game, is a way of creating a comprehensive analysis of a situation” Dunnigan, 1977, Sabin, 2012 in Curry(2020).

1.1 Aim and main research question

This thesis was written at the FHS and codirected by FOI. It sets out to test the hypothesis that it is possible to develop a prototype table-top wargame to teach elements of the Swedish concepts of will-to-defend (försvarsvilja) and psychological defence (psykologiskt försvar) to newly recruited operations analysts. The constraints were a maximum session time of 1 hour and autonomous play with limited participation from the facilitator.

There are many definitions of what constitutes a wargame. A game is “fundamentally a rules-based abstracted model of some aspect of reality (bargaining, negotiation, or conflict) that allows the study of aspects of the real world which would be harmful, costly, or catastrophic to investigate” (Ormrod et al. 2022). For the purpose of this thesis the author supplements this definition with that of the Swedish Defence Research Agency where by a wargame is “a structured discussion with a scenario as a common starting point where inputs (events) are used to structure and drive the discussions forward towards the games goals and objectives” (Nordstrand 2012). The first step of the thesis is therefore to research a suitable scenario around which the participants can base an autonomous educational discussion about will-to-defend. A systems model and its associated rules will be required to allow this scenario to evolve.

1.2 Will-to-defend and psychological defence

¹ Sir David Omand was UK Security and Intelligence Coordinator, Permanent Secretary of the Home Office and Director of GCHQ.

² Colonel Nikolai Stoianov (Bulgarian Army) is director of the Bulgarian Defence Institute (BDI) and chair of the Information Systems Technology (IST) panel of the NATO Science & Technology Organization (STO).

The concepts of will-to-defend and psychological defence have strong Swedish cultural roots. It is today at the core of Sweden's Total Defence (Totalförsvar) concept whereby, in times of war, the entire effort of the country is repurposed for defence. Such a pivot requires strong popular support and will-to-defend is as central to preparing for this eventuality and as will-to-fight is in enacting it, were Sweden to suffer an act of war. Will-to-defend is a predisposition to think and act in a way that supports national defence. It has been measured through perceptions surveys for five decades and is one of Sweden's most consistent defence-related statistic (Rossbach 2017). Since 1940, several government authorities have been tasked with protecting it.

During the WWII, Sweden's State Information Board protected the neutrality of Swedish minds by defeating foreign propaganda that targeted its population (Rossbach 2017). This board was disbanded in 1945 after blurring the lines between protecting from propaganda and distributing its own (Rossbach 2017). Ten years later in 1954 the Beredskapsnämnden would take up the role but this time fighting Cold War propaganda. In 1985 the baton passed to the Styrelsen för Psykologiskt Försvar (SPF) that was in turn disbanded at the turn of the 20th century. Since then, the responsibility has changed hands many times: Centre for asymmetric threats CATS (2003); Psyopsförbandet (2006); Myndighet för Samhällsskydd och Beredskap MSB (2009); and the Myndighet för Psykologiskt Försvar (2022). Today, psychological defence is considered to have three pillars: "to ensure the will of the people to defend themselves in peace and the will to resist in war; to ensure that factual public information can be disseminated quickly and efficiently even in disturbed conditions; to identify, analyse and meet advocacy campaigns" (Försvarsdepartementet 2017).

Sweden is not alone in adopting the concept of Total Defence and incorporating into it will-to-defend and psychological defence, countries like Estonia and Singapore have similar strategies but as the compound hyphenated word itself suggests, the concept of "försvarsvilja" has struggled to gain traction in the Anglo-Saxon world where it doesn't really have a good counterpart. There are similarities with concepts such as esprit-de-corps or morale, but these terms are applicable only to tactical level fighting groups and cannot be extended to the level of the population. The centrality of the will-to-defend in Total Defence can be problematic as neither Sweden, Estonia nor Singapore have experienced a war in which will-to-defend came into play, so many discussions about the concepts remain theoretical. There are however indications that US forces have used the concept in previous engagements since the 1960's and recent research using the term "cognitive warfare" by NATO, US, UK, China, and Russia indicate a clear interest in (re)exploring this concept more closely. This is useful for the purposes of this thesis as it allows the author to build a bridge into a broader spectrum of engagements than Sweden itself has experience with, and to engage with research from thinktanks around the world to understand how will-to-defend can be gamed.

1.3 Cognitive warfare, elections interference

The character of warfare is changing (Stewart 2017). There is growing evidence that armies around the world are developing weapons intended to infringe on freedom of thought (Backes and Swab 2019; Beauchamp-Mustafaga 2019; Claverie et al. 2021). The acronym NBIC, originally coined for exploring human enhancement with Nanotechnologies, Biotechnologies, Information technology and Cognitive science to directly affect the decision centres of the brain, is at least 20 years old (Roco and Sims Bainbridge 2002). Initially aimed at enhancing the capacities of one's own forces, some analysts and leaders believe that militaries around the world are now actively researching NBIC capabilities aimed at degrading opposing force capabilities. "The human brain is now the ultimate battlefield" (Remanjon 2021) yet levels of preparedness are low, capabilities to detect and characterize threats and attacks are lacking, and methods of detection are poorly developed (Claverie et al. 2021). Calls for the recognition of the cognitive domain are not new (Nicholson 2006). It is also known as Fifth-Generation Warfare (Abbott 2010; Stewart 2017) and has gained traction in recent years with the use of information warfare by Russia in its invasion of Ukraine in 2014 (Franke 2015) and publications about Chinese doctrine (Beauchamp-Mustafaga 2019; Kania 2019; Qiao and Wang 2002) which "deals in depth with ways of directly affecting the neuralgic centre of the enemy without damaging the rest" (Commin and Filiol 2015). Calls for NATO to recognize a 6th warfighting domain are gaining traction: a Cognitive Domain that is fought with NBICs and where the aim is to gain control over an adversary's decision-making, perceptions, and behaviour. Fighting in the cognitive domain, cognitive warfare, can be defined as the "weaponization of public opinion by an external entity, for the purpose of influencing public and/or governmental policy or for the purpose of destabilizing governmental actions and/or institutions" (Bernal et al. 2020). In cognitive warfare, the "aim is to change not only what people think, but how they think and act" (NATO Review - Countering cognitive warfare 2021). The parallels between the Swedish will-to-defend and psychological defence on the one hand, and modern "cognitive warfare" on the other are convincing.

1.4 Games as a tool

The character of wargaming must change. The purpose of wargaming is to "provide decision making experience applicable to real-world situations" (UK Ministry of Defence 2017) so the character of wargaming must keep pace with the changing nature of warfare. It is a tool well suited to developing decision-making skills for environments with incomplete and imperfect information (Herman 2009). The design process of developing a wargame is itself a recognized method for creating a comprehensive analysis of a situation (Dunnigan, 1977, Sabin, 2012). Adjudication is the process of attributing outcomes in response to player actions. The battlespace of classic kinetic wargaming is in the physical domain and adjudication tools and methodologies refer to extensive technical databases that model combat result outcomes and expert adjudication by people with

significant battle experience (Burns et al. 2015). These adjudication methods are poorly suited to gaming the cognitive domain (Downes-Martin 2013) where main efforts are not focused on neutralizing opponents through force but aim to nudge opponents and civilian populations towards behaviours with outcomes that are favourable to the force doing the nudging. Research in influence gaming investigates the cognitive domain where effects of actions are diffuse, causality is uncertain, and operations can unfold concurrently over timeframes that are orders of magnitude apart (Train et al. 2022). Where rigid rules in classic wargaming gave structure to interactions between players, influence games battle for the narrative and are permeated with cognitive bias (Train et al. 2022) where social dynamics play a large role in the quality of game outcomes. This is particularly problematic if the wargame shall inform decision making. Participants are traditionally cherry picked from available staff and selected for knowledge and experience which they are expected to bring to the table, but such contributions are not guaranteed, may not be sufficient and are poorly monitored. The role of rank and hierarchy in promoting group think is well researched but often not considered in wargaming. Interpersonal dynamics may lead participants to sabotage outcomes leading to destructive rather than constructive contributions (Downes-Martin 2016). Factors that contribute to improved decision making like diversity may be overlooked (Davis 2021) with predictable outcomes.

1.5 Gap in current games and approaches

A plethora of games aimed at the public on the subject of countering disinformation are available online (Information Disorder Prize Competition 2022; Linden 2020). Many of these are targeted at the general public and aim to improve social media literacy by raising awareness about the mechanisms by which statements on social media are crafted with the intention of triggering neurotransmitters such as dopamine and oxytocin to influence behaviours and moods of the target audience without arousing suspicion (Roozenbeek and van der Linden 2019).

Wargaming influence, where influence is used in pursuit of an in-game objective, is an emerging field of significant interest within western militaries and universities. Projects published so far can be differentiated by whether influence is targeted at an in-game artefact, or whether the participants themselves and their behaviours are the target. The proliferation of disinformation during the COVID-19 pandemic of 2019-2022 (ongoing as of time of publication) and its impact at the geostrategic level has given this field renewed attention. Joint projects between US Global Engagement Centre, The European Centre of Excellence for Countering Hybrid Threats (Hybrid CoE) and Georgetown University Wargaming Society include a Counter Disinformation Wargame (Real-world simulations teach how to defend against disinformation 2022) and the Malign Influence Game (Bae 2022), the UK Ministry of Defence (MOD) Defence Science and Technology Laboratory has a Representing Behavioural Effects (RBE) Project (Dstl wargames the

power of influence 2021) aims to rewrite UK doctrine on wargaming, the Rand Corporation recently developed an Information Warfighter Exercise Wargame (Paul et al. 2021).

No games developed or in development at the time of writing could be identified that specifically addressed will-to-defend or psychological defence. Serious games and wargames oriented at social media awareness raising or demonstrating influence and manipulation were computer based and did not fulfil the core requirements and constraints as set by the Sponsor FOI.

1.6 Brief outline of the next sections

In this thesis I describe the steps and outcomes of the development of a wargame on election interference, starting with a description of the theory of wargames and adjudication, then describing the methodological steps of identifying the relevant components of the game, defining the underlying model, piloting the game, and processing feedback from this pilot. Finally, I discuss the insights drawn from the design and trial of the game in the context of changing warfare, will-to-defend and elections interference.

2 Theory and methods

2.1 Literature research and military leadership theory

Military leadership is enacted down complicated chains of command and across multiple hierarchies. Communications up and down the chain of command can, and often are, filtered to just what the person needs to know or what the commander thinks will fit in the brief. At the same time, coordination across multiple arms requires the simultaneous distribution of information to all. Several tools are available to leaders who wish to gain influence. In addition to editorial control over handbooks and doctrines, and reorganisations of staff structures, speeches at keystone events are commonly used to share a commander's vision widely and set the conceptual framework for years to come. Researchers in military affairs publish books that collect and summarise their research to make it accessible for practitioners not affiliated to an academic institution. For this reason, material for this thesis is sourced and anchored in peer-reviewed literature but it also borrows heavily from speeches by military commanders, books by scholars that synthesise peer reviewed research and military handbooks and doctrines.

Relevant literature was identified by using iterations of keyword search on journal databases at the Swedish Defence University (FHS) followed by a snowballing approach. In a first step, military doctrines and thematic publications from national security think tanks were selected based on the topic of "will-to-defend" and "försvarsvilja". These enabled the selection of an initial list of associated keywords and notable scholars. Academic journals were searched for the identified keywords and resulting documents examined for content and identification of researchers and

keywords for further research. Research into ‘will-to-defend’ brought the author to ‘influence operations’ and ‘cognitive warfare’ which led to its application in ‘elections interference’.

2.2 Systems Engineering

Systems Engineering (SE) was selected as the approach of choice because of its consistent set of tools and guiding principles suitable for building the overarching framework of the thesis, for supporting complex systems analysis and the innovations process of ideation and game creation, and for supporting the structured analysis required for method development. This thesis borrows heavily from Soft Systems Methodology (B. Wilson 2001), Systems Engineering principles and practices (Kossiakoff et al. 2020) and Design Thinking (Hasso Plattner Institute of Design Stanford 2010).

This thesis has two broad themes: product development, and method development. Under the product development theme, the author identifies cognitive warfare as the main system of interest and designs an influence game for teaching core elements as they are used in modern elections interference operations. This product constitutes the main input for the method development theme.

The themes are together composed of five stages iterated recursively. An initial stage of research in influence operations delivers a systems model that illustrates cognitive warfare at work. A decomposition of this model feeds into learning goals for the identified audience. A design and development stage produces an influence wargame that is played and analysed to identify the barriers to effective adjudication. These barriers are addressed through hypothesis testing before conclusions are drawn.

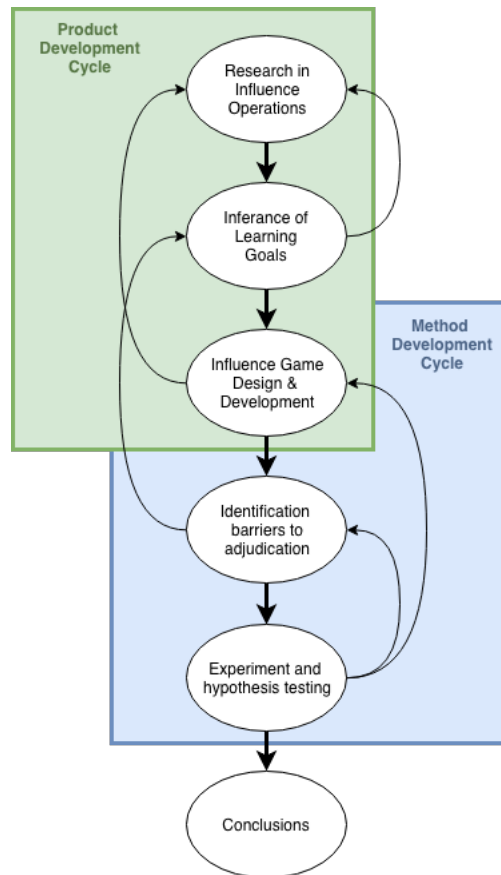


Figure 1: Process diagram and iterative model of thesis development

2.3 Research in Influence Operations

Four methods were used to develop the influence operations model. A literature review, systems modelling, interviews and discussions with professionals in the field of influence, and iterative development.

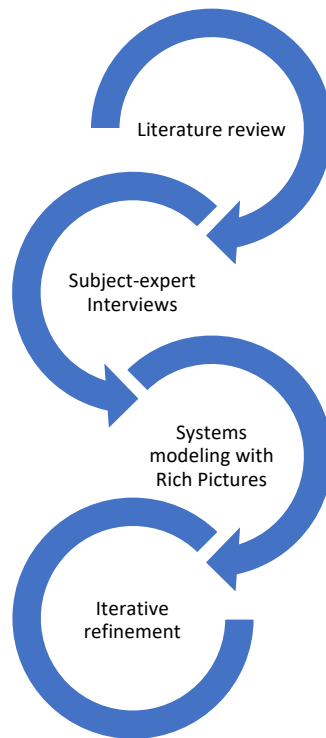


Figure 2: Research in Influence Operations iteration cycle

2.3.1 Discussions with subject experts

Several discussions with subject experts were conducted to check the model and literature research and adjust as necessary. Experts included staff from the Swedish Defence Research Agency and participants at wargaming conferences Connections North 2022 (2022-02-19/20) and Connections Next-Gen 2022 (2022-03-12/13). Security clearance limitations and constraints due to Covid-19 pandemic limited the number of interviews and posed constraints on the type of discussions and engagement.

2.3.1 Soft systems methodology

Soft Systems Methodology (SSM) and Rich Pictures were developed by Brian Wilson and Peter Checkland (Checkland 1981; B. Wilson 2001). SSM, a set of methodologies, was designed for the analysis and definition of information requirements. This methodology was chosen because information is the principal vector of attack in influence operations and humans (or machines imitating humans) are key actors. Rich Pictures methodology produces a graphic diagram that includes organisational entities of interest, the relationships between them, roles of apparent significance, issues, areas of conflict and other elements of importance to describe the system in focus (B. Wilson 2001). Modelling principles of Human Activity Systems (HAS) were used to describe influence operations as a socio-technical system and set relevant systems boundaries for

the modelling influence operations. HAS models suppose that “all individuals within organised groups are acting to try to achieve some purpose [so] can usefully derive (...) models of purposeful activity”. Furthermore, “models developed this way are not intended descriptions of reality but descriptions of ways of thinking about reality” (S. Wilson 2020, 11–12) which offers a level of abstraction suitable for game development and the learning goals.

2.3.2 Iteration

The research method incorporated iteration at its core whereby research informed keyword search which informed choice of expert, refinement of the systems model, further research areas and so forth.

2.4 Inferring learning goals

“The limits of my language mean the limits of my world.” Ludwig Wittgenstein

Underlying the development of the learning goals and the description of the prior system model is the epistemological belief that words are required to describe things and knowledge cannot be generated without the vocabulary to describe it. Without a shared vocabulary, knowledge cannot be shared.

The Swedish Defence Research Agency (FOI) offers support to the Swedish government in many contractual forms. One of these is the embedded operations analyst whose role is to be the “experts’ expert” within their specialisation while acting as a high value network node between the client and the wide array of other expertise within the agency. The role of the OA, as an essential node in a knowledge network, is increased by their capacity to facilitate meaningful discussions. FOI identified the target audience in the early phases of the master’s thesis as “newly recruited Operations Analysts (OA) who are not specialised in influence operations”. The entry requirement for the OA role is master’s +3 years professional experience but this may vary. Duties may be related to specific hard skills, but OA’s are commonly called upon to facilitate and lead internal processes. In recent years, forward-looking horizon planning is common.

A further requirement from FOI on the game development is the duration of the game that shall not exceed one hour. Ambitions for teaching conduct of cognitive operations should take this into account. In comparison, the US Army’s PSYOP Operations Specialist Course runs for 43 weeks (Psychological Operations 2022).

Bloom’s revised taxonomy of learning objectives and Norman Webb’s Depth of Knowledge wheel were used to decompose the systems model into building blocks and to constrain learning goals to achievable objectives with regards to sponsors guidelines.

In addition, a summary media review was conducted during the initial weeks of the 2022 Invasion of Ukraine by Russia to identify gaps in popular understanding about the mechanics of information warfare when compared to the system model developed previously.

2.4.1 Blooms taxonomy

The 2001 revision (Anderson and Krathwohl 2001) of Bloom's taxonomy of educational objectives is more action oriented than the original 1956 (Bloom, Blyth, and Krathwohl 1966) replacing descriptive nouns like "evaluation" with verbs in the present participle "evaluating" and adding an additional level "creating". The scale is used in a similar way to Webb's DOK but is considered less rigorous, easier to apply to tasks in the present. Levels are oriented around a verb and the activity in question. Similar to Webb, the student's cognitive capacity is assessed, and activities prioritized for growth and engagement.



Figure 3: Blooms revised Taxonomy of Educational Objectives (Anderson and Krathwohl 2001)

2.4.2 Depth of Knowledge

Norman Webb's Depth of Knowledge wheel is a tool characterizing tasks based on the complexity of the cognitive challenge they pose. It is used to sort educational activities and optimise educational programmes for growth and engagement by ensuring activity complexity level keeps pace with the growth of the student's appetite for cognitive demand. (Wisconsin Department of Public Instruction 2016). Webb's DOK has four levels ranging from (1) Recall – of a fact, term, definition; (2) Skill/Concept – involves mental processes beyond memory; (3) Strategic Thinking – involves abstract reasoning, planning, and using references to support arguments; (4) Extended Thinking – requires challenging levels of abstract reasoning and planning over an extended period. Webb's tool focuses on the process of thinking. In comparison to Bloom's taxonomy this means

and managers is well established (Markley 2015; UK Ministry of Defence 2017) and they are a significant field of active research (Baird et al. 2009; Curry 2020). Readers will note that influence wargaming and cognitive wargaming are used interchangeably throughout the present thesis.

Games are an ancient form of structuring thoughts and actions for different purposes. Early prototypes of the abstract strategy game *senet* appear in scripture over 5'000 years ago. Serious games are used within private and public sector business administration for a diversity of goals such as building effective leadership teams, planning organisational change and preparing for future events, for example contingency planning or mergers and acquisitions (Herman 2009).

Games within defence and security have been a staple planning tool of modern armed forces since the 1820's in the form of wargames, a term used to describe "a simulation of a military operation, by whatever means, using specific rules, data, methods, and procedures". The course of a wargame is necessarily path dependent as environments are designed to test the decision-making skills and the outcomes of player interactions. Rules of the game are commonly deterministic (missile X has destructive effect Y, with a predetermined probability Z in advanced games) and the effects of player interactions are mostly decided by lookup tables or human-in-the-loop adjudication. Wargames of this nature are data heavy, expensive and time consuming to develop and players' freedom of action is limited by the resources that exist within the game.

For scenarios that do not lend themselves to predetermined rules or where data collection about opponents, hardware and cause and effects predictions are not available or are too expensive to develop, many western armies used argumentation-based games such as Matrix Games. Also referred to as games in workshop form, these are devised from a loosely built scenario and involve players planning out courses of action (CoA) and using rhetoric to argue why a particular CoA was likely to succeed, the opposing side may argue how they would counter or why it was likely to fail, and the outcomes of players' decisions are adjudicated by the game leader based on the rhetorical arguments presented by the two sides and the leader's experience. Players are limited in their actions only by their imagination while realism and path dependence is enforced by the game leader.

It is thought that scenario-based role play can improve both the capacity to predict how situations are likely to play out in real life and the capacity to make sense of current situations. A typical wargame involves asking participants to adopt the perspective of a specific actor (role) and make consecutive "what should I do now" decisions in the context of other participants playing other roles while doing the same. Knowledge is gained by participants through direct participation in the cognitive decision-making process and by observing parties through taking note of actions and related outcomes. The knowledge directly and indirectly supports strategic, operational, and

tactical battlefield decisions. Knowledge acquired through direct participation is thought to be anchored cognitively deeper than that acquired by other means and is thus more valuable.

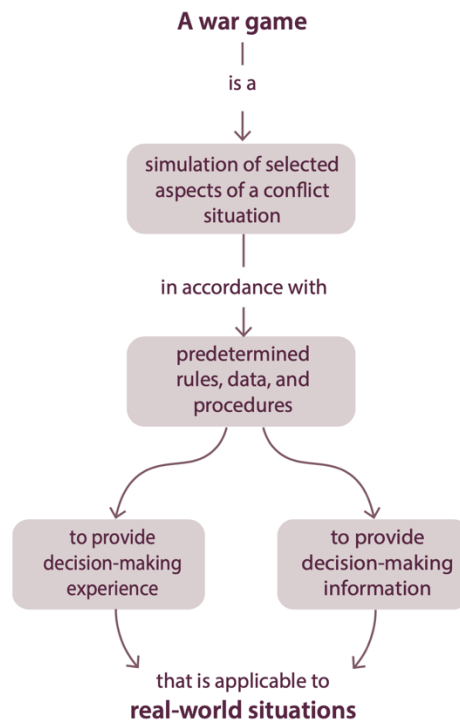


Figure 5: A graphical definition of wargaming from the UK doctrine (UK Ministry of Defence 2017)

2.5.1 Methods for wargame development

Methods used for developing the wargame include wargame design handbooks (Markley 2015) (Burns et al. 2015) (Wade 2018) (UK Ministry of Defence 2017). This was supplemented by unstructured discussions with experts and conferences on wargame development (Connection North 2022-02-19/20, Connections NextGen 2022-03-12/13).

Design Thinking was used as the innovation framework. Design Thinking is a user-centric innovation framework for rapid ideation of meaningful innovations. It is a five-step iterative process that emphasizes listening and understanding the user's situation, 'empathize', before 'defining' the problem, 'ideating' a solution, rapidly 'prototyping' with an agile mindset, 'testing' against user experience and iterating back to 'emphasize'. This framework was useful to establish minimum prototypes for the game that met the requirements of the problem at hand but no more.

Design Thinking Process Diagram*

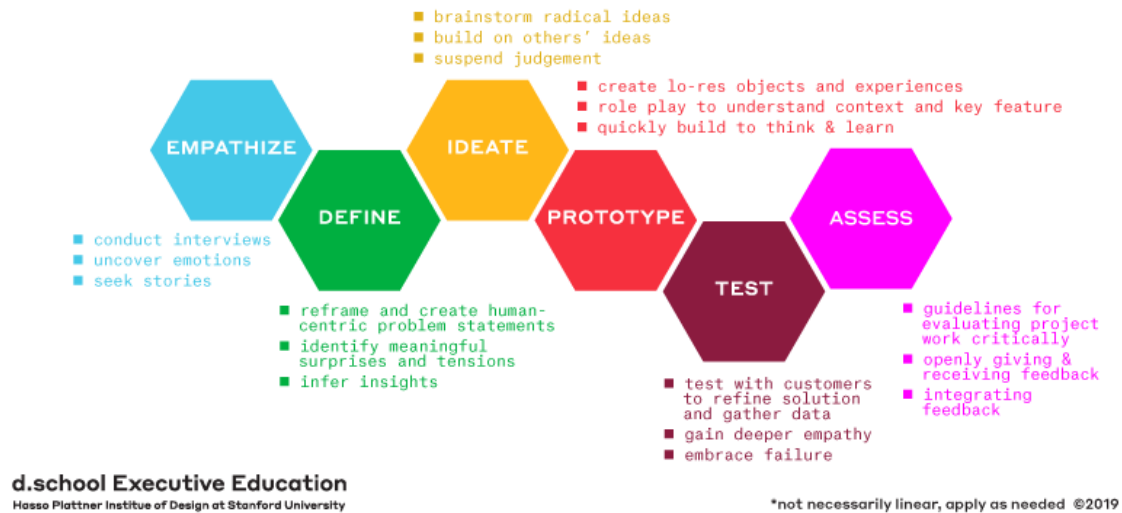


Figure 6: Design thinking process diagram from the Hasso Plattner Institute of Design, Stanford (Hasso Plattner Institute of Design Stanford 2010)

2.6 Adjudication

Adjudication is the process of attributing outcomes to player actions and is thus essential for closing the feedback loop, preferably without interrupting flow and suspension of disbelief that are both important aspect of the learning process. Learning during play requires feedback from the game to the player and where time is represented within the game, feedback is required to enforce causality and path dependence so that player decisions taken earlier in the game have impact and continue to have impact throughout the game. But adjudicating influence games is hard because cognitive bias runs through everything, and causal models are not well established.

3 Results

3.1 Literature research and systems model development

There are many models of warfare in the literature related to information and designed to impact upon the decision centres such as information warfare, manipulation, command-and-control infrastructure (C2 warfare). Some target the morale of the troops (morale warfare, psychological warfare), the opponent's sense-making capabilities (deception). The list of names, fields of operations, levels of war from tactical to strategic vary in nuances across a myriad of different nomenclatures. The lack of consensus in the community about what to call these operations is indicative of the confusion around what they hope to achieve and how they are executed. Few of these models encompass the full spectrum of non-kinetic operations. Nor do they directly target the core of liberal democracies in the in the way that elections interference does. The models

retained below constitute documented use of influence and interference in the political preferences of the population and directly target decision making at the individual level. These models were then integrated into the composite systems model presented lower down.

3.1.1 Information-centric model for asymmetrical conflicts (Berman et al. 2018)

Berman et al. (2018) propose an information-centric model for asymmetric conflict based on field study and data analysis of rebels-government engagements across many conflict zones and spanning multiple decades. An asymmetric conflict is characterized by the overwhelming superiority of movement and firepower of one side within a defined region. Where the government is the strong force, this forces the rebels to adapt their strategies and hide amongst the population. Alternatively, where the rebels are the strong force, government forces must retreat to their barracks and test the rebels with sporadic patrols. Berman et al. propose a three-player model for asymmetric conflict with the government, the rebels, and the civilian population. The rebels and the government fight for territorial control and for the support of the civilian population that is required to hold the territory. The civilian population know where the forces of each side are. They carefully weigh the utility of sharing this information with the parties to the conflict who compete for it by rewarding cooperation (by providing services) or punishing non-cooperation (by withholding services). Berman et al. suggest that this model works well when the services are rapidly scalable and dependent on a particular party being in control. But this model whereby information sharing buys services and security breaks down if the services provided are in the form of large infrastructure projects with committed funds. In this case, services may exacerbate violence as sides vie for control of the resources and know that money will flow to the infrastructure project regardless of who is in control of the area.

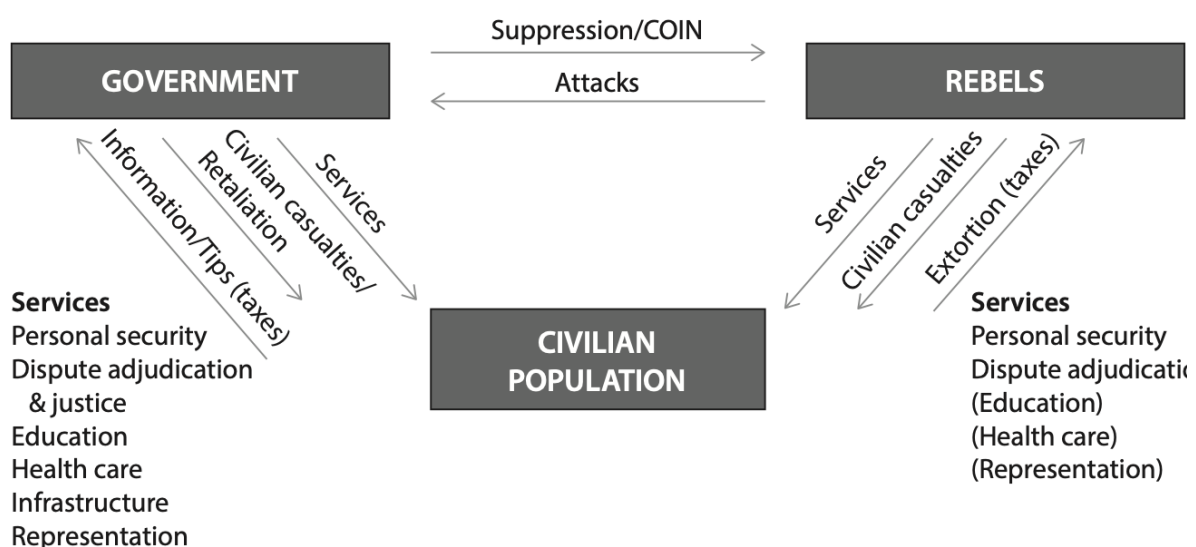


Figure 7: Three-player game of information-centric asymmetric conflict (Berman et al. 2018)

3.1.2 Lie Machines (Howard 2020)

Professor of Internet Studies at the University of Oxford, Howard proposes a three-part model for elections interference in the infamous interference of foreign powers in the 2016 US Presidential elections. Howard proposes a socio-technical perspective and defines a “lie machine” as a “system of people and technologies that distribute false messages in the service of a political agenda” (Howard 2020, 13) to generate computational propaganda. The three parts are (1) Production - political parties, government agencies, candidates for election who produce misinformation to advance their political agenda, (2) Distribution - technological infrastructure of communication networks, bots, and easily exploitable algorithms for micro-targeting and putting information on people’s plates, (3) Marketing – consultants, psychometric analysts, commercial agencies who refine the information through rapid iteration, A/B testing and tailor the message to the individual. Howard argues that such ideas have been the staple of political campaigns for millennia but that the combination of social media’s accessibility, the immediate delivery of messaging and the rapid iterative refining and micro-targeting of the final message constitute a revolution in political affairs and that lie machines are true socio-technical systems where the outcome is far more powerful than the sum of the parts. Stengel (2019) offers deeper insight into the lie machines of Philip Howard from the perspective of the US State Department and Times.com.

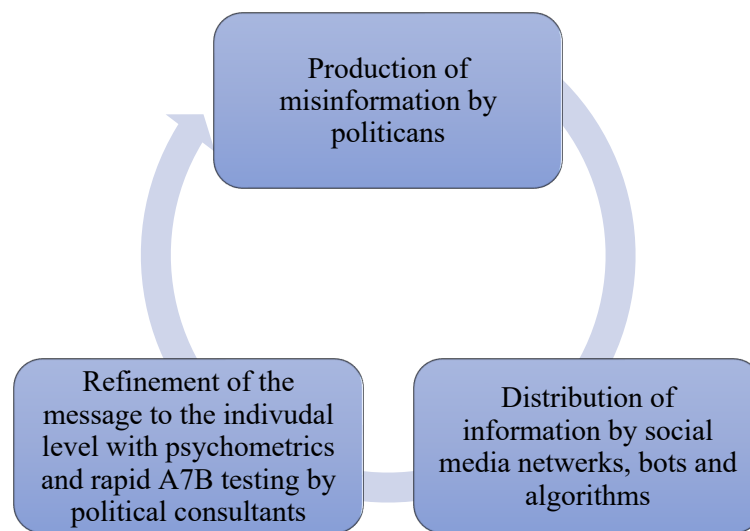


Figure 8: The Lie Machine (Howard 2020)

3.1.3 Principles of Social Engineering (Hadnagy 2018) and the Cognitive centre of gravity Pratkanis in Snow and Taylor (2009)

According to Christopher Hadnagy, social engineering is the act of influencing a person “to take an action that may or may not be in his or her best interests” (Hadnagy 2018). He lists nine

principles that can be exploited to solicit the target to take an action: (1) Reciprocity – the creation of a feeling of indebtedness in the target; (2) Obligation – the appeal to a social norm that forces a response; (3) Concession – a false attribution of authorship making the target feel responsible for the action; (4) Scarcity – the creation of a sense of urgency of action; (5) Authority – calling the target into submission; (6) Commitment and Consistency – in for a penny, in for a pound; (7) Liking and imitation – people like people who like them, people like people who are like them; (8) Social Proof – appealing to group validation; (9) Triggering neurotransmitters – dopamine and oxytocin can be triggered by certain emotions in order to modify disposition and cause behavioural change. Pratkanis in Snow and Taylor (2009) argues that US forces in Vietnam applied a concept of cognitive centre of gravity (COG) or COGs in Conflictual Social Influence Campaigns. Pratkanis identifies nine centres of gravity: Primacy of strategic attack; Morale beneffectance; Trust; Agenda setting; Attitudinal selectivity; Self-justification; Seeds of hatred; Psychological reactance; and the The fog of propaganda. There are clear parallels with Hadnagy's nine principles and Pratkanis' nine cognitive COGs.

3.1.4 Psychometrics

The research of Kaiser (2019) and Lepore (2020) into the use of behavioural and cognitive sciences and micro-targeting with psychometrics in designing and executing political campaigns and psychological operations in the US, Vietnam, Central America, Kenya, Nigeria and the UK by the Simulmatics Corporation and Cambridge Analytica. The portrayal of the Trinidad and Tobago election interference is key inspiration for the main scenario of the elections-interference game.

3.2 Composite systems model for elections interference

The integration of the models above using SSM and HAS leads to the abstracted model in the figure below. The motivations of the actors seeking influence is irrelevant to the functioning of the model but the positive power-feeding feedback loop is important to recognize in addition to rapid iteration of the campaign development and execution loop.

The systems model as abstracted from the literature served as the base for the mechanics and main scenario of the game and for determining the learning goals.

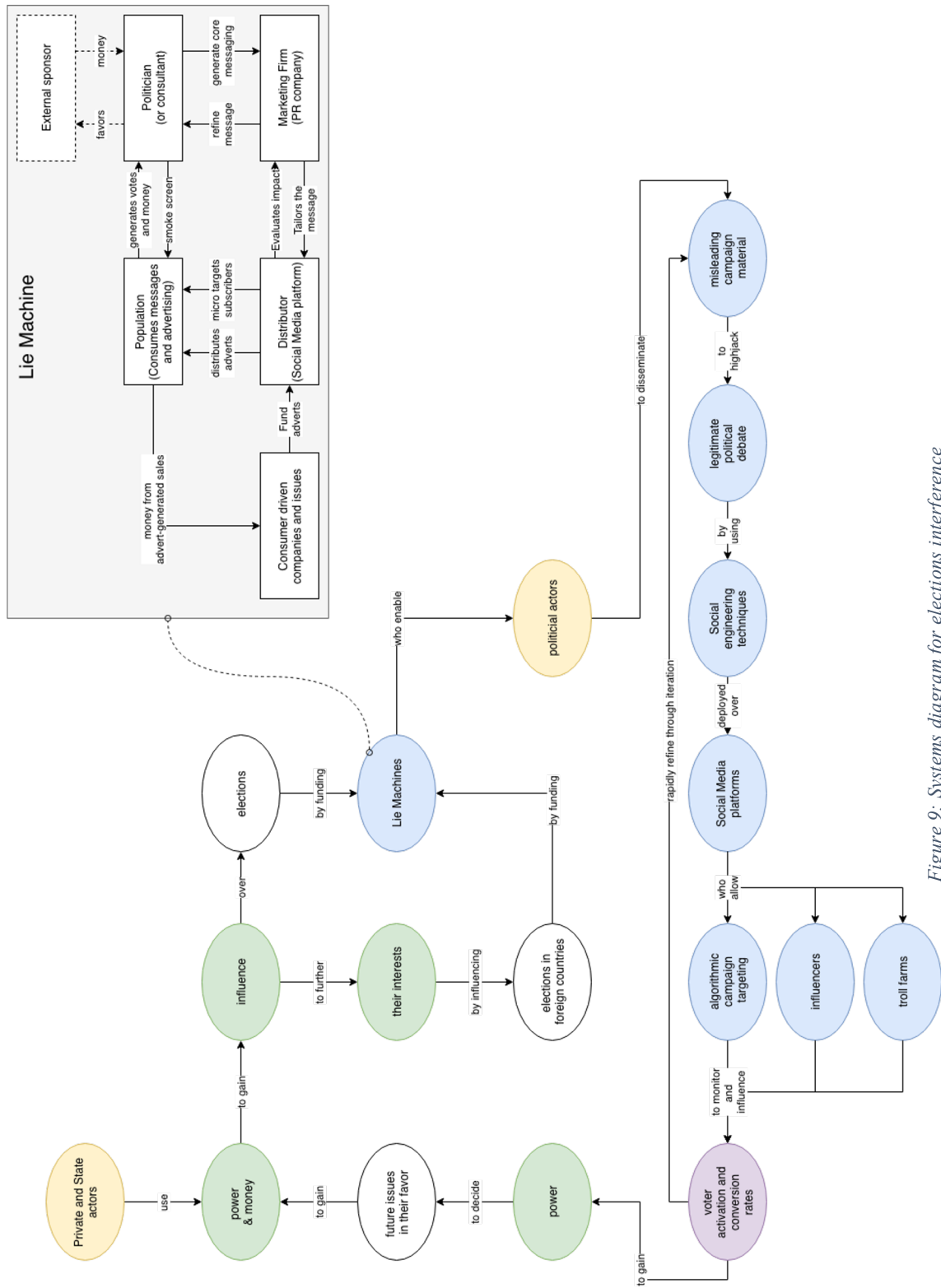


Figure 9: Systems diagram for elections interference

3.3 Learning goals

Analysis of the OA profile and job description suggested learning goals should be oriented towards accompanying processes rather than expert knowledge in cognitive warfare.

Analysis of the media debate in Sweden after the 2022 Ukraine War identified a gap in relation to the fundamental elements of Howard's lie machine, notably the question of marketing and micro-targeting with a large majority of articles focused on what was being produced. Rarely were questions raised about what motivated the choice of just those distribution channels and who the intended target audience was. Through discussions with FOI stakeholders and the initial media scanning, a list of learning goals was drawn and mapped onto DOK and Bloom's diagrams to estimate chances of successful achievement within the timeframe:

Knowledge oriented goals.

DOK level 1: Awareness of the term 'cognitive warfare' and understanding of an application

DOK level 1: Familiarity with the different elements of the system as identified previously, particularly the 'lie machine' model of production, distribution, marketing.

DOK level 2: Recognize gaps in the coverage of related events and system elements that are not being analysed.

Process oriented goals

DOK level 3: OA's should be able to facilitate a discussion between colleagues on the subject of cognitive warfare. This is clearly the most ambitious goal.

3.4 Wargaming

The developed game for elections interference was developed using the systems model developed above and with the learning objectives developed thereafter. It was based upon a classic scenario of resource-based conflict.

3.4.1 Scenario:

The scenario is the following:

Exploration companies have discovered that the nickel-copper mines of Lilla Landet Lagom have significant reserves of Cobalt. Two foreign powers vie to get the mining concession attributed to companies from their nation. To achieve this goal, the foreign power's candidate must win the election.

Each team represents one foreign power. Each team must campaign to win the vote of the people while generating enough ad revenue to fund your campaigns.

Campaign is done by building on the pretext of an event to hijack a legitimate political issue

3.4.2 Description of play:

Random news events take place at regular intervals

Both teams play simultaneously:

- (a) choose a news event,
 - (b) choose a legitimate political issue to hijack,
 - (c) choose a target audience (age group, location),
 - (d) purchase a media campaign of one of four types (newsprint, TV, social media, private social media)
 - (e) write a 280-character tweet tailored to that audience and that subject based on the event.
- Options include purchasing influencers, employing PR consultants and A/B testing campaigns to guarantee results. These options have in game effects such as guaranteeing campaign success regardless of message (PR consultant) and in the case of an influencer, the capacity to win adjacent population segments to your candidate.

3.4.3 Adjudication

Adjudication of the impact of the influence effort is done by the opposing team:

1/ Determine if the targeting voter group was won over: is the message appropriate for the group and how many social engineering techniques were used to craft the message?

2/ Determine how divisive the discourse was: analyse the discourse for emotions and polarisation outcomes. This moves the marker on the 'discourse analysis track' toward or away from civil war.

3.4.4 End of the game

The game ends when an election is called. This can be done by either team at any point in the game. The opposing team then has two extra turns and can either try to win over as many voters as possible and win the voter count or seek maximum polarisation and push the country to civil war in which case neither party gets exclusive control of the cobalt.

3.4.5 The main board



Figure 10: the election interference prototype

3.4.6 Game play

The game was played by four teams of operations analysts in two sittings of two teams. Each sitting was preceded by a 10 min brief about the game, introducing the mechanics, tradeoffs and payoffs. The game was then played for 1 hour followed by a 20min debrief.

3.4.7 Adjudication

Adjudication worked by the work of one team being adjudicated by the opposing team. Conversations were lively and on topic. Message content was analysed and discussed. Some players were happy to immerse themselves in the scenario and explore elaborate plots to win over voters.

3.4.8 Learnings from the game play

Learnings from the game play were recorded at multiple levels. The game itself and the mechanics, payoffs and fluidity were assessed. The game dynamics and interactions between players were observed as were dynamics

4 Discussion and Conclusions

4.1 Cognitive warfare as a proxy for will-to-defend

This thesis set out to teach elements of will-to-defend to newly recruited operations analysts by constructing a scenario that would enable a meaningful discussion capable of anchoring core concepts. Research into will-to-defend and psychological defence led to the observation that this concept, however central to the main tenants of total defence, has not been tested because Sweden has not been at war in over 200 years. Countries with similar total defence and psychological defence concepts like Estonia and Singapore do not offer more guidance. However, as will-to-defend and psychological defence are cognitive concepts vulnerable to influence operations that target the civilian population, key mechanisms by which an enemy could try to undermine will-to-defend can be gleaned from other contexts where adversaries have attacked the cognitive centre of gravity of their opponents.

Such cognitive warfare, where public opinion is weaponised with the purpose of influencing policy, destabilising governments and changing how a population thinks and acts, can be found during the Vietnam War (Pavlik 2011)(Lepore 2020), the Korean, Iraq and Afghanistan Wars (Berman et al. 2018) and in the infamous US 2016 Presidential elections (Stengel 2019)(Howard 2020)(Kaiser 2019). Scholars and practitioners such as Hadnagy (2018) Pratkanis (2007; Snow and Taylor 2009) have identified the social engineering tools and techniques that are utilised with the intent to confuse legitimate political debate and paralyse a nation's capacity to make decisions in the interests of its citizens. Furthermore, a widespread body of research supports the idea that a significant part of the effort in cognitive warfare is directed towards grey-zone elections interference operations and "hearts and minds" operations in asymmetrical warfare. From this research I suggest that cognitive warfare is the appropriate conceptual framework from which to study will-to-defend and psychological defence.

4.2 Elections interference as a gameable proxy for cognitive warfare

If democratic elections have been a key target for cognitive warfare for the past decades and many of the social engineering principles have emerged from research in behavioural sciences in the 1960's, the composite elections interference systems model proposed in this thesis (and formed by integrating research from the authors mentioned in the previous paragraph) illustrates a revolution in cognitive warfare due to the involvement of digital social media networks and the combination of algorithmic micro-targeting, instant feedback on impact and adoption, rapid iteration of campaign material and the advertising based business model that these digital tools permit. Such architectures are referred to as 'lie machines' (Howard 2020).

The ‘lie machine’ offers a mechanism with feedbacks and trade-offs suitable for supporting a game engine. Social engineering techniques constitute a suitable learning goal and one that provides a suitable basis for meaningful discussion. This thesis thus proposes that a serious game, based on the mechanics of the lie machine, the feedback mechanisms of acquired voters and financial returns from advertising, and based on the subtleties of message tailoring, provides all the necessary hooks for anchoring the learning objectives and carrying a meaningful discussion about influence operations and attempts to undermine will-to-defend. Feedback from players of the serious game developed within this thesis supports this proposal.

4.3 The importance of the social context on the adjudication of influence games for educational purposes

Adjudication is the process of attributing in game effects to players’ decisions. The constraints placed on the accuracy of the adjudication processes depend on the intended outcomes of the game. Constraints on adjudication for decision support wargames are very high but where wargames support low level educational outcomes such as practicing terminologies and conceptual relationships, adjudication constraints can be quite low. In the case of the game created for this thesis, constraints on the adjudication process were low as the learning goal was to discuss concepts to anchor knowledge internally. However, by focusing on the socio-technical system of game-interface-player, the adjudication method in the first iterations of the game failed to account for inter-player social dynamics and relationships that extended outside the workshop. The participants desire to value these relationships over the in-game relationships between avatars compromised adjudication.

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