FINNISH NATIONAL DEFENCE UNIVERSITY

DEFINING THE CENTER OF GRAVITY
-A theoretical model for multi-domain operations

Diploma Thesis

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ABSTRACT

The purpose of this research was to develop an understanding of how the concept of Center of Gravity (COG) interact within the U.S. and NATO joint level planning doctrines and to evaluate the COG's applicability in multi-domain operations (MDO) environment. The goal was to increase theoretical understanding and to provide tools for the development of the planning process.

Overall research framework was abductive with elements of Grounded Theory visible in the structure. The results were formulated by using historical, theoretical and doctrinal data from the COG and its usage by analyzing it in a hermeneutical process with content-based and theory-based content analysis methods. First content, then theory, was the driving factor of the analysis. Content-based content analysis was conducted inductively and theory-based content analysis deductively. The former made possible to create the COG theoretical construct and the latter to compare it with the MDO.

The results showed that the evolution of COG created variations of interpretation which emphasized the significance of context. These and related understanding have shifted over time and is visible in the theoretical debate and doctrinal development. The MDO analysis showed that all of its four tenets met the COGTMC criteria with minimal dissonance. The conclusions indicated that common nominators between the COGTMC and MDO were holistic analysis of the operational environment and the need to create effect in a systemic structure. The analysis showed that the MDO can be seen more effect-based than capability-based as it exists in everchanging continuum. The results indicated that the COGTMC is a useful (theoretical) tool that can be used to analyze the MDO concept.

Conclusion of the research was that the current COG and related analytical matrix has utility, however, there could be need to re-examine the current COG principles and the effect of intangible elements. The theoretical examination of COG validity and usability through creation of a (theoretical) construct was the essential new information provided by this research. The results of this research provided theoretical base from which to further develop methods, ways and applications for U.S., NATO (or similar) joint planning processes that utilizes the COG concept, analytical framework and related terminology, as part of the analysis.

Subjectivity of the researcher and the inherent interpretative nature of the qualitative research places limitations on the use the COGTMC, conclusions and results. The following implications for further research rose from the source material: A systems warfare perspective, revised or alternative COG analytical matrix/tool for MDO environment, and effect-based definition of COG for MDO.

KEY WORDS

Center of gravity, multi-domain operations, joint operations, planning process, doctrine

TIIVISTELMÄ

Tämän tutkimuksen tarkoituksena oli ymmärryksen syventäminen siitä, kuinka voimanlähde, (center of gravity, COG) vaikuttaa Yhdysvaltain sekä Naton yhteisoperaatioiden suunnitteludoktriineissa sekä arvioimaan voimanlähteen käsitteen käyttökelpoisuutta monitoimintaympäristö (multi-domain operations, MDO) ympäristössä. Tutkimuksen päämääränä oli lisätä teoreettista ymmärrystä COG:n tunnistamiseen ja määrittelemiseen liittyvästä analyyttisestä prosessista sekä siten tarjota työkaluja suunnitteluprosessin kehittämiseen. Tutkimuksessa käytettiin yleisellä tasolla abduktiivista viitekehystä ja sen rakenteessa oli elementtejä ankkuroidun tutkimuksen (grounded theory) lähestymistavasta.

Tutkimustulokset muodostettiin hermeneuttisessa prosessissa hyödyntämällä COG:n ja sen käytön historiallista, teoreettista ja doktriineista saatua dataa, joka käsiteltiin aineistolähtöisen ja teorialähtöisen analyysin keinoin. Näin ollen ensin aineisto, sitten teoria oli analyysiä ohjaava tekijä. Aineistolähtöistä sisällönanalyysiä tehtiin induktiivisesti sekä teorialähtöistä analyysiä deduktiivisesti. Ensimmäisellä mahdollistettiin COG:n teoreettisen mallin (COGTMC) luominen ja jälkimmäinen mahdollisti mallin vertaamisen MDO konseptiin.

Tulokset osoittivat, että käsitteen evoluutio on luonut variaatiota tulkinnoista ja ymmärryksestä. Ajan kuluessa konteksti, termin käyttö sekä miten se ymmärretään, on muttunut. Tämä näkyy teoreettisessa keskustelussa ja doktriinien sisällössä. MDO konseptin analyysi osoitti, että kaikki sen neljä periaatetta (tenets) vastasivat COGTMC mallin kriteerejä osoittaen vain minimaalista dissonanssia. Johtopäätökset myös osoittivat, että operaatioympäristön holistinen analyysi ja vaikutusten luominen systeemin osiin oli COGTMC:tä ja MDO:ta yhdistävä tekijä. Analyysi osoitti, että MDO ympäristö on enemmän vaikutusperusteinen kuin kyvykkyysperusteinen, koska se sijaitsee muutoksessa olevassa jatkumossa. Tulokset osoittivat myös, että COGTMC on hyödyllinen (teoreettinen) työkalu, jota voidaan käyttää MDO konseptin analysoinnissa.

Loppupäätelminä oli, että tällä hetkellä COG ja sen analyyttinen matriisi on käyttökelpoinen. On kuitenkin huomioitava, että MDO analyysi toi esille joitain seikkoja, jotka saattavat vaatia COG periaatteiden uudelleen arvioimista erityisesti aineettomien tekijöiden osalta. Tutkimuksen tuottama keskeinen uusi tieto oli COG:n käyttökelpoisuuden ja pätevyyden teoreettinen tarkastelu luodun teoriamallin kautta. Tämän tutkimuksen tulokset tuottivat teoriaperustan, mistä Yhdysvaltain ja Naton (tai vastaavien) yhteisoperaatioiden suunnitteluprosesseja kehittämiseen on mahdollista luoda metodeja, keinoja ja sovelluksia.

Tutkijan subjektiivisuus, laadullisen tutkimuksen tyypillinen tulkinnallinen luonne asettavat rajoitteita COGTMC mallin ja tutkimuksen johtopäätösten hyödyntämiselle. Seuraavat jatkotutkimusaiheet ja tarpeet nousivat aineistosta: Systeemiteoreettinen perspektiivi, päivitetty tai vaihtoehtoinen COG analyyttinen matriisi MDO ympäristölle, vaikutusperusteinen määritelmä COG käsitteelle, joka on sidottu MDO ympäristöön.

AVAINSANAT: Voimanlähde, monitoimintaympäristöoperaatiot, yhteisoperaatiot, suunnitteluprosessi, doktriini

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LIST OF ABBREVIATIONS

A2/AD	Anti-access / Area-denial
ADO	All domain operations
AJP	Allied Joint Publication
AJP-5	Allied Joint Publication-5: Allied Joint Doctrine for Planning of Operations
AMDT	Army multi-domain transformation
APP	Allied Procedural Publication
ASCOPE	Areas, structures, capabilities, prganizations, people, events
C1	Component 1 of the COGTMC
C2	Component 2 of the COGTMC
C3	Component 3 of the COGTMC
C4	Component 4 of the COGTMC
C5	Component 5 of the COGTMC
CC	Critical capability
COA	Course of action
COG	Center of gravity
COGTMC	COG theoretical model construct
COIN	Counter-insurgency
CONOPS	Concept of operations
COPD	Comprehensive Operations Planning Directive
CR	Critical requirement
CV	Critical vulnerability
DIME	Diplomatic, informational, military, economic
DoD	Department of Defense
DOTMLFP	Doctrine, organization, materiel, leadership, personnel, facilities, policies
EBAO	Effects-based approach to operations
EBO	Effects-based operations
EMS	Electromagnetic spectrum
FDF	Finnish Defence Forces
FM	Field Manual
FM 100-5	Field Manual 100-5 Operations (1986)

FM 3-0	Field Manual 3-0 Operations (2022)
IR	International Relations
JADO	Joint all domain operations
JADC2	Joint All-Domain Command and Control
JP	Joint Publication
JP 5-0	Joint Publication: Joint Planning 5-0
JPP	Joint planning process
LOO	Lines of operation
MDO	Multi-domain operations (also written multidomain operations)
METT-T	Mission, enemy, terrain and weather, troops support available, time available
NATO	North Atlantic Treaty Organization
OA	Operational area
OE	Operational environment
PMESII	Political, Military, Economic, Social, Infrastructure, Information
PMESII-PT	PMESII + physical environment and time
SOD	Systemic operational design
SoS	System of systems (theory)
SoSA	System of Systems
TRADOC	U.S. Army Training and Doctrine Command
TP	TRADOC pamphlet
UK	United Kingdom
U.S.	United States

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1 INTRODUCTION AND THEORETICAL FRAMEWORK

"*Clausewitz never used the term "center of gravity*"[1]

—Milan Vego

The United States (U.S.) military discovered during operations Desert Shield and Desert Storm that inadequate Center of Gravity (COG) definitions and insufficient joint level agreement on a singular COG results only in poor unity of effort. This lack of cohesion can cause separate wars and independent service/domain specific fights that utilize different COGs which cause friction and disrupt the synchronization of the overall campaign.[2]

Further, Colonel Dale C. Eikmeier argues that in Iraq 2005 "*the lack of a practical COG identification process led Gen. George Casey to misidentify the true COG*"[3]. This misperception led to an extended and bloody counter-insurgency campaign that possibly could have been prevented with a practical method for COG identification.[4]

As Dr. Milan Vego adequately describes, "*Even a cursory glance at the military literature of the last 30 years, starting with core doctrinal documents produced by the Army itself, reveals how pervasive and essential the COG concept has become in U.S. operational thinking*"[5].

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[1] Vego, Milan: *Clausewitz's Schwerpunkt Mistranslated from German—Misunderstood in English*. Military Review, January–February 2007a, p. 101. At the time of writing Dr. Milan Vego was a professor of joint military operations at the U.S. Naval War College.
[2] Eikmeier, Dale C.: *The Center of Gravity, Still Relevant After All These Years?*. Military Review Online Exclusive May 2017, p. 2. [https://www.armyupress.army.mil/Portals/7/Army-Press-Online-Journal/documents/Eikmeier-v2.pdf], read 3.4.2023. According to Colonel Eikmeier this was exemplified by contradicting views of the US Army and Air Force regarding what should be considered a COG. General Norman Schwarzkopf selected three centers of gravity which were leadership and command-and-control nodes, weapons of mass destruction, and the Republican Guard Forces which fit into each service respectively
[3] Ibid. p. 2.
[4] Ibid. p. 2.
[5] Vego (2007a), p. 101.

Hence, understanding of COG theory and its analytical methodology is of paramount importance as to promptly accomplish one's mission with minimal losses and in an effort to avoid possible military catastrophe due to improper, or downright wrong, focus[6]. Furthermore, the concept of COG is a common core nominator in U.S. and North Atlantic Treaty Organization (NATO) planning doctrines and processes regardless of doctrine origin and version[7].

Often the identification and definition of the COG is what makes planning groups spend hours on end debating and arguing about how properly apply it[8]. What makes the concept controversial and difficult to grasp, is the various practical and theoretical interpretations as well as numerous doctrinal changes to its definition done over the course of years. This ambiguity has created a mixture that lacks clarity, logic, precision and testability thus contributing to the overall confusion regarding COGs utility for the planner.[9]

Part of the problematic can be traced to the legacy of the famous theoretician Carl von Clausewitz and his imperfect and unfinished edifice *On War* that portrays a Napoleonic notion of conducting war together with its contextual and mechanistic picture of warfare[10]. Various translations from original German to English as well as conceptual change throughout history has given rise to more confusion than clarity and shown that theoretical terminology should not be used carelessly and assuming it is clear to all concerned.[11]

The first sub-chapter opens the discussion on the importance of researching the COG by using a theoretical approach. It also iterates the meaning of precise conceptual definition and terminology as a key to successfully use of the COG as a tool for the operations planner.

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[6] Vego, Milan: *Joint Operational Warfare – Theory and Practice*. Naval War College, USA 2007b, p. VII-26.
[7] Barfoed, Jacob: *A COG Concept for Winning More Than Just Battles*. Joint Forces Quarterly 88, First Quarter 2018, p. 116. At the time of writing Lieutenant Colonel Jacob Barfoed, Ph.D. was Chief of the Capability Branch, Development Division, Danish Air Staff.
[8] Vego (2007a), p. 101; Eikmeier (2017), p. 1.
[9] Barfoed, Jacob: *The COG strikes back: Why a 200 Year old Analogy Still Has a Central Place in Theory and Practice of Strategy*. Baltic Security & Defence Review, Vol 17, Issue 2, 2014, p. 1. See also, Eikmeier, Dale C.: Modernizing the Center of Gravity Concept—So It Works. *Addressing the Fog of COG – Perspectives on the Center of Gravity in US Military Doctrine*, Celestino, Perez Jr. (ed.) 2012, p. 133.
[10] Palmgren, Anders: *Centre of Gravity – Application and Utility of the Concept in the Modern Art of War*. Tiede ja Ase Nro 64, Suomen Sotatieteellinen Seura, 2006, p. 66, 69.
[11] Schneider, James J. & Lawrence L. Izzo: *Clausewitz's Elusive Center of Gravity*. Parameters, Volume 17, Number 1, September 1987, p. 46, 52. The writers refer to a quotation by Sir Edward Grey, a British Foreign Minister from the First World War: "discussion without definition is impossible". See also, Barfoed (2014), p. 7.

The focus of this introduction is to present the problematic nature of the COG with the purpose of giving perspective on the issue and to look briefly how the COG and MDO are a relevant research subject. Introduction part also touches upon how the COG affects the different levels of planning process and how future doctrinal approaches, such as the multi-domain operations (MDO), might need altogether different approach.[12]

1.1 The problematic nature of the Center of Gravity

The concept of Center of Gravity (COG) has been around for quite some time. Commonly it is understood that first version of it was brought forth by German military theorist Carl von Clausewitz with the term *schwerpunkt* in his book *On War*[13]. Since then, everyone from military students to operation planners has made effort in defining the COG as a part of the operations planning process[14]. What is it that makes COG such a difficult concept to grasp?

One essential reason is that the COG is far from being something as simple as a physical object, such as an enemy capital, or the commander of the opposing force. It is more ephemeral and abstract, yet at the same time something very concrete and physical[15]. COG can be dynamic, subject to change and not necessarily a single entity. It defies efforts to constrict it to a static object. This complexity that connects it to both physical and conceptual domains make it both a center of heated debate as well as an integral part of the operations plan. Furthermore, it can be argued that there is a recognized difficulty in identifying and defining the COG as it is seen as a "theory, distraction and yet something that has utility"[16].

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[12] Vego (2007a), p. 101. Vego raises questions regarding the importance of re-examining some of the key theoretical underpinnings, such as the center of gravity due to the profound transformation of U.S. Army. His remarks carry well into the 2020s due to the implementation of multi-domain operations concept.

[13] Eikmeier, Dale C.: *Give Carl von Clausewitz and the Center of Gravity a Divorce*. Small Wars Journal 2013. [https://smallwarsjournal.com/jrnl/art/give-carl-von-clausewitz-and-the-center-of-gravity-a-divorce], read 2.11.2021.

[14] Headquarters, Department of the Army: *Field Manual 100-5 Operations*. Washington D.C., United States, 1986, p. 10. "The three concepts central to the design and conduct of campaigns and operations: the center of gravity, the line of operations and the culminating point". See also, North Atlantic Treaty Organization, Allied Joint Publication-5 (AJP-5): *Allied Joint Doctrine for the Planning of Operations, Edition A, Version 2*. NATO 2019, p. 3–5: "A key element of operational art is to derive ways to affect the primary actors CoGs sufficiently to achieve NATO objectives, whether by strengthening, protecting, weakening, or destroying the CoG".

[15] Barfoed (2014), p. 7. Barfoed emphasizes the unfinished nature of Clausewitz's *On War*. Especially the discussion regarding COG differ between Book Six (physical nature) and Book Eight (more intangible) and create room for confusion and misunderstanding. Part of the book was re-written by Clausewitz before his death and the entire edifice was compiled posthumously by his widow and colleagues. Problematic are also the translations from German to English and the interpretation this brings to the discussion. See also, Joint Publication*: Joint Planning 5-0*. Joint Chiefs of Staff, United States 2020, p. IV-22.

[16] Eikmeier (2017), p. 1–2. [https://www.armyupress.army.mil/Portals/7/Army-Press-Online-Journal/documents/Eikmeier-v2.pdf], read 3.4.2023. See also, Palmgren (2006), p. 75–76. Palmgren warns not to use COG "in a mechanical or dogmatic way" as modern war is too complex for it.

Thus, with evolving complexity of the operating environment and changing context further evaluation on the utility of COG is needed. Further, the significant effect the U.S. has on the western militaries and NATO through the update and renewal process of its doctrinal family creates an opportunity to review the applicability of the current COG concept[17].The aforementioned problematic raises an interesting question: Is the COG still a valid concept that can be utilized from tactical to strategic level, and if not, should the concept (and the related analytical framework) be redefined for future needs[18]?

The answer is far from simple yes or no, as the debate about the issue has been going on for quite some time originating from the introduction of the concept into the US military doctrine in the 1980s after the US strategic defeat in Vietnam[19]. The arguments presented from both sides as well as from the middle seem valid enough in their own right. Moreover, part of the problem that stems from the concepts long history is that often theoretical terminology is used without regard to its origins or in a very casual way[20]. To some it is high time to lose the current concept and its Clausewitzian legacy as it is unfit for 21st century warfare.[21] To others, it is "so abstract to be meaningless"[22].

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[17] Gjelsten, Roald & Nils Marius Rekkedal: Sodankäynnin käsitteistä. *Operaatiotaito – Operaatiotaidon kehittyminen neljässä suurvallassa.* Maanpuolustuskorkeakoulu, Taktiikan laitos, Julkaisusarja 1, Nro 1/2013, Edita Prima Oy, Helsinki 2008, p. 18; Rueschhoff Jan L. & Jonathan P. Dunne: *Centers of Gravity from the "Inside Out".* Joint Forces Quarterly 60, 1st Quarter 2011, p. 120–121. According to the writers the renaissance of American military theory and subsequent discovery of Center of Gravity was the result of the U.S. military's shift away from defensive doctrine in Europe. This was done in order to counter superior number of Soviet forces in the European theatre. See also, Eikmeier (2017), p. 7. In the United States doctrine writers introduced the term *center of gravity* in the 1980's with the publication of Field Manual (FM) 100-5.

[18] Becker, Jeff & Todd Zwolensky: *Go Ahead, forget the center of gravity...* War on the rocks, 2014. [https://warontherocks.com/2014/07/go-ahead-forget-center-of-gravity/], read 29.10.2021. At the time of writing Jeff Becker was the chief futurist in the Joint Staff J7 Joint Concepts Division and Lieutenant Colonel Todd Zwolensky was a strategist in the Joint Staff J7 Joint Concepts Division.

[19] Meyer, Eystein L.: *The centre of gravity concept: contemporary theories, comparison, and implications*. Journal of Military and Defence Studies Volume 22, Issue 3, 2022, p. 2. [https://www.tandfonline.com/doi/full/10.1080/14702436.2022.2030715], read 16.1.2023.

[20] Schneider & Izzo (1987), p 46. First wider discussion started in 1987, only one year after the appearance of the concept and terminology in the US doctrinal family (FM 100-5, 1986).

[21] Freedman, Lawrence: *Stop looking for the center of gravity*. War on the rocks 2014. [https://warontherocks.com/2014/06/stop-looking-for-the-center-of-gravity/], read 31.10.2021. Professor Lawrence argues to ban the COG term and replace it with 'position' as according to him countries, political entities or armed forces do not have COGs and COGs have little practical value for military operations. This, according to him is due to false assumption that an interconnected system can be made to collapse without possibility to regenerate. At the time of writing, Lawrence Freedman was Professor of War Studies at King's College London since 1982. Compare, Barfoed (2014), p. 15, 17–18. Barfoed argues that "each command level with assigned objectives should develop a strategy that considers COGs at that level of war" and Eikmeier (2013). [https://smallwarsjournal.com/jrnl/art/give-carl-von-clausewitz-and-the-center-of-gravity-a-divorce]. Eikmeier is willing to leave Clausewitzian "*On War*" legacy behind but not to discard the entire COG concept.

[22] Eikmeier (2017), p. 2. [https://www.armyupress.army.mil/Portals/7/Army-Press-Online-Journal/documents/Eikmeier-v2.pdf], read 3.4.2023. Eikmeier cites his colleague, Dr. Alex Ryan, regarding the utility of the Center of Gravity concept.

Why should the vagueness of the concept matter to the planners following officially approved doctrines that give guidance in how to define and identify the COG in the planning process? Is it so that the current doctrinal guidance is lacking in some critical way? First, because there are several planning processes for different levels of war (national strategic, theater strategic, operational and tactical)[23] and COG is understood differently in every one of them[24].

Second, because in the US the traditional domains of warfare (air, land and maritime) have been added with a new physical domain, space, as well as the conceptual domains of cyber and information thus making the US Army coin multi-domain operations (MDO) to describe its latest concept of warfare.[25] Thus, it is important to note that this extension of domains extends the problematic nature of the COG concept to this new MDO framework as well.

The implementation of the MDO concept as the new doctrinal foundation underlines the importance of solid theoretical understanding of the COG that goes beyond the doctrine defined identification and analytical process. Moreover, any doctrinal changes the U.S. makes will cascade to all western militaries to some extent as well as to those who model themselves after the west and the U.S.[26]. This is due to the fact that the U.S. has significant effect for the western doctrine of warfare through its individual influence, bilateral relationships as well as via North Atlantic Treaty Organization (NATO)[27].

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[23] Department of the Army, Headquarters: *Field Manual (FM) 3-0 Operations.* Washington, D.C. 2022, p. 1-11–12.

[24] Riggs, Daniel: *Ideologies, Cults of Personality, and the Center of Gravity*. Over the Horizon, Multi-Domain Operations & Strategy 2020, p. 3. [https://othjournal.com/2020/12/21/ideologies-cults-of-personality-and-the-center-of-gravity/], read 31.10.2021. At the time of writing Riggs was a SWCS Design and Exercise Manager at 5BN, 1st SWTG (A) at Fort Bragg. See also, JP 5-0 (2020), p. IV-22; FM 100-5 (1986), p. 179; Eikmeier, Dale C.: Modernizing the Center of Gravity Concept—So It Works, *Addressing the Fog of COG – Perspectives on the Center of Gravity in US Military Doctrine*. Celestino. Perez Jr. (ed.) 2012, p. 135–136. Eikmeier argues that the level of complexity decides whether a COG has utility at a given level of war. Strategic and operational levels COG have utility when answering 'what' questions, whereas tactical not necessarily as it looks answers to 'how' questions.

[25] Jones, Marcus A., Jose Diaz de Leon: *Multi-Domain Operations, Awareness continues to spread about the importance of operating in multiple domains*. The Three Swords Magazine 36/2020, p. 38–39. [https://jwc.nato.int/application/files/5616/0523/5418/issue36_08lr.pdf], read 31.10.2021. Colonel Marcus A. Jones, U.S. Army was at the time of writing former Programme Director 1, NATO Joint Warfare Center and Lieutenant Colonel Jose Diaz de Leon, U.S. Air Force was serving in NATO Joint Warfare Center. See also, Training and Doctrine Command (TRADOC), Pamphlet 525-3-1: *The US Army in Multi-Domain Operations 2028*. United States Army 2018, p. iii. [https://adminpubs.tradoc.army.mil/pamphlets/TP525-3-1.pdf], read 12.11.2021.

[26] Hitchens, Theresa: *SecDef OKs Joint Warfighting Concept*; *Joint Requirements Due Soon*. Breaking Defense, June 2021. [https://breakingdefense.com/2021/06/secdef-oks-joint-warfighting-construct-joint-requirements-due-soon/], read 2.5.2023. Defense Secretary Lloyd Austin has referred to a "new American way of war" – All Domain Operations.

[27] Palokangas, Marko (LTC): *Lecture to the Finnish Defence Forces General Staff Officer course 61*. Finnish National Defence University, 3.12.2021. See also, Rueschhoff & Dunne (2011), p. 120.

It is important to acknowledge that the applicability of the COG concept affects the COG *identification, defining* and *determination* analytical process[28]. The COG analytical process uses critical capabilities (CC), critical requirements (CR) and critical vulnerabilities (CV) derived from critical factor analysis as a foundation for the identification of COG[29]. A failure to identify the COG due to abstract or imprecise concept would also mean that the "*descriptions of the COG's critical factors—critical capabilities, critical requirements and critical vulnerabilities—*"[30] are either not properly, or at all, identified. This would adversely affect the entire COG analytical process and most importantly, the outcome.

Understanding the COG concept, its historical origins, limitations and factors that have contributed to the current definitions in the doctrines helps to evaluate its applicability in future doctrines, such as the MDO concept, in all levels of war. Further, the importance of COG as one of the key tools for military planners reiterates the need for a review of the concept's utility[31]. This research focuses on the operational level of war[32] but it acknowledges that the different levels overlap and connect. Further, the levels of war can be seen as a framework that provides a connection and correlation between political and military strategic objectives and linking tactical tasks through operational level (campaigns and operations) to the whole.[33] Gaining additional understanding on this research subject is important because, if the concept of COG is not solid, and doctrine(s) use "*metaphor-based definitions*"[34], then there is possibility for confusion as to what, if any, utility the COG has for the planner[35].

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[28] Bosio, Nick: *Clausewitz and the CoG: Marriage Stability for Over 180 Year.* Australian Army Research Centre 2016, p. 3. [https://researchcentre.army.gov.au/library/land-power-forum/clausewitz-and-cog-marriage-stability-over-180-years], read 12.11.2021.

[29] COPD (2021), p. 4-53–4-56.

[30] Eikmeier (2017), p. 3.

[31] Kippen, Ian: *Centre of Gravity: Joining the Dots from Strategic to Tactical Level Plans*. Small Wars Journal 2016. [https://smallwarsjournal.com/jrnl/art/centre-of-gravity-joining-the-dots-from-strategic-to-tactical-level-plans], read 1.11.2021. Kippen notes that the COG still has relevance in Soviet/Russian doctrine and thus its use and analysis is needed to protect our own COG. Ian Kippen is a former British officer that was at the time of writing retired from active service. See also, Supreme Headquarters Allied Powers Europe, Allied Command Operations*: Comprehensive Operations Planning Directive (COPD) version 3.0.* Belgium 2021, p. 4-53, 4-62. COG contributes significantly to the overall operational design.

[32] FM 3-0 (2022), p. 1-13. "The operational level of warfare is the level of warfare in which campaigns and operations are planned, conducted, and sustained to achieve operational objectives to support achievement of strategic objectives."

[33] Department of Defence (DoD): *DOD Dictionary of Military and Associated Terms*. United States 2021, p. 159. See also, Higuchi, Shunsaku: *Operational Art and Tactics of the United States Army*. National Institute for Defense Studies, June 2021 Edition, p. 2–3; FM 100-5 (1986), p. 10.

[34] Eikmeier (2017) p. 3. [https://www.armyupress.army.mil/Portals/7/Army-Press-Online-Journal/documents/Eikmeier-v2.pdf], read 3.4.2023. COL Eikmeier is retired from U.S. Army. He is a former air defense officer and strategist, and at the time of writing was an instructor at the Command and General Staff College, Fort Leavenworth, Kansas

[35] Eikmeier, Dale C.: *After the Divorce: Clausewitz and the Center of Gravity*. Small Wars Journal 2014. [https://smallwarsjournal.com/jrnl/art/after-the-divorce-clausewitz-and-the-center-of-gravity], read 31.12.2021.

The most significant contribution of this research is the theoretical work done as part of the building of the COG concept construct and the related comparison to MDO conceptual model. This will increase the theoretical base of operational art[36] and tactics field of science, sets a foundation for the development of a revised COG analytical framework and helps to build on the overall canon of western military sciences as Finland takes its place in NATO.

Thus, this research situates itself as basic research due its theoretical nature with a purpose of achieving wider theoretical understanding of the COG[37]. The goal is not that of producing information for a specific practical planning application that can be utilized immediately and put into practice right away, but instead the results are applicable in the long run through implementation of theoretical knowledge.

As noted earlier, the U.S. has significant effect for the western doctrine of warfare through its influence. Thus, it is imperative to be aware and stay on top of any new conceptual developments to assess how the planning processes currently in use will work when/ if we adopt new versions. This will help to identify possible pitfalls in advance, especially when terminology and definition are understood in the same way throughout the various planning levels.

It should be emphasized that currently there is only a limited number of purely theoretical works in this field in Finnish Defence Forces. Also, close bilateral relationship with the U.S. as well as the new NATO membership highlight the transference of military-contextual influence[38]. Furthermore, this research hopes to raise questions of the use of possible alternatives for the COG identification in the operational level planning process[39].

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[36] Gjelsten & Rekkedal (2013), p. 13. According to Gjelsten and Rekkedal, operational art has been Europe centric due to its development for major wars in continental Europe.
[37] Rantapelkonen, Jari & Lotta Koistinen: *Pohdintoja sotatieteellisistä käsitteistä.* Maanpuolustuskorkeakoulu, Sotataidon laitos, Julkaisusarja 2: Tutkimusselosteita nro 1, Helsinki 2016, p. 93.
[38] Raitasalo, Jyri: Sotaan varautumisesta aktiiviseen asevoiman käyttöön – Länsimainen sodan kuva muutoksessa. Sotilasstrategian tutkimuksen perusteista, *Suomalaisia näkökulmia strategian tutkimukseen*. Pekka Sivonen (ed.), Maanpuolustuskorkeakoulu, Strategian laitos, Julkaisusarja 1: Strategian tutkimuksia, No 33, Juvenes Print, Helsinki 2013, p. 205.
[39] Eikmeier (2017), p. 4. [https://www.armyupress.army.mil/Portals/7/Army-Press-Online-Journal/documents/Eikmeier-v2.pdf], read 3.4.2023. Eikmeier refers to other theorists who ponder about the removal of the COG concept entirely. See also, Rueschhoff & Dunne (2011), p. 120. At the time of writing Lieutenant Colonel Rueschhoff was an intelligence officer and Lieutenant Colonel Dunne USMC artillery Officer.

This research will also help the Finnish National Defence University to reach out to the wider western military science community through use of English language and common theoretical concepts hence providing a stepping stone of sorts for future cooperation. The classification of this research is public as to guarantee as wide dissemination and access as possible.

The next sub-chapter will briefly review the earlier research done on the subjects of COG and MDO. It will also outline how this research situates itself within the military science and the relations of the various elements of the research in a concise manner. Part of the chapter will present selected works from different authors and point out similarities and differences.

1.2 Operational art as part of art of war disciple and earlier research

In this sub-chapter I will determine how the prior research conducted on the COG is valid for this work y review of selective material of earlier research. I will present the key elements of my research and what the previous research accounts for. This will show how my research differs from those done before and thus show what kind of a 'gap' in the scientific canon needs to be filled. This part will also act as a prologue for the research task sub-chapter where the purpose, goal and benefits of the results are put to forth in a more detailed manner.

1.2.1 Ontological and epistemological choices

Ontology and epistemology form the philosophy of science that looks at the nature of scientific information and with what kind of basic assumptions are tied to it. Further, ontological choices define the phenomenon through our perception of concepts and which of them we decide to utilize, whereas epistemological assumptions focus on the nature of information and how we decide to analyze it. Together with theory, they form the bedrock on how we understand the world to be, and how we think is possible to acquire knowledge from it. Thus, the purpose of my ontological and epistemological choices is to situate this research as part of the military sciences.[40]

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[40] Tähtinen, Janne & Ville Huupponen: Operaatotaidon ja taktiikan tutkimuksen lähtökohdat, "*Näin tutkin taktiikkaa"– Tutkimusprosessi operaatiotaidon ja taktiikan näkökulmasta*. Janne Tähtinen (ed.), Maanpuolustuskorkeakoulu, Sotataidon laitos, Julkaisusarja 2, Tutkimusselosteita nro 20, Helsinki 2022, p. 4–6; Sipilä Joonas & Tommi Koivula, *Kuinka strategiaa tutkitaan*. Helsinki 2013, p. 15. The foundations of scientific research reside within the philosophy of science and the ontological and epistemological choices; See also, Lehtoaro, Tomi: *Securitizing of Failing States in the National Security Strategy of the United States of America*. National Defence University, 2016, p. 13.

One way to think of theory is to look at it as a point of view, an aspect on the nature of reality, or a compressed perspective to a specific phenomenon that gives it understandable form[41]. For practical purposes in this research theory and research framework are considered the same. This is possible because according to Jouni Tuomi and Anne Sarajärvi "*both theory and framework are comprised of concepts and the inter-relational interpretations thereof*" and that a research framework describes the central concepts of the research and their relations[42]. For clarity it should be noted that in later stages of the research the COG theoretical model construct (COGTMC) formulated from the source material will become a theory for analytical purposes.

Thus, the research framework for this study describes how the COG theoretical model construct (the theory) is built and how it compares to the MDO concept model, whereas the research design portrays the methodological and analytical process. In this research the ontological questions are taken 'as given'[43], however, there are no clear demarcation between theoretical and empirical tradition. This is because of how the research framework is built and due to research methodological choices that are explained in detail in sub-chapter 1.7.

I have selected hermeneutics as the background philosophy of science, for it is quite typical for qualitative research such as this one[44]. Hermeneutics, a variation of interpretivism, looks at human action as intentional and thus its results contain meaning[45]. As a philosophy of science hermeneutics looks at different issues and the connections of contexts between those issues as well as looks at phenomenon' and how they develop[46].

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[41] Saaranen-Kauppinen, Anita & Anna Puusniekka: *KvaliMOTV - Menetelmäopetuksen tietovaranto*. Yhteiskuntatieteellinen tietoarkisto, Tampere 2006. [https://www.fsd.tuni.fi/menetelmaopetus/kvali/L2_2.html/], read 27.5.2022. See also, Lehtoaro (2016), p. 13.
[42] Tuomi, Jouni & Anneli Sarajärvi: *Laadullinen tutkimus ja sisällönanalyysi*. Helsinki 2002, p. 24.
[43] Tuomi & Sarajärvi (2002), p. 49–50. According to Jouni Tuomi and Anneli Sarajärvi, the American qualitative research tradition is much more based on epistemology than ontology. They argue that the American tradition mainly leaves ontological questions about the nature of the reality aside and focus on the epistemological. This means taking the reality 'as given, and as it is' and connecting more into the empirical tradition vis-à-vis theoretical one.
[44] Jyväskylän yliopisto Koppa: Interpretivismi. *Menetelmäpolkuja humanisteille*. [https://koppa.jyu.fi/avoimet/hum/menetelmapolkuja/menetelmapolku/tieteenfilosofiset-suuntaukset/interpretivismi], read 3.8.2022. See also, Jyväskylän yliopisto Koppa: Hermeneutiikka. *Menetelmäpolkuja humanisteille*. [https://koppa.jyu.fi/avoimet/hum/menetelmapolkuja/menetelmapolku/tieteenfilosofiset-suuntaukset/hermeneutiikka], read 3.8.2022.
[45] Tähtinen & Huupponen (2022): p. 10.
[46] Jyväskylän yliopisto Koppa: Hermeneutiikka. *Menetelmäpolkuja humanisteille*. [https://koppa.jyu.fi/avoimet/hum/menetelmapolkuja/menetelmapolku/tieteenfilosofiset-suuntaukset/hermeneutiikka], read 3.8.2022

In hermeneutics knowledge is an ongoing process of interpretation that never stops. This process constantly creates new knowledge (and interpretation) and is sometimes called a hermeneutical spiral. In the spiral the bits of knowledge and details continuously refine the whole and thus the (re)interpretation provides an ever-widening understanding of the research subject.[47]

According to Pirkko Anttila (based on B.G Glaser) there are five requirements for theory and research material:

1. "*Theory has to be based on source material and adapt to it. Thus, research material cannot be pre-selected to accommodate a presumed theory or specific classification.*
2. *Theory is built from the source material and not vice versa.*
3. *Theory has to be applicable. Hence, it has to be able to explain and interpret the phenomenon present in the source material. This requires a systematic approach.*
4. *Theory has to have a practical utility. There needs to be realistic way to apply it.*
5. *Theory must have potential for further development. It is not the final truth, but an ongoing process.*"[48]

This ongoing hermeneutical process is illustrated by figure 1:

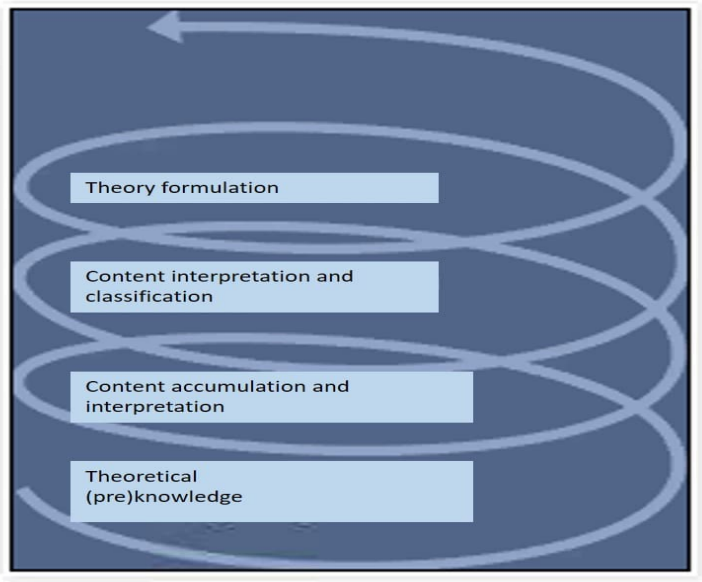

Figure 1: Hermeneutical spiral by Leena Syrjälä et. al.[49]

[47] Jyväskylän yliopisto Koppa: Hermeneutiikka. *Menetelmäpolkuja humanisteille.* [https://koppa.jyu.fi/avoimet/hum/menetelmapolkuja/menetelmapolku/tieteenfilosofiset-suuntaukset/hermeneutiikka], read 3.8.2022. See also, Anttila, Pirkko: Hermeneuttinen kehä. *Tutkimisen taito ja tiedon hankinta,* METODIX. [https://metodix.fi/2014/05/17/anttila-pirkko-tutkimisen-taito-ja-tiedon-hankinta/], read 23.2.2023.

[48] Anttila, Pirkko: Hermeneuttinen kehä. *Tutkimisen taito ja tiedon hankinta,* METODIX. [https://metodix.fi/2014/05/17/anttila-pirkko-tutkimisen-taito-ja-tiedon-hankinta/], read 23.2.2023.

My research strives to create a broader theoretical understanding of the connection between history of the COG concept and its interaction within, and between, the selected doctrines. Further, seeks to provide interpretation and understanding whether COG is a usable concept in the MDO concept by comparing COG theoretical model construct and the MDO concept model.

A notable issue regarding hermeneutics is the highly subjective role of the researcher and constant interaction with the research phenomenon compared to objective approaches. This requires recognition of one's own subjectivity and definition of objective information as to be able to formulate new information and knowledge.[50]

I argue that embedded in the research primary material (selected doctrines and theoretical discussion) is the (subjective) meaning of those who have written them together with the historical accumulation and refinement of knowledge. The consecutive updates and cross-influence between the doctrines and the theoretical debate form a hermeneutical spiral. As Kurt VanderSteen adequately states: "*any approach to centers of gravity should consider both the whole of war and its parts: the hermeneutical circle*"[51]. For these reasons, it is my opinion that interpretivism and hermeneutics are well suited for this research.

Further, I argue that this research belongs to the field of basic research vis-à-vis to applicable research due to its interpretivist and hermeneutical philosophical positioning together with its research purpose and objective. This is due to the research theoretical nature with a purpose of achieving wider understanding of the phenomenon in question. The goal of a basic research is not commonly that of producing information for a specific application, however this research is by nature an 'oriented basic research' where the results are applicable in the long run.[52]

Military sciences, and within it the art of war discipline, provide the upper echelon reference points for this research. Of the three branches of science situated inside the art of war, this research is part of the operational art and tactics branch.

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[49] Syrjälä, Leena, Sirkka Ahonen, Eija Syrjäläinen, & Seppo Saari: *Laadullisen tutkimuksen työtapoja*. Kirjayhtymä, Helsinki 1994, p. 125.
[50] Tähtinen & Huupponen (2022), p. 10–11.
[51] VanderSteen, Kurt P.: Center of Gravity: A Quest for Certainty or Tilting at Windmills?. *Addressing the Fog of COG – Perspectives on the Center of Gravity in US Military Doctrine*. Celestino, Perez Jr. (ed.) 2012, p. 50.
[52] Rantapelkonen & Koistinen (2016), p. 93.

In Finland operational art and tactics is a rather young branch of science and thus does not have an established a paradigm[53] such as the other two branches, strategy and military history[54]. However, operational art and tactics has been established as a recognized branch in Finnish military educational institutions even though it has yet to establish a paradigm and fixed premises for how to conduct research[55].

It should be emphasized that Finnish understanding of operational art and tactics differs from the U.S. (and other) interpretations. In this research I will not compare Finnish operational art and tactics branch of science to the U.S. one, but I will acknowledge the Finnish academic structure as a point of reference. Thus, I will examine the U.S. military scientific and doctrinal debate and discussion from a Finnish perspective and within the overall framework of western art of war. For comparison purposes I will next present a few tenets from both of them.

The variance within the Finnish art of war discipline is visible when one looks at all three branches: Strategy and military history have long traditions through their 'mother sciences'. Strategy and military strategy[56] have roots in the International Relations (IR) field and its related theories[57] that deal with national power and its instruments, including military power, whereas military history draws from historical research traditions that also entails political history[58]. This leaves Finnish operational art and tactics without a clear ontological or epistemological heritage compared to the other two branches of science.

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[53] Merriam-Webster: *Definition of paradigm.* "A philosophical and theoretical framework of a scientific school or discipline within which theories, laws, and generalizations and the experiments performed in support of them are formulated." [https://www.merriam-webster.com/dictionary/paradigm], read 26.5.2022. See also, Niiniluoto, Ilkka: *Johdatus tieteenfilosofiaan – käsitteen ja teorianmuodostus*. Otava, Helsinki 1999, p. 247–248. According to Niiniluoto, Thomas Kuhn sees paradigms as established ways of procedure (beliefs / principles) that enable the evolution of science. This evolution happens through changes in paradigms.

[54] Kesseli, Pasi. Operaatio ja taktiikka tieteenalana, *Ajatuksia operaatiotaidon ja taktiikan laadullisesta tutkimuksesta*. Mika Huttunen & Jussi Metteri (eds.), Maanpuolustuskorkeakoulu, Taktiikan laitos, Julkaisusarja 2, Nro 1/2008, Edita Prima Oy, Helsinki 2008, p. 16–17. Operational art and tactics research started in Finland 1924 at the War College but it was not established as a branch of science until early 2000's in the National Defence University (NDU) when the NDU became a full-fledged university.

[55] Tähtinen, Janne & Ville Huupponen (2022), p. 4, 6–7. According to Tähtinen and Huupponen, the lack of paradigm means that the phenomenon which is researched needs to be closely tied to the operational art and tactics field of science and related theories and concepts compared to other fields with established paradigms.

[56] Kerttunen, Mika. Sotilasstrategia: Sotilasstrategian tutkimuksen perusteista. *Suomalaisia näkökulmia strategian tutkimukseen*. Pekka Sivonen (ed.), Maanpuolustuskorkeakoulu, Strategian laitos, Julkaisusarja 1: Strategian tutkimuksia, No 33, Juvenes Print, Helsinki 2013, p. 40–42.

[57] For basic information on IR theories see for example, Oxford Bibliographies: *International Relations Theory* [https://www.oxfordbibliographies.com/view/document/obo-9780199743292/obo-9780199743292-0039.xml], read 26.5.2022.

[58] Regarding the science and scientific nature of historical research, see f. ex. Apajalahti, Ahto & Henri Hannula, *Historiantutkimuksen tieteellisyydestä*. Suomen historiallinen seura, Historiallinen aikakauskirja 118:1, 2020. [https://www.historiallinenaikakauskirja.fi/wp-content/uploads/2020/04/HAik_1_2020_Apajalahti-Hannula.pdf, read 2.8.2022.

Pasi Kesseli argues that in Finland operational art and tactics is a collective branch of science within the military sciences (e.g. strategy) compared to foundational branch of science, like military history. Moreover, he stipulates that foundational branch, such as military history, look into history science for methodology whereas collective branch of science utilize and combine several methodologies from different fields of science.[59] Thus, in Finland operational art and tactics considers itself as a multidisciplinary field of science that uses multiple methodologies and does not have a recognized paradigm like many others[60]. Aforementioned describes well this research as it does not fit into any exact category, but instead utilizes multiple philosophical and methodological points of origin.

According to Major Walter E. Piatt, the history of the operational art in the US Army derives from the process of formulating and updating *Field Manual 100-5 Operations* (FM 100-5) in the 1980s, and can be further traced to the origin of modern warfare. Major Piatt further states that there exists in the U.S. Army military science faculty two competing theories whether this origin dates to Napoleonic Wars or to the US Civil War. Further, he argues that it is, nor has ever been, a 'silver bullet' to success, but should be understood as a method to determine the best use of resources in successive battles with the aim of winning the war.[61]

Nils Marius Rekkedal notes that after the Vietnam Israel-Arab Jom Kippur (1973) wars the U.S. focused on answering to the Soviet numerical superiority in the European theatre by way of maneuver war and AirLand Battle and that this thinking later spread to the United Kingdom and NATO.[62] In the U.S. military lexicon operational art is embedded firmly in all parts of the operational design and it relies heavily on the cumulative knowledge and experience of the person in question (so called cognitive approach)[63]. This is very similar to the definition in NATO AJP-5, where operational art is portrayed through commander's skill and ability but the role of planning processes is also noted[64].

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[59] Kesseli (2008) p. 17.
[60] Tähtinen & Huupponen (2022), p. 7. See also, Kesseli (2008), p. 8–9.
[61] FM 100-5 (1986), p. 10. See also, Piatt, Walter E.: *What is Operational Art?* School of Advanced Military Studies, United States Army Command and General Staff College, Kansas, United States 1999, p. 1–2, 6, 32. Major Piatt iterates that "more than one battle is the key to understanding any framework for application of operational art".
[62] Rekkedal, Nils Marius: Johdatus operaatiotaidon sisältöön. *Operaatiotaito – Operaatiotaidon kehittyminen neljässä suurvallassa*. Maanpuolustuskorkeakoulu, Taktiikan laitos, Julkaisusarja 1, Nro 1/2013, Edita Prima Oy, Helsinki 2013, p. 63–65. See also, Raitasalo, Jyri: *Constructing War and Military Power After the Cold War*. Department of Strategic and Defence Studies, Series 1, No 21, National Defence College, Helsinki 2005, p. 192–194.
[63] DoD (2021), p. 159.
[64] AJP-5 (2019), p. 1-2.

However, there are critics that claim that the operational thinking in the U.S. military is declining due to effect-based approach to operations (EBAO) and systemic operational design (SOD) and that it is a false assumption to think that technology can remove the uncertainty related to warfare[65]. This remains to be seen. Purpose of operational art is to enable campaigns and operations by "*integrating ends, ways, means and risks*" and it can be seen as a "*measures for coordinating strategy and tactics in the operational level*"[66]. It also has a strong doctrinal linkage to COG dating back to mid-1980s, where the essence of operational art was the identification of the COG[67]. Shunsaku Higuchi sees the US Army operational art and tactics as divided in to "*separate approaches to address separate mutually related problems*" within the strategic framework[68]. According to him the linkage between the two becomes from operational art determining "*when, where and for what purpose*" multiple tactical actions are executed[69]. As I am using sources that draw heavily from Anglo-American military sources and related debate, I will therefore lean onto the aforementioned definitions and discussion in the field of U.S. military sciences when examining the COG and MDO[70].

Operations planning together with joint operations doctrines present some of the research interests of operational art and tactics[71]. The MDO concept as a possible model for future of warfare is in its own right part of these interests as well. This research is theoretical in nature but due to its focus it still retains a very practical orientation. This is evident in the way COG concept and terminology reside at the heart of planning and in that the research seeks to recognize new problems, thus providing grounds for future application driven research.[72]

1.2.2 Research in its field of science

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[65] Rekkedal, Nils Marius & Milan Vego: Amerikkalaisia ajatuksia operaatiotaidosta. *Operaatiotaito – Operaatiotaidon kehittyminen neljässä suurvallassa*. Maanpuolustuskorkeakoulu, Taktiikan laitos, Julkaisusarja 1, Nro 1/2013, Edita Prima Oy, Helsinki 2013, p. 192–195. Rekkedal and Vego reject the notion that one can make an analogy between market economy and warfare and reduce war to scientific and economic activity.
[66] DoD (2021), p. 159. See also, Higuchi, Shunsaku: *Operational Art and Tactics of the United States Army*. National Institute for Defense Studies, June 2021 Edition, p. 1. [http://www.nids.mod.go.jp/english/publication/briefing/pdf/2021/briefing_e202106.pdf], read 26.5.2023.
[67] FM 100-5 (1986), p. 10.
[68] Higuchi (2021), p. 9.
[69] Ibid. p. 5
[70] For an example of Finnish approach, see, Huhtinen, Aki–Mauri: Sotilasjohtamisen tutkimus. *Sotilasjohtamisen tutkimuksen tieteenfilosofiset perusteet ja menetelmät*. Maanpuolustuskorkeakoulu, Johtamisen laitos, Julkaisusarja 2, n:o 16, 2002, Hakapaino Oy, Helsinki 2002, p. 16. In Finnish operational art and tactics (theoretical) framework by itself, and as a stand-alone construct, is quite useful as the field has not yet established any paradigms or theories of its own and thus the (theoretical) framework can be almost anything (doctrine, tactic, planning process etc.).
[71] Kesseli (2008), p. 11.
[72] Rantapelkonen & Koistinen (2016), p. 93. See also, AJP-5 (2019), p. 4-9; JP 5-0 (2020), p. IV-22.

The contentious nature of the COG is evident as there is abundance of texts written on it over the course of several decades ranging from articles and monographs to dissertation. On the other hand, MDO is the newcomer and due to this it has already gone through several name changes. However, it is not yet as debated and widely argued subject but the discussion has picked up pace considerably[73].

The methods used for the mapping of earlier research were keyword and sentence searches with Boolean Operators[74] from the following databases: Finnish Defence Forces (FDF) research registry (restricted to FDF personnel), Finnish National Defence University FINNA - database (public works open to all users)[75], United States Army War College Library and Archives[76], Google Scholar and EBSCO Military & Government Collection. The search found no studies within the selected databases on the use of COG concept aggregate as a theoretical construct as a way to ascertain the applicability or utility of the COG by comparing a theoretical construct to the MDO concept. This indicated that the chosen focus of this research serves to increase knowledge and provide new insights on subject(s). The following works are examples of how this subject has been approached and they closely link to this research either by looking at the definition of COG, or via the upcoming doctrinal concept of *multi-domain operations*.

Major Michael W. Johnson from United State Army has researched the COG in his monograph "*Strange Gravity: Toward a Unified Theory of Joint Warfighting*". His work is located within the same area of interest as mine, in the joint doctrine family. **Major Shayla D. Potter** from United State Army has researched the COG in her monograph "*how Carl von Clausewitz and the modern U.S. military use and describe COGs, how they differ, and what factors influence changes to the U.S. military doctrinal version of COG*". She has a historical comparative emphasis on the linguistics of the concept compared to my usability and background focus.[77]

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[73] Shmuel, Shmuel: *Multi-Domain Battle: AirLand Battle, Once More, With Feeling*. War on the rocks 2017. [https://warontherocks.com/2017/06/multi-domain-battle-airland-battle-once-more-with-feeling/], read 24.3.2022.
[74] Alliant Libraries: *What is a Boolean Operator*. [https://library.alliant.edu/screens/boolean.pdf], read 5.5.2022.
[75] Finnish National Defence University Library. [https://mpkk.finna.fi/?lng=en-gb], read 16.11.2021.
[76] United States Army War College, *U.S Army Heritage & Education Center*. [https://arena.usahec.org/web/arena], read 16.11.2021.
[77] Potter, Shayla D.: *The Center of Gravity Concept: A Study of its Description and Application in Two Different Eras*. School of Advanced Military Studies, United States Army Command and General Staff College, Kansas, United States 2013: Johnson, Michael W.: *Strange Gravity: Toward a Unified Theory of Joint Warfighting*. School of Advanced Military Studies, United States 2001.

Commander Senior Grade Eystein L. Meyer from Royal Norwegian Navy has researched the COG in his article "*The centre of gravity concept: contemporary theories, comparison, and implications*" he compares prevalent contemporary COG theories and produces a comparison matrix to serve as an analytical tool for research and doctrine development purposes. Myer's work comes close to my research with regard to theories used and offers valuable insights from a different viewpoint without multi-domain operations aspect. **Colonel Grant S. Fawcett** from United State Army has researched the MDO in his monograph "*History of US Army Operating Concepts and Implications for Multi-Domain Operation*" Colonel Fawcett's work is interesting as it is quite recent (2019) and as such presents some of the few researches conducted on the MDO.[78]

It is evident from searches and the examples above that the COG is broadly and intently studied subject, especially in the U.S. military. Furthermore, the above also highlights the distinct lack of research papers concentrating on MDO. However, there is also a need to recognize the possibility that there exist papers that did not reach this writer due to various reasons, mainly because of the limited time allocated for the pre-study survey.

1.3 Research task

My research will further the knowledge on both COG and MDO and strive to fill the gap that exists in the theoretical realm of operational art and tactics. It will draw from the historical legacy on the COG concept as well as will build upon the theoretical work of Dr. Joe Strange & Colonel Richard Iron, Dr. Milan Vego, Dr. Antulio Echevarria II and Colonel Dale Eikmeier. Furthermore, it will use and evaluate the selected joint level doctrines of the current doctrinal family. My intent here is that the results will provide new theoretical understanding on the usability of the COG concept as well as provide insight into the MDO concept. In this research, I first looked at the historical and linguistic evolution and interpretation of the COG concept. This provided a basic understanding of the concept and its origin. Then I looked at how the COG was defined and described in the current U.S. and NATO joint level doctrines and how the theoretical debate led to the current doctrinal formulation.

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[78] Grant, Fawcett S.: *History of US Army Operating Concepts and Implications for Multi-Domain Operations*. School of Advanced Military Studies, United States Army Command and General Staff College, Kansas, United States 2019; Meyer, Eystein L.: *The centre of gravity concept: contemporary theories, comparison, and implications*. Defence Studies, Volume 22, Issue 3, Routledge Journal of Military and Strategic Studies 2022.

This together with the historical part provided the components needed for the synthesis to create the COG theoretical model construct (COGTMC). The COGTMC was then compared to the MDO concept model to see how they correspond. This created the basic research problem for this research.

The immediate purpose of this research was to further develop understanding on how the historical legacy of COG terminology and the different variations of the COG concept interact within the U.S. and NATO joint level planning doctrines, and is it possible to formulate an aggregate conceptual definition of the COG that is applicable to the MDO concept. The goal of this research was to increase theoretical understanding of how COG concept affects the COG identification and defining analytical process as a way to provide theoretical tools for the development of the planning process in the multi-domain operations environment. This was done by providing analyzed information on the concept's historical origin, theoretical debate and evolution as well as how the concept of COG is described in the selected joint level planning doctrines. The results showed that a conceptual synthesis, a COG theoretical model construct, drawn from analyzed COG material is applicable as part of the MDO thinking.

From the planning process point of view, it is important that we are able to define the usability of the COG concept not just based on the contemporary doctrine of warfare, but also in accordance to the MDO concept. The MDO it will present the doctrine to come and thus a way of how will war be waged in the future[79]. Consequently, this will bridge COG and MDO concepts and prepare for the change that might appear as MDO takes hold.[80] Therefore, the overall benefit from this work is a deeper theoretical understanding and a new theoretical model that will provide knowledge on the strengths and weaknesses of the COG concept and its applicability. Moreover, this research increases the theoretical base of operational art and tactics field of science and thus helps to build on the overall canon of military sciences.

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[79] Training and Doctrine Command, Pamphlet 525-3-1: *The US Army in Multi-Domain Operations 2028*. Department of the Army Headquarters, United States Army 2018, p. iii. [https://adminpubs.tradoc.army.mil/pamphlets/TP525-3-1.pdf], read 12.11.2021. See also, Training and Doctrine Command, Pamphlet 525-3-8: *U.S. Army Concept for Multi-Domain Combined Arms Operations at Echelons Above Brigade 2025-2045*. Department of the Army Headquarters, United States Army 2018, p. 1, 8. [https://adminpubs.tradoc.army.mil/pamphlets/TP525-3-8.pdf], read 21.1.2022.

[80] TP 525-3-1 (2018), p. 48. According to the pamphlet, MDO was at the time of writing an Army concept but it will be extended to other services (the term might differ somewhat). The significance of the MDO environment has also been emphasized by the Finnish Defence Forces senior leadership for example in a lecture to the General Staff Officer Course 61 by DCOS Personnel, Lieutenant General Rami Saari on 24.5.2023.

The following five together documents formed the primary U.S., NATO and MDO material, respectively[81]. For the purpose of this research, joint level planning doctrines analyzed were: *Joint Planning (JP 5-0)* and NATO: *Allied Joint Doctrine for the Planning of Operation (AJP-5), Edition A, Version 2*.

Regarding MDO the documents analyzed were the U.S. Army Training and Doctrine Command (TRADOC) pamphlets: TP 525-3-1 "*The US Army in Multi-Domain Operations 2028*" and TP 525-3-8 "*U.S. Army Concept for Multi-Domain Combined Arms Operations at Echelons Above Brigade*" as well as US Army mid-tier doctrine *FM 3-0: Field Manual (FM) 3-0 Operations*.

1.4 Research questions

In this sub-chapter I will continue with the formulation of the research questions. The main research question and the adjacent sub-questions will form the focal points through which the analytical process works. The questions also act as a way to connect the different sections of the research together and place them on the disposition. **Against the backdrop of the research task the main research question formulates thusly: *How the Center of Gravity concept applies to the Multi-Domain Operations concept?***

To answer the main research question, four sub-questions formed the analytical structure and divided the thesis into logical parts that will each provided a part of the whole.

The first sub-question started the analytical process as it looked into the background of the COG, how the term was portrayed in the source material, how it had been interpreted and changed as well as what problems and historical baggage it carried. The conclusions showed from what premises the research stems from (appendix 2) and provided themes that were a starting point for the COG analysis. This way they fed into the theoretical model construct and formed the first part of chapter 2. **Hence, the first sub-question was formulated thusly: *What is the origin of the Center of Gravity concept and how it relates to joint level planning doctrines***

[81] Note: I will use the term 'primary material' regards to the selected doctrines and theoretical works to be analyzed. NATO's MDO concept is yet to take its final shape which is why the focus is on the U.S. MDO doctrines.

The second sub-question continued the analytical process by first looking at how selected military theorists understand COG and how they have contributed the doctrine development. Then the process continued by searching from each of the selected joint level planning doctrines for COG concept definitions, descriptions, analytical constructs and related guidance that affects the conceptual formulation. It created an understanding of their functionality, role in the doctrinal family and how the COG links to them. The purpose of this was to map out and compare COG related material in the doctrines against historical and theoretical debate material and to provide concise presentation of it. The results showed visible similarities and exceptions between the doctrines as well as provided basis for the criticism. Conclusions drew together current doctrinal understanding of the COG and provided themes that continued the COG analysis[82]. These themes fed into the theoretical model construct and formed the second part of chapter 2. **Hence, the second sub-question was formulated thusly:** ***What kind of definitions and descriptions of the Center of Gravity exists in the selected joint level planning doctrines?***

The third sub-question took the results from sub-questions one and two and synthesized them by formulating types from the themes. These types formed the component parts of the theoretical model of the COG concept. Thus, the components (conclusions) from the third sub-question were then used to create the COG theoretical model construct (COGTMC). The purpose of this was to galvanize the results from the previous questions and to focus this part of the analytical process in such a way that it provided the necessary tool needed to continue with final part of the analysis. This formed chapter 3. **Hence, the third sub-question formulated thusly:** ***How Center of Gravity can be defined as a theoretical model?***

The fourth sub-question made a similar review of the MDO concept source material as sub-question one and two did for the COG and joint doctrines. It mapped out what MDO is and how it works, however, with a focus on the four MDO tenets described in FM 3-0[83]. The purpose of this was to provide an overall understanding of the concept as well as find the parts of the MDO concept that are relevant for this research. For the purpose of narrowing the topic FM 3-0 (2022) was selected as the main document. Older MDO documents were used to supplement and add into the whole.

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[82] Compilation of theorist' COG definitions in appendix 3.

[83] FM 3-0 (2022), p. 3-2–3-7. According to FM 3-0 the tenets, or desirable attributes, of operations are: Agility, convergence, endurance and depth.

The tenets worked as cross-cutting focal points of the analysis. COGTMC component parts were used as analytical units that drove the MDO content analysis and related comparison. The conclusions provided MDO part of the analysis which formed chapter 4. **Hence, the fourth sub-question was formulated thusly: *What is Multi-Domain Operations concept and how it can be compared to the Center of Gravity theoretical model?*** Next sub-chapter will formulate the research framework and key concepts that are essential to this research.

1.5 Framework and essential concepts

A theoretical framework commonly presents itself as a description of the phenomenon designed to situate the research in relation to earlier research, present how it connects to the wider conceptual and theoretical field as well as the relationships between the essential concepts[84]. In military sciences, there is a difference how theory is used between operational art[85] and tactics vis-á-vis strategy[86] as discussed in sub-chapter 1.2.

In this research, the framework is not a 'theoretical framework', since at the beginning of the research there exists no theory to test. However, the purpose of my research framework is to provide a conceptual construction that outlines the different components of the research and how they relate to one another. Further, the framework ties the essential concepts as part of whole and provides them meaning. This differs significantly from strategy, which shares commonality and tight connection to international relations (IR) theory[87] with its well-established paradigms and theories that researchers use as they are or take selected parts and combine them in the research as needed[88]. Thus, the lack of paradigm and /or theory is not in any way restrictive or decisive in my work. Moreover, the COGTMC will become a theory (of sorts) for this research as part of the analytical process by drawing together, and building upon, previously accumulated research data.

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[84] Kesseli (2008), p. 52.
[85] DoD (2021), p. 159. In the U.S. operational art is defined thusly: "Operational art is the cognitive approach used by commanders and staffs—supported by their skill, knowledge, experience, creativity, and judgment—to develop strategies, campaigns, and operations to organize and employ military forces by integrating ends, ways, means, and risks. Operational art is inherent in all aspects of operational design."
[86] Ibid. p. 203. Strategy is defined thusly: "A prudent idea or set of ideas for employing the instruments of national power in a synchronized and integrated fashion to achieve theater, national, and/or multinational objectives."
[87] For basic information on IR theories see, Oxford Bibliographies: International Relations Theory [https://www.oxfordbibliographies.com/view/document/obo-9780199743292/obo-9780199743292-0039.xml], read 26.5.2022.
[88] For an example of selective use of IR theories, see, Lehtoaro, Tomi: *Securitizing of Failing States in the National Security Strategy of the United States of America*. National Defence University 2016.

The research framework for this thesis consists of five (5) entities that form four (3) distinct parts as well as the planning process development viewpoint. Of these, the joint operations planning process development viewpoint is the chosen lens as it also stands as one of the overall goals of this research together with the increase of theoretical understanding of how COG concept affects the COG identification and defining analytical process.

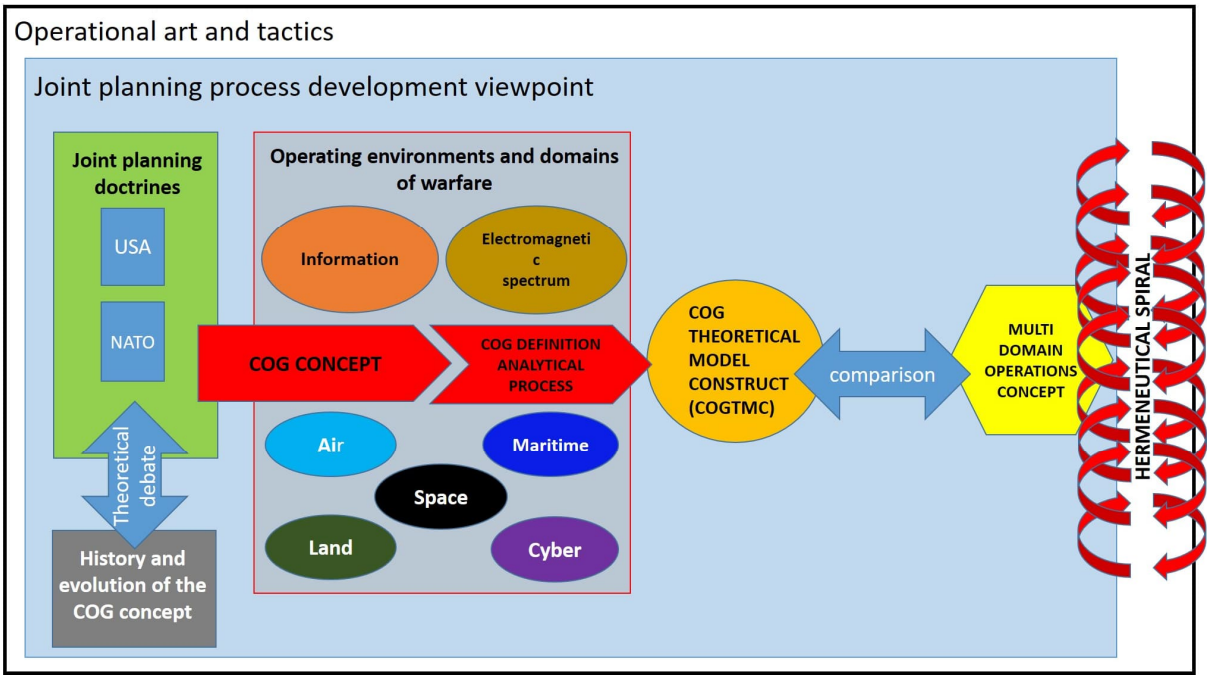

Figure 2: Research framework

The viewpoint forms the base layer of the research framework and within it contains the other four entities thus creating the outer perimeter of the framework. In the framework presented by figure 2 above, within the viewpoint box, the five entities (shapes) and related arrows describe and visualize in a simplified way the interrelationships between viewpoint and the aggregate parts of the research.

1.5.1 History and evolution of the COG concept

The first part of the framework is the 'history and evolution of the COG concept'. The history and evolution foundation of COG draws mostly from the works of Clausewitz, Dr. Joe Strange & Colonel Richard Iron, Dr. Milan Vego, Dr. Antulio J. Echevarria II, Colonel Dale Eikmeier, Dr. Jacob Barfoed and Dr. Anders Palmgren. These theorists have been instrumental in the theoretical debate and analysis of the COG's historical origin and its evolution.

This research follows Dr. Eikmeiers line of thought where the "*existent COG*" is *a thing* that exists and that is part of the friendly or adversary system, and that the COG concept is the planning tool, "*conceptual COG*", that helps focus planning and operations[89]. According to Eikmeier the significant difference is the fact that *"The 'conceptual Cog' is a planning tool. The 'existent Cog' is what the plan and operations focuses on*"[90]. The aforementioned argument is one driver that guides this research to look at, how the existent COG and conceptual COG influence each other. This is done through the analysis of COG related material and the creation of the COG theoretical model construct (COGTMC). For clarity, the conceptual COG that Eikmeier refers to is an analytical tool and therefore not the same thing as the COG concept definition in this research, which comes closer to Eikmeier's "*existent COG*".[91] The same analogy is also usable for the MDO concept, which is a future doctrine of warfare but also a conceptual definition**.**

I will use the term 'COG' to describe the definition and interpretation of the COG concept with related terminology and "COGTMC" to describe the aggregate theoretical model. Moreover, references to the analytical *process* of defining a COG as part of the operational design in a joint planning process will have separate mentions when and if necessary. Other documents from name authors and others as well as books and related articles such as these will form the historical and theoretical part of the framework. In this research, historical definitions supplement and add into current conceptual ones together with key insights drawn from academic journals and articles.[92]

1.5.2 Joint doctrines

The second part of the framework is the 'joint doctrines' that consists of two selected doctrines that comprise half of the primary doctrine material. These doctrines draw heavily from the works of aforementioned theorists as some of them have been instrumental for the development and evolution of the COG in the U.S. and NATO military doctrinal family. The joint doctrine documents interlink with one another through the western military structures, mainly by way of the U.S. as the primary influence.

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[89] Eikmeier (2014). [https://smallwarsjournal.com/jrnl/art/after-the-divorce-clausewitz-and-the-center-of-gravity], read 31.12.2021.
[90] Ibid.
[91] Ibid. For COG identification in a systemic structure, see Rueschhoff & Dunne (2011), p. 121.
[92] For relationships of concept, term and meaning/subject, see Palokangas, Marko: Käsitetutkimus, *Näin tutkin taktiikkaa: Tutkimusprosessi operaatiotaidon ja taktiikan näkökulmasta*. Janne Tähtinen (ed.), Maanpuolustuskorkeakoulu, Sotataidon laitos, Julkaisusarja 2, Tutkimusselosteita nro 20, Helsinki 2022, p. 107.

Hence, as the US updates, renews and develops new concepts and doctrines it subsequently affects other western militaries as well as those modelling themselves after western structures as discussed earlier. Therefore, it is important to look at how the U.S. defines joint doctrine & joint planning with NATO as these documents appear extensively throughout this research. They form key elements of the research framework and design as well as link essentially to the goal, purpose and viewpoint of this research. The U.S. military defines the joint doctrine the following way: "*Fundamental principles that guide the employment of [United States] military forces in coordinated action toward a common objective and may include terms, tactics, techniques, and procedures*"[93]. Thus, joint doctrine provides a common philosophy and language in an analytically reductionist and simplified way to enable focusing on planning.

Based on the above, I argue that there exists a common understanding between the U.S. and NATO of what joint level planning doctrines are, and how the entities see them. This means that there exists a solid foundation upon which to build the research design using the chosen joint level planning doctrines. Furthermore, JP 5-0 and AJP-5 contain the current approved guidelines and definitions for how to conduct joint level operations planning making them essential documents for planning.[94]

1.5.3 Domains of warfare

The third part of the framework is the 'domains of warfare' and it describes the operating environments where joint operations take place[95]. However, there is no agreed upon definition of what a domain and operating environment is between U.S. and NATO. According to Dr. Patrick D. Allen and Mr. Dennis P. Gilbert domain is "'*the sphere of influence in which activities, functions, and operations are undertaken to accomplish missions and exercise control over an opponent in order to achieve desired effects*"[96].

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[93] DoD (2021), p. 114.
[94] AJP-5 (2019, p. xi; JP 5-0 (2020), p. i; Pattee, Phillip G.: Center of Gravity: Right Idea, Wrong Direction, *Addressing the Fog of COG – Perspectives on the Center of Gravity in US Military Doctrine*. Celestino, Perez Jr. (ed.) 2012, p. 128.
[95] JP 5-0 (2020, p. I-1, III-32. The doctrine presents "*all-domain"* term, which entails air, land, maritime and cyber as "domains". See also, Donnelly, Jared & Jon Farley: *Defining the 'Domain' in Multi-Domain*. Shaping NATO for Multi-Domain Operations of the Future. Joint Air & Space Power Conference 2019. [https://www.japcc.org/essays/defining-the-domain-in-multi-domain/], read 20.6.2023. The article notes that Joint Publication 3-0 does not define the term 'domain', but still uses it extensively. As we can see there still remains some inconsistencies in doctrine regarding terminology.
[96] Allen, Patrick D. & Dennis P. Gilbert: The Information Sphere Domain – Increasing Understanding and Cooperation, *The Virtual Battlefield: Perspectives on Cyber Warfare*. IO Press 2009, p. 132–134.

Further, according to JP 5-0 the term 'operating environment' encompasses not just the aforementioned domains but also to a various degree information and electromagnetic spectrum. NATO understands six parts of PMESII[97] as domains whereas the U.S. sees them as systems. I will use the FM 3-0 **definition of a domain**: "*a physically defined portion of an operational environment requiring a unique set of warfighting capabilities and skills*"[98] and return to this discussion in chapter four. In the framework figure, these entities exist each individually but also as a whole under the auspices of MDO concept. Of note is that despite highlighting and naming the domains, this research does not analyze individual domains but only the MDO concept as an aggregate whole. The two-part arrow coming from the joint planning doctrines and piercing through the 'domains of warfare' has two meanings:

Firstly, it describes how we commonly understand the COGC and definition process as sequential: The doctrines define the COGC and give some form of a guidance in form of a planning tool on how to define and analyze the adversary's and one's own COG. Secondly, and importantly for this research, the two arrows describe the historical understanding and evolution of the COGC as well as the analytical process where the COG concepts and related essential information from the selected doctrines are coded, formulated into themes and types, tabled and finally synthesized into the COGTMC.

1.5.4 COG theoretical model construct and MDO

The fourth part has two sub-parts, the COGTMC which forms the theory of this research and the MDO concept. Theoretical model part consists of the synthesis formed from the selected doctrines and historical background, as mentioned earlier in this chapter. From the theoretical model departs two-way arrow on the MDO concept. This represents the comparison and the discussion between these two models. The MDO part of this framework consists of the three main MDO concept documents mentioned in sub-chapter 1.3. MDO presents the doctrine to come and thus how the U.S. sees the future of warfare[99]. The MDO concept links closely to the domains of warfare and related issues discussed earlier. From the concept MDO's four tenets will serve as focal points that cross-cut through the concept.

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[97] Political, Military, Economic, Social, Infrastructure, Information (PMESII). See, f. ex. COPD (2021), p. 1-13.
[98] FM 3-0 (2022), p 1-18.
[99] Jones, Marcus A. & Jose Diaz de Leon: *Multi-Domain Operations, Awareness continues to spread about the importance of operating in multiple domains*. The Three Swords Magazine 36/2020. [https://jwc.nato.int/application/files/5616/0523/5418/issue36_08lr.pdf], read 31.10.2021.

1.6 Viewpoint and narrowing of the topic

This sub-chapter will present the arguments on various chosen limitations set in place by the researcher as well as bring forth the chosen viewpoint and how that will on the one hand focus the research and act as a lens, and on the other hand limit the scope of it.

The chosen limitations and narrowing of the topic reflect the research task, framework and the chosen viewpoint. They are choices made by the researcher to give the research focus and they take into consideration the limited extent of the research as well as the specific time allocated for it. The limitations also direct the research to the essential issues based on the research task and questions[100]. The researcher makes the limitations fully aware that they leave out certain aspects of the phenomenon in question, and in doing so affect the usability of the results. The following present the chosen narrowing of the topic and related limitations.

1.6.1 Viewpoint

The chosen viewpoint of this research is that of the development of the U.S. and NATO -type operational level joint planning process[101]. The current process functions as an analytical tool as well as a conceptual framework that guides the planner. A joint planning process viewpoint makes it possible to take into consideration the increasing future need for joint operations as well as the complexity of the future battlefield where multiple domains converge in a single operating environment creating a multi-domain operation[102]. On the other hand, the chosen viewpoint helps to make for a logical path throughout the research and limit the scope of the research so that it does not become either a pure conceptual study, a historical research or a dissertation. It also serves as a means to keep the research overall classification level ‘public’, as it does not go into troop structures, war games, tactical maneuver, or case studies about the adversary. Sub-chapter 1.7 presents the research methodological choices and limitations thereof.

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[100] Tähtinen, Janne: Suunnitteluvaihe, ”*Näin tutkin taktiikkaa”– Tutkimusprosessi operaatiotaidon ja taktiikan näkökulmasta*. Janne Tähtinen (toim.), Maanpuolustuskorkeakoulu, Sotataidon laitos, Julkaisusarja 2, Tutkimusselosteita nro 20, Helsinki 2022a, p. 47.

[101] This will subsequently affect also those western military joint planning processes that model themselves after the U.S. and NATO. Finland as a NATO member uses standard NATO planning process with possible national linguistic and cultural variance. Hence, a Finnish version of the planning process benefits from this research as well.

[102] Flack, Nathaniel, Alan Lin, Gibert Peterson & Mark Reith: *Battlespace Next™: Developing a Serious Game to Explore Multi-Domain Operations*. International Journal of Serious Games, Volume 7, Issue 2, June 2020, p. 49–50.

1.6.2 Bibliography and source material limitations

All bibliography and source material regarding this research are narrowed down to Finnish and English languages. This limitation stems from the researcher ability to read and understand with a sufficient degree only those two languages. The overall source and reference material limits to such pre-selected graduate works, articles, journal, doctrines, research papers and literature that time and resources have made possible. Timeline narrowing and related limitation for this research is from the year 1980 to the year 2023 and concerns all publicly available documents within that timeframe[103]. The limitation is set to serve the focus of the research and it takes into consideration the timeline by which the COG concept and terminology entered the U.S. doctrinal family and to make it possible to acquire enough material considering the research task. Furthermore, public classification serves the broader usability of the thesis through unlimited access to the results and thus serves the larger scientific community and the discussion therein.

From the joint planning doctrinal family only selected joint planning doctrines mentioned in sub-chapter 1.3 are used. These present the key western doctrines on the subject at the operational level as they not only draw extensively from one another, but also contribute significantly to other western military doctrines as well. Other doctrines, such as from the intelligence and conduct of operations family, are left out as to limit the scope of the research and to focus it specifically at the joint planning level of the doctrinal family as well as to keep the classification public. This knowingly leaves parts of the actual definition of the COG process outside of this research, such as the classified 'intelligence preparation of operational environment (IPOE)' analysis described in Joint Publication 2-0. However, as this thesis is not a case study of a specific battle, nor a war game against an adversary, the choices mentioned above justified and serve the research structure well.

The selected three MDO documents mentioned in sub-chapter 1.3 are used as these present a solid version of the concept that combines previous development versions and thus make it suitable for analysis purposes. Earlier versions of the concept do not qualify for analysis purposes as the content may vary too much compared to the current version.

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[103] Rueschhoff & Dunne (2011), p. 120. The Center of Gravity term "seized prominence" in the US doctrinal publications in the 1980s. Note: Carl von Clausewitz's *On War* is the one exception to this rule.

Moreover, the purpose of this research is not to evaluate the COG theoretical model to previous versions of the MDO but to the current one, nor study the evolution of the MDO concept. In this research, the MDO concept is a single entity and not broken into its component domains or operational environments as discussed earlier. Analyzing individual component domains or operational environments would only provide the kind of information as a result that is domain/environment specific and not applicable to the concept as a whole. Furthermore, domain specific COG research limits the scope of the research outside joint level planning doctrines. With regard to MDO concept and FM 3-0, the research is narrowed to exclude Chapter 7 (Army Operations in Maritime Environments) and Chapter 8 (Leadership During Operations) This is done in order to limit the scope of the research to land operations with the focus on joint level planning[104]. Further, selection of FM 3-0 as the main MDO doctrine narrows the research into Army service thus leaving out Navy and Air Force.

Regarding the MDO concept, this research limits to use it solely as part of the MDO documents framework presented in sub-chapter 1.3. The parallel concepts, such as All-Domain Operations (ADO) or Joint All-Domain Command and Control (JADC2)[105], serve to create an understanding of the MDO concept and locate it as part of the conceptual family, however, the role they have is limited to just that. This is because the meaning of the various concepts differs somewhat depending on the where and for what purpose they are used. To include all of parallel concepts in depth would direct the research purely into a concept and terminology research, thus changing the research task entirely. Using other concepts or definitions carelessly as synonyms for the MDO would damage the integrity of the MDO concept and might change the interpretation of the results of the research. Furthermore, earlier evolutions of the MDO, such as ‘multi-domain battle’, have similar issues tied to them as well, and thus their use is that of historical background material and contextual reference.

1.6.3 Other limitations

The phenomenon often defines through concepts and for a qualitative research, such as this one, the role of concepts is significant[106]. This research focuses on the COG definition, related analytical matrix, and MDO concept thus limiting the role of other concepts.

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[104] For reference, see, FM 3-0 (2022), p. 6-1–47 (Chapter 6).
[105] JP 5-0 (2020), p. 33. See also, Flack et. al. (2020), p. 49.
[106] Tähtinen, Janne (2022), p. 42; Palokangas (2022), p. 106, 109.

The COG is one of the main components of the operational design and as such linked to the other parts of the design[107]. Other components of the operational design are not included in this research because the focus is specifically on the COG. To extend the research into other parts of the operational design would change significantly the research task and go beyond its scope.

1.7 Methods

The purpose of this sub-chapter is to present the methodological choices as well as outline the design and the chosen analytical tools and limitations.

1.7.1 Theoretical factors

Aki-Mauri Huhtinen stipulates, that the purpose of a theory is to test hypothesis and to make sense of the perceived reality by subjecting it to scientific evaluation and re–evaluation[108]. Thus, theoretical constructs define how the researcher views the world and how his or hers understanding of reality forms. The way the researcher perceives reality affect how he / she interprets the empiricism it presents. Therefore, one could say that theory is the 'lens' through which methodology is used as it defines and limits one's choices of looking at a specific object(s) of research. However, theory by itself does not affect the interpretation. Cultural factors together with the interpretation of reality create the aggregate impact on the results of the research as well as how universally they are of use. This is something the researcher always has to take into consideration.[109]

This research is qualitative in nature as it strives to understand the research subject deeply and thoroughly[110]. This is visible in the nature of the research task where an increase of theoretical understanding on how the Center of Gravity (COG) concept interact within the selected joint level planning doctrines is seen as central to the development of the operations planning process.

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[107] JP 5-0 (2020, p. 178–179. See also, AJP-5 (2019), p. 37.
[108] Huhtinen (2002), p. 13.
[109] Regarding misperception and cognitive bias, see f. ex. Sipilä, Joonas, Tommi Koivula, Olli-Matti Mikkola & Antti Pulkka: *Analyysiopas*. Maanpuolustuskorkeakoulu, Sotataidon laitos, julkaisusarja 2: tutkimusselosteita nro 3. Tampere 2017, p. 46–52. See also, Lehtoaro (2016), p. 13.
[110] Metteri Jussi: Laadullinen tutkimus, *Ajatuksia operaatiotaidon ja taktiikan laadullisesta tutkimuksesta*. Huttunen Mika & Jussi Metteri (eds.), Maanpuolustuskorkeakoulu, Taktiikan laitos, Julkaisusarja 2, Nro 1/2008, Edita Prima Oy, Helsinki 2008, p. 34. See also, Sipilä et. al. (2017), p. 31.

Further, by comparing the aggregate COGTMC and MDO models the research searches ways to increase understanding regarding the utility of COG concept. Through the research (theoretical) framework and research design, it also presents a number of tenets typical for a qualitative research such as subjectivity, text analysis, researchers own deduction through inductive and deductive analysis as well as flexibility of the research plan. Qualitative content-based content analysis applied better than quantitative methods as the focus was on one hand the interpretation of the abstract nature of the COG concept and its effect on the COG defining process as well as analyzing doctrines and how they have evolved in relation to the MDO concept.[111]

Quantitative research methods were excluded from this research on the basis of that the research problem does not strive to explain any cause and effect relations or logic, nor does it use statistical or numerical tools or measurements and because the quality and the content of the research primary empirical material is not of equal measure[112]. However, a quantitative method such as modeling and simulation, or conceptual analysis, might have brought additional benefit to this research. If the focus of the research were the COG analytical framework, then a description of the analytical process with related sub-processes and functions could have brought additional depth COGTMC construct. The MDO concept part of the research could have benefitted from mind map or interrelationship charts as a way to model the complex whole in more detail[113]. This could have brought up additional areas of focus for the comparison part. Qualitative analysis with concepts temporal appearance, content changes and verbal emphasis could have been used to make qualitative conclusions from the COG[114].

The choice between these two main approaches was done aware of the fact that it also limits the repeatability of the research as qualitative interpretations vary according to the person making them, whereas quantitative cause and effect results are easier to reproduce and they provide more solid explanatory

1.7.2 Methodology

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[111] For typical tenets of qualitative research, see, Metteri (2008), p. 35.
[112] Metteri (2008), p. 34.
[113] Keinonen, Maria: Mallintaminen ja simulointi, ”*Näin tutkin taktiikkaa”– Tutkimusprosessi operaatiotaidon ja taktiikan näkökulmasta*. Janne Tähtinen (ed.), Maanpuolustuskorkeakoulu, Sotataidon laitos, Julkaisusarja 2, Tutkimusselosteita nro 20, Helsinki 2022, p. 134–137.
[114] Palokangas (2022), p. 108.

In the qualitative research, content analysis is usually either content-based, theory-bound or theory-based. The most suitable analysis method for my research are content-based and theory-based analysis that apply in different parts according to the research design.

In content-based analysis the researcher strives to create from the source material a theoretical entity and thus the result might be one or more acceptable hypothesis. The researchers focus and consideration is that the analysis conducts by terms of the material and not based on the assumption or prejudices of the researcher. Thus, the content is the driving factor and outside information or pre-knowledge should not affect the analysis. Furthermore, there are no pre-defined analytical units based on theory or assumption, but these will formulate based on the content to accommodate the research task. Researcher's own subjectivity is the main critique and problem, as complete objectivity is impossible. Theory-based analysis leans heavily on existing knowledge by way of existing theory or model with its essential concepts. Research is guided by the definition of the phenomenon and the analytical units are formulated from the theory.[115]

For this research the first and second phase on the analysis uses content-based method and the third phase theory-based method. For this research bibliographical review was used descriptively and systematically to form a pre-understanding of the phenomenon, to find and code essential research data for primary and secondary material, and to create the (theoretical) framework of the research[116]. This formed the starting point for the analysis as it went through earlier research and the selected articles as well as the joint level planning doctrines and MDO related material. Formulation of themes is a typical analysis method when using content-based content analysis. Therefore, it is very suitable for this type of research as it provides simplicity and structure throughout the research design[117]. The process progresses from formulation and grouping into more detailed analysis and interpretation[118]. Hence, the formulation of themes is selected as the method of analysis as it suits both for the part of this research that deal with the history, evolution and theoretical debate of the COG concept as well as for the analysis of the selected joint planning and MDO documents as it draws out the essential elements from them.

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[115] Metteri (2008), p. 51–52; Siirtola, Marko & Janne Tähtinen. Kirjallisuuskatsaus vai sisällönanalyysi, *Näin tutkin taktiikkaa: Tutkimusprosessi operaatiotaidon ja taktiikan näkökulmasta*. Tähtinen, Janne (ed.), Maanpuolustuskorkeakoulu, Sotataidon laitos, Tutkimusryhmä 2022, p. 88.
[116] Siirtola & Tähtinen (2022), p. 82–83.
[117] Saaranen-Kauppinen & Puusniekka (2006). [https://www.fsd.tuni.fi/menetelmaopetus/kvali/L7_3_4.html], read 7.1.2021.
[118] Siirtola & Tähtinen (2022), p. 86–87.

The formulation of types is a step further from creation of themes as it looks for something central, essential, and typical that describes the analyzed material as a whole. This is done by taking formulated themes from the COG's history, theoretical debate and joint doctrines and collecting them under specific labels that condense the information into descriptive units, types. These types are the elements that broadly describe the selected material but in an informatively concise form. In this research the types become the component parts of the theoretical model that together form the aggregate COGTMC.[119]

Theory-based analysis uses an existing theory (or authority) and tests it within a new framework by using deductive analysis to formulate generalizations into specifics whereas content-based analysis uses inductive analysis to formulate generalization from empiricism into specifics and abductive reasoning tries to explain the phenomenon in the best possible way. Of these, the first two were the main analysis methods used in this research, respectively. However, the overall research framework was abductive with elements of Grounded Theory visible in the structure and content of chapters two and three.[120]

For the purpose of this research content-based analysis looks at the selected doctrines for elements that make it possible to formulate the COG theoretical construct and analyze the MDO concept. Hence, it makes possible to create the theory, the COGTMC, as well as conduct content analysis of the MDO documents. Theory-based analysis makes it possible to compare the MDO concept tenets and the COGTMC by using the component parts of COGTMC as analytical units[121] and through them looking at how the MDO's four tenets correspond to the COGTMC components. Thus, this part of the content analysis is done with theory-based methodology. Furthermore, the theory-based method provides insights into future research needs by showing where possible fault lines lie in the theory. The empirical part of this research is based on the selected joint planning doctrines and MDO concept documents as well as the COG and MDO theoretical debate and discussion material.

1.7.3 Research design

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[119] Jyväskylän yliopisto Koppa: *Teemoittelu*. [https://www.fsd.tuni.fi/menetelmaopetus/kvali/L7_3_5.html], read 7.1.2021. See also, Siirtola & Tähtinen (2022c), p. 87.
[120] Metteri (2008), p. 51–52. See also, Rantapelkonen & Koistinen (2016), p. 1, 14–15, 40–41.
[121] Forum Qualitative Sozialforchung Social Research: *The Use of Qualitative Content Analysis in Case Study Research,* FQS, Volume 7, No. 1, Art. 21 – January 2006. [https://www.qualitative-research.net/index.php/fqs/article/view/75/153], read 26.4.2023.

The research design of this thesis formed from four distinct phases. These were in chronological order: 1) Research basics and forming of pre-understanding of the research subject, 2) forming and grouping of analytical units and creation of theoretical model construct, 3) comparison and interpretation, 4) combining results into synthesis and forming of interpretation. Each of the phases consisted of two parts, collection and/or accumulation of data and analysis. Phase one formed chapter one (1) of this research report, whereas phase two is used to for the first part of the analytical process thus created chapters two (2) and three (3), respectively. Phase three formed chapter four (4), which was the second part of the analysis and hence completed the analytical process. Finally, phase four drew together all the conclusions from the analysis to create a synthesis in chapter (5) of which an end result was a complete research report. As per hermeneutical research process the research subject was examined intermittently as a whole and as details[122] Research design is illustrated by figure 3 below.

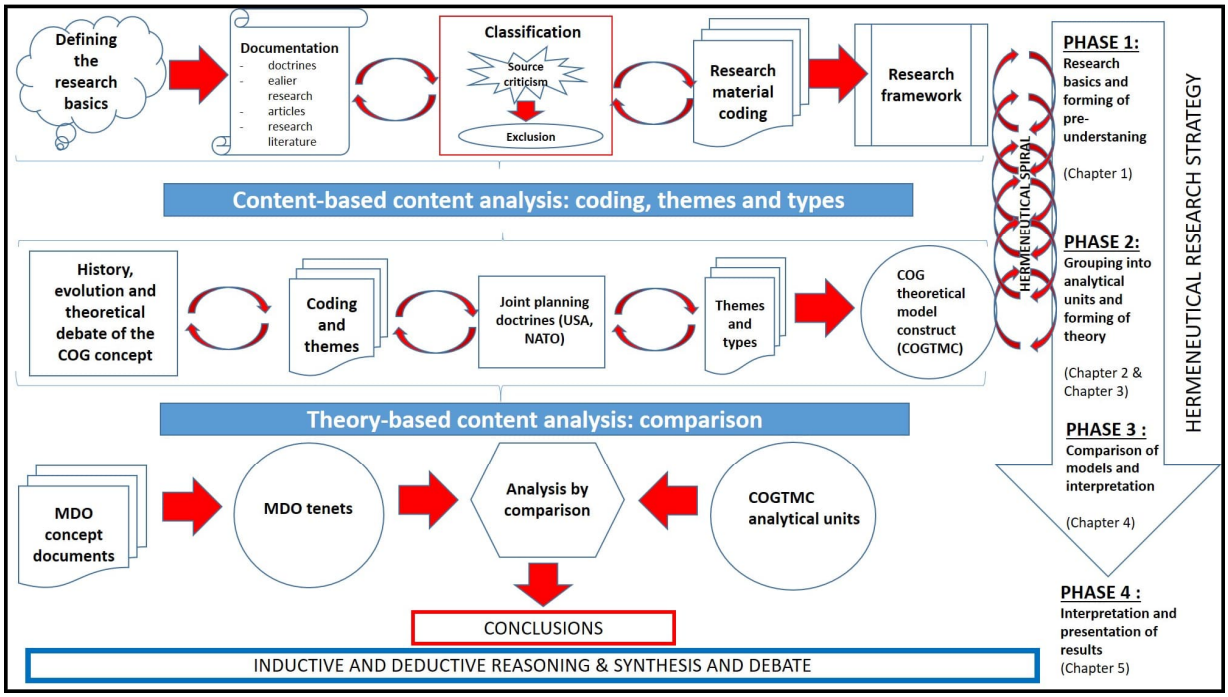

Figure 3: Research design

The first phase used document and bibliographical review to form a pre-understanding of the research phenomenon and to find and code essential research data for primary and secondary material. The main effort of this phase was to connect the phenomenon into the earlier research and to and mapping of research deficiency.

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[122] Palm, Miro & Janne Tähtinen. Hermeneuttinen tutkimus, *Näin tutkin taktiikkaa: Tutkimusprosessi operaatiotaidon ja taktiikan näkökulmasta*. Janne Tähtinen (ed.), Maanpuolustuskorkeakoulu, Sotataidon laitos, Julkaisusarja 2, Tutkimusselosteita nro 20, Helsinki 2022, p. 113.

In classification and coding the documents and bibliographical sources were subjected to criticism and selection. Here happened bibliographical review and selection of suitable material as well as exclusion of unsuitable material. This part also formed the necessary pre-understanding of the subject required by the hermeneutical research strategy. Consequently, in this phase created the theoretical framework of this research through the selection of methods, viewpoint, defining of concepts and terms as well as the framing of the research problem and thus provided the content of chapter one.

The second phase used content-based content analysis for coding and formulation of themes and types from primary and secondary material, thus it provided the content of chapter two and three. First part of phase two there was for mapping of history and evolution of the COG concept and the related descriptions from articles and literature. This was done by coding, followed by grouping into themes risen from the material. The issues and descriptions relating to the COG concept that repeated and from which the themes formulated were subjected to evaluation and comparison. The essence of this first part was to form an (pre)understanding of the conceptual origin and of the related conditions that still affect how the COG is present today in the joint planning doctrines. Moreover, the background and evolution of the concept and the wider discussion and debate around it was integral for the formation of the COG theoretical model construct conducted later at the end of phase two. Second part of phase two placed specific interest in how the COG concept theoretical debate that have affected the doctrine development and how COG was articulated in joint level planning doctrines. The former provided insights into the COG definition and analytical process development with recognized caveats and issues whereas the latter provided understanding of the COG concepts part in the joint operations planning process. The doctrines showed how they use the COG definition as an entity as well as a planning tool. The analysis was conducted similarly as in the first part of phase two by formulation of themes.

In the third part of phase two the main effort was the creation of analytical units and the COG theoretical model construct (COGTMC). This was done by first taking the combined themes and collecting them under specific labels that condensed the information into types, which became the components of the theoretical model. Then the components, generalizations that describe the selected material but in a concise form, were combined into a model thus creating the COG theoretical model construct (COGTMC). The goal of the second phase to was through inductive reasoning to complete the first part of the analysis and create the COGTMC model.

The third phase provided the content of chapter four. Firstly, an overview of MDO concept looked at what it is, where it comes from and what are its current four tenets, agility, convergence, endurance and depth, that stand at the heart of it. This gave a basic understanding of the concept and of its purpose as the future doctrine of warfare as well as provides context in relation to the joint level planning doctrines. Next, the five COGTMC component elements were used to analyze the four tenets MDO thus using COGTMC as a theoretical tool to compare the COGTMC and MDO models. The purpose of this was to see if a theoretical model such as the COGTMC can be used to analyze the MDO concept and what parts of it are valid with the aggregate COG construct. Through this it was possible to find indications of the usability of the COG concept in the MDO environment. In essence, it was a comparison of two models through deductive reasoning: the MDO concept through its tenets and the COGTMC through its component parts.

Phase four gathered all the conclusions and results together to form synthesis and formulated an answer to the research problem. It also critically examined the different phases of the analytical process, sources and used methods as well as possible biases or errors that might have had effect on the results. The main effort of this phase was to take the essential parts of the conclusions, to answer the main research question, and to take into consideration the factors that might have affected the results adversely. Abductive reasoning, interpretation of analyzed data and presentation of the results together with the debate containing the criticism formed the substance of this phase.

1.8 Bibliography and sources

This sub-chapter presents the primary and secondary source material essential for this research. It further divides into un-published and published material that contain different type of documents from articles to academic journals and dissertations. The bibliographic material of this research is from public sources and the main format is electronic files downloaded from the Internet. In addition, selected literature paperbacks supplement electronic material when appropriate. Of the various documents, official doctrines have significant validity since a wide board of experts and government officials participate in the preparation and drafting, and the approval is at the highest level of the military. All bibliographic material and sources are coded into one excel table where their usability and reliability are assessed.

The selected MDO material provide the current view on the development of the concept and how the U.S Army plans to use it. The TRADOC pamphlets were drafted parallel of one another and are mutually supportive of the MDO concepts development[123] whereas FM 3-0 is the latest official document published. The three documents had sufficient information about the MDO and provided the analytical material for the purposes of this research. FM 3-0 is 'field manual' and part of U.S. Army doctrine family, however, it resides mid-level in the doctrine hierarchy with Army Doctrine Publications (ADPs) above it[124]. Since there does not exist at the time of this research any ADP level doctrine on MDO[125], FM 3-0 was selected as part of the primary material[126]. However, for the scope of the research it was reasonable to limit the primary material regarding MDO to just these three. MDO related articles were secondary material that supplemented the doctrinal material and brought more insight and different views on the subject. In article *Accelerating Multi-Domain Operations -Evolution of an Idea,* General Stephen Townsend argued on behalf of MDO and sheds some light in to the history of the concept, as well how it has evolved. General Townsend's article carries significant weight, as he was the acting commander of TRADOC at the time of writing[127].

Another significant article is *Multi-Domain Operations* by LTC's Marcus A. Jones and Jose Diaz de Leon that ponder the new concept and its significance from NATO's perspective with terminology definitions and related debate. An important article written with critical voice is *AirLand Battle, Once More, With Feeling* by Shmuel Shmuel in 2017. The author criticized Multi-Domain Battle (a prior version of MDO) and warned of fallacy to "rebrand" a Cold War concept and idea to modern needs without and in depth look into the operating concept itself[128]. The significance of the article to this research is to remind that MDO is not necessarily as new an idea as one might think.

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[123] TP 525-3-8 (2108), p. iii.
[124] For U.S. Army doctrine hierarchy and logic chart, see appendix 1.
[125] Department of the Army, Headquarters: *Army Doctrine Publication (ADP) 3-0 Operations*. Department of the Army Headquarters, Washington D.C 2019. ADP 3-0 does not recognize the MDO term or related terminology.
[126] For doctrine hierarchy, see, Department of the Army, Headquarters: *Army Doctrine Publication 1-01 Doctrine Primer*. Department of the Army Headquarters, Washington D.C 2019, p. vi. See also, Tetreau, Matthew: *A Beginner's guide to Army Doctrine*. The Company Leader -Leadership Lessons from the Tactical Level of War, 2020. [https://companyleader.themilitaryleader.com/2020/06/12/on-doctrine/], read 21.6.2023. According to Tetreau, in the U.S Army doctrines are "*Army Doctrine Publications (ADPs) and Army Techniques Publications (ATPs)*" and they tell 'what' whereas Field Manuals (FM's) are the 'how'. Pamphlets are used for guidance and policy.
[127] Townsend, Stephen: *Accelerating Multi-Domain Operations -Evolution of an Idea*. Military Review, 2018. [https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/September-October-2018/Townsend-Multi-Domain-Operations/], read 24.3.2022.
[128] Shmuel (2017). [https://warontherocks.com/2017/06/multi-domain-battle-airland-battle-once-more-with-feeling/], read 24.3.2022.

From the joint planning doctrines JP 5-0 (U.S.) and AJP-5 (NATO) formed the primary material regarding the selected joint level planning doctrines. These doctrines describe the COG's use in joint level planning as well as how the doctrines define the concept. Moreover, they provided the planning process perspective on how the COG is defined and what kind of tools are needed for it. This made it possible to gather enough analytical data together with historical sources and theoretical debate to create a combined model of the COG concept. The joint operations planning doctrines documents contain the current approved guidelines and definitions for how to conduct joint level operations planning. They also interlink with one another through the western military structures, mainly by way of the U.S. as the primary influencer. Thus, these two doctrines together with academic journals and earlier research provided enough material for this research and enable the formation of the research design together with the MDO material mentioned earlier.

Dr. Joe Strange groundbreaking work on the COG concept and its origins served as key material for this research. His work from 1996, *Centers of Gravity & Critical Vulnerabilities - Building on the Clausewitzian Foundation So That We All Speak the Same Language,* done in Marine Corps University is extensively referenced in other academic work in the same field as well as used in the doctrinal development. It served as an excellent starting point of in the mapping of the COG concepts history and legacy. Moreover, Dr. Strange and Colonel Richard Iron had written an extensive report on Center of Gravity for the Swedish National Defence University in 2005, *Understanding Centers of Gravity and Critical vulnerabilities*. The report is about how the COG is defined as well as what contributes to the planning process and how the COG should be understood. Their work provided a valuable link between the historical legacy of the COG concept and its modern application to joint level planning doctrines.

Professor James J. Schneider and Lieutenant Colonel Lawrence L. Izzo article *Clausewitz's Elusive Center of Gravity* as well as Professor Milan Vego's *Joint Operational Warfare – Theory and* Practice and *Clausewitz's Schwerpunkt -Mistranslated from German—Misunderstood in English* as well as Anders Pamgren's *Centre of Gravity - Application and Utility of the Concept in the Modern Art of War* ware important linguistic, conceptual and historical accounts of how the COG is understood (or misunderstood) and how it entered the US doctrinal family. These texts provided evolutionary account and are essential part of the material that contributed to chapter two and the building of the understanding of the COG.

A few important doctrinal examinations, such as by Jan L. Rueschoff & Jonathan P. Dunne *Centers of Gravity from the "Inside Out"*, Aaron P. Jackson's *Center of Gravity Analysis "Down Under" The Australian Defence Forces New Approach* as well as Jacob Barfoed's *A COG Concept for Winning More Than Just Battles* and Antulio Echevarria II's *Center of Gravity: Recommendations for Joint Doctrine* gave a detailed look on the COG doctrinal evolution and its effect with regard to the COG analysis model. Furthermore, Colonel (ret.) Dale C. Eikmeier had contributed significantly to the doctrinal discussion. Several of his insights created key parts of this thesis research design. Notable articles by Eikmeier include *Let's Fix or Kill the Center of Gravity Concep* and *The Center of Gravity, Still Relevant After All These Years?* where he ponders from different viewpoints the utility of the COG taking into consideration supporters, critics and more abstract approaches.

In addition to these the article collection edited by Celestino Perez Jr. *Addressing the Fog of COG – Perspectives on the Center of Gravity in US Military Doctrine* from 2012 brought together the view of select faculty of US Army Command and General Staff College, is an extensive and multifaceted discussion on the history, linguistics, evolution and analysis of the COG. These articles combined theoretical, doctrinal and analytical viewpoints and offered criticism toward interpretation and the doctrinal guidance, or lack of it. Of the articles, especially the ones written by Christopher R. Paparone & William J. Davis Jr. *Exploring Outside the Tropics of Clausewitz: Our Slavish Anchoring to an Archaic Metapho*r, Kurt P. VanderSteen's *Addressing the Fog of COG – Perspectives on the Center of Gravity in US Military Doctrine*, Stephen L. Melton's *Center of Gravity Analysis—the Black Hole of Army Doctrine* and Eikmeier's *Modernizing the Center of Gravity Concept—So It Works* were of significant value due to their insights.

The current versions of the dictionaries of United States Department of Defence and NATO, *DOD Dictionary of Military and Associated Terms & APP-06: NATO glossary of terms and definitions* respectively, provide the approved definitions of the terminology and concepts thus giving a point of reference and context. It is notable that the primary material consists to considerable extent of U.S. views on warfare via U.S. dominance in the western military doctrine and that this influence is visible in the NATO doctrine as well. As the aforementioned are considered present a western view of the world, it is reasonable to assume that this cultural heritage has had its effect on the discussion around COG as well as the evolution of the doctrines.

2 THE CENTER OF GRAVITY AND JOINT LEVEL PLANNING DOCTRINES

"*Plans are worthless, but planning is everything*"[129]
—President Dwight D. Eisenhower

The purpose of this chapter is to analyze the origins of the COG concept as well as its implementation into doctrine. The main emphasis of the first sub-chapter lies in the historical background and relevance of the COG as well as what kind of themes rise up from the source material. I argue that at the root of conflicting understanding of COG lies the debate about the meaning and definition of *schwerpunkt* / COG. This debate brakes down into history and interpretation of *schwerpunkt*, respectively.

The first sub-chapter will begin the analysis with the observations regarding COG historical origin and related linguistical and interpretational discussion that rise from source material. The second sub-chapter uses the first as a point of origin and will analyze the COG concept modern evolution and its use in the selected joint doctrines through related theoretical debate as well the through the doctrines themselves.

Hence, history and theoretical debate will provide the context for analyzing the selected joint doctrines. Purpose here is not to focus on individual changes in doctrinal definition, but instead find the essential parts of the COG that either reinforce or criticize it usability as a concept and a planning tool. I will use *schwerpunkt* when referring to Clausewitz's original concept unless otherwise dictated, or due to source related issues.

2.1 Historical origin of the COG

The concept's origin lies with renown German military strategist, theorist and military thinker Carl von Clausewitz, who used it (in German *Schwerpunkt*) as a key element in his unfinished manuscript that later became to be known as the famous book *On War*.[130]

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[129] JP 5-0 (2020), p. I-1.
[130] Echevarria, Antulio J: *Clausewitz's Center of Gravity: Changing Our Warfighting Doctrine – Again!*. US Army War College 2002, p. 11. Palmgren, Anders: *Centre of Gravity – Application and Utility of the Concept in the Modern Art of War*. Tiede ja Ase Nro 64, Suomen Sotatieteellinen Seura 2006, p. 69. Palmgren argues that Clausewitz had two frames of mind when writing, "the idealist and the realist" (absolute war and limited war). According to Palmgren, the aforementioned issue contributed to three books from total of eight and affected the concept of COG in Book VIII, where COG is considered one strategic factor for victory.

Several prominent authors and scholars of Clausewitz agree that his edifice *On War* was not a finished product, but rather a draft that the stratagem aimed to complete but died before he could finish the mission[131]. It was in fact Clausewitz's widow with the help of his colleagues and contemporaries that collected the notes together with draft versions of the chapters and ultimately compiled them into the singular work that we know today[132]. Further, as Colin Gray puts it, "*Clausewitz with all his brilliance, sometimes contributes to general lack of* clatiy"[133]. Thus, when we look at *On War* and make interpretations on his thoughts it is imperative to keep in mind the unfinished nature of Clausewitz's work.

The ongoing debate about the usefulness of the concept in military planning is marked with numerous scholarly and other arguments that range from linguistic and translation issues, to interpretation of Clausewitz's thought and meaning, to his experience of Napoleonic war. Clausewitz's mechanistical and Newtonian analogies and metaphors together with 19th century monarchical war formulated into modern military doctrine has made the concepts adaptions anything but clear. Thus, also our current conceptualization of war has been a product of several centuries of evolution.[134]

2.1.1 Schwerpunkt or Center of Gravity?

One of the most frequent debates and criticisms directed towards what we now understand as COG is that the concept was mistranslated and misunderstood contributing to an ongoing problem with its usability in doctrine and practice[135]. By examining separately translations and interpretation of *schwerpunkt* we can get a more holistic view of the origins of the COG concept and thus understand the underlying factors that have contributed to what we see today in doctrine.

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[131] Kuehn, Thomas T.: Thoughts on Clausewitz, Strategy, and Centers of Gravity: When Jargon Meets Reductionism. *Addressing the Fog of COG – Perspectives on the Center of Gravity in US Military Doctrine*. Celestino, Perez Jr. (ed.) 2012, p. 102, 107. Kuehn (among others) considers that only Book One, "On the Nature of War", of *On War* was finished by Clausewitz before his death in 1831. Rest of the books in *On War* were drafts Clausewitz meant to return to, but he died before completing this task. Kuehn ponders if this places considerable doubt on the usability of some of Clausewitz's definitions, such as the COG. See also, VanderSteen (2012), p. 37.

[132] Eikmeier, Dale C.: Modernizing the Center of Gravity Concept—So It Works, *Addressing the Fog of COG – Perspectives on the Center of Gravity in US Military Doctrine*. Celestino, Perez Jr. (ed.) 2012, p. 135.

[133] Gray, Colin S.: *The Strategy Bridge: Theory for Practice*. Oxford University Press, New York 2010, p. 96.

[134] VanderSteen (2012), p. 36; Raitasalo (2013), p. 207. See also, Paparone, Christopher R. & William J. Davis Jr.: Exploring Outside the Tropics of Clausewitz: Our Slavish Anchoring to an Archaic Metaphor. *Addressing the Fog of COG – Perspectives on the Center of Gravity in US Military Doctrine*. Celestino, Perez Jr. (ed.) 2012, p. 65; Echevarria (2002), p. 6.

[135] Vego, Milan: *Joint Operational Warfare – Theory and Practice*. Naval War College, USA 2007b, p. VII-29.

Dr. Joseph Strange and Colonel Richard Iron have argued that "*to understand centers of gravity, one must be grounded in the original context of On War*"[136]. In their view, the essential elements are found in Book One and Book Six where Clausewitz talks about the collision of living forces and war as clash between armies with the purpose of breaking their will to resist by physical means[137].

For Clausewitz war was a contest: "*War is nothing but a duel on a larger scale. countless duels go to make up war, but a picture of it as a whole can be formed by imagining a pair of wrestlers. Each tries through physical force compel the other to do his will; his immediate aim is to throw his opponent in order to make him incapable of further resistance.*"[138] This physical analogy and its related metaphors are evident in much of the discussion surrounding COG. It coincides well with the Merriam-Webster Dictionary definition of COG that describes the scientific nature COG in physics terms[139].

One of the most common and popular sources of *schwerpunkt* English translations is the passage the Clausewitz's *On War*, Book Eight, Chapter Four, translated by Michael Howard and Peter Paret: *"One must keep the dominant characteristics of both* ***belligerents*** *in mind. Out of the characteristics a* ***certain center of gravity*** *develops,* ***the hub of all power and movement, on which everything depends****. That is the point against which all our energies should be directed.*"[140] Moreover, Professor Joseph Strange and Colonel Richard Iron emphasize that Book Eight of *On War* in particular is a source of misunderstanding together with the aforementioned translation issues[141].

Therefore, it is important to make note of this particular translations effect. This is highlighted on those works that do not question Howard and Paret's translation and interpretation but take it as given. There are, however, other English translations by authors that do not accept Howard and Paret's version as it stands.

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[136] Strange, Joe & Richard Iron: *Center of Gravity — What Clausewitz Really Meant*. Joint Forces Quarterly 35, October 2004, p. 21.
[137] Ibid. p. 21.
[138] Clausewitz (Howard & Paret 1984 transl.), p. 75.
[139] Merriam-Webster Dictionary: *center of gravity*. [https://www.merriam-webster.com/dictionary/center%20of%20gravity], read 10.1.2023. First known use of the phrase is from 1633, in the meaning defined as "center of mass". The COG is defined as "center of mass" and "the point at which the entire weight of a body may be considered as concentrated so that if supported at this point the body would remain in equilibrium in any position."
[140] Clausewitz (Howard & Paret 1984 transl.), p. 595–596. Bold by me.
[141] Strange & Iron (2004), p. 22–24.

As an example, Phillip G. Pattee translates the same Clausewitz's passage thusly: "*Therefore, one must consider the prevailing conditions of both* ***States.*** *From [consideration of] these [conditions],* ***a main focus*** *will emerge****, a nexus of strength and motion****,* ***on which everything depends****. The accumulated thrust of all our power must be directed against this, the opponent's focal point.*"[142] Pattee's translation deviates from Howard and Paret as it consciously (as the author describes) avoids using the term 'center of gravity', but instead uses 'main focus' as the chosen translation. This is, as Pattee describes, because "*the focus is on the 'whatever it is' on which everything depends*" but also as a conscious act by the author to limit the association tied to the current COG term[143].

This is a good example of what, according to Colonel Dale Eikmeier, Dr. Christopher Bassford has referred to as editorial liberties and interpretation of context[144]. Furthermore, Pattee uses 'states' instead of 'belligerents', which was a choice of Howard and Paret's. A state is a political entity whereas belligerents refer to the opponents more generally.[145]

Second deviation from Howard and Paret is by Dr. Antulio J. Echevarria II. He provides a variation of *schwerpunkt* for the same passage of Clausewitz in his article from 2002: "*What theory can admit to thus far is the following: Everything depends upon keeping the dominant characteristics of both* ***states*** *in mind. From these emerge a certain center of gravity, a* ***focal point*** *(Zentrum)* ***of force and movement****,* ***upon which the larger whole depend****s; and, it is against the enemy's center of gravity that the collective blow of all power must be directed.*"[146] Echevarria argues that the COG is strongly tied to physics and thus acts like a force that holds things together. This, he points out, is what makes emphasis clearer with regard to *focal point* as the preferred COG, because it (a form of centripetal force) is what keeps a force together by enabling it to act as a single entity and thus follows more precisely Clausewitz's original physics analogy. [147]

The physics analogue and related metaphors seem to have influenced considerably Echevarria's theory formulation. This might have tied him too tightly to Clausewitz's legacy, however, it also emphasizes his effort to remain true to the original texts.

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[142] Pattee (2012), p. 126. Bold by me.
[143] Ibid. p. 126.
[144] Eikmeier (2012), p. 138.
[145] Pattee (2012), p. 126.
[146] Echevarria (2002), p. 11. Bold by the original author and me.
[147] Ibid. p. 5, 11. Bold by the original author and me.

Contrary to other translations, Echevarria's 'focal point' is something that the "*larger whole depends*" and not "*everything depends*"[148]. It is here that the we see Echevarria's effort to remain as closely as possible in Clausewitz's world of physical analogy and tying his conceptual interpretation to his translation. He, like Pattee, also retains 'state' as a choice of term, probably as to keep in mind keep Clausewitz's idea that war does not exist in a vacuum but has a political objective.[149]

A third version of the same Clausewitz passage is provided by Dr. Milan Vego, who translates *schwerpunkt* as "*weight (or focus) of effort*"[150]. Vego, however, does not automatically insert his translation as part of the text but instead retains *schwerpunkt* in the translated example: "*Theory says that one must keep in mind the dominant relationships of both* ***belligerents****..From these a certain* ***Schwerpunkt****, a center of power and movement, is built,* ***on which everything depends****.; and against that Schwerpunkt one must direct all the assembled push of all his forces.*"[151]

Contrary to 'subject' focus by Pattee and the 'physics' approach of Echevarria, Vego argues that *schwepunkt* is more than mechanical or unified entity with a 'focal point'. It is the greatest source of strength or power (physical / psychological / other) that accomplishes the given objective, or prevents one from doing so. This is a somewhat opposite position with regard to Echevarria. Vego underlines the need to take into consideration more than one critical point, but instead the components that make up COG, including the human element. In his thought, purely mechanical translation is inadequate, as it does not take into consideration both tangible and intangible elements.[152]

The three examples presented above are just a few of many translations of *schwerpunkt* that exist. Other variations include authors of various eras as well as by modern applications, such as Google translate application. Table 1 presents a compilation of translations from selected sources from the past 150 years.

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[148] Echevarria (2002), p. 11.
[149] Ibid. p. 11, 14–15. Echevarria does not explicitly explain why he uses 'state' as the preferred translation of the passage on page 11. However, this political element becomes later implicitly apparent on pages 14–15 with his pondering Clausewitz's thought on levels of war, COG and how political and military objectives constitute a total defeat of the enemy.
[150] Vego (2007b), p. VII-29.
[151] Ibid. p. VII-29. Bold by me.
[152] Ibid. p. VII-33.

Table 1: Translations of *schwerpunkt*.

Translator	**Translation of *schwerpunkt***	**Year**
J.J. Graham	center of gravity	1874
Tom Wintringham	thrust-point	1942
Michael Howard & Peter Paret	center of gravity	1976
Antulio J. Ecchevarria II	focal point	2004
Milan Vego	weight (or focus) of effort	2007
German Bundeswehr (according to Vego)	center of gravity	2007
Austrian Bundesheer (according to Vego)	gravitationspunkt	2007
Stephen L. Melton	main point, focal point, heavy point	2012
Kurt P. VanderSteen	heavy point, focal point, highlight, emphasis, heavy emphasis, grave emphasis, center of gravity	2012
Google translate	main emphasis, center of gravity, main focus, main stress	2022

As we can see from table 1, there is variance in the translations but also a certain similarity that has persisted and endured time. The most notable observation is that 'center of gravity' has retained its position for almost 150 years since J.J. Graham's 1874 first English translation, even to find its way to a very modern Google translate application.

It is apparent from the analysis conducted upon the sources (aside from the joint doctrines) that translation issues are mentioned in most of the selected material. From the perspective of content-based content analysis it is evident that *schwerpunkt translations, the time of translation* and *the translator/user* all form distinctive themes of their own. Thus, they contribute to the analytical construct as their own entities.

2.1.2 Evolution of Schwerpunkt to COG

Closely related to the translation problems lie the challenges regarding interpretation and definition of *schwerpunkt*.

To understand the origins of COG one must understand the mechanistic[153] view of war that Clausewitz held and the physical force analogue the author uses to describe to contest between military forces[154]. Clausewitz lived in an era where warfare in Europe was conducted in monarchical system. In this system the wars were not considered total. The rulers of nations were more or less related to one another through intermarriage and therefore agreed to the same rules conduct. This meant that wars would have limited political goals and objectives, such as conquest of a specific area or province, breakup of an alliance or a weakening of major power.[155]

The era was also heavily influenced by the Napoleonic wars, as Anders Palmgren puts it: *"The Napoleonic way of conducting war...characterized by a divided approach to maintaining operational speed, rapid concentration with converging army corps towards a planned, decisive point and the utilization of surprise, aiming to win decisive battles."*[156] Therefore, one could argue that for Clausewitz war was often limited, albeit violent endeavor, with a specific political goal.

As Clausewitz himself puts it: "*It is, of course well-known, that the only source of war is politics...war is simply a continuation of political intercourse, with the addition of other means...war itself does not suspend political intercourse or change it into something entirely different. In essentials that intercourse continues, irrespective of the means it employs..How could it be otherwise?*"[157]

This is the starting point for interpreting what Clausewitz meant with his *schwerpunkt*. I will use the original German term *schwerpunkt* and its translations interchangeably depending on their context. The point here is to emphasize the variance and made visible the evolution of the definition without locking the readers thoughts to the preconception of what the COG is.

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[153] Melton, Stephen L.: Center of Gravity Analysis—the Black Hole of Army Doctrine. *Addressing the Fog of COG – Perspectives on the Center of Gravity in US Military Doctrine*. Celestino, Perez Jr. (ed.) 2012, p. 82. Melton states that Clausewitz used this type of terminology excessively after exposure to physics lectures at the Bern University. See also, Echevarria (2002), p. 6. According to Echevarria, Clausewitz attended a series of lectures by German physicist Paul Erman, a professor at both the University of Berlin and the Prussian Allgemeine Kriegsschule (War College) and these gave an inspiration for the idea of COG.
[154] Schneider & Izzo (1987), p. 46–47. At the time of writing James J. Schneider was a professor of military theory at the School of Advanced Military Studies, Command and General Staff College, Fort Leavenworth, Kansas USA and Lieutenant Colonel Lawrence L. Izzo was a former Army War College fellow and a faculty member at the School of Advanced Military Studies. See also, Palmgren (2006), p. 66–67.
[155] Melton (2012) p. 83–84.
[156] Palmgren (2006), p. 67.
[157] Clausewitz (Howard & Paret 1984 transl.), p. 605.

Clausewitz is at the heart of this debate. The well-known passage where he uses a mechanistical analogue is often cited in the theoretical debate. It is from *On War*, Book Six Chapter 27 translated by Michael Howard and Peter Paret in 1976: "*A center of gravity is always found* ***where the mass is concentrated most densely****. It presents the most effective target for a blow; furthermore, the heaviest blow is that struck by the center of gravity.*"[158] This can be compared to the earlier translation from original German by J.J. Graham from 1874 presented by Strange and Iron: "*A center of gravity is always situated* ***where the greatest mass of matter is collected****, and as a shock against the center of gravity of a body always produces the greatest effect, and further, as the most effective blow is struck with the center of gravity of the power used.*"[159]

The point that Strange and Iron make here is that Graham's more literal translation is clearer in meaning. Graham's translation highlights Clausewitz's idea of having the best strike that has the most effect on the enemy, even though this might not be the "*heaviest*"[160]. This comparison underlines the linguistic difficulties related to translations and how even small changes may alter the context.

Part of Clausewitz's original thought carried on after his death. From mid-19th century onwards until ca. 1880 there was a tendency in German and Austrian military theorists to nominate the enemy capital as the *schwerpunkt*. Colonel Eikmeier refers to this as "*schwerpunkt as 'the target' understanding*"[161]. Here the enemy capital was the focus as it presented a source of military and political strength and also a place which if threatened would be protected by the greatest amount of forces. Thus, seizing the capital would at the same time destroy the enemy's armed forces.[162]

According to Vego, after 1880, and in part due to the experiences of World War I, the German military evolved the *schwerpunkt* concept to mean a location, or a section, on the front where the mass of forces concentrates (in depth) as a perquisite for success. Behind this line of though was the strategic problem of war on two fronts, and the re-definition of the *schwerpunkt* concept was seen as a way to solve it.[163]

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[158] Clausewitz (Howard & Paret 1984 transl.), p. 485. Bold by me.
[159] Strange & Iron (2004), p 27.
[160] Ibid. p 24.
[161] Eikmeier (2012), p. 135.
[162] Vego (2007a), p. 102.
[163] Ibid.

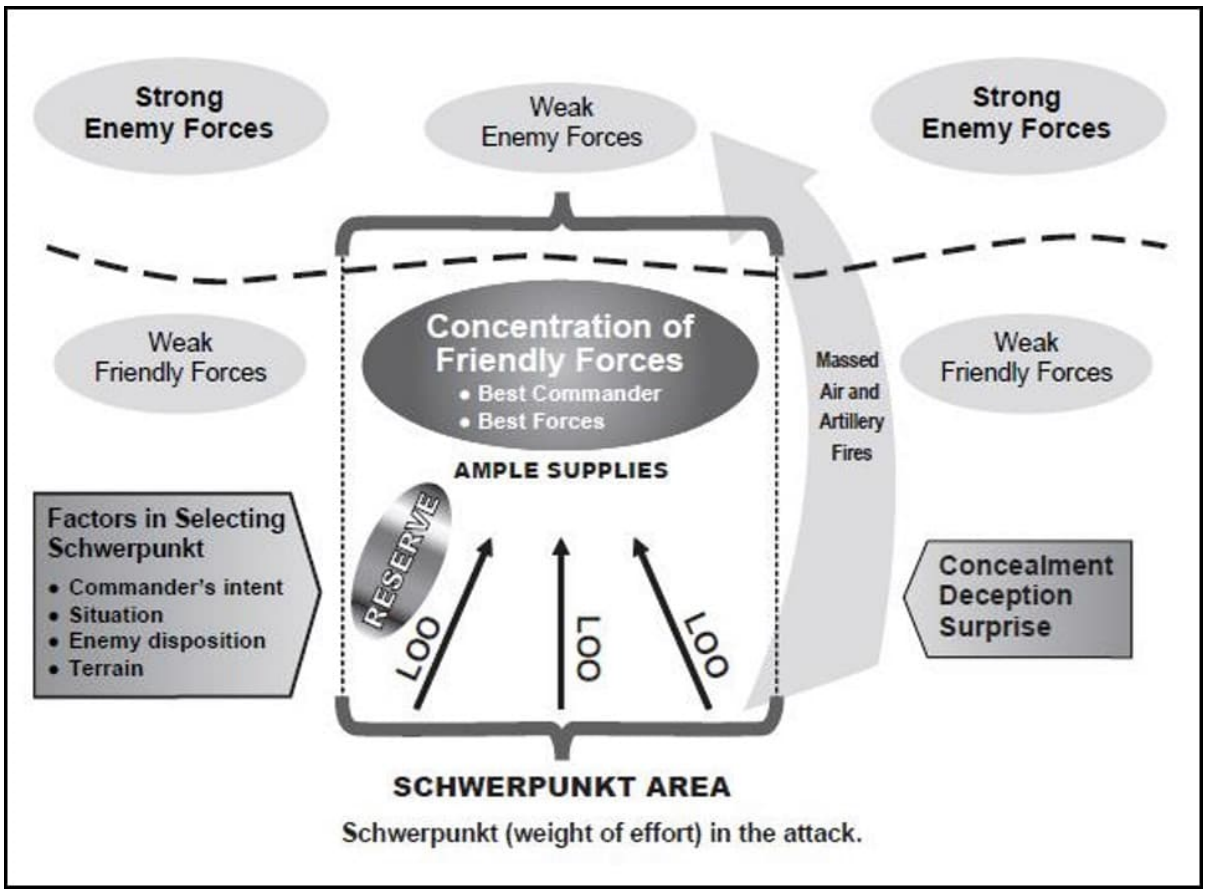

Figure 4: Schwerpunkt area according to Milan Vego[164]

An example of this 'point of focus, or arrow', thinking is illustrated in figure 4. Vego's illustration exemplifies the German thinking behind *schwerpunkt* where the weight of effort is focused on a section of the front, while taking into consideration the conditions and considerations needed for success. Colonel Eikmeir refers to this as "*schwerpunkt as 'the arrow' understanding"*[165]. This coincides with Dr. Echevarria's translation of "*a **focal point** (Zentrum) **of force and movement, upon which the larger whole depends**"*[166] examined earlier. *Schwerpunkt* continued to change between the world wars and started to focus on planning. Eikmeier further states that this was a natural evolution, a kind of a combination, of the 'target' and 'arrow' understandings[167].

[164] Vego (2007a. p. 104.
[165] Eikmeier (2012), p. 135. See also, Vego (2007b), p. VII-37. Vego emphasizes the effect of Alfred von Schlieffen (1833–1913) of the German Great General Staff in the formulation of this principle. According to Vego, Schlieffen's conclusion was that armies in the number of millions and new effective weapons made it paramount to heavily concentrate forces in the in deeply echeloned lines at a decisive place as a prerequisite for success. Vego argues that Schlieffen influence was considerable, even decisive, on the development of German operational warfare.
[166] Echevarria (2002), p. 11.
[167] Eikmeier (2012) p. 136.

This planning-centric focus was visible in German doctrine in the 1920s which required that "*any attack must have its own weight of effort*"[168]. Later in the 1930s General Ludwick Beck formed *schwerpunkt* into a way to plan maneuvers that would penetrate or surround the enemy. This transformed the concept from a *focus of planning effort* to into a *tool used in planning*. World War II was a culmination of sorts for *schwerpunkt* and brought the concept into the awareness of the Allied forces. This was in no small part due to the effectiveness of German Werhmacht in *Blitzkrieg* which galvanized the Allies to find a reason behind German success. An example of this success, and how Jomini's ideas combined with the evolution of *schwerpunkt*, is seen in German operational warfare as the idea of "*scherpunkt within schwerpunkt*".[169]

Vego provides yet again a good illustration of this using German Operation Yellow (1940) as an example:

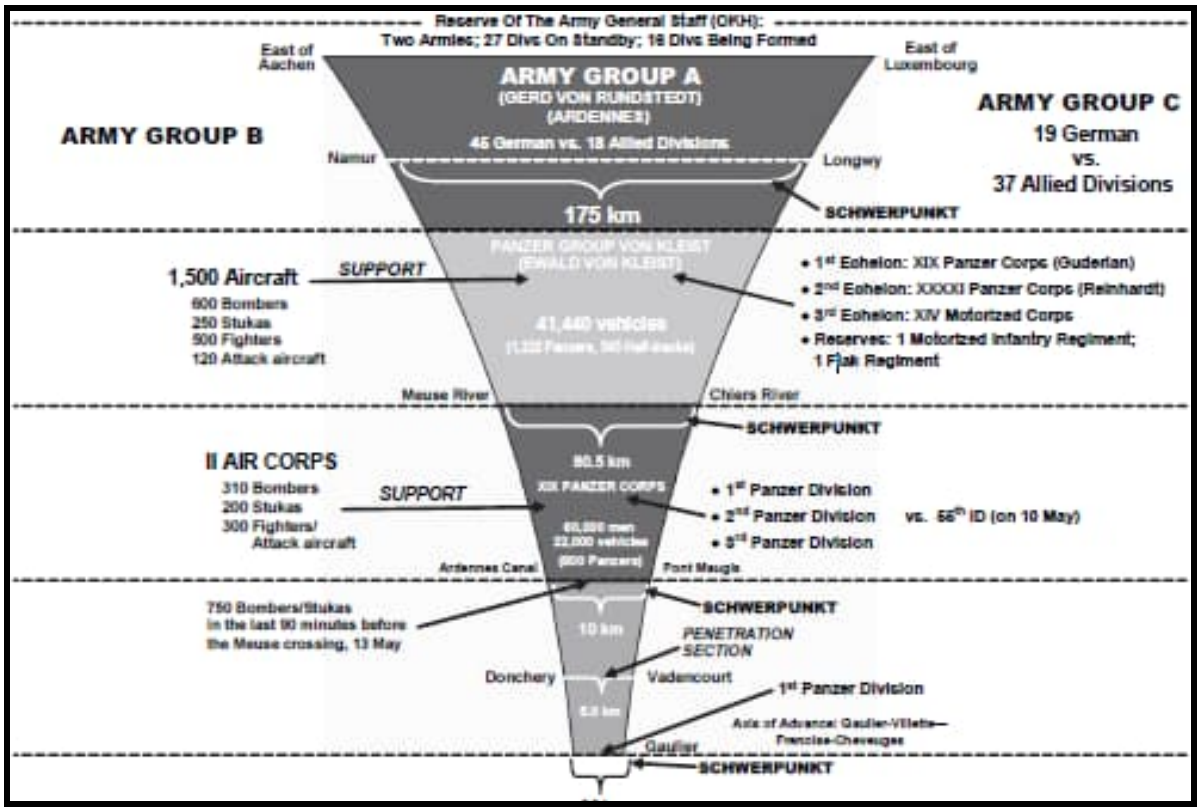

Figure 5: Schwerpunkt within Schwerpunkt: Operation Yellow, May 1940 by Milan Vego[170]

[168] Vego (2007b), p. VII-38. Here Vego uses his translation of *schwerpunkt* as the 'weight of effort'. See also, Eikmeier (2012), p. 136. Eikmeier also uses Vego's translation of *schwerpunkt*.
[169] Schneider & Izzo (1987), p. 52; Vego (2007a), p. 102, 104.
[170] Vego (2007a), p. 105.

As we can see from Vego's example, German 'weight of effort' thinking cut across each command level from the army group all the way to the tactical level. However, as noted earlier, WWII is also seen as origins of sorts for some of the more persistent misunderstandings that have carried to the first doctrinal implementation of COG in 1986. Part of the fault lies yet again in translations and context.

According to Schneider and Izzo, the drive to understand German success gave rise to publications during WWII of which the most influential was Colonel F. O: Miksche's *Attack*. He was assisted by Tom Wintringham who translated German *schwerpunkt* into "*thrust-point*" which Miksche used throughout his book. Wintringham's Clausewitzian idea of concentrated force (at the *thrust-point*) was mixed further by Miksche's misconception of equating objective and *schwerpunkt*.[171]

After WWII the concept appears to have vanished from the US military theoretical discussion to resurface after the end of Vietnam war. At that time Graham's 1874, and Howard and Paret's 1976 translations of *schwerpunkt* as COG were predominant in the literature. As we have seen, the arguments of various western theorists differ to some extent as to what Clausewitz meant with his *schwerpunkt* and how they perceive Clausewitz intended the concept to be understood. Furthermore, what contributed to the ambiguity of the concept of COG was that it had not been present in any significant form or role in the United States (US) military prior to its "reinvention" in 1976. Thus, it was a combination of coincidence, and in no small part the aftermath of US defeat in Vietnam, that opened the door for the COG to enter the American military thought[172]. The concept officially entered US doctrinal family in 1986 with the publication of FM 100-5, O*perations*.[173]

In September 1987 edition of *Parameters*, just one year after the publication of FM 100-5, Schneider & Izzo criticized Clausewitz for creating much of confusion that surrounds the COG concept. They argued that Clausewitz deviates in Book Eight from his earlier physical analogues established in Books One and Five and goes into the realm of the psychological with references to "*personalities*" and "*community of interest*".[174]

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[171] Schneider & Izzo (1987), p. 52.
[172] Melton (2012), p. 85. Melton notes that Colonel Harry Summers and his work '*On Strategy: a Critical Analysis of the Vietnam* (1982), which cited extensive on Clausewitz, was together with the translation of *On War* by Michael Howard and Peter Paret (1976) the primus motor why COG became a trend in American military thought. See also, VanderSteen (2012, p. 34.
[173] Schneider & Izzo (1987), p. 46.
[174] Ibid. p. 49–50. Schneider and Izzo use COG here as the translation for *schwerpunkt*.

The same argument is carried on later by some other theorists, such as Antulio J. Echevarria II and Stephen L. Melton who do not consider the intangible elements essential[175] either due to mechanistical-physical focus and/or an inclination to view COG as a systemic (system of systems, SoS) structure[176]. Moreover, Schneider and Izzo point out that FM 100-5 "*falls into the same semantic trap*" as Miksche because the doctrine lists ideal *objectives* for an attack, such as key terrain, boundaries between combat forces, lines of communication and significant command posts etc. as possible COG's which then creates a false assumption that any 'good' target for an attack is also a COG[177].

Appendix 2, 'definitions and interpretations of *schwerpunkt* (ca. 1832-1987)', presents a compilation of definitions starting from Clausewitz's time and ending with the COG implementation of US doctrine in 1980s. Purpose of the table in appendix 2 is to draw together and compare various interpretation by authors and theorists. It is also a way to visualize the evolution of the concept of *schwerpunkt* on its transformation into COG. Further, appendix 2 presents the analogies and metaphors tied to the particular definition in an effort to broaden understanding on the context as well to create a link through time from Clausewitz's thinking to FM 100-5 (1986).

By examining the table in appendix 2, we see indications of that continuous evolution of the concept but also some parts that have persisted over time. Hence, it would be presumptuous to assume that the concept would remain intact in continuous doctrinal development and evolution shaped by technological development and changes in warfare. Colonel Eikmeier refers to this process as "*evidence of concept not brought into form*"[178]. Therefore, by themselves literal (and historical) translations are just a way to exchange one language to another, however, accompanying definition and interpretation clarifies meaning and gives context.

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[175] Compare, Echevarria II, Antulio J.: *Center of Gravity: Recommendations for Joint Doctrine*. Joint Forces Quarterly 35, Summer 2004, p. 15 and Echevarria II, Antulio J: *Clausewitz's Center of Gravity: It's Not What We Thought*. Naval War College Review, Vol 56, No. 1, Winter 2003, p. 118. Echevarria does not discard intangible COGs completely, but instead sees them connected either to Clausewitzian 'war to the death' or as form of ideological COG. Echevarria seems to have adjusted and specified his position slightly with regards to COG applicability in wars such as 'War on Terror', however, his core arguments from 2002 remain intact.
[176] Echevarria (2002), p. 14. According to Echevarria Clausewitz did not separate COG by level of war (tactical, operational, strategic). This, argues Echevarria, is why the COG is defined by the entire system. See also, Melton (2012), p. 98. Melton retains his notion of Clausewitz's definition that the COG is "the main concentration of enemy strength and power" and intangibles and cultural factors should be discarded and like Echevarria, considers a holistic systemic approach most appropriate.
[177] Schneider & Izzo (1987), p. 52.
[178] Eikmeier (2012), p. 136.

As with the translations in the previous sub-chapter, it is apparent from the analysis conducted upon the sources that *interpretation, definition, analogue* and *metaphor* issues are mentioned in all of the selected material. From the perspective of content-based content analysis it is evident that these all form themes of their own. Thus, they contribute to the analytical construct as their own entities. Sub-chapter 2.1 has provided the needed input for theoretical model construct by answering to the first research sub-question: *What is the origin of the Center of Gravity concept and how it relates to joint level planning doctrines*.

2.2 Joint level planning doctrines

Doctrine should give us common conceptual world and harmonize thinking without destroying creativity in order to reach a common goal[179]. Anders Palmgren argues that the ongoing debate regarding the COG definition in the U.S "*is a reflection on the American way of applying force"*[180]. Therefore, part of the dilemma regarding the use of COG in modern doctrine is how military theorists understand it. It is the authority of these theorists that have influenced the doctrinal development and thus contributed to the wider theoretical discussion surrounding *schwerpunkt* and COG. Hence, it is important to note that *schwerpunkt* and the COG are not the same thing even though they share similarities and a common history[181]. Palmgren's argument, should be kept in mind when we start looking at the concept of COG more deeply.

2.2.1 Theoretical discussion

In the doctrinal and theoretical debate arguments range from Clausewitzian origins, such as translations of the meaning of *schwerpunkt*, to interpretation of concepts and metaphors on to previously articulated official doctrinal definitions. Depending on how one perceives the key arguments of the respective theorists, the viewpoints can be divided into schools of thought or similar constructs. I will draw from Colonel Dale Eikmeier's line of thought and use a modified version of his three camps of "*traditionalists, rejectionists* and the *accommodators*"[182], but reduce the trinity for practical purposes into two competing camps.

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[179] Gjelsten & Rekkedal (2013), p. 18.
[180] Palmgren (2006), p. 75. See also, Rekkedal (2013), p. 69.
[181] Vego (2007a), p. 108–109. See also, Eikmeier (2012), p. 135. Eikmeier's argues that the role of Clausewitz's *On War* as the continued authority on COG (in doctrine) should be critically examined.
[182] Eikmeier, Dale C.: *Let's Fix or Kill the Center of Gravity Concept*, Joint Forces Quarterly 83, Fourth Quarter 2016, p. 110. Italics by me.

I will only use the idea of Eikmeiers *traditionalists* and *accommodators*, respectively, as they both consider that the concept of COG has utility and acknowledge that the current doctrinal family is influenced by Clausewitz and his definitions[183]. This narrowing serves best the purpose of this research. However, I will include Dr. Echevarria's viewpoint of the respective sides of the argument as proponents of "*capabilities-based* and *effect-based*" approaches[184] as this will provide a more descriptive terminology of the opposing camps. Thus, we now have two competing schools of thought: The first one is named *effect-based traditionalists* and the second one as *capabilities-based accommodators*. Both schools have number of theorists that have contributed to them over the years. Key tenets of these theorists are illustrated in table 2 which is modeled after Colonel Eikmeier.

Table 2: Key tenets of the COG theoretical schools of thought[185]

	Baseline idea (of what COG is or what it does)	Context	Analysis method	Application	Theoretical school of thought
Echevarria	Provides cohesion (a centripedal force)	Type of war and force	Three step analysis	Selective	**Effects based traditionalists**
Strange & Iron	Components of strength, power and resistance	Adversarial and system of systems	Analysis of interrelated concepts (COG, CCs, CRs, CVs)	Levels of war	**Capability based accommodators**
Vego	Source of power	Objective and situation	Analytical framework	Levels of war	**Capability based accommodators**
Eikmeier	Attains the objective	Objective and system of systems	Ends, Ways, Means (CCs, COG, CRs, CVs)	Universal	**Capability based accommodators**

First, we will look at the *effect-based traditionalists* camp as it resides firmly in the Clausewitzian foundation. The most notable of this camp is Antulio J. Echevarria II.

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[183] Eikmeier (2016). p. 110. Colonel Eikmeier argues that "rejectionists" consider that COG as a concept is completely useless and are more inclined to look elsewhere for a better suited and more practical analytical tool. Italics by me.

[184] Echevarria (2004), p. 15.

[185] Eikmeier (2012), p. 136. The table is modeled after Colonel Eikmeier with modifications and additions added by the researcher in accordance with this research and analysis of source material. All original Eikmeier parts of the table have been cross-checked from original sources. These original parts are the content of 'context' column and 'application' column as well as parts of the 'baseline idea' and 'analysis method' columns.

He has established a school of thought around himself beginning with his U.S. Army War College 2002 monograph *Clausewitz's Center of Gravity: Changing Our Warfighting Doctrine—Again!* Echevarria continues the debate with the opposing theoretical camps in the following years in academic journals, such as the Naval War College and Joint Force Quarterly Review, where he criticizes those in the *capabilities-based accommodators* camp for striving to renew, or re-define the COG concept away from its Clausewitzian roots and into a capability-based direction[186].

Throughout his debate with the opposing camp, Echevarria retains his basic argument where he perceives the COG as a systemic nexus that incorporates both the tangible and intangible: "*Clausewitz's military CoG and the CoG of the mechanical sciences share many of the same properties**: neither is a strength or a source of strength, per se**, but rather **a focal point** where physical (and psychological) forces come together*.[187]"

Echevarria himself stipulates that his definition of COG is derived with a strict adherence to the original German texts by Clausewitz and the combined understanding of the Clausewitzian context derived from the entire edifice, while also considering the different connections and context where the COG (*schwerpunkt*) is displayed throughout *On War*. Further, Echevarria speaks on behalf of a systemic way to perceive COG. He argues that Clausewitz did not separate war into strategic, operational and tactical levels but instead used COG as a "*unifying effect*".

For him a caveat of this model resides in the cohesion of the enemy. Without unity to bring cohesion, there is nothing to focus on, and thus the *focal point* becomes obsolete. Moreover, he warns against looking for individual COG's for each level of war, as this will only scatter the effect, but instead of perceiving the enemy holistically as a system because levels of war do not exist separately from another.[188]As we will see, his point about the levels of war and COG deviates from some other positions, including joint doctrine, which consider that every level of war has its own COG.

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[186] For Echevarria's detailed arguments and discussion, see, f. ex. Echevarria (2003) and Echevarria (2004).
[187] Echevarria (2002), p. 1. For Echevarria the COG is neither strength or weakness, but a factor of balance. Bold by me.
[188] Echevarria (2004), p. 12–16. Echevarria argues that one should mass effect instead of forces. This systemic construction of his is linked to another one of his thoughts drawn from Clausewitz: "Centers of Gravity should only be sought in wars designed to defeat the enemy completely". 12. See also, Echevarria (2003), p. 114, 117–118.

Furthermore, what has probably contributed to Echevarria's criticism of capability-based thinkers was seeing a similarity, or resemblance, of his interpretation of Clausewitzian COG and (at the time) a new rising concept of effect-based operations (EBO).

Echevarria connects the two in his argument: "*Clausewitz's CoG concept focuses on achieving a specific effect, the collapse of the enemy. Hence, it is an* ***effects-based approach rather than a capabilities-based one****. In this sense, it resembles the emerging concept of "effects-based operations" (EBO) more than the U.S. military's capabilities-based concept of CoG*"[189]. The passage above is also an indication of the effect that the development of warfare and doctrine was having on the theoretical discussion and vice versa as views against EBO later gained traction elsewhere.[190]

In 2004 Echevarria formulated a three-step framework for COG identification and analysis and proposed it to be used in joint doctrine: "1) *Determine whether identifying and attacking a center of gravity is appropriate for the war being waged*. 2) *Determine whether the enemy structure or system is sufficiently connected to be treated as a single body.* 3) *Determine what element has centripetal force to hold the system together*."[191] Based on his earlier thought he had defined COGs as "*focal points that serve to hold a combatant's entire system or structure together and that draw power from a variety of sources and provide it with purpose and direction*."[192]

Colonel Eikmeier notes that Echevarria's definition of COG has three distinct elements: it puts emphasis on cohesion as the thing that keeps the system together, it has a variety of sources it draws power from, and it functions as a provider of purpose and direction. Eikmeier also points out the problematic nature of Echevarria "*three-part construction*". The problem for Eikmeirer in Echevarria's model was the uncertainty of whether one part is enough, or should all three parts of the construct be present to identify a COG. Further, he criticized Echevarria's model as being too limited in use as it not applicable to all types of war.[193]

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[189] Echevarria (2003), p. 115.
[190] Compare Echevarria (2003), p. 115 and Mattis, James N.: *USJFCOM Commander's Guidance for Effects-based Operations.* Joint Forces Quarterly, 4th Quarter, 2008, p. 106–108. General Mattis criticizes heavily the entire EBO concept and related systems of systems approach. He states that it and the associated terminology creates confusion, friction, micromanagement in the U.S. Joint Force and with Allies and "assumes a level of unachievable predictability". Bold by me.
[191] Echevarria (2004), p. 16–17.
[192] Echevarria (2002), p. 19.
[193] Eikmeier (2016), p. 111. According to Eikmeier, the more decentralized the structure becomes, the less utility Echevarria's concept has. A case in point can be seen since 9/11 the 'War on Terror' and COIN operations.

Admittedly Eikmeier has a valid point, as Echevarria's construct seems to assume that the planner is familiar with system of systems (SoS) and its analytical methodology. From the planning process point of view a practical tool is also needed to accompany theoretical model.

The second one of the theoretical schools, *capabilities-based accommodators*, has a number of prominent theorists, such as Dr. Joe Strange, Dr. Milan Vego and Colonel Dale Eikmeier, that have contributed to the doctrinal discussion and taken (somewhat) an opposing position towards Echevarria[194]. An origin of sorts for this school can be traced to Dr. Joe Strange's Marine Corps University *Perspectives* essay (1996) "*Centers of Gravity & Critical Vulnerabilities: Building on the Clausewitzian Foundation So That We Can All Speak the Same Language*"[195]. Later Dr. Strange developed his work further with Colonel Richard Iron (British Army) which had considerable influence on doctrine[196].

For Strange and Iron COGs are "*active agents*" that are obvious, powerful and able to strike effective (heavy) blows[197]. They are neither characteristics or capabilities, nor locations or terrain, but instead they are strength that "*possess certain characteristics and capabilities, and benefit from a given location or terrain*". Strange and Iron argue that these principles provide the distinction between COG and other elements of COG analytical construct.[198]

The two theorists strongly emphasized the significance of 'strength' and its connection to Clausewitz's intent: "*There is no doubt that Clausewitz meant* ***center of gravity as the main strength*** *of an enemy*"[199]. Strange and Iron give also credit to earlier work by Schneider & Izzo (1987) and agree with their interpretation of Clausewitz's "*physical centers of gravity*"[200]. However, there is critique directed towards this perceived dualism of separating the physical and the moral elements into two distinctive spheres.

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[194] Eikmeier (2016), p. 110. Eikmeier states that the viewpoint of "accommodators" is more oriented towards the practical use of COG and not as much inclined to strict adherence and interpretation of what Clausewitz meant.
[195] Strange, Joe: *Centers of Gravity & Critical Vulnerabilities: Building on the Clausewitzian Foundation So That We Can All Speak the Same Language*, Perspectives on Warfighting, Number Four, Second Edition 1996.
[196] See, Strange & Iron (2004) and Strange, Joe & Richard Iron: *Understanding Centers of Gravity and Critical Vulnerabilities.* Department of War Studies, Swedish National Defence College 2005; Pattee (2012), p.114.
[197] Strange & Iron (2005), Part 1, p. 15
[198] Ibid. Part 2, p. 7.
[199] Strange & Iron (2004), p. 24. Bold by me.
[200] Strange & Iron (2005), Part 1, p. 3. Strange and Iron refer to Book Six of Clausewitz's *On War* and Schneider and Izzo's essay from 1987. Dr. Strange continued his work between 2004–2005 with Colonel Iron (British Army) by writing in Joint Forces Quarterly as well as in Swedish National Defence College publication.

Kurt P. VanderSteen refers in his criticism of Strange and Iron to Clausewitz's stipulation that the material (physical) and moral forces are inseparable and both of them are always targeted at the same time. Thus, in real-life situations and for practical purposes "*moral and physical properties both reside in one being*". Furthermore, for VaderSteen it is also about reducing the number places or realms to look for COG.[201]

There is merit in VanderSteen's criticism and Vego's thoughts when one considers the effort planners go to identify COGs. On one hand it would be easier to perceive moral and physical as one as to decrease the number of COGs and to focus the planning effort and thus decrease time consuming discussion on the issue. However, on the other hand there is the possibility that some COGs are predominately one or the other. Then the artificial and forced combination of tangible and intangible might distract planners if they are forced to search for non-existent or abstract moral elements where none are apparent. This could create more confusion and cause problems instead of providing focus and clarity. When looked from this perspective the 'Strange & Iron method' to separate the moral and physical would provide clarity and simplicity to the planning process.

For Strange and Iron COG does not simply "*contribute to strength; they ARE strength*". To find these contributing entities Strange and Iron portray an analytical model that consists of "*four inter-related concepts: Centers of Gravity, Critical Capabilities, Critical Requirements, Critical Vulnerabilities*" (CCs, CRs, CVs for short). The various components of their analytical design are further defined thusly: **Critical Capabilities (verbs):** "*primary ability (or abilities) that makes it a center of gravity in the context of a given scenario, situation or mission – including phases within campaigns or operations.*" **Critical Requirements (nouns):** "*conditions, resources and means that are essential for a center of gravity to achieve its critical capability.*" **Critical Vulnerabilities:** "*those critical requirements, or components thereof, that are deficient, or vulnerable to neutralization or defeat in a way that will contribute to a center of gravity failing to achieve its critical capability.*"[202]

In figure 6 Jacob Barfoed has illustrated the relationship of Dr. Strange' model (COG-CC-CR-CV), where COG is the 'effective strength', CCs as enablers or attackers, CRs as supporting pylons/columns and CRs as the fault lines or critical spots that can make the supporting pylons collapse if attacked.

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[201] VanderSteen (2012), p. 39.
[202] Strange & Iron (2005), Part 2, p. 7–8.

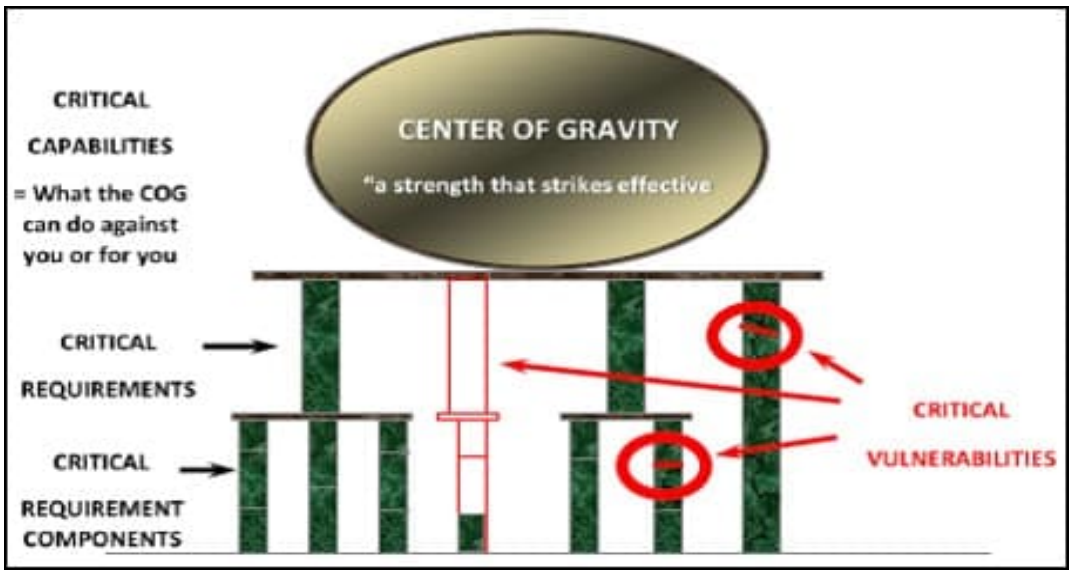

Figure 6: CO–CC–CR–CV relationships by Jacob Barfoed[203]

Strange and Iron present a modified version of the definition of COG that has both the tangible and intangible elements designed into it. Thus, Strange & Iron defined COG(s) as "*Physical or moral entities that are the **primary** components of physical or moral strength, power and resistance*"[204]. There is a similarity to Schneider & Izzo's definition of COG as the "*greatest concentration of combat force*"[205]. Thus, it can be argued that their work has probably influenced Strange' definition, at least from those parts that relate to physical force. This is evident by looking at the two definitions and their wording side by side (appendix 3).

VanderSteen approves Strange's original idea as a good analytical method for operational level despite his misgivings regarding the divide into distinct moral or physical COG. However, he remains skeptical about the applicability of this method for the strategic level planning and is not convinced of its utility in all levels of war[206]. Moreover, Jacob Barfoed argues that Strange's concept is a combination of Clausewitz and John Warden where "*moral COGs control the physical COGs*" and strength is used to strike vulnerabilities found within Warden's "Five-Ring model"[207]. Strange and Iron only mention sources of moral strength and resistance in a historical context regarding populations and also in conjunction with Clausewitz's original texts[208].

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[203] Barfoed, Jacob: *The COG strikes back: Why a 200 Year old Analogy Still Has a Central Place in Theory and Practice of Strategy*. Baltic Security & Defence Review, Vol 17, Issue 2, 2014, p. 14.
[204] Strange & Iron (2005), Part 2, p. 7.
[205] Schneider & Izzo (1987), 56.
[206] VanderSteen (2012) p. 39–40.
[207] Barfoed, (2014), p. 14.
[208] Strange & Iron (2004), p 26.

It is possible that the development of their own COG analysis methodology at the time of writing made them change course and emphasize *entities* instead of *sources* to make the distinction to joint doctrine evident. Based on the discussion above, it can be argued that it is the planner's responsibility to perceive how in the echelon he/she serve in is situated within levels of war as well understanding the nature of the conflict and the role of the military objective. This will give the planner possibility to choose which parts of tangible and intangible elements to take note of and how this affects the balance of those two spheres. However, doctrine should provide clear guidance and simple tools on every level of war as to avoid misunderstanding and possible waste of valuable planning time.

Second prominent theorist in the *capabilities-based accommodators* camp is Dr. Milan Vego, who shares some theoretical principles with both Strange & Iron as well as Eikmeier. As seen already from the discussion so far, the role of objective is essential for Vego. He states that "*center of gravity should not be considered in isolation from the corresponding military objective to be accomplished*". For him it is the objective what creates the framework to find the COG and linking of these to is what provides focus for planner. Further, for Vego objective and situation are those that "*determine the center of gravity, not the other way around*".[209] Vego opposes system theory advocates, such as Echevarria, Strange and Iron, and Eikmeier and criticizes COG identification models that are drawn from system of systems (SoS) theory, such as Warden's 'five ring model' concept in figure 7[210].

Vego also claims that this type of SoS approaches cannot work, because in them "*center of gravity is disconnected from its larger purpose—the political/military objective to be accomplished*"[211]. Moreover, he, with Nils Marius Rekkedal, states that systemic proponents are wrong in their view of what COG consists of because they rely on too much Warden's ring type models and think they can create effects in cognitive/human domain just by creating effects in the physical domain(s)[212].

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[209] Vego (2007b), p. VII-24–VII-25.
[210] Ibid. p. VII-13, VII-25. See also, Barfoed (2014), p. 10–11. Jacob Barfoed notes that Warden's COG analysis searches for the strategic COGs from the aggregate of all rings and subsequent sub-COGs in each individual ring with an aim to collapse the entire system by attacking all found strategic COGs simultaneously.
[211] Ibid. p. VII-26. Vego argues, that SoS proponents consider 'system key nodes' as COG's and "disconnect" them from a larger purpose (objective) and that according to him some network-centric warfare theorists even consider COG concept obsolete. He does, however, agree that in the future the complexity of the critical factors might cause computer networks to be considered a significant part of operational and tactical COG's. It should be noted that Vego does not say that these networks *will be COGs*.
[212] Rekkedal & Vego (2013), p. 203.

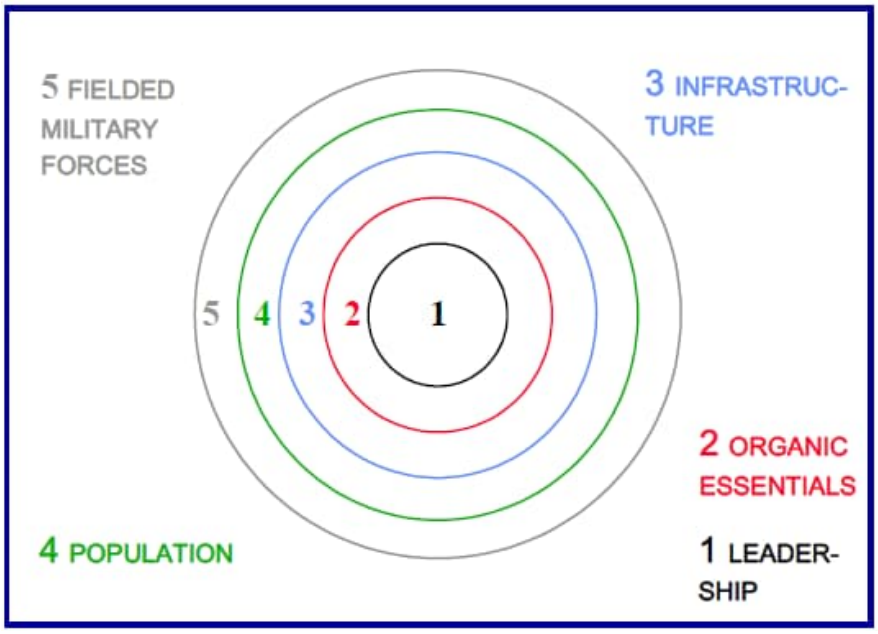

Figure 7: Warden's 5-Ring Model illustrated by Jacob Barfoed[213]

In his magna opus from 2007 Vego advices to focus on those specific elements that are required to attain the military objective. He calls these key pieces of information about the operating environment and the overall situation "*critical factors*" further dividing them into tangible (physical) and intangible (abstract) categories[214]. Further, Vego advices to break the critical factors further into two sub-categories of "*critical strengths*" and "*critical weaknesses*". For Vego critical strengths are: "*Capabilities considered essential for achieving a given or assumed military objective*"[215]. Whereas weaknesses are like strengths but they are also "*essential for the accomplishment of the mission but at the same time grossly inadequate to perform their intended function or task*"[216].

For Vego there is a mutual influence between the strengths and weaknesses that is tied to time. Over the course of the campaign or war enemy actions can cause one's strengths to become weaknesses. Interestingly, Vego does not portray a situation where this might happen, conversely however, there is a connection to critical vulnerabilities. He sees critical vulnerabilities as related to critical weaknesses or even critical strengths "*those elements of one's military or non-military sources of power open to enemy attack, control, leverage or exploitation*".[217]

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[213] Barfoed (2014), p. 10.
[214] Vego (2007b), p. VII-14.
[215] Ibid. p. VII-15.
[216] Ibid. p. VII-16.
[217] Ibid. p. VII-16. Vego argues that such a vulnerability for the U.S. can be, for example, high casualties.

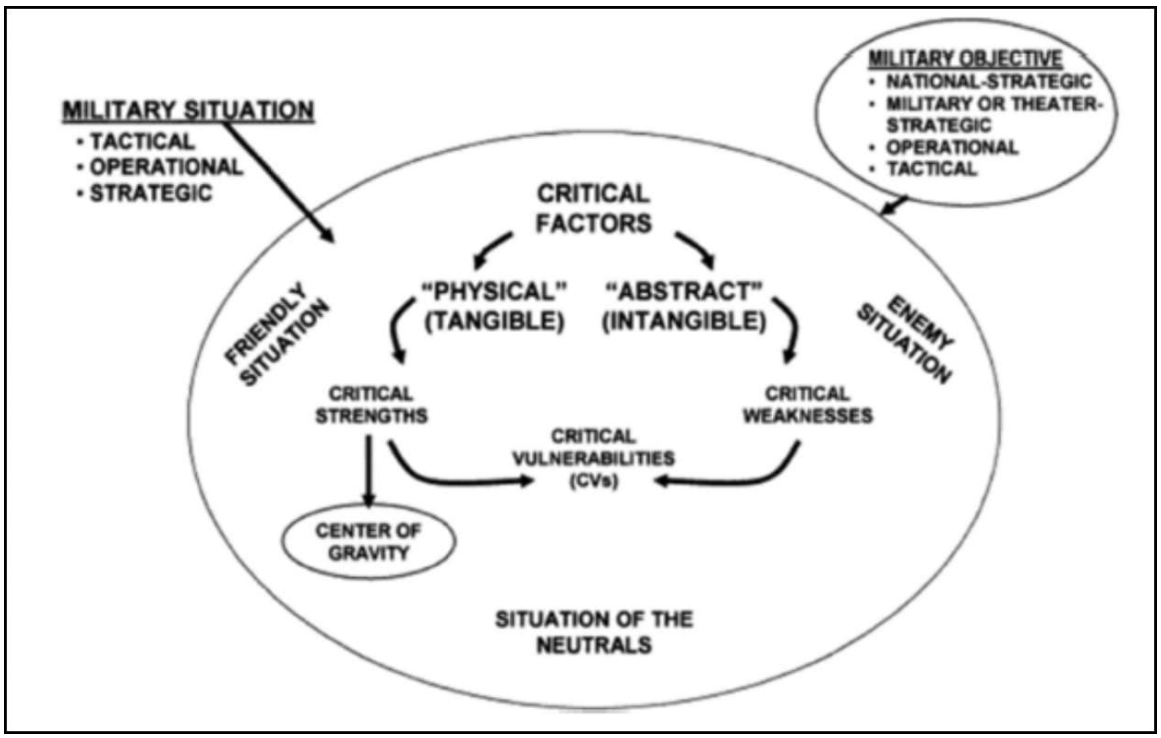

Figure 8: Concept of Critical Factors and Center of Gravity by Milan Vego[218]

Vego illustrates his concept and the relationships that contribute in figure 8. There are few points and a warning that Vego provide in relations to his analytical model. First, critical factors are not fixed but instead transient. They are affected by actions of one own force as well as the enemy, thus they change over time. Second, without a thorough understanding of the enemy (culture, society, politics etc.) one cannot properly identify critical weaknesses and vulnerabilities. Third, realism, instead of overconfidence is the preferred choice to avoid downplaying the enemy.[219]

This issue regrading tangible/intangible COGs is addressed by Vego with his base argument about the centrality of the objective as well as the nature of war. According to Vego, the "*objective to be accomplished*" and the level and nature of war/conflict determine whether it is tangible or intangible element which predominates. He states that this correlates directly with the number of intangibles which increases as the level of war rises. Based on the above Vego argues that "*any center of gravity is composed of a combination of tangible and intangible sources of power*".[220]

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[218] Vego (2017b). p. VII-15.
[219] Ibid. p. VII-16–17.
[220] Ibid. p. VII-18. Vego notes that intangible elements of COG are usual present at higher levels of war, such as national or theater-strategic, however, he argues that in "*operations other than war*" (such as counter-insurgency, COIN) intangible elements are also present in operative and tactical levels where usually only tangible elements exist.

Thus, Vego defines COG as "*a source of massed strength—physical or moral—or a source of leverage whose serious degradation, dislocation, neutralization [sic], or destruction would have the most decisive impact on the enemy's or one's own ability to accomplish a given military objective*"[221].

He illustrates his composition of COG by using a 'core model' where aforementioned critical weaknesses and vulnerabilities (as well as other possible elements) reside at the 'outer core' and 'inner core' is the one that houses the actual "*main source of power*". For Vego, both cores together form the COG, however, he warns of oversimplification as the relationships between the elements residing in each core as well as the relationships between the cores, are complicated. The relevance of the component elements within a core can shift between different levels of war, thus changing which one is outer an which is inner core. However, regardless of this Vego states that "*military or nonmilitary sources of power cannot function properly without their outer core*" as illustrated in figure 9.[222]

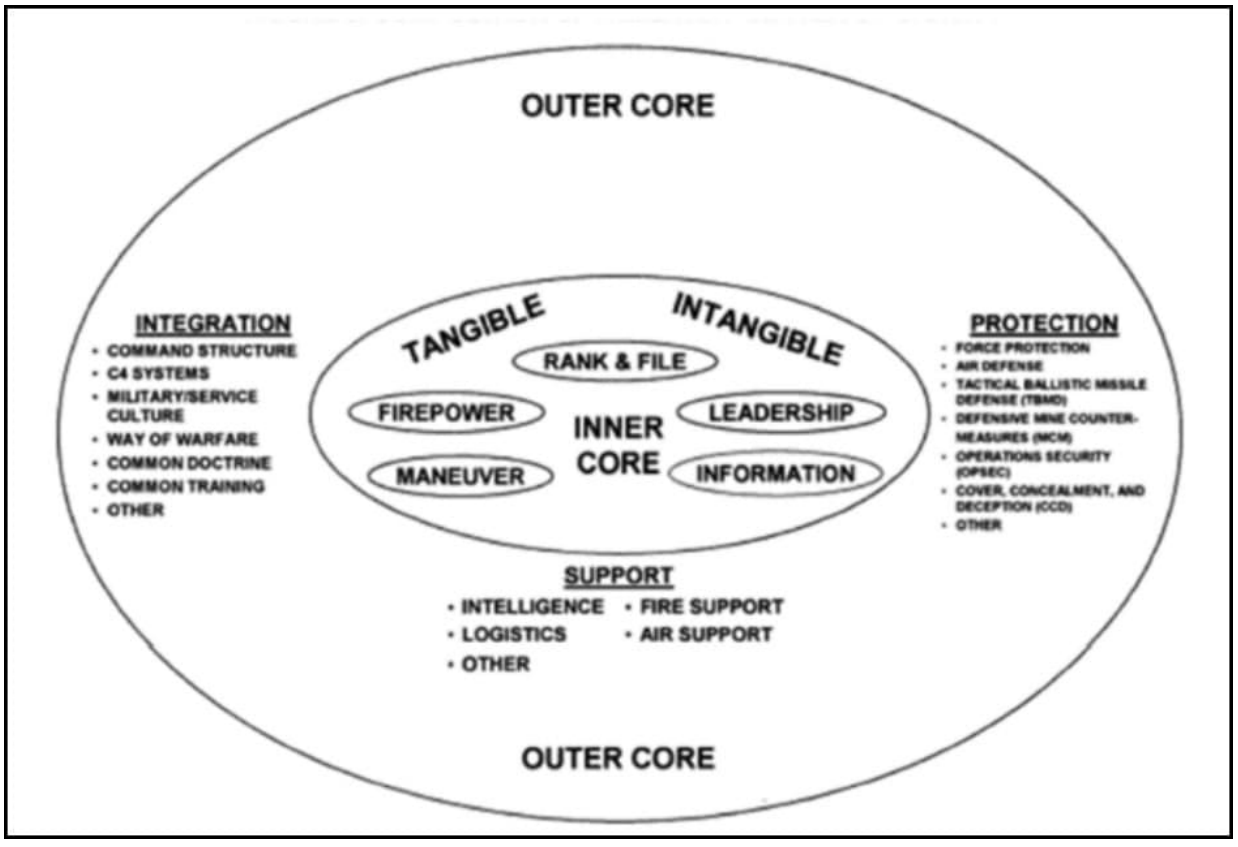

Figure 9: Composition of a Military Center of Gravity by Milan Vego[223]

[221] Vego (2007b). p. VII-13.
[222] Ibid. p. VII-17.
[223] Ibid. p. VII-19.

For Vego, the main utility of the concept of COG is in the ability to use it as a way to increase the odds of using one's own sources of power in an optimal way to accomplish the military objective. He reminds (echoing Clausewitz) that the enemy is not completely defeated until his "*relevant mass of power*", his COG, is destroyed or neutralized. In addition to the aforementioned, Vego argues that a principal characteristic of COG is the "*ability to put friendly center of gravity in physical danger*". [224]

Vego seems to draw from the Strange & Iron in his analytical model of critical factors, strengths, weaknesses and vulnerabilities. He, like Echevarria, has 'Clausewitzian' ideas regarding intangible and tangible. Interestingly, even though he detests SoS theory and Effect-Based Operations (EBO) his core model portrays a striking similarity to these. Further, as discussed above, he sees effects rather than mass essential. As we will later see, Dr. Milan Vego has further contributed to the theoretical debate and discussion regarding joint doctrine more than is apparent.

Third prominent theorist in the *capabilities-based accommodators* camp is Colonel Dale Eikmeier. He has been an active and influential part of the discussion and debate on COG since his 1999 master's thesis *The Center of Gravity Debate Solved* [225]. Eikmeier refined his theories by presenting an analytical method that was inspired by Arthur Lycke's strategic framework of 'ends–ways–means'[226].

For him Lycke's framework was a way to provide structure and a solid base for COG analysis and thus a clear goal with something more than "*guesswork*". Eikmeier was particularly annoyed with various earlier definitions of COG as he saw them drawn from incorrect or misinterpreted translations tied to Clausewitzian context and usage that confused the meaning and had made the COG "*practically useless*" for the modern planner.[227]

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[224] Compare Vego (2007b). p. VII-20 and JP 5-0 (2020), p. IV-24. JP 5-0 describes the same as something that "present challenges to friendly forces". See also, Vego (2017b), p. VII-13. Here by 'mass' Vego means 'massed effect' vis-à-vis literally mass as physically gathered combat potential/power concentrated in specific location.
[225] VanderSteen (2012), p. 40.
[226] JP 5-0 uses the same 'ends–ways–means' framework. See, JP 5-0 (2020), p. I-1.
[227] Eikmeier, Dale C.: *A Logical Method for CENTER-OF-GRAVITY ANALYSIS*, Military Review: The Professional Journal of the U.S. Army, September-October 2007, p. 62, 64; Eikmeier, (2013). [https://smallwarsjournal.com/jrnl/art/give-carl-von-clausewitz-and-the-center-of-gravity-a-divorce], read, 23.1.2023. Eikmeier continued the COG debate between 2010–2017 in Joint Forces Quarterly and Military Review as well online in blogs such as the Small Wars Journal.

However, for Eikmeier this criticism did not mean abandoning Clausewitz's theoretical wisdom; what ultimately matters to him was whether COG had utility, e.g. was it relevant in planning, and does it work in real world[228]. Somewhat related to his criticism of Clausewitz Eikmeier states that the "*joint community*" should drop the relational as well as the abstract/moral (or intangible) aspects of Clausewitz's COG. Instead, they should focus on unifying the COG definition and making the analytical construct useful by implementing his version of Lycke's framework. For Eikmeier only military and economic powers are relevant because they have capability for action whereas intangibles inherently, do not.[229]

Furthermore, Eikmeier argues that the current joint doctrine definition is metaphor based (source of power) and as such it is stands in the way of full realization of the COG's utility. He adequately points out that "*if a metaphor has to be explained the use of a metaphor is inappropriate to begin with*"[230]. Eikmeier accuses doctrine (and Clausewitz) for using metaphors that do more harm than good since metaphor-based definitions provide endless possibilities to debate what is COG, as anything that fits the metaphor can be considered one[231]. Further, Eikmeier sees that the problem with COG is split into two parts, where one part relates to definition and the other to methodology, i.e. practical COG analysis done by the planners and staff[232]. He wanted to fix the aforementioned shortcomings in the COG concept with his own model. Eikmeier's theory has roots in Dr. Strange' original idea of CG–CC–CR–CV[233] model, however, he emphasizes the role of capabilities thus revising the analytical order to CC–CG–CR–CV[234].

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[228]Compare, Eikmeier (2017), p. 1–2, 5–7. [https://www.armyupress.army.mil/Portals/7/Army-Press-Online-Journal/documents/Eikmeier-v2.pdf], read 24.1.2023 and Paparone & Davis (2012), p. 66. Eikmeier refers to Paparone & Davis in his ponderings about various criticism pointed towards COG's conceptual foundations and their relevance today. Eikmeier does not agree that "relevancy is somehow related to age", but instead argues that usefulness and utility are what really matter.

[229] Eikmeier (2012), p. 143. Eikmeier argues, that "intangibles, such as moral strength, public opinion, or righteous cause have no inherent capability for action. They can be requirements." According to Eikmeier, one cannot 'target' morale as it does not exist physically, however, it can be accounted for as a "*critical factor*" and acted against by indirect means. See also, Vego (2007b), p. VII-18–VII-19 and Eikmeier (2014). [https://smallwarsjournal.com/jrnl/art/after-the-divorce-clausewitz-and-the-center-of-gravity], read 23.1.2023.

[230] Eikmeier (2013). [https://smallwarsjournal.com/jrnl/art/give-carl-von-clausewitz-and-the-center-of-gravity-a-divorce], read, 23.1.2023.

[231] Eikmeier (2017), p. 3. [https://www.armyupress.army.mil/Portals/7/Army-Press-Online-Journal/documents/Eikmeier-v2.pdf], read 24.1.2023. Eikmeier laments in 2017 that the doctrine still refers to 'metaphor-based' definition of COG as 'source of power'. See also, JP 5-0, p. GL-6 and DoD (2021), p. 30. In 2020 JP 5-0 and DoD dictionary still use this type of definition, so despite Eikmeier's efforts this part of the doctrine has not changed.

[232] Eikmeier, Dale C: *Redefining the Center of Gravity*. Joint Forces Quarterly 59, Fourth Quarter 2010, p. 156.

[233] Strange (1996), p. 43.

[234] VanderSteen (2012), p. 40.

To fix the COG methodology Eikmeier slightly adjusted Dr. Strange' COG components to accommodate his analytical model: "***Critical Capabilities.*** *Primary abilities essential to the accomplishment of the objective which merits a Center of Gravity to be identified as such.* ***Critical Requirements****. Essential conditions, resources and means the COG requires to perform the critical capability.* ***Critical Vulnerabilities****. Critical requirements or components thereof which are deficient or vulnerable to neutralization, interdiction or attack in a manner achieving decisive results.*"[235]

As early as 2004 Eikmeier stated that the two problems relating to COG originated from joint community's failure to agree upon unified COG definition, which promulgated dissent in the form of competing definition, as well as the aforementioned inability to provide a useful tool for the planner[236]. Eikmeier's goal has been to renew the concept of COG by redefining it and critical factors because "*the lack of precision, logic, and testability*" in the joint doctrine is what has kept the COG from being a useful tool for planners[237].To revise the perceived problems in doctrine Eikmeier defined COG as "*the primary entity that inherently possess the critical capabilities to achieve the objective*"[238].

For him the redefined definition of COG (and its adjusted components) was the way to solve the perceived problem residing in joint doctrine. In his formulation of a new definition Eikmeier used the following four criteria to evaluate its utility as well as to compare the former joint definition *"**clarity:** answers the question "what is it?" and is simple to understand with limited meaning*; ***logic:*** *contains rules that allow for a valid inference*; ***precision:*** *narrowly focused to exclude the extraneous*; ***testable:*** *can be objectively tested using rules and logic*"[239]. He linked the words "*primary"* and "*entity*" to clarify the relation of COG (a noun) and capabilities (verbs). COG became the "*primary doer*[240]". He then built a logical construct which also provided a clear-cut method of defining what is *not* a COG[241].

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[235] Eikmeier (2012), p. 164. Eikmeier's definition of Critical Capability follows that of Dr. Strange by emphasizing primary abilities as enablers (verbs) as not to confuse them with nouns. Bold by me.
[236] VanderSteen (2012), p. 40. VanderSteen notes that this criticism is something Eikmeier had in common with Strange & Iron.
[237] Eikmeier (2010), p. 156. See also, Eikmeier (2014). [https://smallwarsjournal.com/jrnl/art/after-the-divorce-clausewitz-and-the-center-of-gravity], read 23.1.2023.
[238] Compare Eikmeier (2012), p. 142 and VanderSteen (2012), p. 40. VanderSteen notes that Eikmeier's definition of COG has changed somewhat over the years. According to VanderSteen in 2004 Eikmeier still though of COGs as 'sources of power'. Note: In my observation since 2012 Eikmeier's definition of COG has consistently remained the same without further modifications.
[239] Eikmeier (2010), p. 156. Bold by me.
[240] Eikmeier (2017), p. 3. [https://www.armyupress.army.mil/Portals/7/Army-Press-Online-Journal/documents/Eikmeier-v2.pdf], read 27.1.2023.
[241] Eikmeier (2012), p. 142. Eikmeier's logic: "*A(primary entity)+B(capability to achieve objective)=COG*".

Furthermore, Eikmeier stated that "*capability must be directly linked to attaining the objective*" and that "*and objective is always linked to COG*". This highlights Vego's emphasis of the relevance of objective in COG definition[242]. Eikmeier placed emphasis on the word "*primary*" to provide precision and to exclude any other possibilities for COG. For him this also served as a way to clarify the relationships between COG (that uses resources) and the other components that support it. Eikmeier divided COG identification in to four phases as illustrated in figure 10.[243]

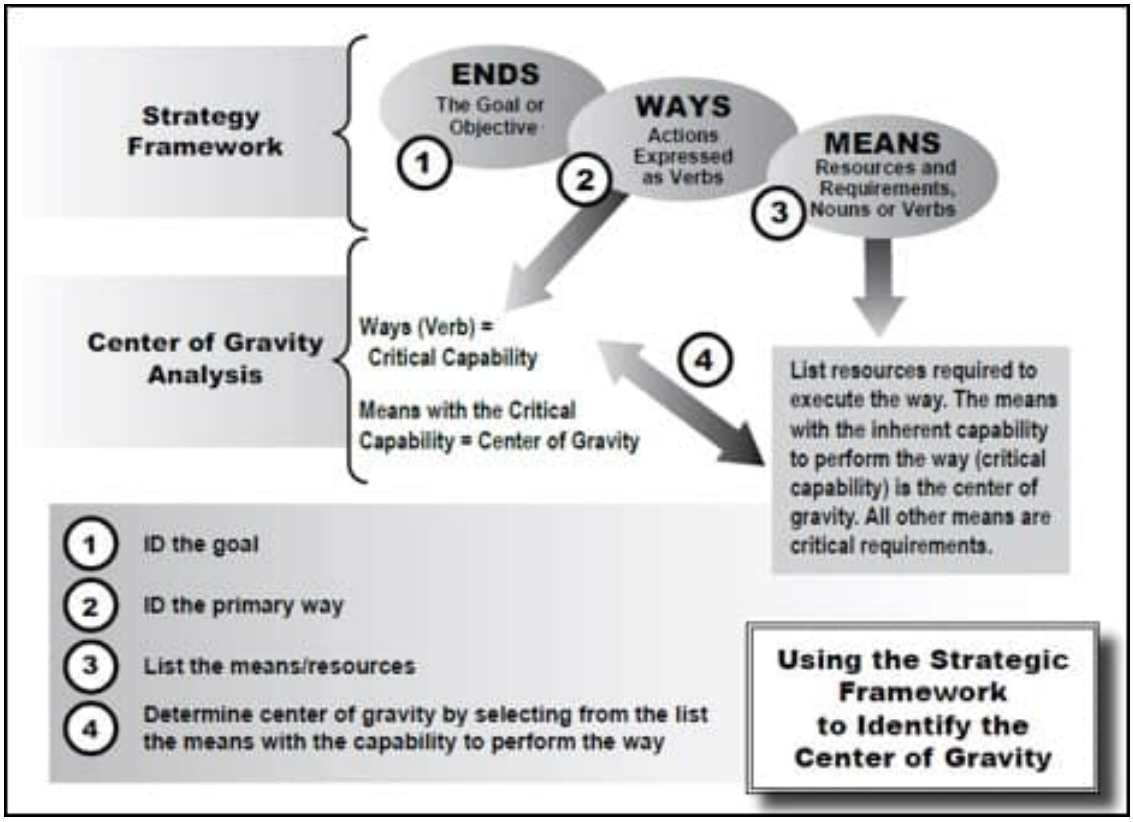

Figure 10: Identifying Center of Gravity by Dale Eikmeier[244]

Kurt P. VanderSteen criticizes Eikmeier for completely discarding the moral and intangible aspects of COG. He sees a problem when one does not take into consideration the will of the people or other instruments of power such as diplomacy and information. As an example of the power of the abstract VanderSteen cites Napoleon maxim "*moral is to the material as three to one*" as well as exemplifies how the Japanese calculations failed when the attack on Pearl Harbor in 1941 unified the disunited Americans instead of crippling the U.S. [245]

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[242] Vego (2007b), p. VII-14.
[243] Eikmeier (2012), p. 142.
[244] Eikmeier (2007), p. 64. In 2014 Eikmeier later removed from 'means' sphere the reference to 'verbs' and left only nouns as possible designator for the entity. According to him this clarified the model.
[245] VanderSteen (2012), pp. 40–43.

Therefore, Eikmeier's claim that the COGs are only physical entities differs from the other prominent theorists, Echevarria, Strange & Iron and Vego. Depending on their respective views as discussed earlier, all consider COGs to be able to exist as either separate abstract or physical entities, or that moral (intangible) elements reside within physical (tangible) COGs as part of the whole.

Most of the theorists agree that COGs exist at every level of war (strategic, operational and tactical)[246] and that there can be more than one COG[247]. However, there are some caveats and exceptions. Of the theorists, Strange and Iron as well as Vego consider COGs useful at all levels of war. Strange and Iron put particular emphasis on that there is not one, but multiple COGs that form a "*continuum*" from tactical to strategic level[248]. Further, Strange and Iron provided an example from 1991 Gulf War of how COGs can differ between the levels of war (see appendix 4). Vego and Eikmeier both consider that *depending on the number of objectives* multiple COGs are possible. According to Vego on the strategic level there is usually only one COG whereas on operational and tactical level there are multiple COGs. However, tactical level utility declines towards the lowest level and thus becomes obsolete at some point[249]. In addition, Eikmeier also claims that even though COGs exist at every level of war, the complexity of the system (level of war) decides the utility of the COG. Thus, according to Eikmeier the concept of COG has most utility on strategic and operational levels of war[250].

The only one view that stands apart from these is Echevarria's. He considers that it is useless to separate the levels of war to find individual COGs for each, but instead the COG is defined by the entire "*system structure of the enemy*" and thus it should be viewed holistically and it is also dependent upon the nature of the conflict. However, he agrees with the other theorist that multiple COGs are possible.[251]

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[246] Compare FM 3-0 (2022), p. 1-11–12 and Strange & Iron (2005), Part 2, p. 3. FM 3-0 defines current levels of war "*national strategic, theater strategic, operational and tactical*". This differs somewhat from Strange & Iron who use the same principle but in reference of older version of FM 3-0.

[247] This though is also shared by Jacob Barfoed. See, Barfoed, Jacob: *The COG strikes back: Why a 200 Year old Analogy Still Has a Central Place in Theory and Practice of Strategy*. Baltic Security & Defence Review, Vol 17, Issue 2, 2014, p. 21. Barfoed emphasizes the need for each command level with assigned objectives to develop adjacent COG(s) particular to that level.

[248] Strange & Iron (2005), Part 2, p. 3.

[249] Vego (2007b), p. VII-25.

[250] Eikmeier (2012), p. 153–154.

[251] Echevarria (2004), p. 12, 16. According to Echevarria "dividing centers of gravity into tactical, operational, and strategic elements only leads to centers of critical capability". He also emphasizes that COG should be used selectively taking into consideration that it might not apply to every situation in a global decentralized conflict.

Based on the above and the discussion so far, the various theorists share some theoretical principles and doctrinal issues whereas their thoughts diverge on some other. Table 3 draws together the discussion so far, illustrates the key points and provides a summary of what the theorists agree or disagree upon:

Table 3: Theoretical discussion and variance

	COGs can change	COG is a holistic systemic structure	COGs are physical / moral (tangible / intangible)	COG has utility	Application	School of thought	Notes
Echevarria	Yes	Yes	Both	Yes	Selective	**Effects based traditionalists**	Selective inside a system, not separate levels of war
Strange & Iron	Yes	Yes	Both but separately	Yes	Levels of war	**Capability based accommodators**	COGs are physical *or* moral entities
Vego	Conditionally yes	No	Both	Conditionally yes	Levels of war	**Capability based accommodators**	Utility of the COG is dependent on objective to be accomplished
Eikmeier	Yes	Yes	Only physical	Yes	Universal	**Capability based accommodators**	Intangibles have no inherent capability for action and cannot be COGs

As we can see from table 3, the theorical and doctrinal discussion is far from a simple division into opposing or agreeing camps. Instead it is a network of arguments that at times coincide somewhat, but as often stand in partial or complete opposition against one another.

The most notable differences between the theorists reside in whether the COG should include both tangible and intangible elements, should it be seen holistically as a systemic structure as well as its range of application regarding the levels of war. These differences originate mostly from competing interpretations of Clausewitz as well as from philosophical and practical disagreements regarding how COG should be defined and utilized.

Moreover, all of the theorists disagree about the *definition* of the COG and thus have made their own that differ either somewhat, or completely, from current joint doctrine. This can be argued to stem from each theorist having their own interpretation of Clausewitz, military history, as well as different perception about the usefulness of doctrine coupled with experience as an operations planner and/or teacher at military institution.

Appendix 3 compiles the aforementioned theorist' definitions, accompanying analogies and metaphors (if any). It uses Schneider & Izzo's definition from 1987 as a baseline as this can be seen as an origin of sorts for the theoretical discussion and debate as well as the following doctrinal development. It should be noted that despite the variance and disagreements, all of discussed theorists draw upon Clausewitz in one form or another. Some more deeply than others and none have discarded the Prussian completely. The way they choose to interpret and contextualize Clausewitz is where the variance emerges thus affecting their utilization of COG.

All of the theorists firmly believe in the utility of the concept, however, for different reasons. For Strange and Iron & Eikmeier the utility lies in the revised definition and the accompanying analytical construct (CC–CR–CV/ends–ways–means) whereas Vego emphasizes the role of the objective, and Echevarria resides firmly in the Clausewitzian origins coupled with his own definition and analytical construct that draws from that source. Appendix 5 combines the theoretical discussion of sub-chapter 2.2.1. It is apparent from the analysis conducted upon the sources that the issues illustrated in appendix 5 are mentioned throughout the theoretical debate.

From the perspective of content-based content analysis it is evident that the theoretical debate between the significant theorists forms a number of distinctive themes. These are: *Definition of COG, Basis, Context, Ability to change, COG as a systemic structure, Utility, COG as tangible/ intangible, and Applicability within levels of war*. Thus, these themes contribute to the analytical construct as their own entities.

Sub-chapter 2.2.1 has provided the needed input for theoretical model construct by answering to the first research sub-question: *What is the origin of the Center of Gravity concept and how it relates to joint level planning doctrine*".

2.2.2 Joint Planning 5-0 (JP 5-0)

As we saw from the theoretical discussion above, the theorists in their respective schools of thought are neither satisfied with the current definition of COG, nor happy with the analytical construct provided by joint doctrine. Next, I will look into how the selected joint doctrines JP 5-0 (U.S.) and AJP-5 (NATO) present COG and its analytical construct. This will provide the last analytical part needed for the creation of the COG theoretical model construct. The joint doctrines each contain specific conceptual definition and description of the COG as well as how the COG definition process works as part of the operations planning process. The COG concept and its definition analytical process are interlinked and they draw influence mainly from the U.S., the legacy documents as well as from on one another. To narrow the research into operational level and to the selected doctrines is a conscious choice that the researcher is well aware.

According to Jacob Barfoed, the concept of operational level of war was originally meant for European size theater to handle theater and front level efforts and to "*bridge*" strategy and tactics. Its origin lies with the Soviet Union and its purpose was to coordinate battles in order to succeed in the campaign. Barfoed states that the concept appeared in U.S. military doctrine in 1980s and in NATO in the 1990s, respectively.[252]

I will briefly look into the context where COG resides in the current U.S. joint and Army doctrine. Of the selected source material *JP 5-0*: *Joint Planning* provide a good basis for this and *Army Doctrine Publication (ADP) 3-0: Operations* is used when needed to supplement it. It should be reminded that the focus of this research is at the operational level of war even though strategic level is mentioned in the selected doctrines. As noted from the theoretical discussion, problems begin to surface when in an effort to combine several different views descriptions are poorly, or inadequately, articulated and theoretical concepts used in a careless manner. The relevance of joint doctrine is that it gives basic guidance on how to plan joint operations. with the appropriate definitions and conceptual tools that go with it. In the current U.S. Army doctrine operational level is seen as the link between tactical level (forces deployment) and national-strategic level of warfare[253].

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[252] Barfoed (2014), p. 17–18, 30. According to Barfoed, the Gulf War (1990–1991) and Iraq War (2003) saw the first uses of the concept of operational level of war in practice.

[253] FM 3-0 (2022), p. 1-1–1-13. According to FM 3-0, operational level is "the level of warfare in which campaigns and operations are planned, conducted, and sustained to achieve operational objectives to support achievement of strategic objectives". See also, DoD (2021), p. 161 and NATO Standardization Office: *APP-06 NATO Glossary of Terms and Definitions (English and French) Edition 2020*. NATO Standardization Office (NSO) 2020, p. 95. The U.S definition coincides content wise with NATO with minor changes. A strong U.S. influence to NATO doctrine is evident here.

This continuum is illustrated well in current U.S. Army FM 3-0 Operations, where we can see how the levels of war overlap one another:

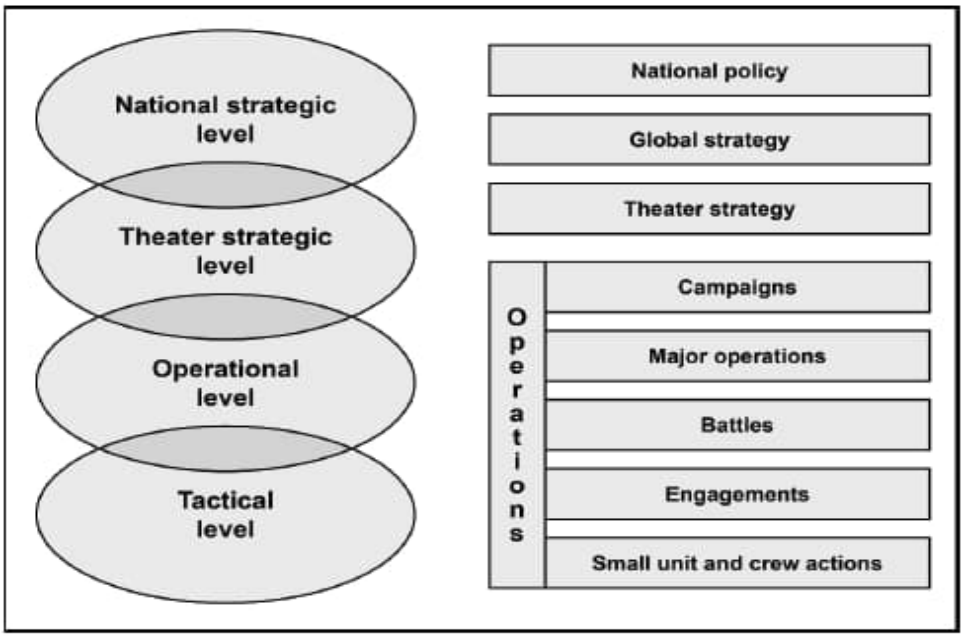

Figure 11: Levels of warfare according to FM 3-0[254]

As discussed in the previous sub-chapter, some theorists, such as Echevarria, consider levels of war a continuum that should not be broken into pieces. This picture with its overlapping 'levels' can be seen as a nod in Echevarria's direction. It is doctrine's way of reminding not to fixate on separate levels of war but instead look at them holistically to see the interdependence and relationships between them. Therefore, we need to pay particular attention on how the selected joint doctrines formulate their guidance and what kind of analytical models are used in planning and how

In the U.S. at the operational level joint planning transforms national guidance into "*specific activities aimed at achieving strategic and operational objectives*". According to JP 5-0 Joint planning is defined as: "*the deliberate process of determining how to implement strategic guidance: how (the **ways**) to use military capabilities (the **means**) in time and space to achieve objectives (the **ends**) within an acceptable level of **risk.***"[255] As we can see from the passage above, the doctrine has implemented Colonel Eikmeier's suggestion to use Arthur Lycke's ends–ways–means strategic framework.

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[254] FM 3-0 (2022), p. 1-11–1-12. Levels of war are defined by FM 3-0 as "a framework for defining and clarifying the relationship among national objectives, the operational approach, and tactical tasks".
[255] JP 5-0 (2020), p. I-1–I-2. Bold text in the original source. See also, AJP-5 (2019), pp. 3-1–3-2.

The framing coincides with Eikmeier's analytical model for identifying the COG (as seen in figure 10). However, it seems that JP 5-0 uses it in a more overarching way to describe the entire joint planning process (JPP).

In addition to the JPP, joint planning also consists of four sequential planning functions and operational design methodology. Planning functions are not discussed here as they are not relevant for this research. The guidance that doctrine provides for planning is evident in the way operational art is applied in the creation of operational design as part of the JPP. According to JP 5-0 the JPP is "*an orderly set of logical steps to frame a problem*" that has a relationship with operational design and application of operational art, whereas operational design is defined as a construct of "*analytical framework that underpins planning*"[256]. JP 5-0 notes that the COG identification and analysis takes place during steps two and three as highlighted by the red box in figure 12[257].

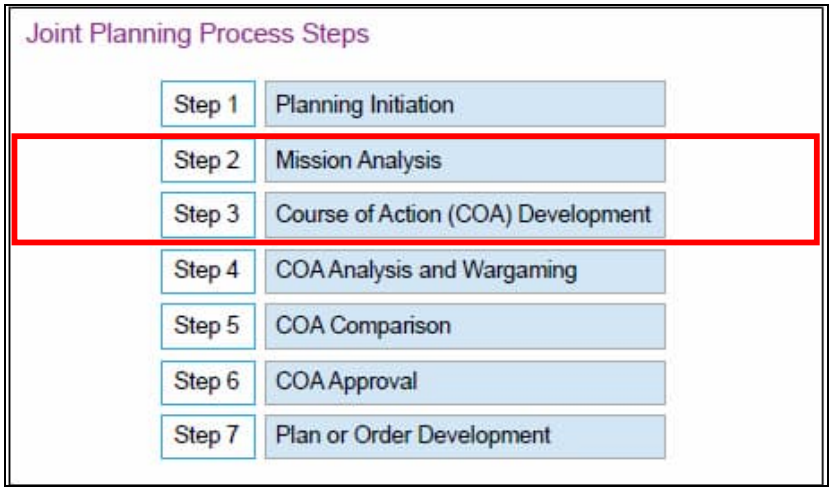

Figure 12: Joint planning process steps according to JP 5-0[258]

Operational design is also tightly connected to the COG. Its application "*provides an iterative process and the conceptual basis for structuring campaigns and operations*"[259]. Further, it is a concpetual framework that houses several elements, including the COG. According to JP 5-0 operational design consist in total of 13 elements; these are depicted in figure 13 with the COG highlighted by a red box:

[256] JP 5-0 (2020), pp. xx–xxi. See also, DoD (2021), p. 120, 160.
[257] Ibid. p. III-37. Highlighted red box added by me.
[258] Ibid. p. III-11.
[259] Ibid. p. III-4, III-10.

Figure 13: Elements of Operational Design according to JP 5-0[260]

Joint doctrine uses operational design as a methodology through which operational art is applied. The role of the COG is to link commander's situational understanding gained from operational design with his initial intent. Simply put, the operational design identifies the problem and COG provides insights into removing it.[261] Thus, the COG is "*an analytical tool for planning of operations*"[262].

In relation to previous sub-chapter, and the discussion regarding tangible and intangible elements, JP 5-0 is rather straightforward and clear. It states that the Operational Environment (OE) "*is the composite of the conditions, circumstances, and influences that affect the employment of capabilities and bear on the decisions of the commander. It encompasses physical areas and factors of the air, land, maritime, and space domains; the information environment (which includes cyberspace); and the electromagnetic spectrum*"[263]. Moreover, within the OE are "*tangible and intangible factors that affect combat and support operations*"[264].

With the statement above the doctrine implies to *all* relevant factors that have effect, not just those of military nature. Hence, the entire statement can be argued to mean that also the other instruments of power, diplomatic, informational and economic, have significance. They are taken into consideration within the respective level of war together with military instruments as needed and appropriate as part of the understanding of the OE.

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[260] JP 5-0 (2020), p. III-75. Highlighted red box around COG added by me.
[261] Eikmeier, (2012), p. 157. See also AJP-5 (2019), p. 1-1–1-2.
[262] ADP 3-0 (2019), p. 2-6.
[263] JP 5-0 (2020), p. IV-6. See also, DoD (2021), p. 160.
[264] Ibid. p. xxiii. See also, ADP 3-0 (2019), p. 2-6.

Key outputs from the analysis and understanding of the OE include friendly and enemy COGs as part of the description of the OE[265]. Of the elements mentioned in figure 13 above, JP 5-0 names *objective* as the most important one. The centrality of the military objective and its relationship to COG is apparent when one looks at JP 5-0's "*notional factors of operational design"* in figure 14. The objective, as we can see, is located at the top of the hierarchy as it specifies what must be accomplished and thus links directly to the reason why the mission is being conducted[266].

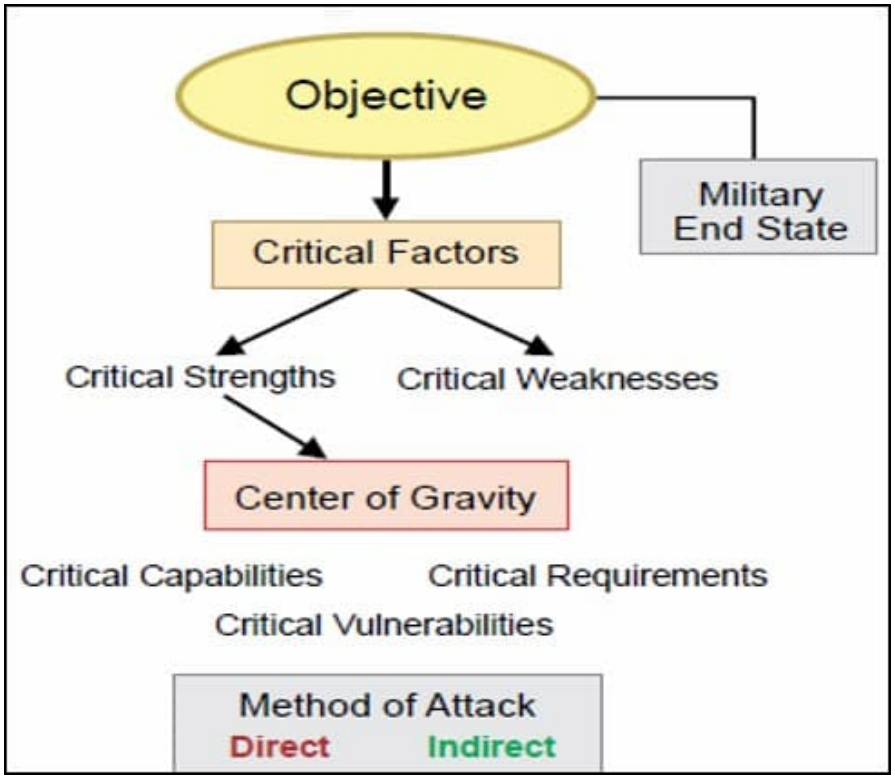

Figure 14: Notional factors of operational design according to JP 5-0[267]

This pre-eminence of **objective** is what Vego and Eikmeier have advocated. JP 5-0 seems to draw from their work and thoughts thus creating a similar framework and marching order with the objective as the defining actor. Furthermore, we can see in figure 14 present both Vego's critical strengths and weaknesses as well as Strange and Iron's & Eikmeier's critical capabilities, requirements and vulnerabilities. Thus, one cannot understate the significance of COG and its related analytical components parts.

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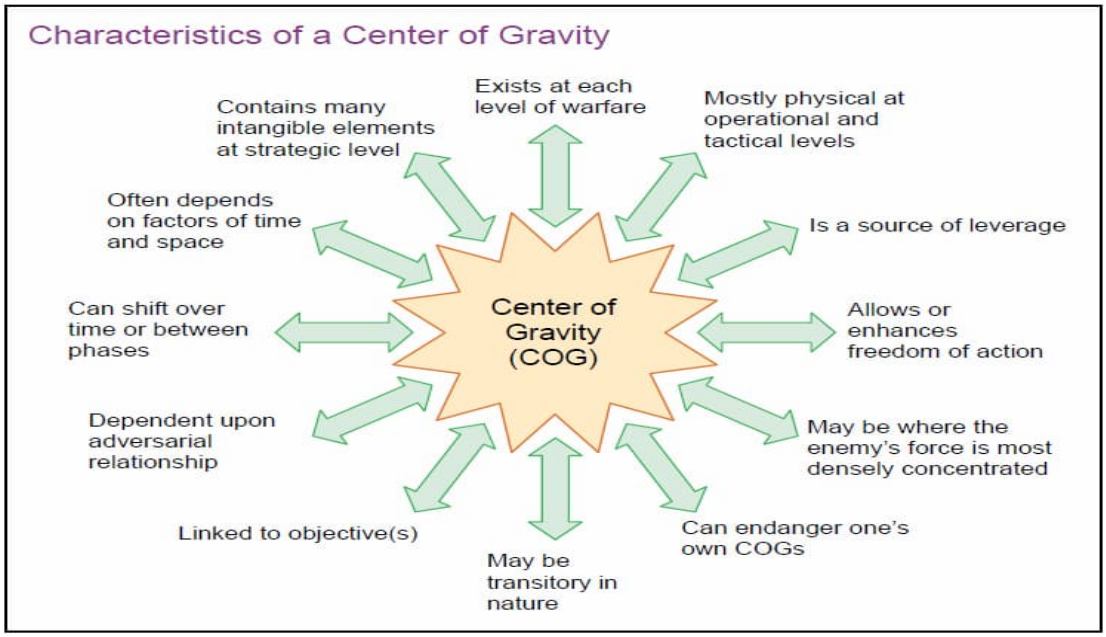
[265] JP 5-0, (2020), p. IV-7. Various network analysis methods and analysis tools such as PMESII, ASCOPE, METT-T together with strategic guidance, nature of the conflict etc. provide key inputs that create a comprehensive understanding of the operational environment. See also, AJP-5, p. 3-2–3-3.
[266] Ibid. p. xxiii, IV-19–IV-20. JP 5-0 states that "objectives may be broad or defined by a military end state as directed or informed by policy and strategy". These objectives are further linked to national objectives.
[267] Ibid. p. IV-20. This is only part of the whole picture with relevant COG related parts. The original picture as a whole with the parts that were cut out from this one is in appendix 6.

This is an excellent example of how debate and discussion amongst theorists and their (direct/indirect) participation in doctrinal development has yielded a composite model in the joint doctrine family.

Closely resembling the theoretical discussion JP 5-0 states that COGs can exist at each level of war[268], they can be tangible or intangible in nature, and they are prone to change when shifts occur in prevailing conditions. These changes may originate from strategic environment or OE and they can cover military aspects as well also other instruments of power[269]. The current joint doctrine JP 5-0 and DoD Dictionary define the COG as "*The source of power that provides moral or physical strength, freedom of action, or will to act*"[270] and the COG analysis is seen as "*the linchpin of the planning effort*"[271]. JP 5-0 illustrates COG characteristics in figure 15 which shows the various elements that relate to it. JP 5-0 seems to draw a significantly from Dr. Milan Vego and his perception of COG characteristics.[272]



[268]Compare, Echevarria II, Antulio J.: *Center of Gravity: Recommendations for Joint Doctrine*. Joint Forces Quarterly 35, Summer 2004, p. 12. Of the theorist discussed earlier, only Echevarria disagrees. He argues that the planners should "resist dissecting an enemy into tactical, operational and strategic centers of gravity" as this is artificial "unless an enemy is too dispersed or decentralized to have a dominant center of gravity".
[269] JP 5-0 (2020), p. IV-22. JP 5-0 lists examples of what COG can be at different level of war. This is problematic as it directs one to find something to 'fit' the description instead using the analytical method provided by the doctrine. Exhaustive list should be avoided as to decrease the possibility for misunderstanding and confusion.
[270] Ibid. p. GL-6; See also, DoD (2021) p. 30.
[271] Ibid. p. IV-22–23.
[272] Ibid. p. IV-23 and Vego (2007b), pp. VII-20–24. Vego states that "a center of gravity at any level of war has certain characteristics that are not found among military objectives, geographic location, or decisive points." Vego's uses a 'core' and further separates military and non-military COG's. He also iterates, that "for each operational objective to be accomplished there is a corresponding center of gravity. These are separated in terms of time and space."

Figure 15: Characteristics of COG according to JP 5-0[273]

The methodology provided by JP 5-0 uses critical factor analysis as a tool to identify and a analyze COG as part of the evaluation of operational design elements. It directs the planners to look for critical strengths (capabilities) and analyze networks for tangible and intangible factors. According to JP 5-0, the COG is usually found from the listed critical strengths. For JP 5-0 critical strengths are "*Capabilities considered essential for achieving a given or assumed military objective*".[274] The passage above is a direct citation from Milan Vego's work and thus, it be argued that the doctrine takes this connection between capabilities and objective from him[275]. JP 5-0 further states that as part of critical factor analysis "*planners evaluate the operational design elements and identify those considered crucial for mission accomplishment*"[276].

Both joint doctrine and Vego consider accomplishment of (military) mission/objective important and direct the planner to focus on to those factors that best serve this goal. However, for reasons unknown neither JP 5-0 nor DoD Dictionary define critical weaknesses. It is conspicuously missing from the doctrine content and definitions lexicon, even though it is present in the figure 14 that depicts notional factors of operational design. Thus, it appears that only some (but not all) of Vego's analytical construct have found their way to the U.S. joint doctrine. Based on the guidance of JP 5-0 it is evident that the COG is first identified by the planning staff amongst the threat's critical factors (strengths), followed by a process to determine how to attack it. The doctrine uses the framework of CCs, CRs, CVs to analyze identified COG and "*deconstructs*" it to missions and tasks as part of Courses of Action (COA) development. [277]

JP 5-0 defines COG components of the analytical design thusly: **Critical capabilities (CCs)** "*are the primary abilities essential to the accomplishment of the mission*"; **Critical requirements (CRs)** "*are essential conditions, resources, and means the COG requires to employ the critical capability*"; **Critical vulnerabilities (CVs)** "*are aspects of critical requirements vulnerable to attack*"[278]

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[273] JP 5-0 (2020), p. IV-23. See also, Vego (2007b), p. IV-21. Vego argues that especially at the operational and tactical level one of the most important characteristics of COG is to put one's own COG in danger.
[274] Ibid., p. IV-24.
[275] Vego (2007b), p. VII-15.
[276] JP 5-0 (2020), p. IV-24.
[277] Ibid.
[278] Ibid. p. IV-25. Bold by me.

The definition of CCs, CRs, CVs in JP 5-0 is almost identical with Strange and Iron & Eikmeier[279]. The doctrine seems to have taken the centrality of the objective and mission as the defining factor of CC which is a hybrid of Strange and Iron & Eikmeier proposals. The definition of CR in doctrine is nearly identical with the theorists. Regarding the definition of CV, the doctrine is more compact and concise. The overall meaning captures the essence of the theorists well. However, the theorist's definitions of CV have more explanatory power which makes them more understandable for the planner and reduce chance of misunderstanding. The overall conceptual framework of COG analysis is illustrated by the JP 5-0 in figure 16 thusly:

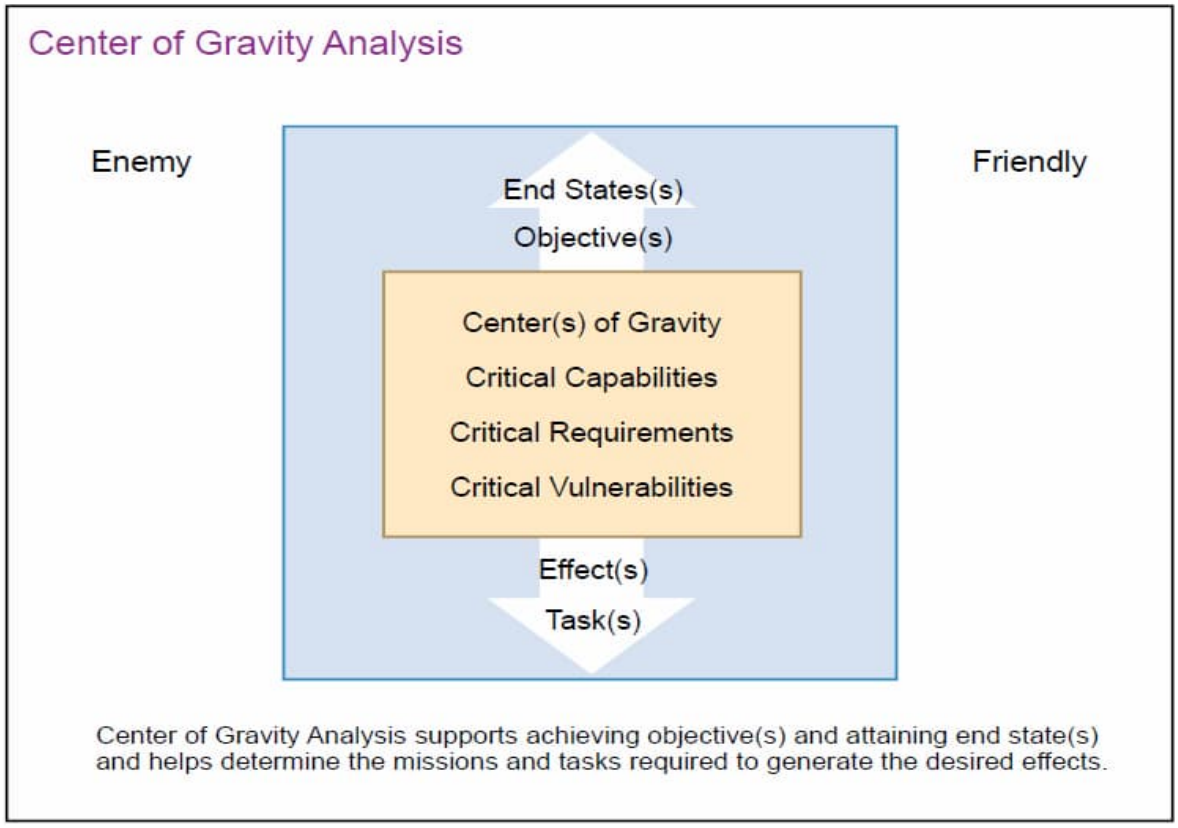

Figure 16: Center of Gravity Analysis according to JP 5-0[280]

The doctrine warns about leaving COG static or relying on initial findings. It emphasizes the need for testing via wargaming or additional analysis, as well as continuous evaluation of critical factors. Changes in objectives and the progression of the campaign can affect conclusions that further on alter critical factors and/or vulnerabilities.

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[279] Compare, Strange & Iron (2005), Part 2, p. 7 and Eikmeier (2012), p. 164. Biggest difference between the theorists is in the wording and form of CC. Eikmeier's definitions are concise and clear whereas Strange and Iron explain the terms in detail. However, it can be argued that the conceptual meaning between them is the same.

[280] JP 5-0 (2020), p. IV-25.

Furthermore, after COG analysis JP 5-0 encourages planners to review the results critically: Does attacking (destroying) the identified COG accomplish the objective and work towards higher command's objective? What ramifications of unforeseen effects does this create? Which one is more feasible, direct or indirect approach?[281]

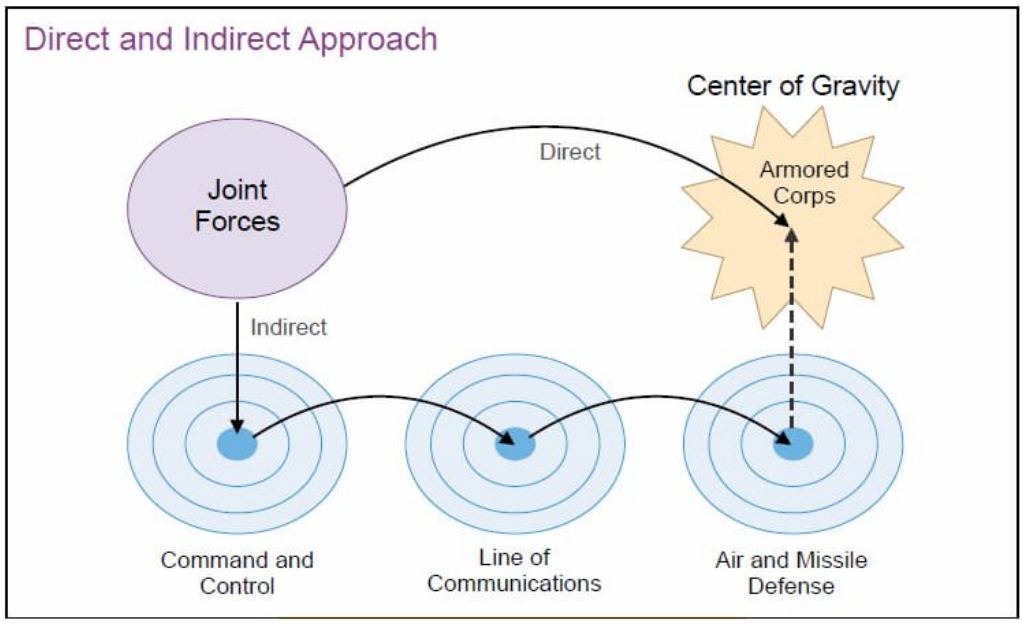

Figure 17: Direct and indirect approach according to JP 5-0[282]

According to JP 5-0 (figure 17) at the operational level the direct approach "*attacks enemy's COG or principal strength by applying combat power directly against it*", whereas the indirect approach focuses on aspects of the combat power "*attacks enemy's COG by applying combat power against critical vulnerabilities that lead to the defeat of the COG while avoiding enemy strength*". JP 5-0 sees the direct approach as the usual manner in operational level and the quickest way to victory. If direct approach is not feasible for any number of reasons, an indirect approach is recommended to mold the conditions suitable thus enabling the direct approach.[283] According to Colonel Eikmeier this attacks the COG's CRs and CVs and in doing so "*denies the COG the means it requires to perform a critical capability*" and thus rendering it unable to achieve its objective[284].

[281] JP 5-0 (2020), p. IV-25–IV-26. Interestingly, JP 5-0 acknowledges the fact that a total collapse of the enemy system might not be the optimal result and lead to escalation and increase in complexity and "mission creep", i.e. mission increase.
[282] Ibid. p. IV-34.
[283] Ibid. p. IV-33–IV-34.
[284] Eikmeier (2012), p. 160.

The direct approach is the traditional way the U.S. military has attacked the enemy with the aim of destroying the opposing army[285]. However, the need for an indirect approach has also been present ever since the FM 100-5 (1986) was published and is consequently a key element of Colonel Warden's 'Five-Rings' approach[286].

Based on the discussion so far, it can be argued that JP 5-0 has drawn significantly from the various theorists as well as retained a number of elements from the legacy documents. Notable influence to the doctrine has been the works of Dr. Joe Strange and Richard Iron, Dr. Milan Vego and Colonel Dale Eikmeier.

Sub-chapter 2.2.2 has provided the needed input for theoretical model construct by answering partly to the second research sub-question: *What kind of definitions and descriptions of the Center of Gravity exists in the selected joint level planning doctrines*. The second half of this analysis is conducted in the following sub-chapter. After this the combined results are gathered into a table.

2.2.3 Allied Joint Doctrine for the Planning of Operations (AJP-5)

Next, I will look at the NATO *Allied Joint Doctrine for the Planning of Operations* (AJP-5). This doctrine is the "*keystone NATO doctrine for planning of Allied joint operations*" and it strives to provide a framework of unified principles and guidance for NATO planners at the operational level[287]. AJP-5 is comparable with JP 5-0 as they both address joint level planning.

Those parts that are identical to JP 5-0 will not be separately repeated here, instead the goal is to highlight the differences. Identical content (if not exact wording) with JP 5-0 is found in operational art, end–ways–means construct and related definitions, holistic understanding of the OE, operational design concepts and primacy of the objective parts.[288]

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[285] Barfoed (2014), p. 7. Barfoed refers to Russel F. Weigley's "*The American Way of War; A History of United States Military Strategy and Policy"*. See also, Palmgren (2006), p. 75. Palmgren argues that the American strategic culture emphasizes "*destroy and neutralize*" function.
[286] FM 100-5 (1986), p. 180. See also, Barfoed (2014), p. 9–12.
[287] AJP-5 (2019), p. xi.
[288] Compare, AJP-5 (2019), p. 1-1–2, 3-1–4, 3-6 and JP 5-0 (2020), p. I-1, III-4, III-22, III-75, IV-6–8, IV-21–26. Note: There are some differences in wording due to U.S. – British linguistic variance, however, the conceptual meaning remains the same (e.g. JP 5-0 decisive points and lines of effort vs. AJP-5 decisive conditions and sequencing & phases).

Based on the above it can be argued that the context and the framework where COG resides in the NATO doctrine coincides with that of the U.S. for the most part. AJP-5's approach to the 'levels of war' issue is to explicitly state that below political-strategic level only physical-strength COG's can exist. This deviates from JP 5-0 which emphasizes a "*military capability*" instead of physical strength thus leaving room also for intangible COGs[289]. This is a common approach amongst most the theorist discussed earlier, however, it should be iterated that for example Dr. Milan Vego considers COG (at any level of war) to consist of both tangible and intangible elements[290].

For reasons unknown AJP-5 does not tie COG into the adversarial context the way JP 5-0 does. In fact, there is no mention of this conceptual constraint. This might be a residual element of NATO's long crisis management history where there was an avoidance to designate a definite enemy or a way to facilitate common agreed content within the alliance.

There is somewhat difference in how AJP-5 sees the indirect approach issue compared to JP 5-0. The difference lies in the way AJP-5 perceives the end result of indirect approach. JP 5-0 sees indirect approach mainly as a 'stepping stone' (as portrayed in figure 17) to create conditions for direct approach whereas AJP-5 considers the indirect method as means to "*render combat ineffective rather than physically destroy the adversarial COG*"[291].

This might be a cultural factor, or stem from the NATO's role as the defensive military alliance where one does not wish to emphasize the complete destruction of the adversary/enemy. As with the adversarial context issue, it is more than likely that the various nations within the alliance have strived for politically acceptable presentation versus purely a military consideration. AJP-5 and JP 5-0 both use critical factor analysis as a way to comprehend the OE and the agree with the subsequent importance of these recognized factors to COG identification and analysis. However, there is a slight difference with regard to how the conclusions are made. For JP 5-0 the analysis of critical factors is done with analytical tools such as PMESII, ASCOPE and METT-T, and the doctrine seems to implicitly assume that planners are familiar with them and their use[292].

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[289] Compare, AJP-5 (2019), p. 3-5, B-1 and JP 5-0 (2020), p. IV-22.
[290] Vego (2007b), p. VII-18–VII-19.
[291] AJP-5 (2019), p. 3-5
[292] JP 5-0 (2020), p. IV-6–IV-8.

AJP-5 seems to provide a more 'hands on' approach and provides a concrete tool for the planner illustrated by figure 18:

Factor	Deduction	Conclusion
A significant factual statement of information known to be true that has operational implication. *What is the current state of affairs or trends?*	The implications, issues or considerations, derived from fact(s) that have operational significance. *So what is the significance of the factor?*	The outcome or result reached that requires action in planning or further analysis. *So, what can or should be done?*
Example ▪ *Existing SPODs have limited throughput capacity*	▪ *Identified ports are not adequate for rapid deployment of large heavy forces*	▪ *Pre-deployment of enabling forces to maximize/expand SPOD capacity is required (action, forces)* ▪ *SPOD usage requires detailed de-confliction with HN/IOs/NGOs (operational action, liaison)* ▪ *Need ready alternatives (risk, branch, CCIR)*

Figure 18: Factor analysis according to AJP-5[293]

Furthermore, compared to JP 5-0, AJP-5 seems to place more emphasis on the linking some parts of operational design by explaining the connection. A good example of this is the way the connection between COG and lines of operation (LOO) is explained. According to AJP-5 "*The conclusions of the CoG analyses provide valuable inputs to the required conditions and how to achieve them*"[294].

This direct and explicit linkage is missing from JP 5-0, however, there are references that the accomplishment of the objective and overall mission but despite this the main focus reside in identifying the CCs, CRs and CVs[295]. AJP-5 definition of COG closely resembles that of JP 5-0. According to AJP-5 the COG is "*the primary source of power that provides an actor its strength, freedom of action, or will to fight. It is always an entity*".[296]

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[293] AJP-5 (2019), p. 4-8. Note: AJP-5 does not dismiss comprehensive tools such as PMESII-PT, DIME (Diplomatic, Informational, Military, Economic), but considers them a way to gather information that then are processed via presented three column analytical table. For detailed definitions, see FM 3-0 (2022), p. 1-23, 5-5, Glossary-2.
[294] Ibid. p. 3-7.
[295] JP 5-0 (2020), p. IV-24, IV-26.
[296] AJP-5 (2019), p. 3-5. According to AJP-5, "At the political-strategic level, moral-strength as well as physical-strength CoGs exist; both types are physical entities in nature, but vary in purpose. At lower levels of command, only physical-strength CoGs normally exist".

AJP-5 definition shares commonality with JP 5-0 regarding that it considers COG as a source power but instead focusing on achieving the objective (as latter does), it sees the COG as something that enables 'the actor' by providing it the things listed in the passage above. When considering the context of AJP-5, and the prominence of military objective as part of the operational design, one might argue that the passage above implies that COG as the "*strength, freedom of action, or will*" works towards the accomplishment of the objective.

However, the problem with the AJP-5 definition is that it leaves some question to the reader whether the COG needs one or all of the aforementioned properties whereas JP 5-0 simply states that the "*power or strength*" is the enabler[297]. AJP-5 definition seems to draw from Strange and Iron & Eikmeier with the part that acknowledges 'primary source' as the nominator which differentiates COG from other sources of power. Moreover, according to Eikmeier this logic guides the planner to look for a "*primary entity that has the capability to achieve the objective*"[298].

As we can see from the discussion above, on one hand AJP-5 provides a more concise guidance on COG identification than JP 5-0 but on the other hand it creates unnecessary confusion for the planning staff. Furthermore, Colonel Eikmeier argues that by using the word 'primary' one "*excludes the secondary, supporting, or extraneous*" therefore removing the need for extended list of possibilities. This, he claims, provides "*clarity, logic and precision and makes it testable*" thus simplifying the COG process due to the fact that "*if something is not the primary 'doer'*, it is not the COG".[299]

The NATO doctrine also makes a point of emphasizing that COG "*is always an entity*". AJP-5 explains this further by providing a list of intangible items such as "*cohesion, ethnic nationalism and ideology*", which according to the doctrine cannot be COGs because they are not 'entities'[300]. This is similar to what Eikmeier has argued: "*Intangibles, such as moral strength, public opinion, or a righteous cause, are not COGs because they have no inherent capability for action*".[301] Thus, it can be argued that the NATO doctrine has taken this part more or less directly from Eikmeier's thoughts.

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[297] Compare AJP-5 (2019), p. 3-5 and JP 5-0 (2020), p. IV-22.
[298] Eikmeier (2017), p. 3. [https://www.armyupress.army.mil/Portals/7/Army-Press-Online-Journal/documents/Eikmeier-v2.pdf], read 27.1.2023.
[299] Ibid.
[300] AJP-5 (2019), p. B-1.
[301] Eikmeier, (2016), p. 112.

AJP-5, like JP 5-0, reminds that the COG analysis is not limited to specific planning activity, nor does it start or end as such, but it remains an iterative process which is continues throughout the operations. The methodology provided by the NATO doctrine uses an analytical matrix for COG identification and analysis. It consists of the same elements as JP 5-0. These are COG, CCs, CRs, CVs, assessed objectives and potential COAs as well as conclusions derived from the analysis that feed into the planning. AJP-5 uses this analytical matrix for both strategic and operational level of war but provides separate guidance for each.[302]

AJP-5 defines COG components of the analytical design thusly: **Critical capabilities (CCs)** "*what the CoG can do – its primary abilities – in relation to achieving the actor's objectives at the given level in the context of a given environment*."; **Critical requirements (CRs)** "*are specific conditions, resources, and/or means that are essential for a CoG to perform its critical capabilities*."; **Critical vulnerabilities (CVs)**"*are those critical requirements, or components thereof, that are deficient, missing, or vulnerable to influence in a way that will contribute to a CoG failing to perform one or more of its critical capabilities*".[303] These definitions of CCs, CRs and CVs are close to JP 5-0 in wording. For practical and interpretation purposes the meaning is identical. AJP 5-0 explains more in detail CCs and CVs role and function compared to JP 5-0. However, the definitions of CR are almost identically written.

Compared to the theorists there is a definite resemblance to the definitions of Dr. Strange and Colonel Iron. In fact, AJP-5 definitions are nearly identical for CCs and identical with regard to CRs and CVs compared to Strange & Iron[304]. Moreover, the doctrine's definitions come close to Colonel Eikmeier's as they share the 'primary ability' statement of CC as well as nearly identical wording regarding CRs and CVs[305].

Therefore, it can be argued that the work of Strange and Iron as well as Eikmeier's has had significant effect on NATO doctrine. This has been either directly through iterations of US joint doctrine, or indirectly via theoretical debate and discussion. Next before drawing together the doctrinal part of sub-chapter 2.2, there is some criticism presented by the theorists on how the joint doctrines define COG and its analytical framework.

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[302] AJP-5 (2019), p. B-8–14.
[303] Ibid. p. B-6.
[304] Compare, Strange & Iron (2005), Part 2, p. 7 and AJP-5 (2019), p. B-6.
[305] Compare, Eikmeier (2012), p. 164 and AJP-5 (2019), p. B-6.

Dr Echevarria has criticized joint doctrine for ambiguity that relates strongly to the various services' different conception of COG: For U.S: Marines, Navy and Army COGs are "*sources of strength*" whereas U.S. Air Force looks for "*strategic and operational critical points*". This, according to Echevarria has led the Joint Staff to, in his opinion unsuccessfully, to combine the various services' conceptions to a joint definition of COG. He states that (earlier version) of JP 3-0 the COG was described as "*those characteristics, capabilities, or locations from which a military force derives its freedom of action, physical strength, or will to fight*".[306]

The above passage from JP 3-0 (2003) version of COG is actually a direct copy from FM 100-5 (1986) description of what a COG is[307]. This reappearance illustrates the historical linkage of COG / *schwerpunkt* and the significance it holds in the doctrine development. AJP-5's definition of COG still retains much of that passage above which Echevarria criticized, however, JP 5-0 has changed its definition to somewhat more 'objective' oriented[308].

From doctrinal point of view, Echevarria's idea was to bring the COG back to its Clausewitzian roots and discard the capability-based definition of joint doctrine. He has proposed a set of changes in doctrine publications JP 3-0 Operations and JP 5-0 Joint Planning to redefine the COG as his version of it with systemic and effects-based connection. He has argued that the COG should be a "*focal point—the element with centripetal force to hold everything together*" instead of "*strength, weakness or a source of strength*".[309]

Strange & Iron were particularly annoyed with joint and NATO doctrine for the term *characteristic*, which for them presented a mistranslation and opened the 'Pandora's Box' for basically anything and everything to be nominated as COG. In their view, the term is a mistranslation from original German text and misses the "*adversarial element*" that Clausewitz intended it to have. For Strange & Iron this removal of adversarial element was problematic as it portrayed COG as something that can exist "*in its own right as a function*". Thus, for them COG then became separated from the context of war & battle and therefore it no longer portrays a strength or force that that can have an effect on the opponent.[310]

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[306] Echevarria (2003), p. 108—109. Echevarria refers to 2003 version of Joint Planning 3-0: Operations.
[307] FM 100-5 (1986), p. 179.
[308] Compare FM 100-5 (1986), p. 179, AJP-5 (2019), p. 3-5 and JP 5-0 (2020), p. IV-22.
[309] Echevarria (2004), p. 11—12. See also, Echevarria (2003), p. 117. Echevarria proposed his changes in 2004, apparently with little to no effect.
[310] Strange & Iron (2004), p. 24—25.

Same argument is carried by Anders Palmgren. who points out that the adversarial concept originates from Clausewitz himself and the concept of COG "*is only valid if there is a desire to gain a decision by battle on both sides*"[311]. The aforementioned is still visible in AJP-5 (2019), however, in comparison JP 5-0 explicitly stipulates that "*COGs exits in an adversarial context*".[312]

Colonel Dale Eikmeier has criticized the joint doctrine and also Strange and Iron for leaving too much room for interpretation regarding the adversarial issue. He seems to draw from Vego by recommending to focus on the objective instead of adversary. For Eikmeier objective is essential for COG to exist whereas adversary (as such) remains a secondary consideration. As we can see here, the adversarial context and the issues therein have carried from Clausewitzian era all the way to current doctrine debate. Furthermore, it is apparent that the various theorists do not agree upon the relevance or utility of adversary (or Clausewitz for that matter), as the discussion above have showed.[313]

It can be seen from the analysis conducted upon the doctrine sources that the issues illustrated in the table in appendix 7 are mentioned throughout the joint doctrines. From the perspective of content-based content analysis it is evident that the two doctrines between them form a number of distinctive themes.

These are: *Definition of COG, Basis, COGs ability to change, COG as a systemic structure, COG as tangible/ intangible, and COG's applicability within levels of war, and definition of CCs, CRs, CVs*. Thus, these themes contribute to the analytical construct as their own entities. It is evident from the table in appendix 7 that both doctrines have parts that coincide with one another and some others that differ. The most evident similarities lie in basic essence of the COG and the analytical construct of CCs, CRs and CVs.

Sub-chapter 2.2.3 has provided the needed input for theoretical model construct by answering partly to the second research sub-question: *What kind of definitions and descriptions of the Center of Gravity exists in the selected joint level planning doctrines*. The theoretical discussion and joint doctrines sub-chapters together have provided the needed inputs for the COGTMC and thus provided overall answers to the second research sub-question.

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[311] Palmgren (2006), p. 68
[312] Clausewitz (Howard & Paret 1984 transl.), p. 488, JP 5-0 (2020), p. IV-22.
[313] Eikmeier (2010), p. 155—156 See also, AJP-5 (2019), p. 3-5. AJP-5 uses the term 'actor' intermittent with adversary.

3 CREATION OF THE COG THEORETICAL MODEL CONSTRUCT

"*Centers of gravity are unifying constructs that can only be considered as part of other unifying phenomenon. They do not stand alone as separate units of analysis outside the system of war that gives them their meaning.*"[314]
—Kurt P. VanderSteen

Chapter three is divided into four sub-chapters where the first three parts are used to condense the results and conclusions from the analysis conducted in chapter two. The conclusions of each sub-chapter (3.1 to 3.4) create the components for the COGTMC model. The final sub-chapter is dedicated for the formulation of the COGTMC model.

The creation of the COG theoretical model construct (COGTMC) draws from four different parts. These parts are the linguistic history, the concept and the contextual interpretations of the COG concept discussed in sub-chapter 2.1 as well as the theoretical debate and doctrinal discussion together with the selected joint doctrines discussed in sub-chapter 2.2. The COGTMC model is visualized in figure 19 at the cross-section of the four-part VENN-diagram:

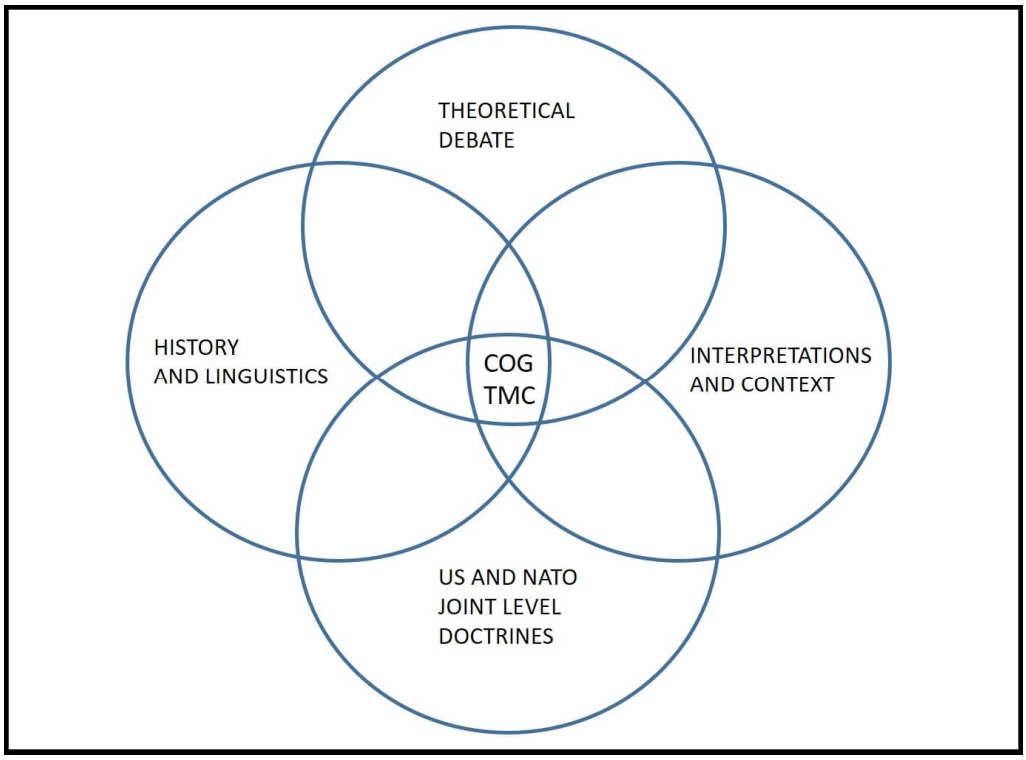

Figure 19: Creation of the Center of Gravity theoretical model construct (COGTMC)

[314] VanderSteen (2012), p. 58.

The composition of figure 19 is derived from a number of issues addressed earlier in chapter two. Their relevance for the COGTMC model is explained thusly: Origin of the concept and related linguistics have had a verified effect on how the COG concept has transformed from its original meaning and how mistranslations can cascade throughout time affecting current doctrine and thus are integral part of this model.

Further, the translations and the historical background have created variations of interpretation. These together with context of a particular era, and with the continuous evolution of usage, have created a specific (transitory) understanding of the concept which emphasizes the significance of context as a driver for interpretation. Thus, interpretation and context related issues have relevance for the theoretical model.

Theoretical debate around the COG and the associated critical thinking conducted by the selected theorists have had a significant contribution to the U.S. and NATO doctrine development. It has been incremental to include it as part of the model as a way to provide insight into the conceptual definition, COG identification and analytical methodology as well as objectivity, and critical approach view of the COG concept in joint doctrines.[315]

The doctrines *as a whole* were not direct copies of each other, and I argue that therefore neither were the COG related issues. From a planning process viewpoint these doctrines were good object for analysis due to the operations planning focus and related COG analytical framework and methodology.

The joint planning doctrines of U.S. and NATO joint, JP 5-0 and AJP-5, shared enough similarities and characteristics for comparison, but still differed enough as to provide variation in the interpretation of the COG concept. Hence, they contributed in their part to the theoretical model construct.

3.1 Historical and linguistic issues and their relevance

[315] Meyer (2022), p. 1. According to Meyer, prominent theorists with acclaimed effect and critical thinking regard to doctrine include: Dr. Joe Strange and Colonel Richard Iron with their COG analysis and theory method development, Dr. Antulio J. Echevarria II with his extensive work on Clausewitz and influence on COG thinking, Dr. Milan Vego with his influence on joint doctrine and COG thinking, as well as Colonel Dale Eikmeier with his influence on doctrine work and practical COG theory and analysis.

In 1986 several new theoretical concepts entered the U.S. military doctrine family including the COG, which was at the time presented as the "*key to all operational design*"[316] to underline its importance to the campaign and operations planning. However, immediately upon COG's entry to doctrine the use of this theoretical terminology sparked a vivid conversation combined with an aim to clarify the COG definition, reduce confusion, and to promote its universal understanding and proper use. [317]

Colonel Dale Eikmeier emphasizes the challenges related to translation of a theoretical concept by referring to Clausewitzian scholar Dr. Christopher Bassford: "*Any translation from one language to another necessarily involves interpretation not only of the language but of the conceptual content. Even the most honest and competent translation inevitably includes both technical errors and arguable or controversial—if not flatly wrong—conceptual interpretations. Further, even editors working in the original language have been known to take liberties with the writer's original words...editorial interventions are prompted by political fear or ambition, conceptual confusion, or contrary conviction.*"[318]

Thus, the effect that a particular translation and its possible errors have on the context cannot be understated. Eikmeier provides an example of this by comparing English translations of Graham's (1874) to Howard and Paret's (1976) "*Graham says, '...this center generally lies in the capital.' While Howard and Paret say, 'the center of gravity is generally the capital....' 'Lies in' and 'is generally the capital' have very different meanings.*"[319]

A second example of these kind of problems relates to the often-cited part of the passage from Clausewitz's *On War*, Book Eight, Chapter Four: "*a hub of all power and movement*". Dr. Joe Strange & Colonel Richard Iron argue that this is not a correct translation, but instead an analogy created by Howard and Paret. According to Strange and Iron the literal translation is "*a center of power and movement*", but Howard and Paret's version is the one that have had the most effect subsequent use of the terminology.[320]

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[316] FM 100-5 (1986), p. 179.
[317] Schneider & Izzo (1987), p. 46. See also, VanderSteen (2012), p. 34.
[318] Eikmeier (2012), p. 138. See also Strange & Iron (2004), p 22. Note: Dr. Bassford's stipulation reiterates the hermeneutical and interpretative nature of this research due to consecutive translations (and interpretations) of the source material by the original authors as well this researcher. As a non-native English speaker my interpretations more than likely vary from those done by native speakers.
[319] Ibid. p. 137.
[320] Strange & Iron (2004), p 23.

Howard and Paret's translations are commonly used in a variety of articles and research that strive to interpret Clausewitz's thoughts. Furthermore, as Dr. Antulio J. Ecchevarria II states "*Most of the U.S. military's definitions of CoGs derive from Sir Michael Howard's and Peter Paret's English translation of Clausewitz's On War.*"[321]

For Eikmeier translations were just part of the problem. He highlights the difficulty one has of correctly interpreting, and thus understanding, Clausewitz's 19th century use of German language. This, he argues, is because even though the meaning has remained the same the usage of the concepts has evolved over time.[322]

In the source material the level of analysis regard to linguistics of *schwerpunkt* and COG varies. Some documents looked into them extensively, and went into great analytical depth, whereas others mentioned them shortly and only tied to the broader context of that particular article or study.

Therefore, it can be argued that every translation is a combination of interpretation, skill, error and editorial freedom coupled with context and ideology. Needless to say, like the translations, the interpretations and extrapolations of *schwerpunkt* have varied across time and have evolved depending on the context and usage.

An item that rose from appendix 2 'definitions' -column was a tendency to associate *schwerpunkt* / COG as *something* (tangible/intangible) to focus *on*, a *location* to focus the (mass) *on*, or a *way* to focus (mass). This is arguably tied to the discussion regarding strength but it also provides glimpses of how the various levels of war (strategic, operational and tactical) might have different COGs, i.e. different focuses.

Depending on one's interpretation, the first and second observation of appendix 2 either coincide, or not, with Clausewitz's original idea[323]. This debate is connected to the utility of *schwerpunkt* / COG regarding different the levels of war, and it is yet another thing several theorists do not agree upon.

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[321] Echevarria (2004), p. 10.
[322] Eikmeier (2012), p. 137. For an extensive discussion on translations issues, see Vego (2007a).
[323] Compare e.g., Strange & Iron (2004), p. 27 and Echevarria (2002), p. vi. Strange and Iron argue that "Clausewitzian COG's are not characteristics, capabilities or locations. They are dynamic and powerful physical and moral agents of action or influence with certain qualities and capabilities" whereas Echevarria argues that COG's are "not a source of strength or a critical capability, but a focal point that is essentially effects-based, rather than capabilities-based". This is a good example of theoretically opposite positions.

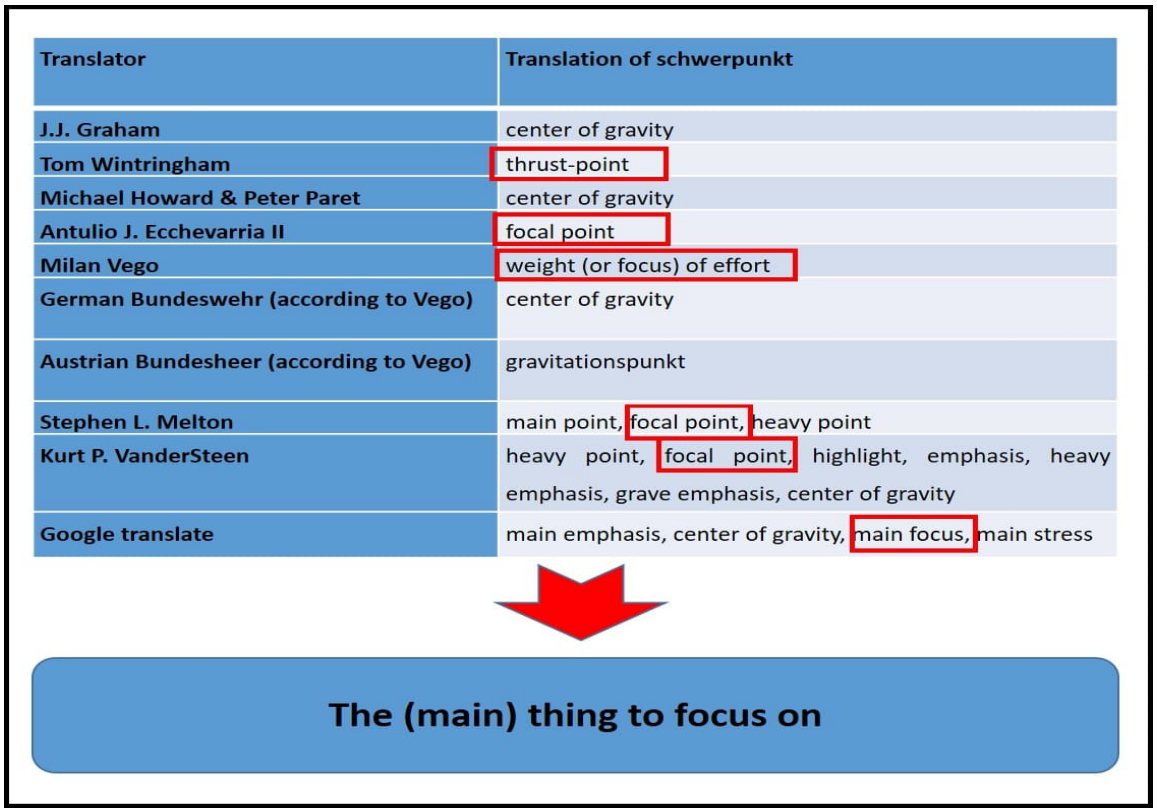

Figure 20: Component formulation from 'historical and linguistics' issues

The content analysis in sub-chapter 2.1.1 provided the three themes, *schwerpunkt translations, the time of translation* and *the translator/user* that were further formulated into a type (component of the model). Figure 20 shows that it was possible to formulate the *'the (main) thing to focus on* component of the theoretical model from these three themes. Thus, "historical and linguistics" issues sub-chapter provided the first component of the COGTMC.

3.2 Interpretational and contextual issues and their relevance

Dr. Milan Vego underlines the importance of context when interpreting Clausewitz. He argues that what really mattered to Clausewitz in the end was the destructions of enemy forces as a means of achieving the final and ultimate victory, and not a particular item from a list of possibilities[324]. However, it should be noted that Clausewitz himself borrowed concepts and theories from many scientists and thinkers of his time as well as drew metaphors from mechanical sciences[325].

[324] Vego (2007a), p. 102. See also, Schneider & Izzo (1987), p. 50 and Palmgren (2006), p. 70. Vego's view regarding interpretation of Clausewitz is also shared by Schneider & Izzo and Palmgren.
[325] Echevarria (2002). p. 6.

The reason behind Clausewitz's mechanistical metaphors was at the time common Prussian officers background in engineering as well as Clausewitz's wish to explain 19th century socio-political theory and phenomena of war[326]. Thus, to understand the context in which Clausewitz formulated his thoughts, analogies, and metaphors, we need to understand how warfare was conducted in his era. Hence, Napoleonic warfare together with the aforementioned mechanistical and socio-political aspects provide the contextual image of war.

In Clausewitz's time wars with (mostly) limited objectives were fought in as system governed by a set of rules with a political force governing the use of force[327]. Context and the interpretation tied to it have been shifting over time due to theoretical debate as well as doctrinal development. Christopher R. Paparone and William J. Davis Jr. refer to this process, which leaves residues from old meaning and transfer them into new, as "*concept extension and displacement*"[328]. An example of this is the famous 'hub of power and movement' phrase by Howard and Paret that has been taken out of its context and used as building block of doctrine since 1986.[329]

It should be reiterated that metaphors are not meant to be literally true and that they carry the weight of context with them[330]. Thus, when one looks at analogies and metaphors disconnected from their original context often more confusion than clarity is created.

Furthermore, Kurt P. VanderSteen reminds that it is important to remember that Howard and Paret's translations aimed for consistency while retaining Clausewitz's thought and intent. This, he argues, is what Howard and Paret did when they standardized the COG terminology from various terms found in the text. This has led to considerable confusion regardless of the appraisal given to the translation.[331] Eystein L. Meyer, in reference to Clausewitz's *On War*, argues that "*the inconsistency between the books, together with the translation itself, have been the root causes for debate and diverging theories on the subject*"[332].

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[326] Eikmeier (2012), p. 135.
[327] Melton (2012), pp. 83–84.
[328] Paparone & Davis (2012), p. 66.
[329] Pattee (2012), p. 126.
[330] Merriam-Webster Dictionary: *metaphor*. [https://www.merriam-webster.com/dictionary/metaphor], read 13.1.2023. Merriam-Webster Dictionary defines *metaphor* as: "a figure of speech in which a word or phrase literally denoting one kind of object or idea is used in place of another to suggest a likeness or analogy between them."
[331] VanderSteen (2012), p. 36.
[332] Meyer (2022), p. 1. [https://www.tandfonline.com/doi/full/10.1080/14702436.2022.2030715], read 20.1.2023.

The aforementioned argument is supplemented by Paparone and Davis who point out that "*interpretations of Clausewitz's figurative language in On War are biased by doctrinaires' upbringing in (and subsequent predisposition to) a Western-style, modernist worldview*". For them this creates western "*Anglo-American analytic philosophy*" that is evident in modern normative military science anchored in positivistic philosophy. Further, Paparone and Davis argue that this affects *all* interpretation and thus changes the meaning of COG away from the original Clausewitzian and into the analytical process we see today.[333]

Two main points to draw together the interpretation and context part. First, most of the definitions of *schwerpunkt* presented in appendix 2 refer to strength or power in some way. This can be affirmed by looking at the analogies used to list those sources in column five of appendix 2. Furthermore, terms that refer to military strength (force, army) or moral / psychological strength (leadership / will of the people) are prominent in the definitions as shown in column four of appendix 2. Thus, definitions and analogues together with contextual interpretation form a trinity of that provides a possibility for generalization.

Second, the metaphors, in column six of appendix 2, reflect to the time of conception of a particular definition. From the metaphors themselves it would be particularly hard to derive the essence of *schwerpunkt* / COG. They exhibit some of facets of the analogies but more often than not they are a list of ambiguous items that are more ephemeral than real. Present in the metaphors are parts of Clausewitz's thought and meaning as well as articulations of the contemporary theorists who have tried to find a way to express and describe theoretical concepts.

As we have seen, there exist a number of translations and interpretations regarding *schwerpunkt* spanning more than 150 years. This is a factor that cannot be ignored, as it related to the overall structure of how we understand and conceptualize COG today. By using the four themes 'interpretation', 'definition', 'analogue' and 'metaphor' provided by the content analysis sub-chapter 2.1.2 as basis we can further generalize them into a type (a component of COGTMC). However, regarding the component formulation some guidance relating to analogies and metaphors should be remembered.

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[333] Paparone & Davis (2012), p. 66.

Kurt P. VanderSteen adequately points out two things of note related to analogies and metaphors: 1) "*analogy is a cognitive device for understanding deep truths about a subject. It gives us relationships*" and 2) "*metaphors are not meant to be used as literal replacements or exact analogues to the concept they are explaining*"[334]. This is a valid point when looking at the content of appendix 2 that draws together Definitions and interpretations of *schwerpunkt*. Therefore, based on the arguments and discussion above, metaphors are excluded from this component formulation. By using the remaining three themes we can further formulate them into a component of the COG theoretical model as illustrated by figure 21:

Original term (year)	Interpretation	Definition	Analogue (if any)
Schwerpunkt (ca. 1832)	Howard and Paret	Source (or center) of power	Concentration of mass, Army, Capital, Community of interest, Army of the protector, Personality of a leader, Public opinion
Schwerpunkt (ca. 1832)	Ecchevarria	Focal point	Factor of balance
Schwerpunkt (ca. 1832)	Vego	Weight (or focus) of effort	Massed strength — physical or moral — or a source of leverage
Schwerpunkt (ca. 1880)	Vego	Point of focus	Capital
Schwerpunkt (after 1880 until WWI)	Vego	Section of the front	A location where a bulk of one's forces is employed to reach decision
Thrust-point (ca. 1942)	Wintringham, Miksche	Concentrated forces	Objective
Center of Gravity (1976 /1986)	FM 100-5	Source of strength or balance	Mass of the enemy force, Boundary between two major combat formations, Vital C2 center, Logistical base, Lines of communication , Cohesion among allied forces, Key economic resource or locality, Strategic transport capability, Vital part of the homeland, Moral thing (intangible)
Center of Gravity (1987)	Schneider & Izzo	Greatest concentration of combat force	Hub of all power and movement

Concentrated force / effect

Figure 21: Component formulation from 'interpretation and context' issues

[334] VanderSteen (2012), p. 48.

The content analysis in sub-chapter 2.1.2 provided the four themes, *interpretation, definition, analogue* and *metaphor* of which all except 'metaphor' were further formulated into a type (component of the model). Figure 22 shows that from these three themes it was possible to formulate a type focusing on massing forces and effect, which is the *concentrated force / effect* component of the theoretical model.

Thus, 'interpretation and context' issues sub-chapter has provided the second component of the COGTMC

3.3 Theoretical debate issues and their relevance

Next, I will address some of the key differences of opinion between the various theorists. These pave way to the formulation of the third component of the COG theoretical model construct.

First, Echevarria together with Strange & Iron agree that COG should be seen as a holistic systemic structure. They also agree that Clausewitz is at the heart of understanding COGs, and that ultimately *effects* are what matter[335]. However, they disagree upon the relevance and interpretation of *cohesion*. For Echevarria cohesion is critical and it can be either physical or psychological/moral in nature. If there is none, it means that there is no single entity for against which to utilize the concept of COG[336].

This differs from Strange and Iron, who consider that "*cohesion, unity and political interest*" have significance but only as variables that determine COGs. They agree with Echevarria that cohesion itself is important, but its manifestations, the components and variables of COG, are not[337]. The diverging view of these theorists is a good example of how interpretation of the same source, in this case Clausewitz, has produced different paths that joint at times but in still end up in completely different direction.

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[335] Echevarria (2003), p. 118 and Strange & Iron (2005), Part 2, p. 23. At time of Echevarria's and Strange' & Iron's writing effect-based operations (EBO) was an evolving concept in the US Military. See also, Eikmeier (2016), p. 113. According to Eikmeier, the idea of *critical factors* proposed by Strange & Iron as part of COG analytical tool was a way for them to connect COG and system theory.

[336] Ibid. p. 14. Echevarria presents al-Qa'aida as an example of an enemy without a sufficient physical cohesion, and thus without a clear COG. His line of thought is that an antiterrorist operation in Afghanistan does not have an effect on the terrorist organization elsewhere, thus one must go beyond the physical to look for ideological COG that have sufficient centrifugal force.

[337] Strange & Iron (2004), p. 21.

Second, a dividing factor between the chosen theorists is the significance of systemic approach and how it is seen in defining the COG. As we have observed in sub-chapter 2.2.1, Strange and Iron, as well as Echevarria together with Eikmeier argue that a combined holistic and systems approach is essential for COG determination. This differs from Vego, who frowns upon this view and claims that some proponents of systems approach go as far as to argue that in the information age COG has become obsolete or irrelevant[338].

Third, Eikmeier, despite his difference of opinion with Vego on relevance of the systems theory agrees with the latter regarding translations and interpretations of Clausewitz. This is visible in the way Eikmeier cites Vego's interpretations of the Prussian repeatedly and consistently in his own texts.[339] Thus, Clausewitz can be seen as a bridge and an overarching influence between all of these theorists. This is despite the differences of opinion they have regarding Clausewitz's significance for doctrine or interpretation of his writings.

Fourth, despite the aforementioned difference of opinion in other matters, Eikmeier supports Vego's arguments with regard to the role of (military) objective in COG identification. For Eikmeier, identification of the objective becomes a precondition for COG identification, thus becoming even more important than the adversary itself[340]. Here the role and significance of the objective is a good example of how Eikmeier used Vego's theoretical underpinnings to develop his COG theoretical & analytical framework, and in doing so contributed to the ongoing doctrinal development and discussion.

Fifth, all of the theorists agree that COGs are not fixed and can change over time. Vego and Echevarria consider that these changes can occur for example due to shifts or changes in alliances, combatant power structures, leadership on the political level, phases of operation or achievement of the military end-state[341]. For Eikmeier, changes in ends–ways–means reflect unto COG as these are interconnected and, like Vego and Echevarria, he considers that changes occur due to shifts in factors and specifically in the context of military plans[342].

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[338] Vego (2007b), p. VII-13, XII-61; Rekkedal & Vego (2013), p. 202–204.
[339] Eikmeier (2012), p. 136; Eikmeier (2013). [https://smallwarsjournal.com/jrnl/art/give-carl-von-clausewitz-and-the-center-of-gravity-a-divorce], read, 23.1.2023; Eikmeier (2014) [https://smallwarsjournal.com/jrnl/art/after-the-divorce-clausewitz-and-the-center-of-gravity], read 23.1.2023; Strange & Iron (2005), Part 2, p. 23; Echevarria (2003), p. 115. See also, See, also Mattis (2008), p. 106–108. General Mattis criticizes heavily the entire EBO concept and related systems of systems approach.
[340] Eikmeier (2012), p. 155–156.
[341] Echevarria (2004), p. 12; Vego (2007b), p. VII-20–VII-23.
[342] Eikmeier (2012), p. 154–155.

Sixth, within the theorist community there is some difference of opinion whether both physical and moral COGs exist. As discussed earlier, Echevarria, Strange and Vego all agree that both tangible and intangible COGs exist, however, for Eikmeier only physical (tangible) COGs are possible. Furthermore, an interesting viewpoint is that Eikmeier, who is often seen as a harsh critic of Clausewitz, actually gives a lot credit and value to the theoretical base and thoughts of Clausewitz and as such is not willing to discard the COG concept but instead its "*slavish devotion to 18th century military theory*". He argues that the changes in linguistics, theory, tactics, or technology do not make COG obsolete or irrelevant because COG is essentially about *planning*.[343]

Kurt P. VanderSteen criticizes Eikmeier for not including intangible elements in his COG analytical model and notes that Eikmeier is surprisingly reductionist for a system theory advocate. In support of VanderSteen, Strange and Iron argue that "*the will to fight and ability to command are necessary resources*" and thus applicable as overarching moral COGs. VanderSteen continues with this line of thought and warns to oversimplify a complex phenomenon such as war. With regard to this he further advices not to use solely either deductive or inductive methods, but instead a Clausewitzian type holistic approach with Echevarria -type focus on *focal points* and cohesion.[344]

Finally, Strange & Iron, Echevarria, Vego and Eikmeier even with their theoretical disagreements share an understanding that Clausewitz and his thoughts have a certain role. They agree that understanding Clausewitz is also essential in understanding and defining the COG and that the concept has utility[345].

Hence, by using themes provided by the content analysis in sub-chapter 2.2.1 and the discussion above we can further formulate it into components of the theoretical model as illustrated by figure 23. The content analysis in sub-chapter 2.2.1 provided eight (8) themes, *Definition of COG, Basis, Context, Ability to change, COG as a systemic structure, Utility, COG as tangible/ intangible, and Applicability within levels of war.*

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[343] Eikmeier (2014).[https://smallwarsjournal.com/jrnl/art/after-the-divorce-clausewitz-and-the-center-of-gravity], read 23.1.2023.
[344] VanderSteen (2012), p. 40, 49–50 and Strange & Iron (2004), p 26. See also, Echevarria (2002), p. 19. VanderSteen does not completely accept Eikmeier's analogy of a train system as a validation of his renewed COG model due to this perceived offset between a closed system (railway network) and an open one (warfare).
[345] See, for example, Eikmeier (2017), p. 5, 7. [https://www.armyupress.army.mil/Portals/7/Army-Press-Online-Journal/documents/Eikmeier-v2.pdf], read 24.1.2023, Echevarria (2002), p. 21, Strange & Iron (2005), Part 2, p. 5, 22–23 and Vego (2007b), p. VII-26, VII-29–VII-30. Vego states that it is important to understand the theoretical principles of Clausewitz in order to be able to apply them.

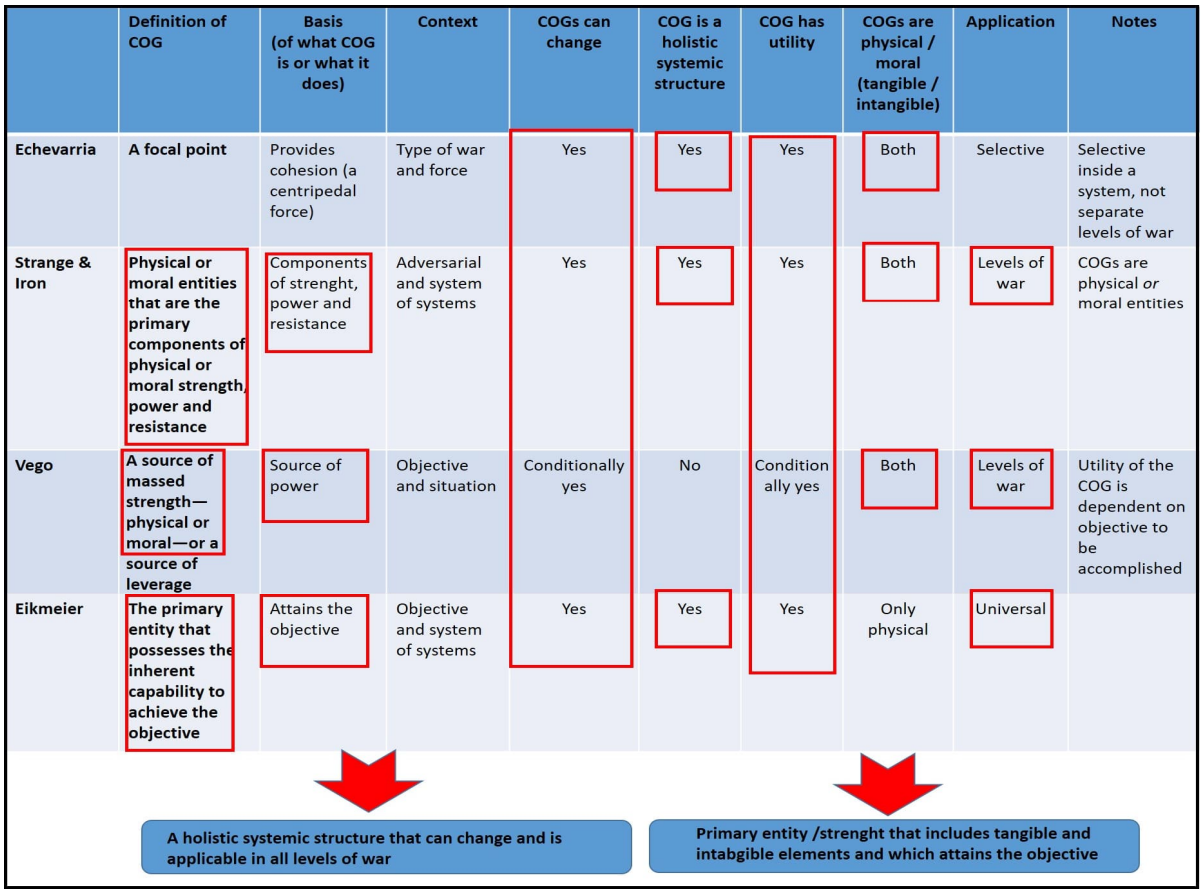

Figure 22: Component formulation from 'theoretical debate' issues

Figure 22 shows that it was not possible to formulate just one component from the theme that would have been a generalization of the theoretical debate. Thus, two separate components were formulated. First component was formulated from the *COG as a systemic structure, Ability to change* and *Applicability within levels of war* themes.

This component provides a generalization of COG's context, properties and applicability. The second component was formulated from the *Definition of COG, Utility, Basis, COG as tangible/ intangible* themes. This component provides a generalization of the (main) doer and its utility. One theme, *Context*, was left out as it did not fit into either type. Thus, 'interpretation and context' issues sub-chapter has provided the third and fourth components of the COGTMC.

3.4 Joint doctrine issues and their relevance

Joint doctrines that are selected for this research reside at the operational level of war. At this level, influencing the adversary COG causes changes to its course of action (COA) and ability to achieve operational objectives[346]. Therefore, the purpose of operational design is to assist in the understanding of complex OE and to organize it into a framework that supports the planning process. The goal is a to find a way to produce a concept of operations (CONOPS) that has the highest chance to succeed[347].

At first look, the current doctrinal definitions of the COG concept seemed fairy similar in the primary material due to the close interrelationship of the joint level doctrines. It should be noted that the U.S. joint doctrine has seen at least five (5) definitions of COG before the latest 2020 version[348].

Both U.S. and NATO doctrines place significant importance in the COG analytical process, the centrality of the objective and emphasize the dire consequences that a faulty, or hasty, COG analysis can bring to the effort of achieving the strategic and operational objectives. Thus, the importance of COG analysis and identification cannot be understated as its results cascade through the planning process.

The effect of Dr. Strange on the doctrine can be observed by looking at the JP 5-0 COG definition[349], which can be seen as a derivative of Dr. Strange's 1996 definition "*Primary sources of moral or physical strength, power and resistance*"[350]. As noted earlier in chapter 2, JP 5-0 definition has Dr. Strange's tangible (physical) and intangible (moral) elements as does the FM 100-5 (1986) version.

Stephen L. Melton has criticized the doctrine for retaining the mistranslated '*source of power*' part in the COG definition and recommended a return to the Clausewitzian definition where the COG is "*the main concentration of enemy strength or power*"[351].

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[346] Barfoed (2018), p. 117. Centrality of the objective is an essential element in both JP 5-0 and AJP-5.
[347] JP 5-0 (2020), p. xxi.
[348] Eikmeier (2017), p. 2, 8. [https://www.armyupress.army.mil/Portals/7/Army-Press-Online-Journal/documents/Eikmeier-v2.pdf], read 24.1.2023. Eikmeier list the following definitions: FM 100-5 (1986), FM 100-5 (1993), JP 1-02 (1994), Joe Strange (1996) and JP 5-0 (2006).
[349] Ibid. p. GL-6. See also, DoD (2021), p. 30. According to JP 5-0 COG is "The source of power that provides moral or physical strength, freedom of action, or will to act".
[350] Strange (1996), p. 43.
[351] Melton (2012), p. 98.

Interestingly, Dr. Strange modified his original COG definition and formulated a new one with Colonel Iron between 2004—2005. The updated version has one significant difference to the original from 1996, it is missing the word *source*. In their 2005 two-part article Strange and Iron claimed that it was this particular word imbedded in joint and NATO doctrine that was the root of the confusion surrounding COG[352].

Earlier this was not the case, so what had changed and altered the course? There is no clear answer available. Strange & Iron do not give explicit explanation to this question in their later work. However, there are tacit implications in their 2004 work of this but they are not enough to provide a definite answer[353]. It might be that they just came to the same conclusion than Melton, that this particular word creates too much confusion and variations of interpretation.

In addition, according to Melton the doctrine did not properly take into consideration a systems theory perspective where multiple sources can exist, and as this does not fit into single or multiple sources of power model, and thus does not reflect reality[354]. Then again, as we can see from appendix 7, the word '*source*' is still present in both of the current joint doctrines despite the criticism presented.

JP 5-0 (in conjunction with a number of theorists) stipulates that COG cannot exist by themselves but only in relation to the opponent: "*COGs exist in an adversarial context involving a clash of moral wills and/or physical strengths. COGs do not exist in a strategic or operational vacuum; they are formed out of the relationships between adversaries and enemies*"[355]. This has not been without criticism. Colonel Dale Eikmeier has argued that the adversarial context creates unnecessary confusion by shifting the focus away from the objective and possibly creating false assumptions by mirroring the enemy[356]. However, he does acknowledge the utility of adversary in "*selecting the ways to achieve the objective and the determination of one's vulnerabilities*"[357].

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[352] Strange & Iron (2005), Part 2, p. 1.
[353] Strange & Iron (2004), p 267. Sources of power and characteristics, capabilities and locations are somewhat linked here, but the connection is tenacious at best.
[354] Melton (2012), p. 98. Melton uses the phrase "combatant systems have manifold sources of strength".
[355] JP 5-0 (2020), p. IV-22. Note: NATO AJP-5 (2019) does not mention adversary as a perquisite for COG to exist.
[356] Eikmeier (2012), p. 155. See also, Vego (2007b), p. VII-17. Vego warns also of the 'mirroring effect' mentioned by Eikmeier.
[357] Ibid., p. 155. Eikmeier argues that the adversarial thinking by Strange & Iron is illogical because their way of thinking leads to a claim that "if a system has an objective, strength and means to achieve it, but no opposition, it does not have a COG or 'doer." This, according to Eikmeier dismisses the objective and its role in COG identification.

Jacob Barfoed echoes Eikmeier and states that in the possibility that no adversary exists, such as peacekeeping missions, one still benefits from the COG and its components (CCs, CRs, CVs) identification. Thus, according to Barfoed one should nevertheless look for COG within the actors present as this will provide the commander and planning staff valuable information. This is contrary to a position by Stephen L. Melton, who does not consider COG identification meaningful in this type of situation.[358]

As we can see, the adversary issue has originated from various translations and interpretations of Clausewitz and resurfaced later due to debate and has eventually found its way into doctrine. By looking at the source material, it can be argued that Echevarria's ideas have not carried into the current doctrinal family in any significant form. Instead they have remained mostly in the theoretical sphere of debate and discussion, even though he agrees upon a number of issues with his fellow theorists.

This could be due to his fairly strong advocacy of Clausewitz's original texts and a refusal to separate the levels of war into their own COG's. Furthermore, his 'focal point' definition of COG deviates significantly from all the other theorist' definitions. It should also be noted that his EBO related recommendations seem to have been ahead of time, or not strong enough, to have made a lasting impression on doctrine. This might be something to re-evaluate with the MDO doctrine being applied.

Based on the discussion so far, it can be argued that a problem in current COG identification surfaces, if the situation is not clear-cut and one strictly follows the doctrine to the letter without understanding neither the theoretical underpinnings, nor the complexity and everchanging nature of the operational environment. The biggest common nominator for JP 5-0 and AJP-5 is the COG analytical framework (CCs, CRs, CVs) that utilizes Dr. Strange's and Colonel Eikmeir's work.

The usability and significance of this is further highlighted by the fact that both doctrines agree that COGs are transient and subject to change depending on changes in OE and phase of operation. Further, both doctrines agree that COGs are 'power' that resides in a holistic, systemic structures and is applicable in all levels of war. This all culminates in the common analytical framework (CCs, CRs, CVs).

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[358] Compare, Barfoed (2018), p. 118 and Melton (2012), p. 98. Unlike Barfoed, Melton sees COG searching "a fruitless effort" in situation where one might not exist.

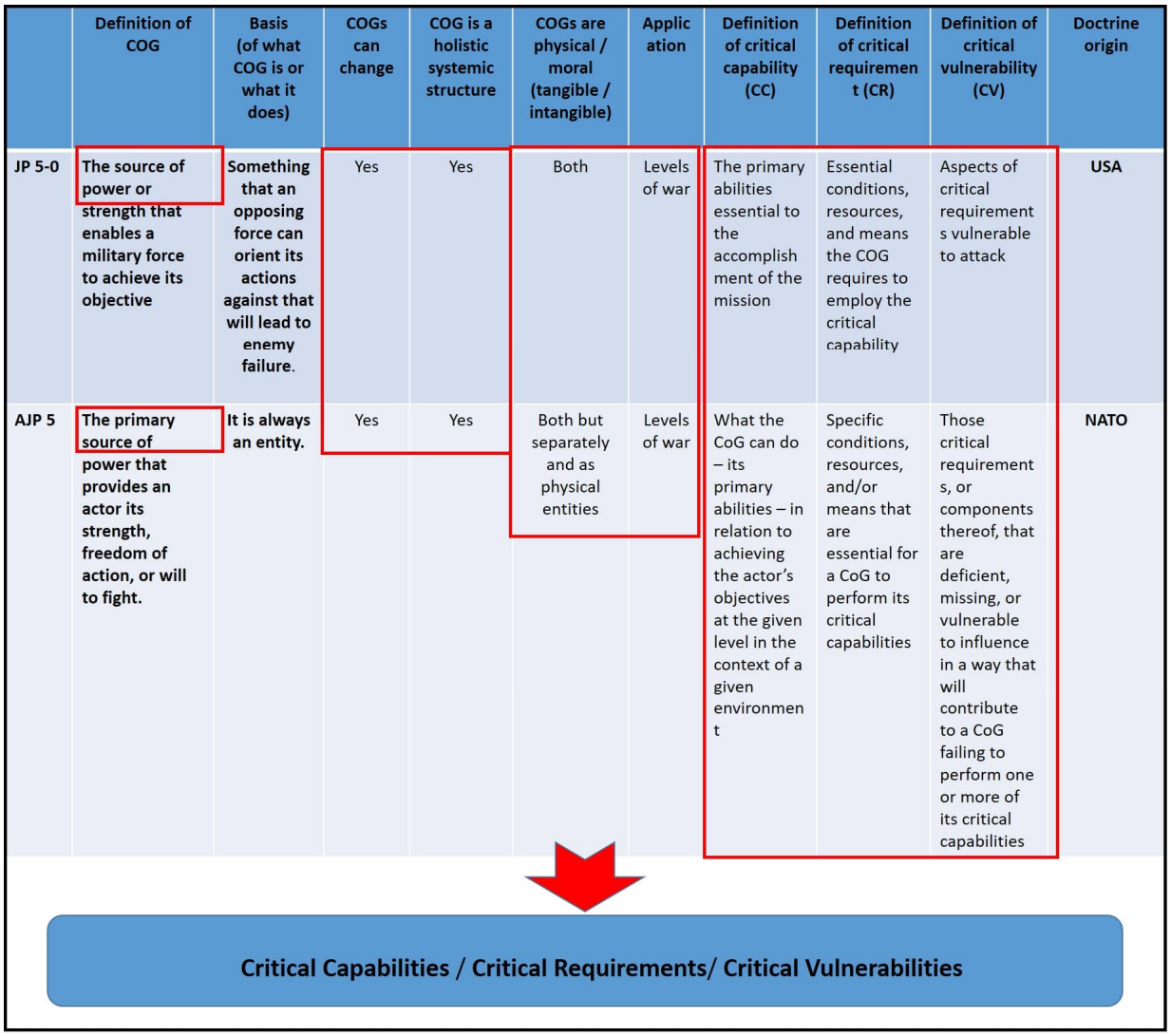

Figure 23: Component formulation from 'joint doctrine' issues

The content analysis done in sub-chapters 2.2.2 and 2.2.3 provided total of six themes: *Definition of COG, Basis, COGs ability to change, COG as a systemic structure, COG as tangible/ intangible, and COG's applicability within levels of war,* and *definition of CCs, CRs, CVs*. By using these themes provided by the content analysis and the discussion above we can formulate them into a type as illustrated by figure 23.

The figure above shows that it was possible to formulate a component for the theoretical model that is a synthesis of the joint doctrines. Thus, component formulation from 'joint doctrine' issues sub-chapter has provided the fifth and last component of the COGTMC.

3.5 COG theoretical model construct (COGTMC)

Building the COGTMC has not been an easy process. It was done by drawing together information of the COG from various historical sources, looking at the variations regarding its linguistics and interpretation as well as analyzing definitions and comparing theoretical and doctrinal evolution. The COGTMC is a synthesized model created from the components derived from 16 separate themes.

These themes are the ones that have risen from the source material through content-based content analysis. A compilation of the themes with illustrations is found in appendix 8. The number of variables present in the selected material have required considerable re-reading to make condensing of the component parts of the model from the themes possible. This has been a hermeneutical process in its essence.

Chapter two started the analysis by defining the themes needed for chapter three. The 16 themes were described in detail on sub-chapter 2.1 and 2.2, respectively. This part of the analytical process was finished in chapter three, sub-chapters 3.1, 3.2, 3.3 and 3.4 where used for the formulation of the five components parts of the COGTMC were described in detail;

These are (in the order of appearance):

- The (main) thing to focus on
- Concentrated force/effect
- Primary entity / strength that includes tangible and intangible elements which attains the objective
- A (friendly / enemy) holistic systemic structure that can change and is applicable in all levels of war
- Critical Capabilities, Critical Requirements and Critical Vulnerabilities

The creation of the COGTMC was the end product of combining the separate component parts into a model which is illustrated by figure 24. The creation of the COGTMC also completed the first part of the overall analytical process and phase 2 of the research design.

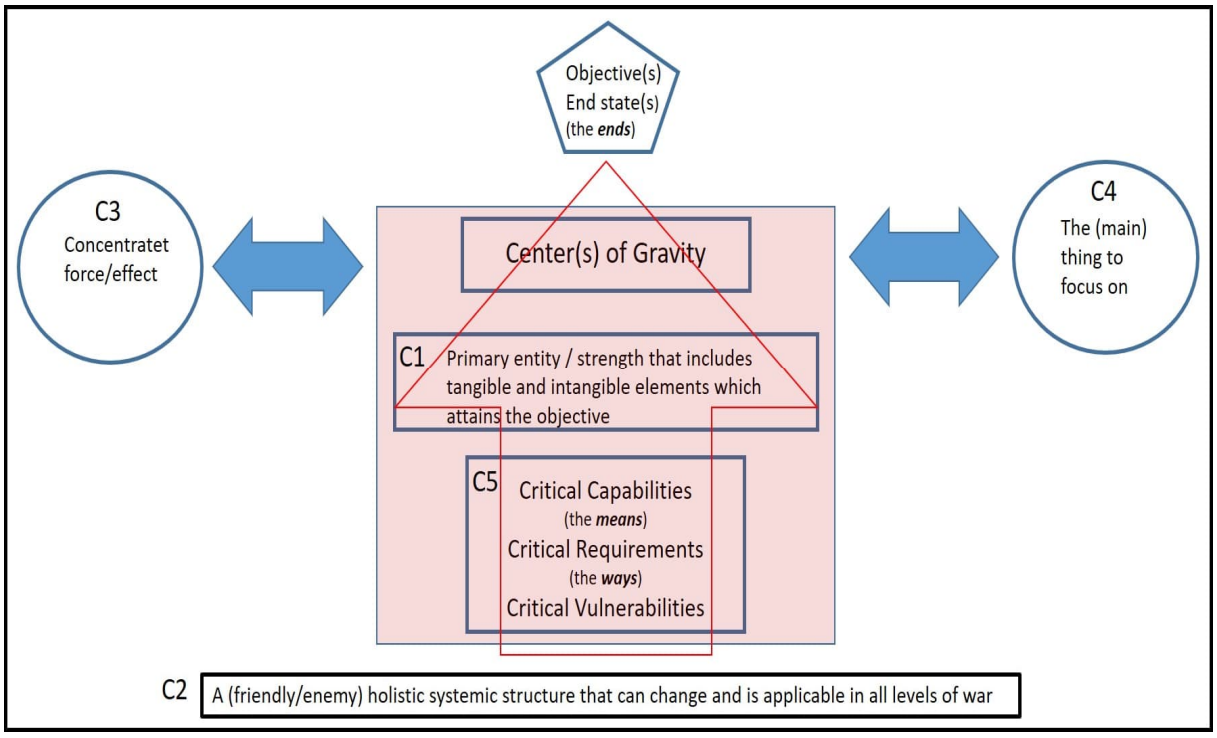

Figure 24: COG theoretical model construct and component parts

The figure of the model illustrates in a concise way the interrelationships of various elements of the COG concept by bringing together historical and linguistic effect, interpretation issues, theoretical debate (and its effect) as well as the current joint doctrines COG analytical framework. Thus, the COGTMC portrays the analytical results derived from chapters two and three and how they relate to the research task. Center(s) of gravity (COGs)[359] are situated in the middle as it is the 'heart' or main focus of the model. Based on the analysis in this model the COG is defined as the *primary entity / strength that includes tangible and intangible elements which attains the objective*.

This definition is also named **the first component (C1)** of the COGTMC model. It describes the main utility of COG identification and definition analytical process and it works towards achieving the military objective / end state, thus describing its purpose. The other four component parts that form the 'bones' of the model describe properties, functionalities and analytical elements of COG without creating a list of examples, analogies or metaphors. This is a conscious choice in an effort to simplify the model and narrow out possible interpretation issues as well remain true to the source material and analytical results.

[359] Multiple COGs are possible at any given time especially at strategic and operational levels of war.

The second component (C2) of COGTMC resides at the bottom of the picture and it describes a property of the COG. It highlights the importance of seeing holistically both the OE and friendly/enemy systems as an interconnected structure (system of systems). This affects the COG which can change dynamically according to changes in OE or phase of operations and is applicable in all levels of war. This component sets the framework and context for COG identification.

The third component (C3) of COGTMC is situated on the left side in the picture. It is the *concentrated force/effect* that describes a functionality of COG. The component has some elements of EBO and indirect approach (e.g. Warden's Five rings) as well as direct approach (e.g. traditional massive concentration of military force) with a purpose to destroy enemy main military strength.

The fourth component (C4) of COGTMC is situated on the right side in the picture. It is *the (main) thing to focus on* that describes a functionality of COG. This component is connected to the utility of COG and how different levels of war have different kind of COGs, i.e. different things to focus on. Furthermore, it relates to how both the tangible and intangible elements can have different focuses or kind of focal points.

The fifth and last component (C5) of COGTMC is situated in the middle box below COG definition. It is the analytical matrix (CCs, CRs, CVs) that describes the analytical elements that are used to identify, define and analyze the COG in one's own and adversary systems. The matrix is the practical tool that together with critical factor analysis, an important part of OE analysis and a pre-condition for COG analysis, makes it possible to find correct COG. A separate and completely new analytical matrix was not feasible to create at the time allocated for the research.

Thus, sub-chapter 3.5 has drawn together the component parts of the COGTMC and answered the third research sub-question: *How Center of Gravity can be defined as a theoretical model*.

4 ANALYSIS OF MULTIDOMAIN OPERATIONS CONCEPT

The future warfighting is in MDO environment and MDO is the way US Army forces "*contribute to and operate as part of the joint force*"[360]. Further, the Army considers that "*all operations are multidomain operations*"[361] as it prepares to fight in the future near-peer adversaries, such as China and Russia as illustrated by figure 25. The implementation of the MDO concept will in all likelihood affect the joint level planning processes in some timeframe due to effects the U.S. has on the western military doctrine. The purpose of this chapter is to test the COGTMC by comparing it to the MDO concept to see if the COG holds up to this future challenge. This will provide valuable theoretical information on the usability of the COGTMC model as a theoretical tool. This chapter focuses on the selected MDO documents with the purpose of evaluating them against the COGTMC model.

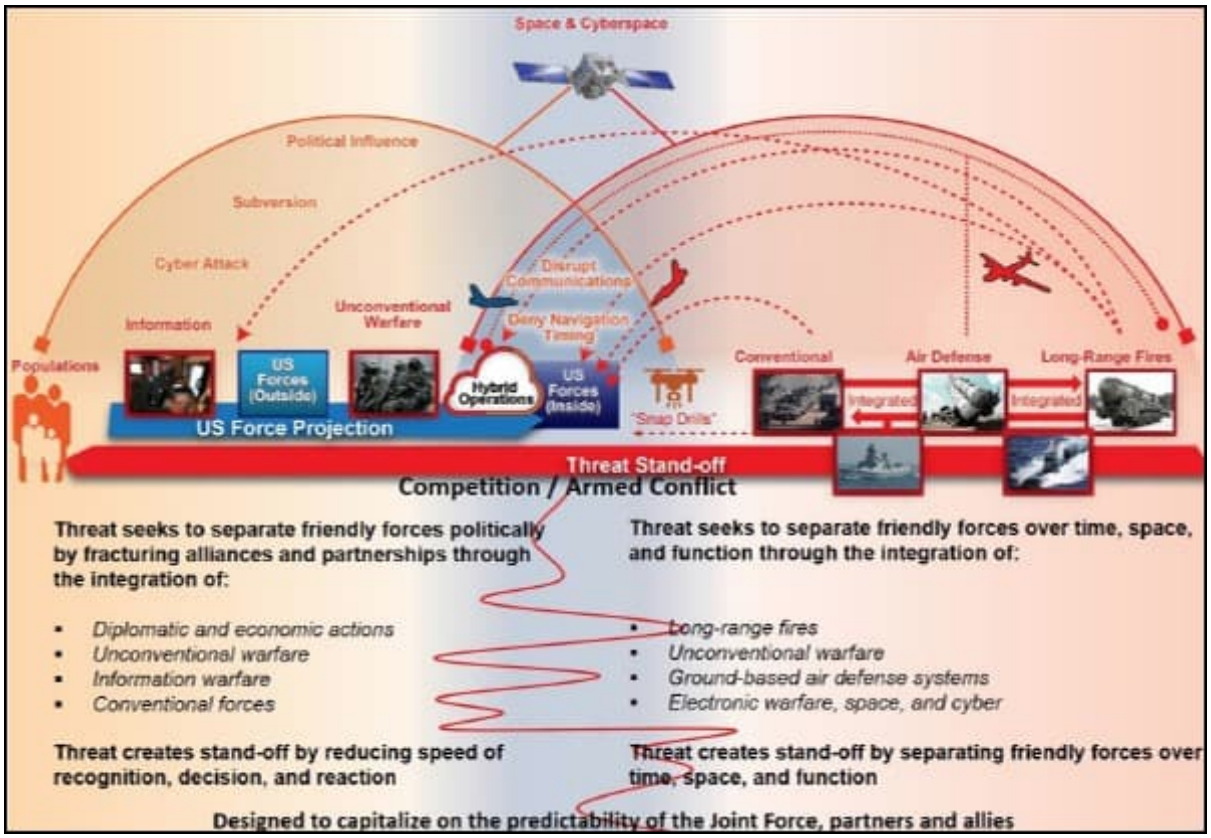

Figure 25: China and Russia as in competition and armed conflict according to TP 525-3-1[362]

[360] FM 3-0, p. 3-1.
[361] Jones & de Leon (2020) [[https://jwc.nato.int/application/files/5616/0523/5418/issue36_08lr.pdf], read 31.10.2021; FM 3-0 (2022) p. 1-3.
[362] TP 525-3-1 (2018), p. 9.

The MDO documents were analyzed by theory-guided methodology using the COGTMC as the theory and comparing the data drawn from the MDO primary source material as well complementing it with selected secondary material (articles etc.)[363]. The main MDO document used was FM 3-0 as it was the latest version of the concept formed into the U.S. Army doctrine family with the approved MDO terminology and framework.

Thus, it provided a finalized mid-tier doctrine to examine and the current versions of the MDO tenets[364]. Of the selected MDO documents TP 525-3-1 and TP 525-3-8 provided parallel information of the concept and insights into the development of the MDO tenets. Marine operation as well as strategic and tactical levels of war were narrowed out as per the research task and chosen focus. The analytical units[365] that drove the content analysis were the five component parts of the COGTMC construct.

I analyzed the MDO concept with regard to the COGTMC model by looking at how the MDO's four tenets (agility, convergence, endurance and depth)[366] correspond to four of the five COGTMC components. With qualitative content analysis, each tenet was first compared to the COGTMC as a whole using specific criteria drawn from the model itself the get a general impression. Then each individual tenet was compared against a single component (from C2 to C4) thus creating total of 16 analytical cycles. Lastly, the hybrid definition of COG was compared against the combined results of tenets analysis.

The criteria for the analysis was drawn from the COGTMC model and it is shown in appendix 9. The reason for selecting the tenets as the focus within the MDO concept was that they cut across the domains and various levels of 'competition continuum' defined in FM 3-0[367]. This provided an opportunity to look at the MDO concept as a whole (as per research framework) without going into domain, or continuum specific, analysis that would have been out of the scope of this research.

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[363] Forum Qualitative Sozialforchung Social Research: *The Use of Qualitative Content Analysis in Case Study Research,* FQS, Volume 7, No. 1, Art. 21 – January 2006. [https://www.qualitative-research.net/index.php/fqs/article/view/75/153], read 26.4.2023.
[364] For U.S. Army doctrine hierarchy and logic chart, see appendix 1.
[365] Siirtola & Tähtinen (2022), pp. 81–89. The analytical units are created from the theory that defines the research phenomenon. I have used as analytical units the five components formulated in sub-chapter 3.5.
[366] FM 3-0 (2022), p. 3-2.
[367] Ibid. p. 1-14. The 'competition continuum' is a joint doctrine way of describing the strategic environment in a way that that is not a simple dualistic war or peace, but rather a dynamic interaction of strategic relationships (cooperation, competition below armed conflict and armed conflict).

Furthermore, for analytical purposes the MDO tenets acted as focal points for each individual COGTMC component to be evaluated against. The purpose of the analysis was to find those parts of the MDO that are valid with the component parts of the COGTMC model in order to appreciate the aggregate model itself. This third phase of the research design was done in order to see if there were enough correspondence with the COGTMC construct to indicate the usability of the COG concept with regard to the current MDO concept. As a result, a comparison table was created at the end of chapter four to accommodate the data derived from MDO concept documents as to evaluate how well the COGTMC model holds up.

4.1 Origin and definition of multidomain operations

The history of the multidomain operations (MDO) concept tracks back to the birth of the AirLand Battle concept that was developed during the Cold War as well as the experiences gained from 'Operation Desert Storm' in Iraq and Kuwait in the 1990s. AirLand Battle doctrine was developed in US Army Training and Doctrine Command (TRADOC) in the 1970s after the strategic defeat in Vietnam and notes taken from the 1973 Arab-Israeli war with a mindset for the future wars as 'not to lose' vis-à-vis achieving decisive military end-state. AirLand battle evolved into official doctrine in 1982 with the publication of US Army Field Manual (FM) 100-5.[368]

After the Cold War in the U.S. the so called 'Revolution in Military Affairs (RMA)' discourse contributed significantly to the doctrinal development due to perceived new type of conflicts and fast paced technological development. This arguably paved way for the later inception of the MDO concept. Other prominent influences to the MDO doctrine have been Russia's 2014 annexation of Crimea and 2018 *United States Security Strategy*, the *Joint Operating Environment 2035* and in 2020s the recent 2nd Nagorno-Karabakh war and the current and ongoing Russo-Ukraine war. FM 3-0 systems warfare example from Ukraine in appendix 10 exemplifies the challenges of the MDO environment.[369]

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[368] FM 3-0 (2022), p. 'foreword'; Wille, Dennis: *The Army and Multi-Domain Operations: Moving Beyond AirLand Battle*. New America, October 2019, p. 14. [https://www.newamerica.org/international-security/reports/army-and-multi-domain-operations-moving-beyond-airland-battle/], read 2.5.2023; Perkins, David G.: *Multi-Domain Battle -Joint Combined Arms Concept for the 21st Century*. Association of the United States Army, 2016. [https://www.ausa.org/articles/multi-domain-battle-joint-combined-arms], read 4.7.2023; Raitasalo (2013), p. 212–213; Rekkedal (2013), p. 63–65.

[369] Raitasalo (2005), p. 192–198; Joint Chiefs of Staff: *Joint Operating Environment (JOE) 2035 -The Joint Force in a Contested and Disordered World*., United States 2016, p. 28–29, 47–48; Wille (2019), p. 5; TP 525-3-1 (2018), p. 6; FM 3-0 (2022), p. 'foreword'.

The MDO concept was developed to meet needs of the U.S. Army after national security focus shifted from counter-terrorism operations to addressing near-peer adversaries (e.g. Russia and China) "*on an increasingly complex and unpredictable battlefield*" where these adversaries can create "*political and military stand-off*" and challenge domain dominance of the Joint Force. The concept links to an idea that China and Russia have altered the battlefield by expanding it to include cyberspace, electronic warfare and information therefore making it harder to differentiate between peace and war as illustrated by figure 26. However, the MDO concept is also versatile enough to be used in other situations as well.[370]

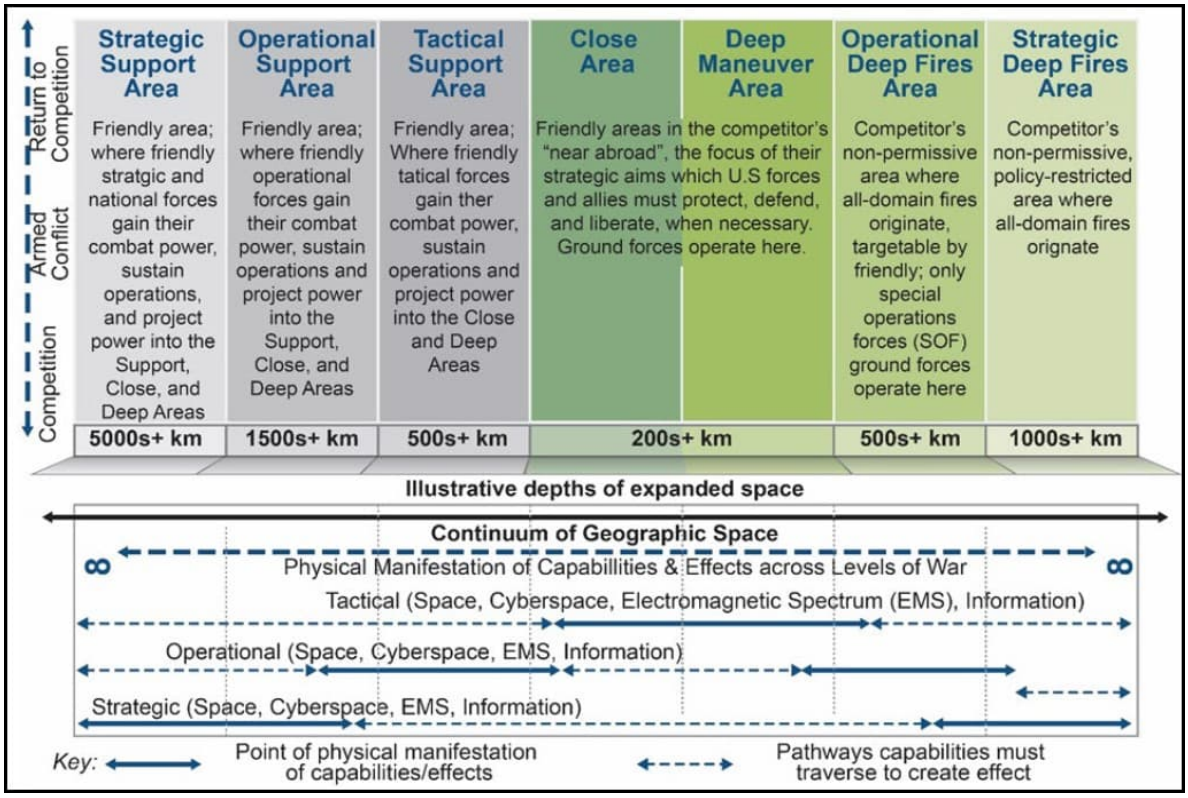

Figure 26: MDO framework according to TP 525-3-1[371]

The MDO concept is described in detail in the TRADOC pamphlet (TP) 525-3-1 '*The U.S. Army in Multi-Domain Operations 2028'*. Conceptual development was supported by TP 5-3-8, '*U.S. Army Concept for Multi-Domain Combined Arms Operations at Echelons Above Brigade 2025-2045'* as well as TP 525-3-0, '*The U.S. Army Capstone Concept* (ACC)'.

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[370] Feickert, Andrew: *Defense Primer: Army Multi-Domain Operations (MDO)*. Congressional Research Service, November 2022. [https://crsreports.congress.gov/product/pdf/IF/IF11409], read 28.4.2023; Tan, Michelle: *The Multi-Domain Battle*. Defense News, October 2016. [https://www.defensenews.com/digital-show-dailies/ausa/2016/10/03/the-multi-domain-battle/], read 2.5.2023; Perkins, (2016). [https://www.ausa.org/articles/multi-domain-battle-joint-combined-arms], read 4.7.2023. See also, TP 525-3-1 (2018), p. 5–8, 15. TP 525-3-1 argues that current (before 2018-2022) conceptual framework does not take into consideration the stand-off problem posed by Russia and China thus the need for a new concept.

[371] TP 525-3-1 (2018), p. 8.

Guidance was given by *Army Multi-Domain Transformation* (*AMDT) -Ready to Win in Competition and Conflict* document. The first complete version of the MDO in the U.S. Army doctrine family was published in the form of *Field Manual 3-0 Operations* in 2022 and it conceptually links to other doctrinal publications, such as ADP and AJP -series.[372]

In 2018 James K. Greer stipulated that in the U.S. armed forces, the Air Force uses Army's MDO concept, whereas the Navy has "*Distributed Lethality*" concept and the Marines Corps "*Expeditionary Advance Base Operations (EABO)*" concept. This exemplifies the ongoing development of the MDO within the U.S. armed forces and also iterates the fact that a joint vision is still being sought.[373]

To further complicate matters, an interesting thing to note is how the individual doctrines between the U.S and NATO define what fits into the 'domains of warfare' category. The description or list is not the same in all of the selected doctrines. From terminology perspective there exists some difference of an opinion regarding what is considered a domain and what an operating environment. This can be compared to the evolution of context, use and interpretation that has plagued the COG.

For example, JP 5-0 considers the domains of warfare to consist of the physical domains of air, land, maritime and space (total of four) and that the information environment (including cyber) and electromagnetic spectrum (EMS) are separate entities. NATO defines domain simply as "*A specified sphere of activity or knowledge*" and operating environment as "*A composite of the conditions, circumstances, and influences that affect the employment of capabilities and bear on the decisions of the commander*". NATO domains connect to PMESII spectrum used to analyze operational environment. However, there are three *dimensions* (land, air / space and maritime) that are comparable to U.S. domains.[374]

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[372] TP 525-3-1 (2018), p. 1; TP 525-3-8: (2018), p. 8; FM 3-0 (2022), p. v. See also, Department of the Army, Headquarters: *Army Multi-Domain Transformation* (*AMDT) -Ready to Win in Competition and Conflict.* Department of the Army, Chief of Staff Paper #1, Headquarters, Washington D.C 2021.

[373] Greer, James: Ulysses S. Grant, Command and Control, and the Multi-Domain Battlespace of the future. Modern War Institute, West Point 2018. [https://mwi.usma.edu/ulysses-s-grant-command-control-multi-domain-battlespace-future/], read 21.6.2023.

[374]Compare AJP-5 (2019), p. xvii, Lex-11; COPD (2021), p. 2-8, 3-53, 4-13, K-3; TP 525-3-1 (2018), p. iii, vi and JP 5-0 (2020) p. III-32, III-40; COPD (2021), p. 4-13. NATO COPD 3.0 recognizes the same five operational domains. Interestingly AJP-5 does not mention the term "domain" in any part of the document. TP 525-3-1 agrees with NATO doctrines and puts forth same five (5) domains and separates the information environment and EMS from the list of "domains" whereas JP 5-0 acknowledges four physical domains (air, land, maritime and space), however it is unclear from the phrasing whether the information environment (that includes cyberspace) and the electromagnetic spectrum are domains or not.

FM 3-0 defines domain as "*a physically defined portion of an operational environment requiring a unique set of warfighting capabilities and skills*" and further lists the same five domains as JP 5-0. For the FM 3-0 dimensions are physical, information and human and they are used to evaluate the impact of operations. The information dimension as described by the FM 3-0 is narrowed out of the MDO related analysis as the focus here is the physical world. Donnelly and Farley adequately describe that "*the purpose for the existence of the domain concept is to provide a framework for focusing action in pursuit of strategic aims*" which draws together this part of the discussion.[375]

TP 525-3-8 defines 'multi-domain' term as *"dealing with more than one domain at the same time"*[376]. This emphasizes the challenge of having to operate (or create effects) in multiple domains simultaneously. JP 5-0 tries to clarify this by explaining 'all-domain operations' in the following context: *"The joint force will increasingly operate in a transregional (across multiple areas of responsibility [AORs]), all-domain (land, air, maritime, space, and cyberspace)...environment*".[377]

Thus, the JP 5-0 lists what it considers are the domains of warfare: land, air, maritime, space and cyberspace. This, however, leaves out of domains other elements such as information and electromagnetic spectrum and does not mention the MDO concept. It should be iterated that neither the DoD dictionary nor the NATO AAP-06 dictionary by NATO Standardization Office (NSO) recognize the terms 'multi-domain'/ 'multidomain' or 'multi-domain operations'. Same applies for the current joint level doctrines.

This is probably due to the fact, that the MDO concept was still in development at time of the last update and the term had not solidified yet into general use. This will probably change when NATO military dictionaries and lexicons are next brought up to date. The description of 'all-domain operations' found in JP-5.0 is also a good analogue.[378]

Furthermore, it seems that TP 525-3-1 describes MDO in relation to organization and operational context instead of simple definition of the term:

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[375] FM 3-0 (2022), p. 1-18, I-20; Donnelly & Farley (2019). [https://www.japcc.org/essays/defining-the-domain-in-multi-domain/], read 20.6.2023.
[376] TP 525-3-8 (2018), p. 90.
[377] TP 525-3-1 (2018), p. x; TP 525-3-8 (2018), p. 90; JP 5-0 (2020), p. III-33. See also, DoD (2021), p. 11, 55, 127, 136, 198. DoD dictionary and TP 525-3-1 recognizes the same five domains as JP 5-0.
[378] JP 5-0 (2020), p. III-33.

"The...concept describes how Army forces fight across all domains, the electromagnetic spectrum (EMS), and the information environment and at echelon"[379].

Based on the previous arguments and observations it is likely that the U.S. armed forces use all-domain operations (ADO) parallel to multi-domain operations (MDO) to describe the future warfighting domains whereas *AMDT* from 2021 uses Joint All Domain operations (JADO) to describe where MDO resides in joint family. JADO is U.S. DoD concept that promotes jointness in the services as to prepare for the next war where "*integrating effects across all domains*" is paramount for success.[380]

TRADOC pamphlets TP 525-3-1 and TP 525-3-8 and the AMDT seem to provide together a picture of the MDO concept that gives both strategic and operational meaning to the definition depending on the context where it is applied. The lack of synchronization regarding MDO terminology most likely stems from unfinished nature of the development and update work, disagreements amongst services as well as linguistic variance between U.S. and NATO. This highlights the significance of understanding theoretical concepts and related terminology the same way as to avoid confusion brought by interpretation and contextual issues.

Currently MDO is defined by US Army *Field Manual 3-0 Operations* thusly: "*Multidomain operations are the combined arms employment of joint and Army capabilities to create and exploit relative advantages that achieve objectives, defeat enemy forces, and consolidate gains on behalf of joint force commanders*"[381]. This emphasizes a comprehensive approach where all capabilities are brought fore jointly in order to achieve desired results and end-state.

As noted from the discussion above, MDO suffers somewhat from same kind of conceptual dissonance as the COG. For the purpose of this research, I will use the MDO to describe both terms as well as the older 'multi-domain battle' term and only make the difference if the source clearly indicates a deviation from this common analogue. Further, for clarity I will use only 'multi-domain' form of the term to harmonize content unless a source is directly cited.

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[379] TP 525-3-1 (2018), p. 5; Hitchens (2021). [https://breakingdefense.com/2021/06/secdef-oks-joint-warfighting-construct-joint-requirements-due-soon/], read 2.5.2023; AMDT (2021), p. 6; Locklear, Roye Jr.: *The Army of 2040 -An extension of the 2030 Goals*. Landwarfare Paper 154 / March 2023, The Association of the United States Army 2023, p. 2. [https://www.ausa.org/publications/army-2040-extension-2030-goals], read 4.7.2023.

[380]Hitchens (2021). [https://breakingdefense.com/2021/06/secdef-oks-joint-warfighting-construct-joint-requirements-due-soon/], read 2.5.2023.

[381] FM 3-0 (2022), p. 1-2.

It should be iterated that the traditional physical domains of air, land, maritime and space together with the cyber domain and the information environment & electromagnetic spectrum all fall under the general term 'multi-domain'. This also coincides with the official MDO concept paper. Thus, when discussing domains of warfare or MDO in this research, the meaning is overarching unless otherwise dictated or directly cited. In addition to aforementioned definition, FM 3-0 emphasizes how the five domains are further divided into three dimensions: human, physical and information[382]. The aggregate model of the OE illustrated in figure 27 shows the how the information and PMESII factors cut across the physical domains.

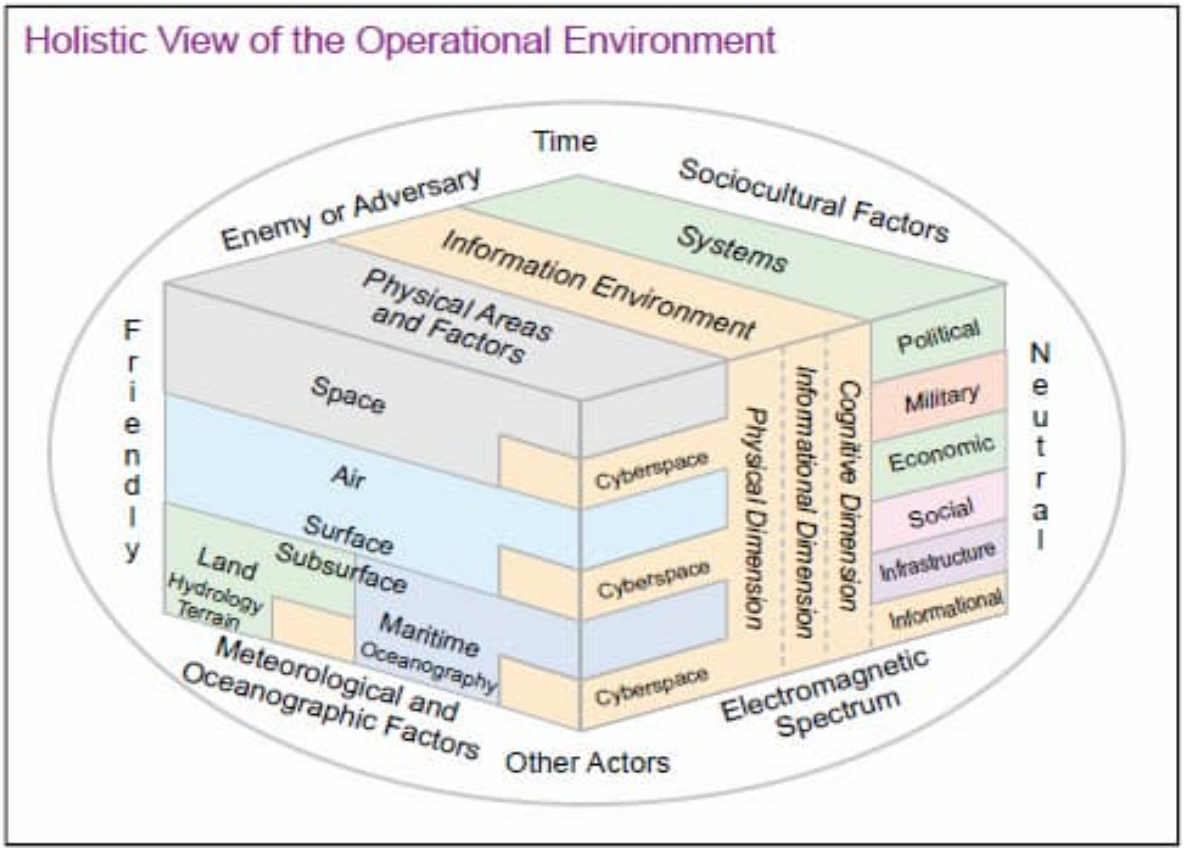

Figure 27: Holistic view of the operational environment according to JP 5-0[383]

As we can see, the picture above, the OE exemplifies well the holistic nature of the MDO environment. Furthermore, it highlights the complex nature of the modern OE and thus places considerable pressure for the MDO concept to deliver what it promises.

4.2 Multidomain operations as a concept

[382] TP 525-3-1 (2018), p. vi; FM 3-0 (2022), p. 1-16
[383] JP 5-0 (2020), p. III-11.

The concept of multi-domain operations (MDO) resides within the Joint Warfighting Concept (JWC). The idea of MDO is to break down traditional domain specific boundaries in order to provide as many "tools" as possible for the commander. Further, it underlines the importance of joint actions by all services in an Operational Area (OA)[384] in support of the Joint Force Commander.[385]

According to FM 3-0 "*all operations are multidomain operations*" and their purpose is to "*fracture the coherence of threat*" by striking various ways the interconnected and interdependent systems (SoS) thus creating opportunities to exploit. The doctrine emphasizes the interconnectivity of one's own systems where the joint and domain interdependence reinforces and complements capabilities as well as mitigate vulnerabilities, but at the same time require constant integration in a contested OE.[386]

For the Army MDO means a need to become a more balanced actor, that not just consumes assistance, but also able to provide support and create effect for the adjacent services (and domains) in order to establish *"windows of superiority*" for the Joint Force[387]. These 'windows' link closely to what the FM 3-0 calls "*relative advantage*", an opportunity created in any domain in order to move towards, or achieve the military objective[388].

The Army context where MDO operations are conducted is illustrated by figure 28. It exemplifies that there exists no clear boundary between war and peace, but instead a revolving joint competition continuum between competition, crisis and armed conflict. The essence of MDO according to AMDT (2021) is to introduce a "*transformational change to join warfighting*" by 2035"[389]. I will use 'continuum' term when referring to the entire competition continuum and separate parts of the trinity as required.

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[384] JP 5-0 (2020), p. III-40. Operational areas (OA) with geographical boundaries are a combination of aforementioned physical domains and operational actions are performed in all domains, EMS and information environment.
[385] Hitchens (2021). [https://breakingdefense.com/2021/06/secdef-oks-joint-warfighting-construct-joint-requirements-due-soon/], read 2.5.2023; Palazzo Albert & David P. McLain III: *Multi-Domain Battle: A New Concept for Land Forces*. War on the Rocks, September 2016. [https://warontherocks.com/2016/09/multi-domain-battle-a-new-concept-for-land-forces/], read 5.5.2023.
[386] FM 3-0 (2022), p. 1-2–1-3, 2-15. See also, Laird, Robbin: *Multi-domain Integration: Australia's 21st Century Way of War*. The National Interest, April 2016. [https://nationalinterest.org/blog/the-buzz/multi-domain-integration-australias-21st-century-way-war-15854], read 5.5.2023.
[387] Palazzo & McLain III (2016). [https://warontherocks.com/2016/09/multi-domain-battle-a-new-concept-for-land-forces/], read 2.5.2023 and Tan (2016). [https://www.defensenews.com/digital-show-dailies/ausa/2016/10/03/the-multi-domain-battle/], read 2.5.2023.
[388] FM 3-0 (2022), p. 1-2.
[389] Department of the Army, Headquarters: *Army Multi-Domain Transformation -Ready to Win in Competition and Conflict*. Department of the Army, Chief of Staff Paper #1, Headquarters, Washington D.C 2021, p. 2–4.

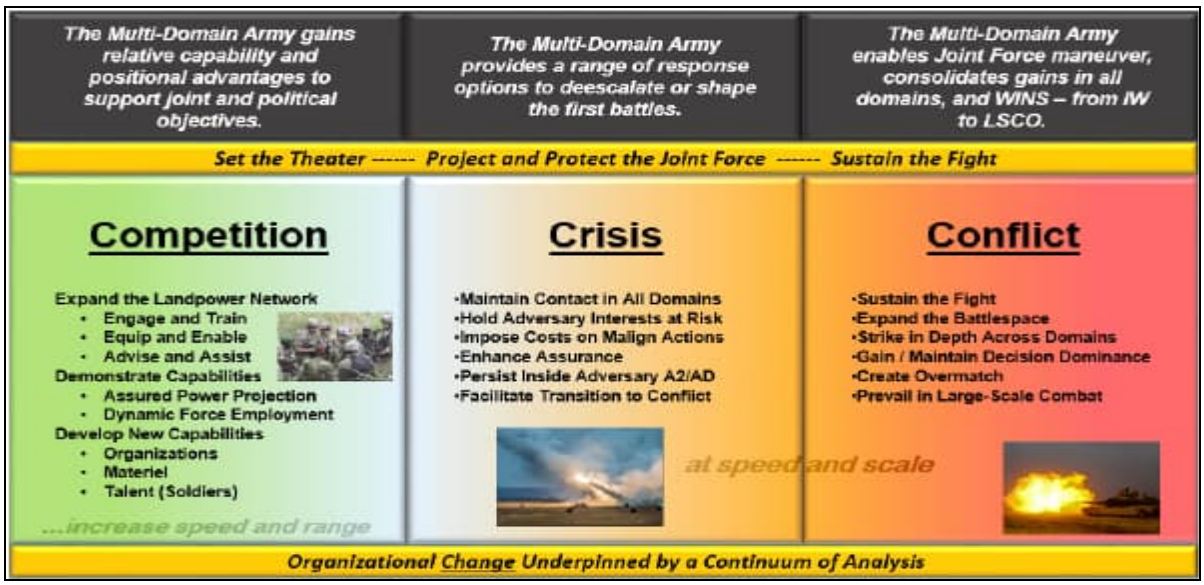

Figure 28: U.S. Army strategic context and operational categories according to Army Multi-Domain Transformation[390]

Further, I will use the 'competition' in the same context as FM 3-0 which means 'competition below armed conflict'. This term is defined by the FM 3-0 as "*two or more state or non-state adversaries have incompatible interests, but neither seeks armed conflict*", yet low levels of violence are possible. Another part of the continuum is 'crisis' which the doctrine describes as "*emerging incident or situation involving a possible threat to the United States, its citizens, military forces, or vital interests…that commitment of military forces and resources is contemplated to achieve national and/or strategic objectives*". It can pave way to an armed conflict either in the long run or nearly instantaneously. The final part of the continuum is 'armed conflict' that is defined as a condition where "*a state or non-state actor uses lethal force as the primary means to satisfy its interests*" and it can be conventional, irregular or a combination of the two.[391]

The four tenets of multi-domain operations are "*mutually reinforcing*" ways to solve various problems (figure 29) in different phases in the competition continuum[392].

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[390] AMDT (2021), p.2.
[391] Ibid. p. 1-14–1-15. Examples of competition given by FM 3-0 include Cold War exercises and Ukraine security assistance since 2014. The context of conflict is in relation to the adversary to differentiate it from natural disasters. It is here that the COG related adversary debate discussed earlier becomes relevant. Examples of crisis given by FM 3-0 are the Cuban missile crisis and Iraq's invasion of Kuwait. Armed conflict is always political decision, as is the its end. Examples of armed conflict provided by the doctrine are Vietnam War and Operations Desert Storm and Inherent Resolve.
[392] Wille (2019), p. 9–10; FM 3-0 (2022), p. 1-2; TP 525-3-1 (2018), p. 17.

FM 3-0 defines them as "*desirable attributes that should be built into all plans and operations, and they are directly related to how the Army's operational concept should be employed*" [393]. I argue that the significance of the tenets resides in the fact that they are not tied neither to a level of war nor to any specific moment in the competition continuum. As mentioned at the beginning of this chapter, the tenets cut across the MDO concept and as such provide a perfect focal-points for the analysis of COGTMC. This makes them especially relevant for this research. The tenets also reflect the recognized problems of MDO as illustrated in figure 29.

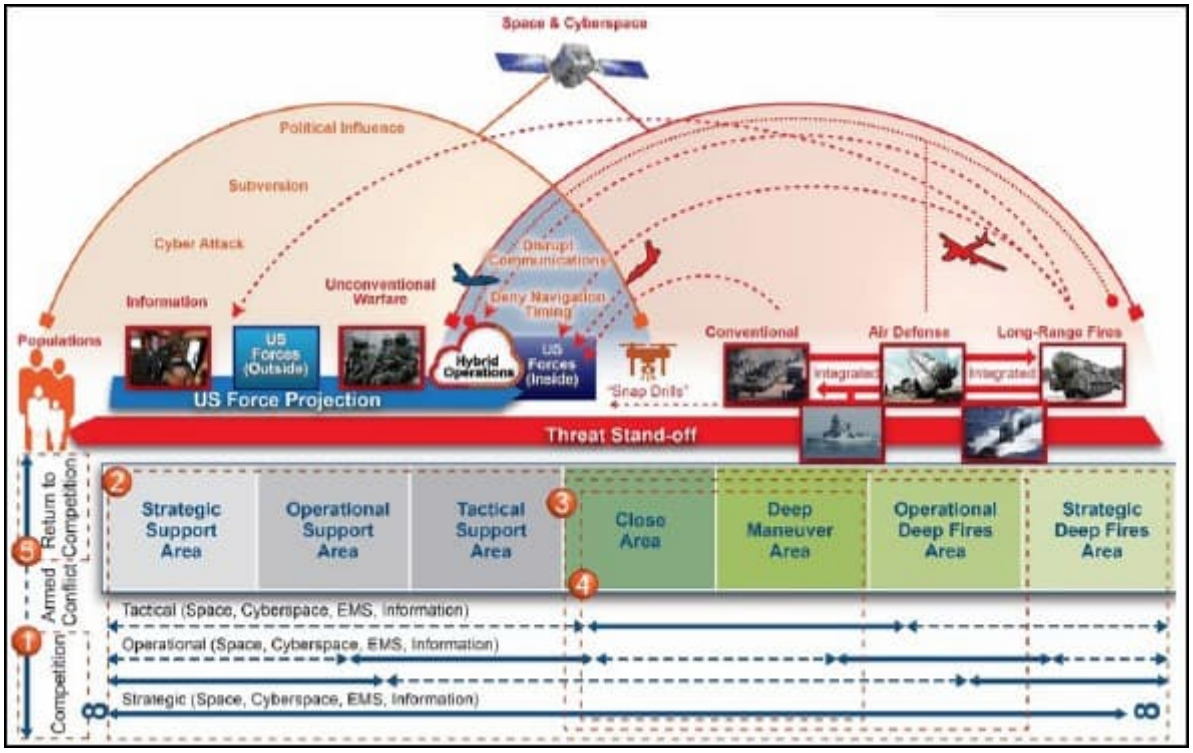

Figure 29: Problems superimposed on the MDO framework according to TP 525-3-1[394]

The Army contributes to the joint effort with its multi-domain operations doctrine, the FM 3-0 which is the end result of a long path influenced by many senior U.S. Army four-star generals[395].

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[393] Compare, FM 3-0 (2022), p. 3-2 and TP 525-3-1 (2018), p. 17. TRADOC conceptual paper from 2018 has slightly different tenets: C*alibrated force posture, multi-domain formations, and convergence*. Only convergence seems to have remained from 2018 to the current 2022 FM 3-0.

[394] TP 525-3-1 (2018), p. 16.

[395] Compare, Palazzo, Albert: *Multi-Domain Battle: Meeting the Cultural Challenge*. The Strategy Bridge, November 2017.[https://thestrategybridge.org/the-bridge/2017/11/14/multi-domain-battle-meeting-the-cultural-challenge], read 5.5.2023; FM 3-0 (2022), p. 1-2 and Tan (2016). [https://www.defensenews.com/digital-show-dailies/ausa/2016/10/03/the-multi-domain-battle/], read 2.5.2023. Palazzo criticizes MDO concept of not actually changing or discussing the existing U.S. Army culture.

Further, as stated by the Congressional Research Service (CRS) report, there are organizational changes implemented through the MDO that will take the Army back to the historical Division and Corps structure as well set up five 'Multi-Domain Task Forces'[396].

Some of the criticism directed at MDO is placed at its very foundation. Does it really seek to alter the way the US Army and NATO wage war or is it just a way to justify increases in budged or to reinstate the land forces positions amongst the services?[397]

Enabling MDO will require modernization throughout the spectrum as well as coordination between the services if a coordinated approach regarding MDO is to be acquired. One key element of the operationalization of the MDO will be the Multi-Domain Task Forces (MDTFs)[398].

4.3 Multidomain operations and COGTMC

The purpose of this sub-chapter is to analyze the MDO concept using the COGTMC model using its five components[399] and the four interrelated and mutual reinforcing tenets of MDO agility, convergence, endurance and depth.[400] The sub-chapter is divided into four separate parts that each provides the analytical information needed for the conclusion.

4.3.1 Agility

The tenet of agility is related to speed, tempo and maneuver and was introduced as a new term with the publication of US Army FM 3-0.

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[396] Feickert, (2022). [https://crsreports.congress.gov/product/pdf/IF/IF11409], read 28.4.2023. These task forces will be geographically located in various regions (1xEurope, 2xIndo-Pacific, 1xArtic and 1xGlobal).
[397] Palazzo (2017).[https://thestrategybridge.org/the-bridge/2017/11/14/multi-domain-battle-meeting-the-cultural-challenge], read 5.5.2023.
[398] Feickert, (2022). [https://crsreports.congress.gov/product/pdf/IF/IF11409], read 28.4.2023; Locklear (2023), p. 2. [https://www.ausa.org/publications/army-2040-extension-2030-goals], read 4.7.2023. See also, AMDT (2021), for reference on how the U.S Army plans to conduct the Multi-Domain transformation.
[399] For reference, see figure 24 in chapter 3, sub-chapter 3.5.
[400] Compare, 525-3-1 (2018), p. 17–20 and FM 3-0 (2022), p. 3-2–3-7. Earlier TRADOC MDO conceptual TP 525-3-1 portrays three tenets: calibrated force posture, multi-domain formations and convergence. Of these, only convergence ended up in the final version of the doctrine (FM 3-0). It is a good example of evolution of the concept.

Agility is present throughout the competition continuum and various levels of war. It provides commanders and senior leaders flexibility during competition, possibilities with force composition and mission variance during crisis, and enables units to recognize and utilize opportunity with rapid movement in armed conflict. FM 3-0 defines the tenet of agility as the "*ability to move forces and adjust their dispositions and activities more rapidly than the enemy*" and it is visible through operational tempo. The new term is more descriptive, yet at the same time compact and understandable.[401]

In order to gather and mass military force, or to achieve concentrated effect, one must utilize sufficient speed, operational tempo and ability to maneuver. These three elements are present in all domains even though the way we understand and discern them differs from domain to domain. It can be argued that the tenet of agility draws heavily from historical roots of maneuver warfare as well as Clausewitzian tradition of massing of force and effect in time and place to achieve desired outcome. In agility we can see the end result of the conceptual development that started from TP 525-3-1 with the term "*calibrated force posture*". The idea was originally tied to enhancing Army combined arms maneuver and massing of effects at decisive spaces with emphasis placed location and maneuver. TP 525-3-1 described it as a new way of using old principles thus providing advantage over the enemy systems.[402]

Furthermore, I argue that the old definition by TP 525-3-1 was vague at best and completely useless at worst due to misleading definition vis-à-vis desired outcome of describing how to tackle MDO challenges. This problem was corrected by discontinuing its use in FM 3-0 with the implementation of 'agility'.

The second component (C2) and agility connect through the OE and systemic structures. In modern warfare the OE is constantly changing. Changes are reflected in the shifts of the competition continuum as well as in the battlespace where domains and tangible-intangible elements constantly overlap and interact. This creates effects to combat and support operations throughout the continuum. Further, as discussed earlier, JP 5-0 implies that this overarching effect of the various factors extends not just into military, but further into the sphere of other instruments of power (DIME)[403].

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[401] FM 3-0 (2022), p. xii, 3-3.
[402] TP 525-3-1 (2018), p. ix, 17. See also, appendix 4 for definitions and interpretation of *schwerpunkt* (COG) by various authors and sources as well as FM 3-0 (2022), p. "foreword".
[403] For definition of DIME, see f.ex. FM 3-0 (2022), p. 5-5.

FM 3-0 states that "*agility requires leaders to anticipate needs or opportunities*"[404]. In order to successfully plan and implement operations one must constantly use sufficient agility to adjust assessment of friendly and enemy systems. This also means to accurately discern the relevant properties of these systems in order to take advantage of them.

Moreover, these systems cannot be viewed as separate, or broken into component domains, but instead they need to be looked holistically. It means taking into consideration the operating environment and how the all the different levels of war are focused on achieving the military objective. Thus, agility and C2 can be seen as properties and enablers, but also elements that create framework and provide context for COG.

The third component (C3) and agility have several elements that connect them. The idea of Effect Based Operations (EBO) as well as the direct-indirect approach resonate well with agility due to their close connection with massing of force to attack identified systemic vulnerabilities. Furthermore, both agility and C3 can be seen as functionalities that create advantage over the adversary. This forms a conceptual bridge between them.

The fourth component (C4) and agility can be seen to connect mainly through tempo. According to ADP 3-0 "*tempo is the relative speed and rhythm of military operations over time with respect to the enemy*"[405] FM 3-0 further states that "*it implies the ability to understand, decide, act, assess, and adapt*". The aforementioned passage highlights the need to find the essential thing focus on, an ability to find the signal from the noise.

There are different (main) things to focus on at different times and on different levels of war. This means a constant assessment of tangible and intangible elements in order to adapt and adjust the force tempo accordingly. Moreover, the 'advantage tempo' of competition can quickly and flexibly change into 'superior tempo' of armed conflict within the continuum[406]. This requires ability to focus on the main thing on any given time. Thus, tempo can be seen as a tool that brings utility and focus to agility.

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[404] FM 3-0 (2022), p. 3-3.
[405] Ibid. p. 2-8.
[406] Ibid. p. 3-3.

The fifth component (C5) and agility form the connection forms yet again through tempo. The CC–CR–CV model is a practical tool for analysis of one's own and adversary system in order to find the specific COG through its component parts (CCs, CRs, CVs). A clear-cut analytical model like this provides focus and clarity which enables a faster assessment of critical factors and the OE. Further, it provides a way to influence the speed of the OODA-loop[407] by providing needed agility and an ability to respond flexibly to the changes in the competition continuum. As discussed earlier in this research, the identification of COG can be difficult in a situation where no clear adversary exists. However, FM 3-0 provides a solution to this by dividing operations according to the competition continuum framework and by providing guidance and an example of adversary methods during a particular phase[408].

All five components of the COGTMC were thus compared to MDO tenet 'agility'. Table 4 compiles the analysis and shows below the results and conclusions.

Table 4: Comparison of MDO tenet 'agility' with COGTMC

COGTMC component (2-5)	MDO tenet: AGILITY (meets/does not meet COGTMC criteria)	Conclusions
Component 2 (C2): A (friendly / enemy) holistic systemic structure that can change and is applicable in all levels of war	Meets criteria	Agility and C2 are both properties and enablers, but also elements that create framework and provide context for the COG.
Component 3 (C3): Concentrated force/effect	Meets criteria	Agility and C3 are both functionalities that create advantage over the adversary by rapidly utilizing massing of force and capabilities to attack systemic vulnerabilities.
Component 4 (C4): The (main) thing to focus on	Meets criteria	Agility and C4 connect mainly through tempo. Tempo brings utility agility and provides it focus.
Component 5 (C5): Critical Capabilities, Critical Requirements and Critical Vulnerabilities	Meets criteria partially	Agility and C5 connect through tempo. The CC–CR—CV model provides focus, clarity which enables faster tempo and a way to influence the OODA-loop.

Based on the above, it can be argued that the MDO tenet of agility meets COGTMC components C2 to C5 criteria.

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[407] Decision making model developed by U.S. Air Force Colonel John Boyd (OODA = Observe, Orient, Decide, Act). A Lecture by professor John Olsen for the GSOC 61 at the Finnish National Defence University 11.4.2023.
[408] For detailed description, see FM 3-0 (2022), p. 4-1–6-47. Operations by continuum specific details are portrayed in chapters four to six of the document.

4.3.2 Convergence

Convergence is the only MDO tenet that has retained its name from earlier concepts (TPs 525-3-1 and 525-3-8). The purpose of convergence is to create "*exploitable opportunities that enable freedom of action and mission accomplishment*". It requires a high level of focused synchronization which can be achieved by using holistic understanding of the enemy/adversary system, including capabilities, vulnerabilities and processes, in relation to one's objective. This requires integration and synchronization of capabilities on a service and joint level throughout the domains. This is done in order to create "*simultaneous, sequential, and enduring effects against the enemy system*". Convergence is one of the key tenets for global integration of a joint force and essential for defeating the adversary anti-access and area denial A2/AD. [409]

Figure 30 illustrates well the idea of convergence and at the same time provides an example of how MDO differs from previous concepts.

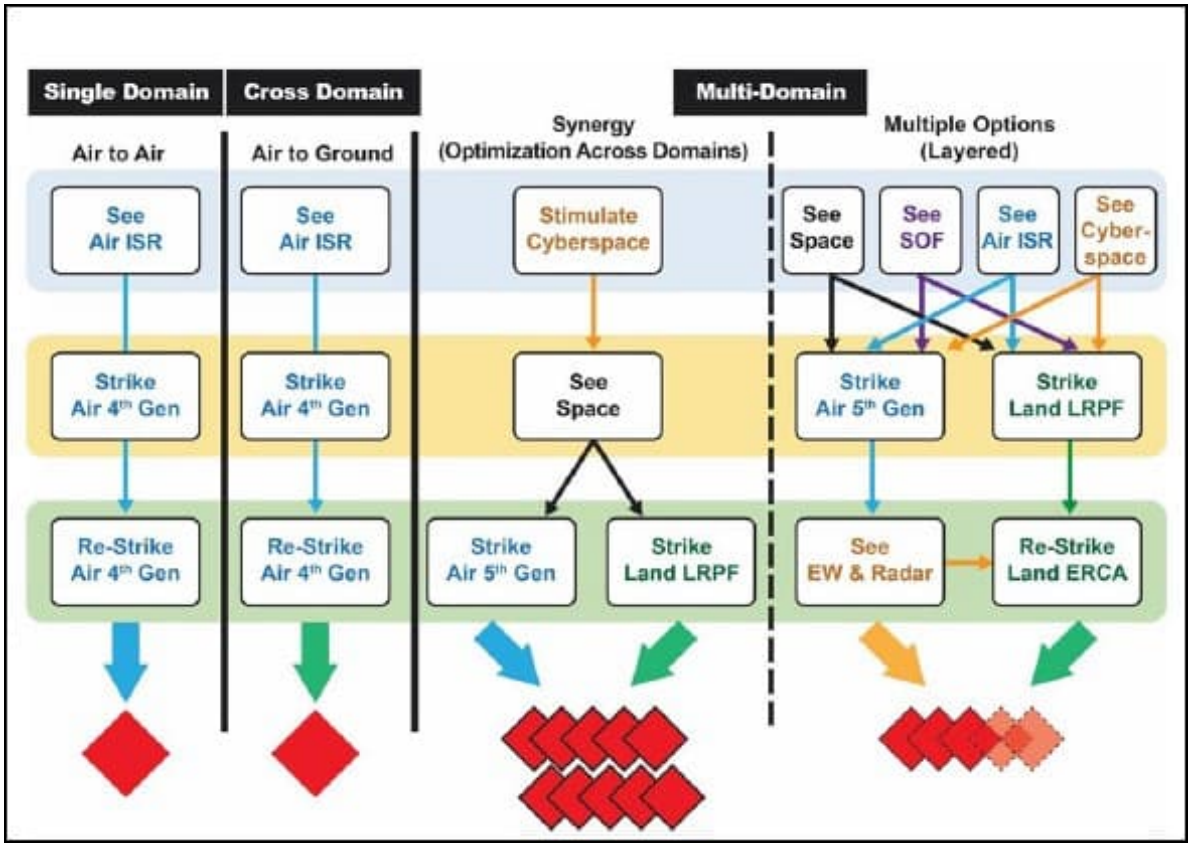

Figure 30: Converging capabilities according to TP 525-3-1[410]

[409] FM 3-0 (2022), p. 3-3–3-4, 6-17; TP 525-3-1 (2018), p. 17.
[410] TP 525-3-1 (2018), p. 21.

By using converging assets, the MDO force is able to create multiple effects in from various directions in order to "*impose complexity on the enemy*". Furthermore, convergence exposes the adversary's COG vulnerabilities and complicates their defense throughout the continuum. This "*cross-domain synergy*" and "*layering of options*" is what separates convergence from the traditional single domain variants. However, convergence can be seen as a challenge with regard to command and control (C2). It requires a high level of interoperability between the services and allies (e.g. NATO) as well as resilient communications that enable centralized planning and decentralized execution with synchronized action.[411]

Convergence is shown as a flexible tool that serves as a deterrent during competition, provides basis for joint action at the time of crisis and armed conflict, and serves as a focus for anticipatory planning throughout the continuum. Furthermore, FM 3-0 underlines the need to understand the service specific requirements, processes and time needed for integration to be able to plan the integration and synchronization in a way that convergence becomes possible.[412]

The second component (C2) and convergence have several points where they connect. The idea of perceiving the adversary as a system of interconnected structures and processes is at the heart of convergence and C2[413]. The OE in all domains is in a constant state of motion and the changes within it affect convergence, C2, and thus also the COG. Convergence links conceptually to C2 through the COG theoretical debate discussed earlier, where the idea of a combined holistic and systems approach is seen essential for COG determination.[414]

Moreover, what connects both convergence and C2, is the need to specify and determine the target for the overall effect with a purpose of striking multiple recognized (tangible/intangible) vulnerabilities at the same time where needed. This is where convergence can be seen as a kind of a property. By providing "*layered options*", several kinds of convergence in different domains simultaneously, it creates insurmountable complexity to the adversary[415].

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[411] TP 525-3-1 (2018), p. 20–23; FM 3-0 (2022), p. 3-6.
[412] FM 3-0 (2022), p. 3-6.
[413] TP 525-3-8 (2018), p. 23.
[414] TP 525-3-1 (2018, p. 21.
[415] Ibid. p. 21.

The third component (C3) and convergence specifically connect through massing of effect and capabilities. The changing and dynamic nature of COG requires the massing and synchronization of resources and capabilities in order to create sufficient effect in any domain. A key element of convergence is the principle of massing of force and combat power as one part of cumulative effect (and simultaneous use of other means elsewhere) for a specific purpose, objective or a decisive point[416]. As discussed earlier, it is also an old fundament of military operations dating to Clausewitz and *schwerpunkt*. Thus, it has a strong connection to the C3. Both can be seen as functionalities aimed at creating the desired effect via "*windows of superiority* as described by TP 525-3-8."[417]. The effects created by the converging capabilities can be either direct or indirect which is true also for utilization of C3.

The fourth component (C4) and convergence connect through synchronization. Component C4 is connected to the utility of COG and how the focus shifts between levels of war and tangible-intangible elements. According to FM 3-0 convergence requires a high level of synchronization and integration to be effective. The doctrine also highlights the need for leaders and commanders to have a good understanding of the OE in order to assess the situation accordingly, and focus on the right things (specific targets and objectives) in order to make it work. Further, in order to synchronize and integrate the capabilities in all domains one must focus planning centrally, but enable decentralized execution.[418]

The conceptual background of C4 relates to something to focus on, a location to focus the (mass) on, or a way to focus (mass), whereas convergence, through synchronization and integration, provides a way to focus capabilities in space, time, and across domains. Thus, both of them need a specific kind of focus. For C4 the synchronization develops through the need to find the (main) thing to focus on and for convergence this same focus develops through synchronization and integration.

The fifth component (C5) and convergence connect through the comprehensive analysis of the adversary system[419]. The degree of convergence is dependent on the level of understanding of the adversary system, capabilities, processes and related vulnerabilities[420].

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[416] FM 3-0 (2022), p. 3-3, A-2.
[417] TP 525-3-8 (2018, p. 23, 2018.
[418] FM 3-0 (2022), p. 3-3–3-4.
[419] For a definition of the systems warfare methodology, see TP 525-3-8 (2018), p. 23.
[420] FM 3-0 (2022), p. 3-4.

Similarly, the COG analytical matrix that C5 presents uses CCs, CRs, CVs to identify, define and analyze the COG in one's own and adversary systems. Thus, both C5 and convergence can also be seen as practical tools for achieving desired results.

It can be argued that CC–CR–CV analysis is a way to find and define COG through systemic analysis together with effect-based approach by focusing on the mission objective, whereas convergence uses the level of systemic understanding and assessment of effects as a way to measure the extent convergence has been achieved. Both look ways to find and exploit vulnerabilities (TP 525-3-8 uses the term 'critical nodes')[421] in order to create a cascading effect that causes a systemic collapse in all phases of the continuum. It should be noted that Milan Vego have argued that this kind of SoS analytical perspective does not sufficiently consider the human element, reduces war too much, "*disconnects*" the COG from the objective enabling multiple COG's and thus makes COG 'lose its meaning'[422].

Figure 31 illustrates how MDO concept perceives SoS as well Rueschoff & Dunne's idea of how COG identification can be visualized from SoS. The similarities are striking.

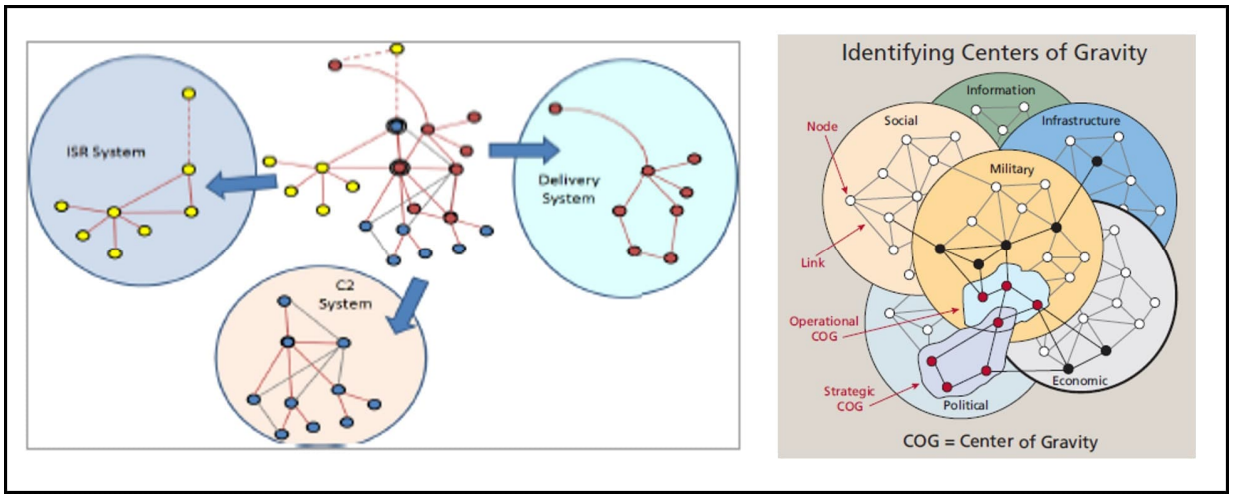

Figure 31: Left picture the composite SoS according to TP 525-3-8 and right picture the COG identification from a systemic structure by Rueschhoff & Dunne[423]

All five components of the COGTMC were thus compared to MDO tenet 'convergence'. Table 5 compiles the analysis and shows below the results and conclusions.

[421] TP 525-3-8 (2018), p. 33.
[422] Vego (2006b), p. XIII-60–XII-61.
[423] TP 525-3-1 (2018), p. 33; Rueschhoff & Dunne (2011), p.121.

Table 5: Comparison of MDO tenet 'convergence' with COGTMC

COGTMC component (2-5)	MDO tenet: CONVERGENCE (meets / does not meet COGTMC criteria)	Conclusions
Component 2 (C2): A (friendly / enemy) holistic systemic structure that can change and is applicable in all levels of war	Meets criteria	C2 and convergence perceive the adversary as a system of interconnected structures and processes (SoS) and connect via the need to specify and determine the overall effect with a purpose of striking multiple vulnerabilities at the same time.
Component 3 (C3): Concentrated force/effect	Meets criteria	Convergence and C3 specifically connect through a Clausewitzian massing of effect and capabilities. Both can be seen as functionalities aimed at creating the desired (cumulative) effect via "*windows of superiority*".
Component 4 (C4): The (main) thing to focus on	Meets criteria	C4 relates to something to focus on whereas convergence, through synchronization and integration, provides a way to focus capabilities in space, time and across domains. For C4 the synchronization develops through the need to find the (main) thing to focus on and for convergence this same focus develops through synchronization and integration.
Component 5 (C5): Critical Capabilities, Critical Requirements and Critical Vulnerabilities	Meets criteria	Convergence and C5 connect through the comprehensive analysis of the adversary system and they can also be seen as practical tools for achieving desired results. Both look ways to find and exploit systemic vulnerabilities in order to create a systemic collapse in all phases of the continuum

Based on the above, it can be argued that the MDO tenet of convergence meets COGTMC components C2 to C5 criteria.

4.3.3 Endurance

The third tenet, endurance, has its roots in TP 525-3-1 and was originally called 'multi-domain formations'. The basic idea of endurance is based on resilience accumulated over time and in advance in various theatres. This resilience is the capacity and capability of the (joint) force to "*conduct independent maneuver, employ cross-domain fires and maximize human potential*". This enables the force sustain itself over extended periods of time and conduct operations in contested environment and from dispersed locations.[424]

[424] TP 525-3-1 (2018), p. 19.

It also takes into consideration intangibles, such as training & education as well as flexible planning, and prepares to operate as dispersed units of various size. FM 3-0 defines endurance accurately as "*the ability to persevere over time throughout the depth of an operational environment*". Key elements of endurance are ability organize and to keep up sustainment of the force via maritime, air, land, space and cyber domains as well as provide adequate protection for it. [425]

The second component (C2) and endurance seem to have little in common at first look, however, the connection can be found in the moral or intangible aspects. As noted with the previous two tenets, C2 emphasizes a holistic and systemic approach to OE that takes into consideration both friendly and adversary systems. This includes both moral and physical (tangible/intangible) elements. One of the moral aspects is the "*will to fight and ability to command*".

This moral endurance of the force is portrayed in of one's own and adversary systems in various ways, such as leadership skill and ability as well as the level of training and related capability to execute maneuver and cross-domain fires. These elements are not tied to a specific level of war, nor are they only part of a particular phase in the continuum. They exist throughout the continuum and take different forms depending on dynamic changes in the OE and overall situation. Thus, it can be argued that these intangible elements of 'endurance' resonate well with C2 of the COGTMC as it implicitly entails them as part of the structure.

The third component (C3) and endurance connect through resilience and maneuver as means to mass force. Preparation and dispersion of force together with a steady stream of pre-stacked supplies to combat troops are key enablers to enhance endurance. This makes it possible to "*mass combat power from dispersed positions to generate desired effects*"[426]. This principle of endurance stated in FM 3-0 aligns well with the *concentrated force/effect* functionality of C3. Furthermore, it also rings true to the Clausewitz's *schwerpunkt* and the related discussion that has served as basis for the formulation of C3[427].

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[425] FM 3-0 (2022), p. 3-6–3-7.
[426] Ibid. p. 3-7.
[427] See Chapter 2, sub-chapters 2.1.1 and 2.1.2 for detailed discussion on Clausewitz's *schwerpunkt* and appendix 4 'definitions and interpretations of *schwerpunkt*' for historical comparison.

The fourth component (C4) and endurance connect very thinly, if at all, together. A strenuous connection might be found through the contributing factors that affect endurance. According to FM 3-0, operational tempo, weather, physical distance, the strength of the adversary and possible early culmination of the all have effect on the force[428].

One could argue that a connection between C4 and endurance can be formed by looking at the contributing factors and drawing a conceptual line to the point where the main thing to focus is one or all aforementioned factors. However, this would create false analysis of the source material as there is no additional contributing evidence in the content itself. Furthermore, it would force endurance to be a specific (one) thing rather than combination of factor as portrayed above. Thus, I argue that C3 and endurance do not have a discernible connection.

The fifth component (C5) and endurance have a similar connection through systemic analysis as convergence had with C5. FM 3-0 notes that "*endurance reflects the ability to employ combat power anywhere for protracted periods in all conditions, including environments with degraded communications, chemical, biological, radiological, and nuclear (CBRN) contamination, and high casualties*"[429].

The analytical matrix that C5 presents uses CCs, CRs, CVs to identify, define and analyze one's own and adversary systems with the aim of finding and defining the COG. However, as part of the process it uses critical factor analysis and produces information related to the entire OE. This type of analysis can provide essential information about endurance related issues and contributing factors in all phases of the continuum. Therefore, it is specifically useful regarding one's own force by enabling the identification of possible vulnerabilities and pitfalls that might have an effect on the endurance of the force.

It can be argued that CC–CR–CV matrix (and the built-in factor analysis) is a tool not just for finding out logistical chokepoints, identifying the means for sustainment or enabling protracted operations, it is also a way to *create* endurance through joint planning effort while doing COG analysis.

All five components of the COGTMC were thus compared to MDO tenet 'endurance'. Table 6 compiles the analysis and shows below the results and conclusions.

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[428] FM 3-0 (2022), p. 3-7.
[429] Ibid. p. 3-7.

Table 6: Comparison of MDO tenet 'endurance' with COGTMC

COGTMC component (2-5)	MDO tenet: ENDURANCE (meets/does not meet COGTMC criteria)	Conclusions
Component 2 (C2): A (friendly / enemy) holistic systemic structure that can change and is applicable in all levels of war	Meets criteria	Endurance and C2 connect through intangible, aspects within the friendly/adversary systems as they are implicitly part of both structures but not tied to a specific level of war or part of the continuum.
Component 3 (C3): Concentrated force/effect	Meets criteria	Endurance and C3 connect through resilience and maneuver as means to mass force. The principle of endurance aligns with C3 in accordance with Clausewitzian *schwerpunkt.*
Component 4 (C4): The (main) thing to focus on	Does not meet criteria	There are no contributing evidence in the source material to implicate a connection.
Component 5 (C5): Critical Capabilities, Critical Requirements and Critical Vulnerabilities	Meets criteria	Systemic analysis (CC–CR–CV) can provide essential information about endurance related issues in all phases of the continuum. The factor analysis existing as part of CC–CR–CV matrix is also the means to *create* endurance through joint planning.

Based on the above, MDO tenet of endurance met COGTMC components C2, C3 and C5 criteria (three out of four). Thus, it can be argued that when looked as a whole endurance meets COGTMC components criteria.

4.3.4 Depth

The last tenet, depth, was not part of the original three tenets mentioned in the initial MDO concept documents TP 525-3-1 and 525-3-8. Thus, it has no direct terminological relation to the previous versions of the MDO doctrine the same way as the other current MDO tenets do. However, it is one of the 'unified land operations' tenets mentioned in ADP 3-0. Thus, a reference point for depth can be found in ADP 3-0 which states that depth is an essential part of operations. Depth is on one hand related to deployment and use of Army forces and on the other hand it makes it possible to "*extend operations in time and space*". According to ADP 3-0, the capability to conduct operations in depth (i.e. operational reach) can be seen as a pre-requisite for simultaneous action across multiple domains. Thus, depth contributes to, and acts as an enabler of convergence, but it can also be seen as an integral element of endurance.[430]

[430] ADP 3-0 (2019), p. 2-9, 2-11, 3-3, 3-11–3-12.

Moreover, TP 525-3-1, TP 525-3-8 and ADP 3-0 all present actions or 'defeat mechanisms' in depth together with a number of solutions as an integral part of the methods of accomplishing the mission. These actions serve to create multiple dilemmas for the enemy in order to provide 'windows of superiority' that f. ex. disrupt adversary C2, logistics and use of reserves. Further, these actions also are a way to influence the adversary decision making cycle. FM 3-0 defines depth as "*the extension of operations in time, space, or purpose to achieve definitive results*" citing directly ADP 3-0. According to FM 3-0, during competition phase preparations are done by various means to create depth. These will then facilitate use of capabilities against adversary in time of armed conflict.[431]

The second component (C2) and depth connect through the OE, and specifically via the adversary. This is because the focus of depth is on "*enemy locations and dispositions across all domains*"[432]. To achieve this kind of in-depth focus in multiple domains, a comprehensive and holistic systemic view of both the OE and the adversary is required. The changing nature of the OE and the related actions of the adversary changes the COG dynamically. Depth allows one to prepare in advance, and if needed, use (joint) capabilities to extend operational reach of one's own force to create effect at the adversary's operational depth[433]. Furthermore, depth and C2 require commanders the ability to analyze the adversary system as a whole to see and understand the entire battlespace to enable effects at adversary echelons. Therefore, it can be argued that depth and C2 both set the framework and give context to their respective reference points. Also, the systemic view of OE and adversary provides a conceptual linkage between C2 and depth, thus connecting them together.

The third component (C3) and depth connect through focusing force and effect in time and space in order to influence the adversary throughout the continuum. C3 can be seen to be related to depth-related element of operational reach in that regard that a successful concentration of force and effect requires an understanding of one's own capabilities, and also their limitations.[434]

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[431] TP 525-3-8 (2018), p. iv, 16; TP 525-3-1 (2018), pp. vii–ix, 19; ADP 3-0 (2019), p. 2-4; FM 3-0 (2022) p. 3-7, 3-12, 3-19. All these documents use "isolation, dislocation, disintegration, and destruction" as defeat mechanisms. See also FM 3-0 (2022), p. 4-18; TP 525-3-1 (2018), p. iii. There are specific solutions such as "penetrate, disintegrate, exploit" to describe a logical chain of effects and outcomes. These solutions have carried from the original concept papers to the current doctrine. Preparations can be done that will facilitate capabilities such as space/cyber and degradation of adversary A2/AD.
[432] FM 3-0 (2022), p. 3-7.
[433] TP 525-3-8 (2018), p. iv.
[434]ADP 3-0 (2019), p. 3-7, Glossary-7. Operational reach is "The distance and duration across which a force can successfully employ military capabilities".

Moreover, the functionality of COG that is the *concentrated effect* (C3) resonates well with the idea that leaders can "*enhance the depth of their operations*" by influencing and coordinating effectiveness of their operations in one dimension to amplify them in others[435]. Depth is also more than just geographical distance, it can be seen as human potential that portrays itself as technical and professional knowledge and expertise[436]. Human potential is one of the pre-conditions for employing multi-domain capabilities thus enabling concentration of force and effect[437].

The fourth component (C4) and depth connect mainly through purpose and objective. Every military operation requires an objective or defined end state to give it something to focus on and a purpose why it exists[438]. It can be argued that depth has a function of providing purpose via operational design the same way as C4 describes a functionality of COG. This focus, or purpose, can shift and re-focus according to changes in the OE and in relation to the designated objective, but the goal nevertheless remains to achieve definitive results based on the overall objective. Thus, as per the depth tenet definition the focus lies with the adversary and its locations and dispositions throughout the five domains. Further, it is evident that different phases of the continuum have different objectives that sometimes overlap and change depending on situation and the level of war. Sufficient depth in plans (OPLAN & contingency) enables focusing on the most essential task at any given time thus providing a clear purpose for the force regardless of the phase of operations within continuum. Purpose enables the extension of operations and connects to the utility of depth in the way C4 is connects to the utility of COG. This creates a conceptual bridge between the two.[439]

The fifth component (C5) and depth connect through the analysis of one's own and adversary systems. As noted earlier, the focus of depth is on the adversary and "*commanders achieve depth by understanding the strengths and vulnerabilities of the enemy echeloned capabilities*"[440]. For this purpose, the critical factor analysis and the CC–CR–CV matrix provide practical tools.

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[435] ADP 3-0 (2019), p. 3-7.
[436] TP 525-3-1 (2018), p. x.
[437] Interestingly, the MDO concept does not provide an answer as to how this can be analyzed accurately in SoS analysis considering complex human behavior and the fog of war. See also, Vego (2006b), p. XII-53–XII-61.
[438] JP 5-0 (2020), p. xxiii. According to JP 5-0 "The objective is the single most important element of operational design" and the very reason for the existence of the operation.
[439] FM 3-0 (2022), p. 3-7. According to FM 3-0, depth to operations can be added by interoperability with multinational forces, infrastructure preparations as well as expanding influence with allies and local population. This is an example of the versatile nature of depth and how it can be perceived in different ways.
[440] FM 3-0 (2022), p. 3-7; TP 525-3-8 (2018), p. iv, 9.

They do not solely focus on identifying the COG but create a wealth of analyzed information regarding the OE, adversary and own forces. This information can be utilized to create and achieve depth as intended by FM 3-0. One way to perceive the connection between C5 and depth is how operational reach is assessed. Planning staff analyses and takes into consideration sustainment, available capabilities and forces to form courses of action that are compared against adversary capabilities and courses of action[441]. It can be argued that C5 is an essential component of this process of assessing operational limits, risks and points of transition. Furthermore, both C5 and depth cut across the continuum and therefore are applicable in any phase of the operation. Based on the above, it can be argued that the MDO tenet of depth meets COGTMC component C5 criteria. All five components of the COGTMC were thus compared to MDO tenet 'depth'. Table 7 compiles the analysis and shows below the results and conclusions

Table 7: Comparison of MDO tenet 'depth' with COGTMC

COGTMC component (2-5)	MDO tenet: DEPTH (meets/does not meet COGTMC criteria)	Conclusions
Component 2 (C2): A (friendly / enemy) holistic systemic structure that can change and is applicable in all levels of war	Meets criteria	Depth and C2 connect and link conceptually through the systemic view of OE and adversary. The focus of depth is on 'enemy locations and dispositions' across all domains. In order to create effect throughout operational depth and across all domains, an ability to analyze the adversary system as a whole and to understand the entire battlespace is needed.
Component 3 (C3): Concentrated force/effect	Meets criteria	Depth and C3 connect through focusing force and effect in time and space in order to influence the adversary. Successful concentration of force and effect requires an understanding of one's own capabilities, and also their limitations. C3 resonates well with the tenet's idea that leaders can "*enhance the depth of their operations*" by influencing and coordinating effectiveness of their operations in one dimension to amplify them in others. Depth seen as human potential is one of the pre-conditions for employing multi-domain capabilities, thus enabling concentration of force and effect.
Component 4 (C4): The (main) thing to focus on	Meets criteria	Depth and C4 connect mainly through purpose and objective. Depth in plans enables focusing on the most essential task at any given time thus providing a clear purpose for the force regardless of the phase of the competition continuum. Purpose enables the extension of operations and connects to the utility of depth in the way C4 is connects to the utility of COG. Through tempo there is also a connection to the tenet 'agility'.
Component 5 (C5): Critical Capabilities, Critical Requirements and Critical Vulnerabilities	Meets criteria	Depth and C5 connect through the comprehensive analysis of one's own and adversary systems and their capabilities in echeloned depth. The CC–CR–CV matrix can be used to asses depth related issue of operational reach. C5 is an essential component of this process of assessing operational limits, risks and points of transition.

Based on the above, it can be argued that the MDO tenet of depth meets COGTMC component C4 criteria.

[441] FM 3-0 (2022), p. 3-7.

4.4 Conclusions

This sub-chapter compiles the conclusion drawn from the analysis of the MDO four tenets and the COGTMC components C2 to C5. Further, it compares these results against COGTMC component C1, the hybrid definition of COG, as well any COG related definitions from MDO doctrines FM 3-0, TP 525-3-1 and TP 525- 3-8. Appendix 11 shows the results from the first part of the analysis, appendix 12 the compilation of the second part of the analysis, whereas appendix 13 shows a simplified graphic illustration of the MDO concept and COGTMC correspondence (figures 32 and 33).

The results of the analysis indicated that of the 16 analytical cycles only one (1) did not meet the criteria. Thus, based on the criteria established at the beginning of this chapter and the two-part analysis of the COGTMC components C2 to C4 and MDO four tenets, it can be argued that the COGTMC model is applicable with the current MDO concept as portrayed by FM 3-0.

All four tenets met the four general criteria when compared to the COGTMC as a whole. When the four tenets were compared to individual COGTMC components nearly all met the criteria. The one tenet that did not meet the criteria with C4 was ‘endurance’. There were no plausible or perceivable connection evident within the source material to implicate a connection.

One combining factor between several of the tenets and the COGTMC components was an analysis of the OE to create a holistic view of one’s own and adversary resources, capabilities, vulnerabilities and possibilities in order to understand the entire battlespace in all moments within the competition continuum. This enables prudent planning, flexible and fast massing of force, focusing of effort and unity of command in order to create desirable effects in all domains.

Another combining factor was the planning perspective. It is intimately related to the aforementioned analysis of the OE. Several of the MDO tenets underscore the need to conduct planning in advance in order to coordinate, integrate and synchronize (in time and space) the joint force capabilities to be able to respond to the layered threat of the near peer adversaries in all domains. Only this will enable the collapse of the adversary layered systems regardless of what phase is ongoing within the continuum.

Further, an interesting combining factor was found through intangible elements. For the COGTMC intangible, or moral/abstract, elements are embedded within all of the five components. They are portrayed for example through cohesion of the force or alliance, unity of command, will to fight, leadership and planning that affect operations in all levels of war[442]. For the MDO tenets, endurance and depth exhibit intangible elements through enablers such as leadership skill, training, human potential and joint planning, but intangibles are also found in tenets agility and convergence via the OODA-loop and moral systemic vulnerabilities.

Final part of these conclusions is the comparison of component C1 and the results from the four tenets analysis. The first component (C1) of the COGTMC is "*a primary entity / strength that includes tangible and intangible elements which attains the objective*". It serves as the combined definition of COG in the construct model and also describes COG's overall purpose. The component emphasizes COG's utility for the planner as the main doer, a means to achieve the military objective (the ends) while taking into consideration both the physical and moral aspects. Interestingly, the main MDO conceptual document TP 525-3-1 does not have a definition of a COG, however, TP 525-3-8 does. The latter document took form parallel to TP 525-3-1 and is part of the same conceptual family[443].

TP 525-3-8 defines the COG as "*the source of power that provides moral or physical strength, freedom of action, or the will to act*" which is exactly the same wording as JP 5-0 and DoD dictionary[444]. The COGTMC definition of COG includes the aforementioned tangible and intangible elements drawing both from the US/NATO doctrines as well as MDO concept family. Thus, it cuts across the levels of war with multiple COGs possible at any given time within the competition continuum.

As discussed above in previous sub-chapters, the various tenets (or desirable attributes) are derived from the U.S. Army operational concept, are mutually reinforcing, and through planning built into the OPLAN of the joint force. Further, the utility of tenets comes from the way they can be used to assess COA's flexibly throughout the planning process.

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[442] Compare, JP 5-0 (2020), p. xxiii, IV-22, 160 and AJP-5 (2019), p. 3-5, B-1. As noted earlier in chapter two, various theorists disagree whether intangible elements, however, the joint doctrine JP 5-0 considers both tangible and intangibles as factors of OE and does not explicitly rule out moral COG's at operational or tactical levels whereas AJP-5 sees moral COG's possible only at the political-strategic level.
[443] TP 525-3-8 (2018), p. iii, 2018.
[444] Compare, TP 525-3-8, p. 34 and JP 5-0 (2020), p. GL-6; DoD (2021), p. 30.

Similarly, component C1 describes the main utility of COG identification and definition process and that this 'doer', or ability, is the focal point of the analysis exhibiting both effects-based and capability-based properties. Guided by the COG definition and the CC–CR–CV analytical matrix one or more COGs might emerge from the MDO aggregate attributes. However, vice versa, the analysis will more than likely provide insights into improving the individual tenet related issues thus increasing the degree to which an operation exhibits MDO tenets. The key connecting feature between C1 and the four tenets is that they all work towards achieving the military objective by enhancing and improving the chance of success. Moreover, neither restricts, limits or dictates how the mission should be planned. They leave room for mission command type orders, thus providing freedom for the subordinate commands to solve the tactical or operational problems as they see fit.

Based the above, and the conducted on the MDO material, it can be argued that there is sufficient correspondence between the analytical units of the COGTMC and MDO tenets that it can be argued that the current aggregate version of the MDO concept meets the COGTMC model criteria. Further, it can be argued that COG is a valid concept that still has utility in the MDO environment but re-evaluation of the concept and the related analytical framework might be in order in the future. This is due to the evolution of the MDO concept, context, terminology and usage. Moreover, the analysis showed that the COGTMC theoretical model is a useful (theoretical) tool that can be used to analyze a concept such as the MDO.

The criticism presented by Dr. Milan Vego against SoS model is also something to consider. It is probably true that, as Vego claims, that the SoS analysis does not take sufficiently into consideration the Clausewitzian 'friction' and 'fog of war' as well as the human psychological element. He adequately states that "*because combat is a clash of wills, uncertainties and unknowns abound*". It should be remembered that not everything can be calculated.[445]

Chapter 4 first analyzed the MDO concept with content-based analysis by mapping out what MDO is and how it works with sub-chapters 4.1 and 4.2. Then theory-based analysis was used in sub-chapter 4.3 with a focus on the four MDO tenets and COGTMC components. Thus, the analysis and the conclusions in sub-chapter 4.4 answered research sub-question: *What is Multi-Domain Operations concept and how it can be compared to the Center of Gravity theoretical model?*

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[445] Vego (2006b), p. XIII-53–XII-54; XII-58–XII-60.

5 SYNTHESIS

"The art of war deals with living and with moral forces. Consequently, it cannot attain the absolute, or certainty; it must always leave a margin for uncertainty, in the greatest things as much as in the smallest"[446]

—Carl Von Clausewitz

The results of the research came together by looking first at the evolution of the COG concept and then using this information to conceptualize the COG from the doctrines to create a theoretical model construct of the COG. The applicability of this construct was then compared against the data drawn from the selected MDO concept documents mentioned earlier.

This research followed Coloned Dale Eikmeier's line of thought that the 'existent COG' is a thing that exists and that is part of the friendly or adversary system, and that the COG concept is the planning tool, 'conceptual COG', that helps focus planning and operations[447]. A key driver of the research was to look how the 'existent COG' and 'conceptual COG' influence each other through the analysis of both the COG theoretical model construct (COGTMC) and the MDO concept.

Theories collect and systemize previously accumulated research data and should also be potentially to able to prove falsifiable. However, with regard to this qualitative research, there was no need to prove anything true or false, but instead find a new and different way of looking at the COG as a research phenomenon. An example of this accumulation is the COG theoretical model construct created for the purpose of this research.[448]

Contrary to common principle with regard to theories, this research did not aim to generate hypothesis to test, but instead it created the COG theoretical model construct for analytical purposes. The model acted as a theory (of sorts) for this research, however, without a need to prove it true or false. The lack of hypothesis was a possibility to improve the objectivity of the research and to create new theoretical understanding on the subject as well as provide (theoretical) building blocks for the operational art and tactics paradigm.

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[446] Clausewitz, Carl Von: *On War*. Transl. and ed. Michael Howard & Peter Paret, USA 1984 (reprint 1989), p. 86. Note: All of the direct citations of Clausewitz are from this version of Howard & Paret's translation unless otherwise dictated.

[447] Eikmeier (2014). [After the Divorce: Clausewitz and the Center of Gravity | Small Wars Journal], read 31.12.2021.

[448] Jari Eskola & Juha Suoranta (1998), *Johdatus laadulliseen tutkimukseen*, p. 20. See also, Lehtoaro (2016), p. 54. In qualitative research there is no need for cause–relation connection to test a theory.

The overall research framework was abductive with elements of Grounded theory visible in the structure and content of chapters two and three. However, Grounded Theory was not used as framework or a method for this research. Content-based content analysis was done inductively in chapters two and three whereas theory-based deductive content-based analysis was used in chapter four. The former made possible to create the COGTMC theory and the latter to compare the MDO tenets with it.

Through COG analysis and joint doctrines this research tied itself firmly as part of the operational art and tactics branch of science as well as to the art of war discipline. As we have seen, joint level doctrines and the concept of COG stand at the heart of planning. This research formed its framework around those two central elements together with the MDO concept and used the COG history and terminology as a point of origin.

The abstract nature of the COG concept (with its underlying effect on the COG defining process) together with the theoretical interpretation of the COG as well as the joint planning doctrines comprehensive approach, made hermeneutical research strategy a good choice to build a holistic understanding of the phenomenon in question. Each new reading of the source material created additional understanding, new insight and interpretation consistent with the basic principles of hermeneutics. The aggregated interpretation of consecutive readings changed the meaning of the information. Knowledge kept accumulating and refining through the hermeneutical spiral as analysis of source material went forward as well as when the researcher subsequently returned to review and re-examine the material.

This research followed the common structure of content analysis where the aim was to create a concise and clear description of the phenomenon by breaking it into pieces that were conceptualized, classified and themed according to the research task and design, and finally compiled again into logical entity. Bibliographical review was present as part of this research in the selection of material, forming of pre-understanding and in the part where earlier research is reviewed. In this research, content analysis followed the main structure of the method by coding, and creating themes and types from the research material. The coding done during the bibliographic review was essential precondition for the creation of "*themes that describe central issues that raise from the research material*".[449]

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[449] Juhila, Kirsi: Teemoittelu. *Laadullisen tutkimuksen verkkokäsikirja*. Jaana Vuori (ed.), Yhteiskuntatieteellinen tietoarkisto, Tampere. [https://www.fsd.tuni.fi/fi/palvelut/menetelmaopetus/kvali/analyysitavan-valinta-ja-yleiset-analyysitavat/teemoittelu/], read 6.1.2021; Siirtola & Tähtinen (2022), p. 85–87.

Moreover, the table of sources created during coding served as a basis for the systematic view and review of the overall research material as part of the analytical process. Of note is the fact that bibliographic review was not all encompassing due to limited time allocated for the research. The material selected for the research followed the principles outlined in the data collection part of this research plan. Themes that rose from the research material based on the earlier classification done through coding and source material analysis with emphasis on what the material tells the researcher and how similarities and dissimilarities appeared.[450]

Consequently, the interpretation of the content continued until the very end, including the synthesis and conclusions drawn from them. This is why hermeneutics was not just the philosophy of science for this research, but also its research strategy.

The selection of a specific viewpoint made it possible to narrow the scope of the research and focus it to serve a clear purpose. By choosing the planning process development viewpoint, the research was not limited into any particular force structure or domain. This makes the utility of this research universal and less dependent upon future changes.

5.1 Conclusions

Through the research process it was possible to find key elements of the COG concept from the selected doctrines as well related commonalities within the MDO concept. The results of the analysis indicated that the current aggregate version of the MDO concept met the COGTMC model criteria, that the COG concept had utility regarding the MDO environment, and that the COGTMC theoretical model is a useful (theoretical) tool that can be used to analyze a concept such as the MDO.

The theoretical examination of COG validity and usability through creation of a (theoretical) construct, with the related analysis and examination of the source material was the essential new information provided by this research. Thus, it answered the main research question: *How the Center of Gravity concept applies to the Multi-Domain Operations concept?*

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[450] Saaranen-Kauppinen & Puusniekka (2006). [https://www.fsd.tuni.fi/menetelmaopetus/kvali/L7_3_4.html], read 6.1.2021.

The applicability of the COG concept became apparent by analyzing the variations of COG definitions and analytical constructs within the context of the concept's history and theoretical evolution and because the U.S. and NATO doctrines share a common conceptual origin and legacy. This provided an opportunity to look at the usability of the COG concept critically and to evaluate its validity with regard to the MDO concept.

The structure of the research followed the order of sub-questions presented in chapter 1. Each main chapter answered to one or more questions depending on the disposition. At the end of each chapter, there was a section where the essential results and conclusions drawn from the chapter were gathered. This created a logical construct for the research. Chapter three was used to compile and further analyze the information from chapter two in order to formulate components which were then used to create the theoretical model. The model itself consisted of five (5) formulated component parts that together were fused into the COGTMC. Chapter 3 aggregate conclusions created the COG theoretical model construct (COGTMC).

In chapter four the COGTMC was compared against the MDO concept tenets by using four of the five COGTMC components as analytical units. The criteria in appendix 9 was drawn from the COGTMC and used as catalyst whereas individual MDO tenets were used as focal point for evidence. This first part of the MDO analysis provided generalized results (appendix 11) that were used as reference for the next phase.

Lastly the COG definition (component C1) was compared against the results of the tenet analysis. Analyzed information was placed into a collective table with tenet information. This provided the analytical framework for comparison. Conclusions were gathered into the same table (appendix 12) in concise form supplemented by text where the results were discussed in detail. This process provided analyzed information on how the MDO concept responded to the COG concept. This formed the content of chapter four.

The conclusions of the four different sub-questions together formulated a synthesis that answered to the main research question. The synthesis and discussions part of the research gives possibility to broaden the definition and conceptual understanding of the COG as to accommodate the MDO concepts role as a future doctrine of warfare. This formed the content of chapter five. Thus, this fifth chapter compiles the synthesis and the essential results so that it contained the overall conclusions, debate and criticism.

It was my estimation that the definition of the COG had similarities between the U.S. and NATO joint level planning doctrines as they draw from the legacy of previous versions of the same branch of documents as well within the hierarchic doctrinal family itself. This proved to be correct. I used the current iterations of the doctrines but also took into consideration possible changes that might occur during the study. The theoretical debate part of the research provided valuable information on the doctrinal development and also provided a critical look into it. In addition to the primary sources, I utilized relevant research and methodology literature, documents, articles and studies as secondary source material as needed.

The issues and descriptions relating to the COG concept that repeated went through evaluation and comparison, first with regard to the history and evolution part and then further continuing into the joint planning doctrines. The historical evolution and interpretation as well as the theoretical debate parts gave context and made possible to formulate the component parts for the COGTMC model. Furthermore, they provided an insight into how the current doctrinal formulations have developed which created the understanding required to compare the model against the MDO tenets.

The results and conclusions provided themes of the COG concept, which in turn gave a basic understanding of the COG concept as well as its part in the joint operations planning process. This part of the analysis placed specific interest in how the joint level COG concept articulated and linked to the COG definition process since it ties to the later analytical process with the MDO concept. Consequently, the two phases provided "*quotations and segments of the research material that illustrated the themes and provided the reader an idea what the formulation of themes was based on*"[451] and combined them into a table that served basis for the next phase of the analysis, which was the formulation of types.

For this research, the purpose of the formulation of types was to look for commonalities within themes and from those create component parts of the COGTMC. Inductive reasoning was applied throughout themes and types process to widen the understanding of the phenomenon and to proceed from individual cases and issues into general arguments. These component parts combined the material then into the COGTMC which in this case was the aggregate of the most 'essential and central' tenets of the COG concept.

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[451] Juhila (2021). [https://www.fsd.tuni.fi/fi/palvelut/menetelmaopetus/kvali/analyysitavan-valinta-ja-yleiset-analyysitavat/teemoittelu/], read 6.1.2021.

The second part of the analysis used theory-based content analysis adaptively to compare the 'theory of COG concept' with the MDO concept to see how the combined definition of COG correspond to the MDO concept. The main method of reasoning was deductive where the goal was to go from general issues to specific ones.[452]

5.1.1 Conclusions from the formulation of COGTMC

The creation of the COGTMC was illustrated by the VENN-diagram in figure 19 at the beginning of chapter 3. The theoretical construct is a synthesized model created from the five components (types) derived from 16 separate themes that are illustrated in appendix 8. These themes are the ones that have risen from the source material through content-based content analysis and have been formulated into components of the model (types) and finally combined into the COGTMC model (figure 24) as described in sub-chapter 3.5.

Thus, history of COG and the formulation of COGTMC (chapters 2 and 3) answered the research questions one to three:

- *What is the origin of the Center of Gravity concept and how it relates to joint level planning doctrines?*
- *What kind of definitions and descriptions of the Center of Gravity exists in the selected joint level planning doctrines*
- *How Center of Gravity can be defined as a theoretical model?*

The key conclusions from the history of COG and the formulation of COGTMC are:

- The current COG and Clausewitz's *schwerpunkt* are not the same and therefore should not be used interchangeably.
- Clausewitzian origin of the COG and related linguistic and other inconsistences have transformed the concept from its original meaning.
- Positivistic Anglo-American analytic philosophy has changed the meaning of COG from original into an analytical process.
- Metaphors should not be used in doctrine as they create more confusion than clarity.

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[452] Metteri (2008), p. 51, 55; Juhila (2021). [https://www.fsd.tuni.fi/fi/palvelut/menetelmaopetus/kvali/analyysitavan-valinta-ja-yleiset-analyysitavat/tyypittely/], read 7.1.2021.

- The COG theoretical debate has had a significant contribution to the U.S. and NATO doctrine development. Usage of COG concept emphasizes context due to evolution.
- Theoretical understanding of COG helps to identify possible pitfalls in its use.
- The COG concept has utility as a planning tool.
- It is possible to create a hybrid model, such as the COGTMC, by using historical and theoretical information as well as U.S and NATO joint planning doctrines.

The translations and the historical background have created variations of interpretation. These have created a specific (transitory) understanding of COG which emphasizes the significance of context as a driver for interpretation. Further, context, and the interpretation tied to it, have been shifting over time due to theoretical debate as well as doctrinal development. This "*concept extension and displacement*"[453] leaves residues from old meaning and transfer them into new ones.

Thus, interpretation and translation related issues have relevance for the model because they span more than 150 years. This is a factor that cannot be ignored, as it related to the overall structure of how we understand and conceptualize COG today and indicates continuing change in the future as well.

For this research there were a selected number of COG theorists that have contributed to the debate and discussion. As discussed earlier in this research, all of the theorists agree that the concept of COG has utility but for different reasons. Further, they agree upon some key elements and building blocks of COG whereas disagree on other. Most notable disagreements are in relation to the definition of COG and related analytical construct as well as whether or not intangible (moral/abstract) have significance.

Almost all acknowledge the significance of a holistic view with related systems of system perspective because a complex phenomenon such as war cannot be oversimplified, or reduced, too much[454]. The theoretical debate part of this research contributed into two out of five components of COGTMC and thus provided a significant portion of it. Moreover, it showed that theoretical debate has contributed to doctrinal development directly as well as indirectly.

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[453] Paparone & Davis (2012), p. 66.
[454] Interestingly Dr. Milan Vego sees the system of systems approach *specifically* as the one reducing the complexity of war and its human element into calculable 'key nodes'. See Vego (2006b), p. XIII-53–XII-61.

The selected joint doctrines were a good source to analyze because they shared enough similarities and characteristics for comparison, but still differed because they were for specific purpose reflecting the needs and requirements of the US and NATO. Hence, they provided variation in the interpretation of the COG.

An interesting part that rose up was the fact that the U.S. joint doctrine had seen at least five definitions of COG before the latest 2020 version as well as that contrary to U.S., NATO's defining of COG did not seem to have necessarily needed an adversary. This reiterated the constant change and evolution in the concept and its usage.

The aforementioned overarching linguistic, interpretational and theoretical issues were visible in JP 5-0 and AJP-5. They presented themselves as emphasis placed on achieving the military objective by successfully defining and identifying the COG. At the operational level influencing the adversary COG affects its ability to achieve operational objectives[455]. Thus, it can be argued that a faulty COG analysis could bring severe consequences to the effort of achieving one's own operational, and therefore strategic, objectives.

The biggest common nominator for JP 5-0 and AJP-5 was the CC–CR–CV analytical matrix. Furthermore, both doctrines agreed that COGs are transient and subject to change depending on changes in OE and phase of operation. The joint doctrine part contributed to COGTMC by providing the analytical framework to the model. Moreover, it showed that in order to create a completely new COG analytical model for practical planning purposes a more in-depth look at the critical factor analysis and CC–CR–CV analytical matrix is probably required.

I previously argued that when we are looking at the COG concept, we are always looking to COG definition process and vice versa. In my opinion, this means that without understanding how the theoretical aspect of the COG affects the definition process it might be difficult to grasp how changes affect the utility of the COG as a whole.

This will affect adversely the entire planning process as critical factor analysis and the CC–CR–CV analytical matrix provide inputs to the entire operational design, not just the COG. This research has shown that doctrine should be careful not to create additional confusion with metaphors, inadequate/deficient terminology or lacking analytical methodology.

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[455] Barfoed (2018), p. 117.

5.1.2 Conclusions from analysis of MDO

The MDO concept was looked at as an entity by using the four tenets as cross cutting focal points. All four tenets met the four general criteria when compared to the COGTMC as a whole. When the four MDO tenets were compared to individual COGTMC components in 16 analytical cycles nearly all met the criteria This could mean a need to re-examine the current COG principles and analytical framework to adjust them to the MDO environment.

The one exception was COGTMC component C4 and MDO tenet endurance. Notable combining factors between several of the tenets and the COGTMC components were holistic analysis of the OE and the planning perspective that is closely related to the aforementioned analysis. Thus, analysis of MDO concept and its comparison against the COGTMC (chapter 4) answered the research questions four: *What is Multi-Domain Operations concept and how it can be compared to the Center of Gravity theoretical model?*

The key conclusions from the analysis of MDO concept and its comparison against the COGTMC are:

- MDO tenets underscore the need to conduct prudent planning in order to coordinate, integrate and synchronize (in time and space) the joint force in all domains.
- A comprehensive analysis of the OE was a combining factor between several of the MDO tenets and the COGTMC components.
- A holistic view of one's own and adversary resources, capabilities, vulnerabilities and possibilities is needed both in MDO and COG analysis in order to understand the entire battlespace within the competition continuum.
- Intangible elements such as will to fight, moral leadership, planning ability, connect MDO tenets and COGTMC conceptually and through systemic vulnerabilities.
- Doctrinal foundations of COGTMC and MDO reside in the same intellectual family which is evident from the identical COG definition of TP 525-3-8 and JP 5-0.
- MDO tenets and the COGTMC main component (C1) both aim at achieving the military objective by enhancing and improving the chance of success.
- The four tenets described in FM 3-0 meet the COGTMC criteria, thus showing that COG has utility in MDO environment but re-examination of COG might be needed.
- A theoretical tool, like COGTMC, can be used to analyze concept such as the MDO.

Several of the MDO tenets underscore the need to conduct planning in advance in order to coordinate, integrate and synchronize (in time and space) the joint force capabilities to be able to respond to the layered threat of the near peer adversaries in all domains. Therefore, I argue that the doctrinal foundation of COG that stems from JP 5-0 versions has been taken into consideration within the MDO concept family development. Thus, it exists within FM 3-0 as well even though the COG is not explicitly mentioned there. Moreover, it means that NATO doctrine AJP-5 profits also from the same connection.

Kurt P. VanderSteen has argued that one cannot separate moral from the physical and sees that COG's represent a systemic property that emerges from the comprehensive OE factors to "*exist in the abstract until observed in the context of conflict*"[456]. I argue that his statement fits well to both COGTM and MDO even though it was originally just part of COG and doctrine debate. In this research context, VanderSteen thoughts can be seen to exemplify how the complex systemic structure of the MDO environment together with the dynamic nature of the competition continuum connect with the elements of the COGTMC. Based on the above, it can be further argued that a common nominator of both COGTMC components and MDO tenets is the complex systemic structure they strive to make sense of and influence upon.

An interesting issue regarding this research was that, the way we see the COG defined in the current doctrines might well be different from what it will become in the MDO concept when that doctrine matures. One indication of this future change might be a conscious decision of not defining, nor copying the current JP 5-0 definition of COG, or the related analytical matrix, into FM 3-0. On the other hand, it could be that for the sake of clarity it has already been decided not to add another multifaceted concept such as COG on top of the already extensive and highly interpretational MDO.

Even with the common doctrinal family and its interconnected concepts and terms it takes time for the MDO to take hold and solidify in place. I noted earlier that Dr. Echevarria's ideas have not taken visibly hold in the doctrine evolution. Echevarria argued in 2004 that "*If a total collapse is desired, planners should identify the connections and gaps in an entire enemy structure or system before deciding whether a center of gravity exists*" and that to achieve this one should focus more on desired effects rather than capabilities[457].

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[456] VanderSteen (2012), p. 54; For a critical view, see Vego (2006b), p. XIII-53–XII-61.
[457] Echevarria (2004), p. 12.

In the light of the passage above, MDO's 'windows of superiority' and 'relative advantage' can be seen more EBO based than capability-based, thus leaning towards 'effect-based traditionalists' thinking[458]. Furthermore, Echevarria has reiterated the need to fade out the distinct categories of tactical, operational and strategic when looking for a COG. Thus, his thoughts suit well for the MDO 'competition continuum' thinking where there exists no clear boundary between war and peace, but only parts that more or less overlap with one another in possibly quickly changing situations. Consequently, Echevarria's EBO related recommendation regarding COG seemed to have been a bit ahead of time in 2004. However, when reconsidered in the current MDO context, they might become relevant in the 2020s as the MDO evolves. As Jyri Raitasalo adequately notes, our collective perceptions of what war is are sometimes very hard to change[459].

5.2 Comparison of prior research

I chose the following works as they closely link to this research either by someway looking at the definition of COG, or the upcoming doctrinal concept of Multi-Domain Operations.

Major Michael W. Johnson's monograph "*Strange Gravity: Toward a Unified Theory of Joint Warfighting"* looked at the dilemma of joint definition of the COG and tested the applicability of the framework by Dr. Joe Strange as a possible solution for this problem. Key issue in Major Johnson's research premises was his statement that the joint doctrine does not define the center of gravity, and that the vagueness of the definition is where a lot of confusion and arguments stems from. [460]

He tested an existing COG framework of Dr. Strange, thus it differed significantly from my research design where the COG 'framework' or theoretical structure was built both from the doctrines and historical premises. Moreover, Major Johnson used case studies to test the effectiveness of his hypotheses, whereas in my research the aggregate COG theory and the selected part of the MDO concept 'discussed' and thus formulated results for the research questions.

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[458] See table 2 for reference on the theoretical schools of thought.
[459] Raitasalo (2013), p. 207; See also, Gray (2010), p. 96. Gray notes that Clausewitz's *On War* has reached a level of "veneration" where it is considered a kind of a "sacred text".
[460] Johnson, Michael W.: *Strange Gravity: Toward a Unified Theory of Joint Warfighting*. School of Advanced Military Studies, United States 2001.

Major Shayla D. Potter's monograph "*The Center of Gravity Concept: A Study of its Description and Application in Two Different Eras*" compared how Clausewitz and the U.S. military describe the COG and what factor contributed to U.S. doctrine. As a result, she concluded that there had been a change in the definition of COG from an abstract to a more specific one. Further, she argues that the U.S. COG concept and its definition are narrowing and becoming less and less usable over time, especially in the operating environments of the future, emphasizing that military concepts are dependent on their contemporary environment.[461]

Major Potters work comes close to my research, however, she has a historical comparative emphasis and a definitive focus on the linguistics of the concept, whereas my thesis looked at the COG concept from the planning process development perspective and its usability for the MDO concept. In my research the historical comparison of COG concept was just a part of the building of the COG theoretical model concept.

Commander Senior Grade Eystein L. Meyer's research paper "*The centre of gravity concept: contemporary theories, comparison, and implications*" used various methodologies including grounded theory to describe and compared selected contemporary theorist' thoughts on Clausewitz's COG in a comparison matrix. Meyer argues that the COG term is 'polluted' and its use both in planning and doctrine should be viewed critically taking into consideration the specific theory in question. Or alternatively, he suggests removing the concept entirely but retaining the critical factor analysis. According to him, it also provides an analytical tool (the matrix) for further research and doctrinal purposes.[462]

Meyer's work is very recent (2022) and has same elements as my research regarding the comparison of the theorists and usability of the COG concept. However, Myer uses partly different COG theorists and different methodology as well as does not mention the MDO in any way. This exemplifies the need for my research to fill that 'gap'.

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[461] Potter, Shayla D.: *The Center of Gravity Concept: A Study of its Description and Application in Two Different Eras*. School of Advanced Military Studies, United States Army Command and General Staff College, Kansas, United States 2013.

[462] Meyer, Eystein L.: The centre of gravity concept: contemporary theories, comparison, and implications. Defence Studies, Volume 22, Issue 3, Routledge Journal of Military and Strategic Studies 2022.

Colonel Grant S. Fawcett's monograph "*History of US Army Operating Concepts and Implications for Multi-Domain Operation*". As a result, he concludes that like the AirLand Battle (ALB), MDO is not concept for future but reality today since the fighting already conducts in all domains simultaneously. Further, he states that the MDO is already applicable in the land domain in 'armed conflict' but lacking in other parts of the continuum. Fawcett also iterates the need for a joint integration of MDO into a 'holistic method' in order to gain a real MDO solution.[463]

His research looks at the utility of the concept using the MDO tenets and with a historical case study lens whereas in my research the MDO tenets are used to compare the concept to the COGTMC. Consequently, the planning perspective I have differs significantly from Fawcett's historical one.

5.3 Criticism and evaluation of reliability

There are no 'one track' method to evaluating the credibility and reliability of qualitative research, thus it requires a comprehensive approach with a display of results, sufficient arguments and critical examination of the research process[464].

Hermeneutical approach supported the research theoretical framework and was important for the synthesis, but it was not without its challenges. One recognized challenge was to form a sufficient pre-understanding of the research phenomenon in short time upon which to build the interpretation and deeper understanding. Sufficient narrowing of the topic and limitations to the subject of the research helped to lessened this challenge, but at the same time left elements of source material outside. This is visible especially in the MDO related material that changed a bit during the research. It narrowed the MDO compared to the COG related material thus affecting comprehensiveness of the MDO concept. Also, specifying the classification to 'public' left classified doctrine and other sources outside thus narrowing out possible themes and other observations that could have risen from these sources.

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[463] Grant, Fawcett S.: *History of US Army Operating Concepts and Implications for Multi-Domain Operations.* School of Advanced Military Studies, United States Army Command and General Staff College, Kansas, United States 2019.

[464] Tähtinen, Janne: Raportointivaihe, *Näin tutkin taktiikkaa – Tutkimusprosessi operaatiotaidon ja taktiikan näkökulmasta*. Janne Tähtinen (toim.), Maanpuolustuskorkeakoulu, Sotataidon laitos, Julkaisusarja 2, Tutkimusselosteita nro 20, Helsinki 2022b, p. 71–72.; Rantapelkonen & Koistinen (2016), p. 65.

This research was interested in the meaning of the texts and how we can understand them, thus it looked for similarities and using qualitative content analysis and hermeneutical approach. This requires multiple iterations of interpretation and a known challenge with hermeneutical research is its highly interpretational nature that reduces reliability. This factor could have been reduced by using qualitative methods in support of the quantitative tools. For example, an analysis of COG concept temporal appearance, content changes and verbal emphasis could have been used to make qualitative conclusions from the COG[465]. This would have given additional depth to the COGTMC as well as added reliability to the conclusions whereas now interpretations, conclusion and results are solely based on qualitative analysis. However, the scope of this research and time allocated for did not make this possible to resort more extensive use of methods. Nevertheless, the qualitative choices proved correct considering the research task, questions and related source material.

For the results, the biggest issue proved to be the subjectivity bound to the researcher. The nature of the hermeneutical research makes it highly subjective due to the emphasized interpretation factor. For the results this means that repeatability is difficult, or impossible, to acquire. Hence, conclusions are not universal as they represent the view of the researcher. The results and conclusions originated from this researcher and due to methodological limitation and subjectivity issues repeating this research identically is not recommended. Despite the aforementioned limitations, the research provides one way to perceive the COG as a theoretical model. Thus, it enables to see the connection between history of the COG concept and its interaction within, and between, the selected doctrines.[466] Therefore, considering the research task and questions, the ontological and epistemological choices seem valid and justified.

The formulation of themes and types from content of the research material utilized significant interpretation. Thus, it is possible that the researcher has drawn conclusions especially from the thoughts of various theorists that do not represent their aggregate views. It is possible that this has had an effect on the entire research process and therefore on the validity of the results without the knowledge of the researcher. Regardless, the overall logic chain of the research was solid and followed the research design and disposition. Minor changes were conducted upon the research framework, design, questions and the report headline as the work progressed.

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[465] Palokangas (2022), p. 108.
[466] Palm & Tähtinen (2022), p. 112–113.

However, these did not change the initial premises, but instead rose from the source material and clarified the thoughts of the researcher. The exact use of MDO's four tenets and the comparison to the COGTMC was not clear initially, but formulated during the research process. Despite the difficulty, the creation of the COGTMC and subsequent analysis of the MDO were the most interesting and rewarding parts of the research. Unfortunately, other research strategies such as conceptual study ethnography, case study, phenomenology, or discourse analysis were not suitable for this research. This was due to their nature, because of how the research task and design was formulated, or lack of time and resources thus limiting the ability to generalize the results and narrowing the research in specific way.[467]

This research was conducted according to scientific method and ethos. No fabrication of results or deliberate plagiarism was done. All citations were done to the best ability of the researcher in order to give credit to the work done by others and possible mistakes are unintentional. Appendixes of the research together with the report provide the information to ascertain how the analysis was conducted. The researcher did not use any specific analytical tool from prior research, however, elements such as figures and tables were used to illustrate the research subject and the analysis. The researcher used methodological literature and feedback from seminars and mentors to formulate the required tools. The chosen methods were sufficiently simple enough for the creation of the themes. However, the creation of types and the COGTMC were quite hard requiring frequently coming back to the material.

Theoretical and cultural factors contributed to this significantly as noted earlier in this chapter. In this research subjectivity was present via the interpretation the researcher makes from the material and the meaning he places unto it. Thus, researcher's cultural and national background together with interpretation formed the context, affected his subjectivity[468]. This research and its reference material contain theoretical, conceptual and terminological material that is complicated, or even complex, for a native user of English, much less to a Finn.

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[467] Huupponen, Ville: Konseptitutkimus, *Näin tutkin taktiikkaa – Tutkimusprosessi operaatiotaidon ja taktiikan näkökulmasta*. Janne Tähtinen (ed.), Maanpuolustuskorkeakoulu, Sotataidon laitos, Julkaisusarja 2, Tutkimusselosteita nro 20, Helsinki 2022, p. 144.; Palm & Tähtinen (2022), p. 111–113; Tuomi, Jouni & Anneli Sarajärvi: *Laadullinen tutkimus ja sisällönanalyysi*, Helsinki 2002, p. 54.

[468] I was born Finland and have lived here my entire life aside from short incursions to crisis management operations. This means that I have assimilated the societal and cultural characteristics of Finnish society and that its linguistics and concepts affect how I think and view the world around me. Moreover, as a Finnish national I represent a western cultural–normative background with its historical–ethical baggage. A person with a different national and cultural background would more than likely draw different conclusions and interpretations from the same material.

In operational art and tactics, conceptual and terminological understanding is key to understand the complicated whole that also often includes abstract concepts and multinational reference[469]. Therefore, with interpretation one must be careful not to assume too much and leave room for criticism. All of the primary source material was in English which is a notable issue for a non-native speaker of the language. This calls for careful reading of the material and is something to be aware of when creating an understanding of the research subject.

It should be noted that my Finnish background created a possibility for a different kind of interpretation of the English literature compared to a native speaker. Thus, the interpretation issue was something that needed to be remembered with each individual text and specifically while making analysis, drawing conclusions and creating synthesis. Moreover, prior experience and familiarity on the subject can affect interpretation. However, due to my limited pre-research understanding on the subject, I estimate that this factor was not a significant one but nevertheless its effect cannot be completely discarded.

When reading English literature and formulating it into text, there is a cultural-societal transcription done without my knowledge. These underlying issues are bound to affect both the analysis as well the conclusions without my knowledge[470]. Something to consider regarding the cultural-societal transcription was that it is not just a factor regarding English language. It has already come into effect in the material produced by native English speakers that had first gone through translation from some other language, thus creating a cascading effect[471]. This was well exemplified by the COG concept evolution discussion and the creation of sub-chapter 2.1. Further, the overall context where concepts are used defines them, which highlights the fact that the use of same concept in different connection creates different meaning. Thus, the meaning of concepts varies due to ontological, theoretical, epistemological and methodological positioning[472]. This could have affected both COGMTC and MDO's tenets usage in this research without my explicit knowledge.

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[469] Palokangas (2022), p. 106, 109.
[470] Sipilä & Koivula (2013), p. 15. According Sipilä and Koivula, theoretical assumptions together with cultural–normative background creates our subjectivity. See also, Lehtoaro (2916), p. 53.
[471] Rekkedal (2013), p. 30. Rekkedal notes that the differences in the use of military terminology between the English and German speakers together with the status of Howard and Paret's translations in the Anglo-Saxon world influences thinking and thus interpretation.
[472] Takala, Tuomo & Anna–Maija Lämsä: *Tulkitseva käsitetutkimus organisaatio– ja johtamistutkimuksen tutkimusmetodologisena vaihtoehtona*. Liiketaloudellinen aikakausikirja 50 (48) 2001, p. 383; Lehtoaro (2016), p. 53.

Consequently, it was a recognized factor and I understand that it might have affected the overall interpretation of the material, analysis, and thus the results of this research perhaps more than for a native speaker who is more familiar with the language and context. Significance of the context became evident by looking at the research material where the concepts of COG and MDO and their meaning differed considerably depending on the author, utility, source and time of writing[473]. Thus, I had to compromise and draw conclusions based on the information available and use cross-checking of sources to verify validity. This was a constant process during the research and required multiple re-examination of the sources.

The primary material leaned heavily on the U.S. and NATO doctrines as well as Anglo-American theoretical tradition but it poses no problem regarding the reliability or usability because of my chosen research subject and focus. Consequently, this research is part of the studies on the future of western warfare as well as on the development of the (western) operational planning process and as such, it draws from the aforementioned heritage. However, regarding the usability of the results and the synthesis a certain amount of caution is in order. The results should not be used to directly guide planning process development without considering the research premises and primary material background. Otherwise mistakes and false assumptions might occur. As always, the results and related interpretation apply only within the framework and context created for the research. However, they can be used for further development of concepts and analytical tools with aforementioned limitations.

Finally, it should be noted that part of the MDO material has gone through changes since the start of this research and inconsistences are possible between the conceptual documents and FM 3-0 that solidified MDO in the U.S. Army doctrine[474]. Regarding the utility of and future of COG in MDO environment we should take note of the words of Stephen L. Melton. He argues that "*making our COG doctrine conform to the reality of warfare, rather than forcing our perceptions of war into an ill-conceived COG construct, will provide salutary results*". Thus, perhaps future of warfare in complex OE and MDO battlespace requires us to 'conform' the COG and the related analytical matrix into MDO doctrine, and not the other way around.[475]

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[473] Palokangas (2022), p. 106, 109. Note: most of the documents used in this research were by distinguished authors, some with acclaimed credit and vast experience. Also, official governmental documents and doctrine have an implicit validity by themselves as they represent the work of many experts and the authority of the state.
[474] FM 3-0 (2022), p. 'foreword'.
[475] Melton (2012), p. 99; Vego (2007), p. VII-26.

5.4 Usability and recognized need for further research

The results of this research provided theoretical base which can be used to further develop methods, ways and applications for U.S., NATO (or similar) joint planning processes that utilizes the COG concept, analytical framework and related terminology, as part of the analysis. Furthermore, the results showed that a conceptual synthesis drawn from analyzed COG material is comparable and thus applicable as part of the MDO thinking. In the process it also built the overall canon of western military science and showed that a theoretical model, such as the COGTMC, can be used to analyze a concept such as the MDO.

This research used historical, theoretical and doctrinal data from the COG and its usage and analyzed it in a hermeneutical process by using content-based and theory-based content analysis. Thus, first content, then theory, was the driving factor of the analysis. The content-based method created understanding of the research subject and created the COGTMC. Theory-based method made possible to compare MDO and COGTMC as well as provided insights into future research needs by showing where possible fault lines lie in the theory.

Consequently, this research filled its purpose of developing the understanding of how historical legacy of COG terminology and different variations of the concept interacted within the U.S. and NATO joint level planning doctrines. Moreover, it reached its goal of increasing theoretical understanding of how COG concept affects the COG identification and defining analytical process and thus provided through the COGTMC as a theoretical tool for the further development of the planning process.

The conclusions presented in sub-chapter 5.1 have the following implications for further research: *A systems warfare perspective*, *revised or alternative COG analytical matrix/tool for MDO environment*, and *effect-based definition of COG for MDO*. The conclusions showed that the COG and MDO share common systemic (SoS) interpretation of the OE. However, for this research the content-based content method conducted upon the MDO's four tenets part left considerable parts of the concept untouched. A systems warfare perspective with the use of SoS theory (with its weaknesses) and theory-guided methodology would provide a possibility to build a theoretical model of MDO similar to the COGTMC. This 'MDO theoretical model construct' could then be tested/compared using case study methodology to various historical or current military operations to see how the concept holds up to reality.

Further, the joint doctrine uses the CC–CR–CV analytical framework and critical factor analysis to analyze the OE. Thus, that model also serves the needs of the current MDO concept. A further research interest based on this would be to critically examine the current CC–CR–CV structure and its connections to the operational design by 'dissecting' the framework and building a revised analytical tool for the MDO purposes. This research's COGTMC model, or a new MDO theoretical model construct, could be used as a theory for theory-guided content analysis. The benefit of this would be a creation of a new analytical tool specifically for MDO purposes as well as a critical examination of the CC–CR–CV construct and its possible flaws.

Moreover, the conclusions of the research showed that even though the current COG concept has utility and is usable in the MDO environment, it nevertheless carries the historical, conceptual, theoretical, and doctrinal baggage with it. Thus, a new effect-based definition of COG with the related explanations could be devised from a 'clean slate'. This would enable to discard those parts of the old which are not applicable to modern warfare, are conceptually / terminologically incompatible, or otherwise without utility. It could be done specifically to serve a specific level of war, or if possible, to create an overarching definition.

Conceptual (re)definition of COG rings oddly familiar, and as this research has showed, it has been tried numerous times before with varying results. However, it could be combined as part of the revised analytical framework or conducted as a standalone research to create a theoretical foundation for the MDO. One way to do this could be a combination of conceptual research[476] and creation of a theoretical model similar to the COGMTC.

The benefit of this would be to create a purely military definition without any political inclinations of the past tied to the MDO phenomenon. This would also give an opportunity to review the tangible-intangible debate and update it to suit the modern complex OE and multidimensional battlespace[477]. A practical application of the results would be to use them together with a revised analytical matrix to create 'MDO update' on joint planning doctrine thus providing concrete planning tools for the staff.

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[476] Huupponen (2022), p. 142–144. Huupponen states that concepts are often used to "describe broad and abstract entities" and presents as an example the AirLand Battle concept created by TRADOC. This exemplifies the utility of conceptual research and its applicability to MDO concept.

[477] Barfoed (2018), p. 123. Barfoed states that even though the "current U.S. doctrine makes the COG concept the centerpiece in operational planning, there is a broad call for either revising or killing the concept". Further, he argues that the revised version should link better effects & actions as well provide guidance for tangible-intangible issues.

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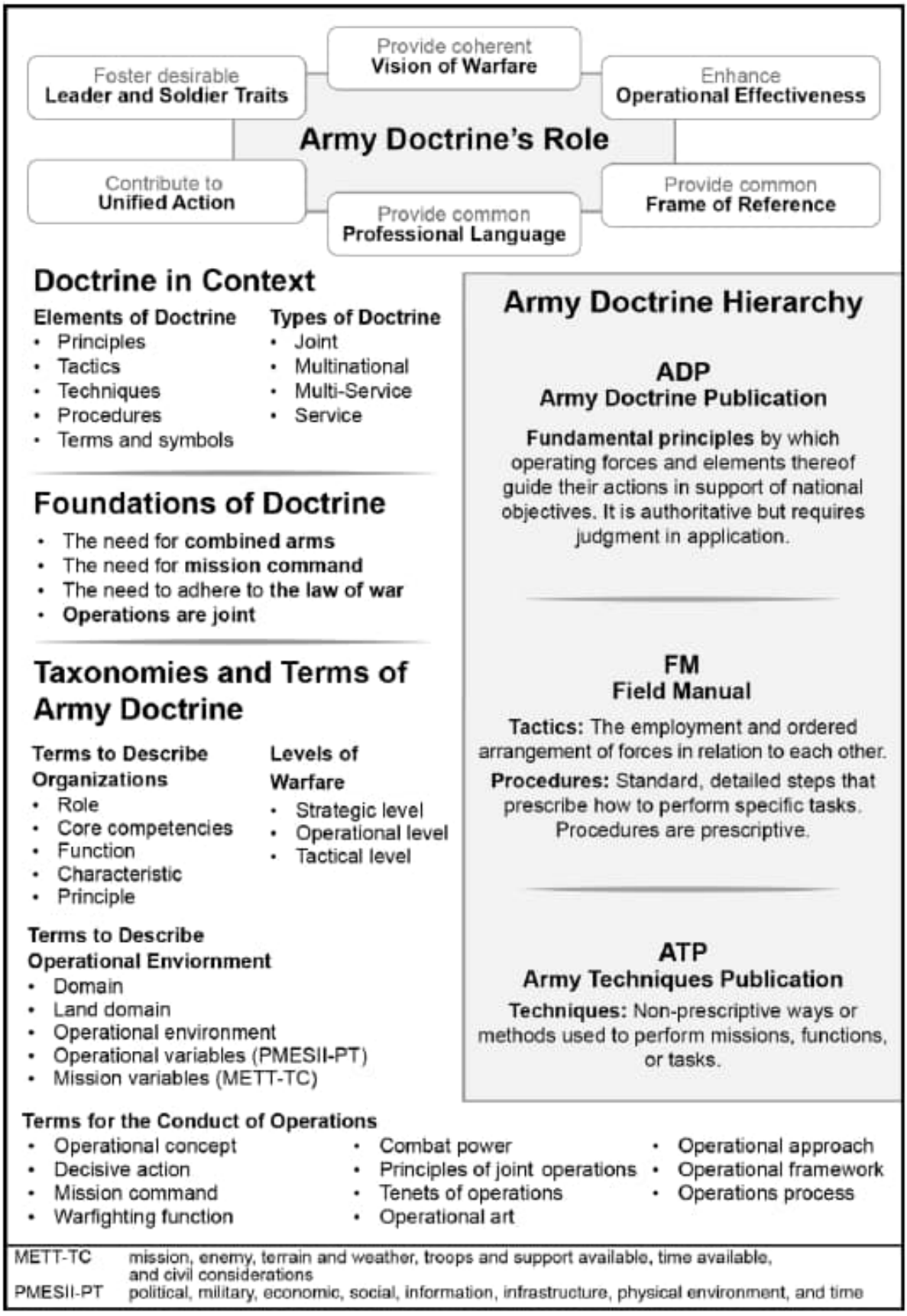
APPENDIX

LIST OF APPENDIXES:

U.S. Army doctrine hierarchy and logic chart



Logic chart for doctrine according to ADP-1-01[478]

[478] Department of the Army, Headquarters: *Army Doctrine Publication 1-01 Doctrine Primer*. Department of the Army Headquarters, Washington D.C 2019, p. vi.

Definitions and interpretations of *schwerpunkt* (ca. 1832-1987)

Original term (year)	Translation (year)	Interpretation	Definition	Analogue (if any)	Metaphor (if any)
Schwerpunkt (ca. 1832)	Howard and Paret (1976)	Howard and Paret	**Source** (or center) **of power**	• Concentration of mass • Army • Capital • Community of interest • Army of the protector • Personality of a leader • Public opinion	• Hub of power and movement • Duel • Wrestling match
Schwerpunkt (ca. 1832)	Ecchevarria (2002)	Ecchevaria	**Focal point**	• Factor of balance	• Effect-based approach (EBO): Focal points that hold the system or structure together
Schwerpunkt (ca. 1832)	Vego (2007)	Vego	**Weight** (or focus) **of effort**	• Massed strength — physical or moral — or a source of leverage	• Massed effect for accomplishing military objective

Schwerpunkt (ca. 1880)	Vego (2007)	Vego, Eikmeier	**Point of focus**	• Capital	• "Target"
Schwerpunkt (after 1880 until WWI)	Vego (2007)	Vego, Eikmeier	**Section of the front**	• A location where a bulk of one's forces is employed to reach decision	• "Arrow"
Thrust-point (ca. 1942)	Wintringham (1942)	Wintringham, Miksche	**Concentrated forces**	• Objective	• Rolling concentration

Center of Gravity (1976 /1986)	Howard and Paret (1976)	FM 100-5	**Source of strength or balance**	• Mass of the enemy force • Boundary between two major combat formations • Vital C2 center • Logistical base • Lines of communication • Cohesion among allied forces • Key economic resource or locality • Strategic transport capability • Vital part of the homeland • Moral thing (intangible)	• Hub of all power and movement • Key to all operational design • Characteristic, capability, or locality from which the force derives its freedom of action, physical strength, or will to fight
Center of Gravity (1987)	Schneider & Izzo (1987)	Schneider & Izzo	**Greatest concentration of combat force**	• Hub of all power and movement	• Directed against one or more decisive points

Selected theorist' definitions of COG and year of publication

Year	Source	Definition	Analogue (if any)	Metaphor /Notes (if any)
1987	Schneider & Izzo	**Greatest concentration of combat force**	• Hub of all power and movement	• Directed against one or more decisive points
1996	Strange	**Primary sources of moral or physical strength, power and resistance**	• Leaders • Public/ popular/ national support • Armed forces • National economic / industrial power • Large population	• Are dynamic agents of action or influence (abilities that are *verbs*)
2004 & 2005	Strange & Iron	**Physical or moral entities that are the primary components of physical or moral strength, power and resistance**	• Main strength of an enemy • Leaders • Ruling elites • Strong-willed populations	• NOTE! The word *source* is removed from the definition • Dynamic and powerful physical and moral agents of action or influence that possess certain characteristics and capabilities, and benefit from a given location or terrain

Levels of war and Iraqi Centers of Gravity 1991 by Strange & Iron[479]

Level of War	*Coalition example missions*	*Example opposing Iraq CG*	*Why it's a CG*
(a)	*(b)*	*(c)*	*(d)*
Strategic Level			
• National Policy →	Restore the legitimate Government of Kuwait.	Saddam Hussein	Can maintain popular support and direct the Iraqi Army to hold Kuwait against international condemnation and coercion.
• Theater Strategy →	Defeat the Iraqi Army south of Euphrates.	Iraqi Army	Can defend occupied Kuwait against Coalition attack.
Operational Level			
• Campaigns →	Isolate and encircle the Iraqi Army in Kuwait.	Republican Guard	Can prevent encirclement of Iraqi Army defending Kuwait.
• Major Operations →	Cut communications from Baghdad to Kuwait.	Iraqi integrated air defence system	Can prevent freedom of action of Coalition air through high attrition of allied aircraft.
Tactical Level			
• Battles →	Penetrate the Iraqi defences along the Saudi border.	Iraqi 12th Corps	Can prevent VII Corps penetration of Iraqi linear defences using fixed defensive positions.
• Engagements →	Defeat Tawakalna Division on 73 Easting.	Tawakalna Division reserve Tank battalion.	Can counter attack and defeat elements of VII Corps attacking Tawakalna Division.
• Small unit actions →	Breach element of Iraqi defensive line.	Iraqi defensive bunker complex.	Can defeat breaching attempt through use of direct fire weapons.

[479] Strange, Joe & Richard Iron: *Understanding Centers of Gravity and Critical Vulnerabilities*, Department of War Studies, Swedish National Defence College 2005, Part 2, p. 4.

A compilation of selected theorist' main arguments regarding COG

	Definition of COG	Basis (of what COG is or what it does)	Context	COGs can change	COG is a holistic systemic structure	COG has utility	COGs are physical / moral (tangible / intangible)	Application	School of thought	Notes
Echevarria	**A focal point**	Provides cohesion (a centripedal force)	Type of war and force	Yes	Yes	Yes	Both	Selective	**Effects based traditionalist**	Selective inside a system, not separate levels of war
Strange & Iron	**Physical or moral entities that are the primary components of physical or moral strength, power and resistance**	Components of strength, power and resistance	Adversarial and system of systems	Yes	Yes	Yes	Both	Levels of war	**Capability based accommodators**	COGs are physical *or* moral entities
Vego	**A source of massed strength—physical or moral—or a source of leverage**	Source of power	Objective and situation	Conditionally yes	No	Conditionally yes	Both	Levels of war	**Capability based accommodators**	Utility of the COG is dependent on objective to be accomplished
Eikmeier	**The primary entity that possesses the inherent capability to achieve the objective**	Attains the objective	Objective and system of systems	Yes	Yes	Yes	Only physical	Universal	**Capability based accommodators**	

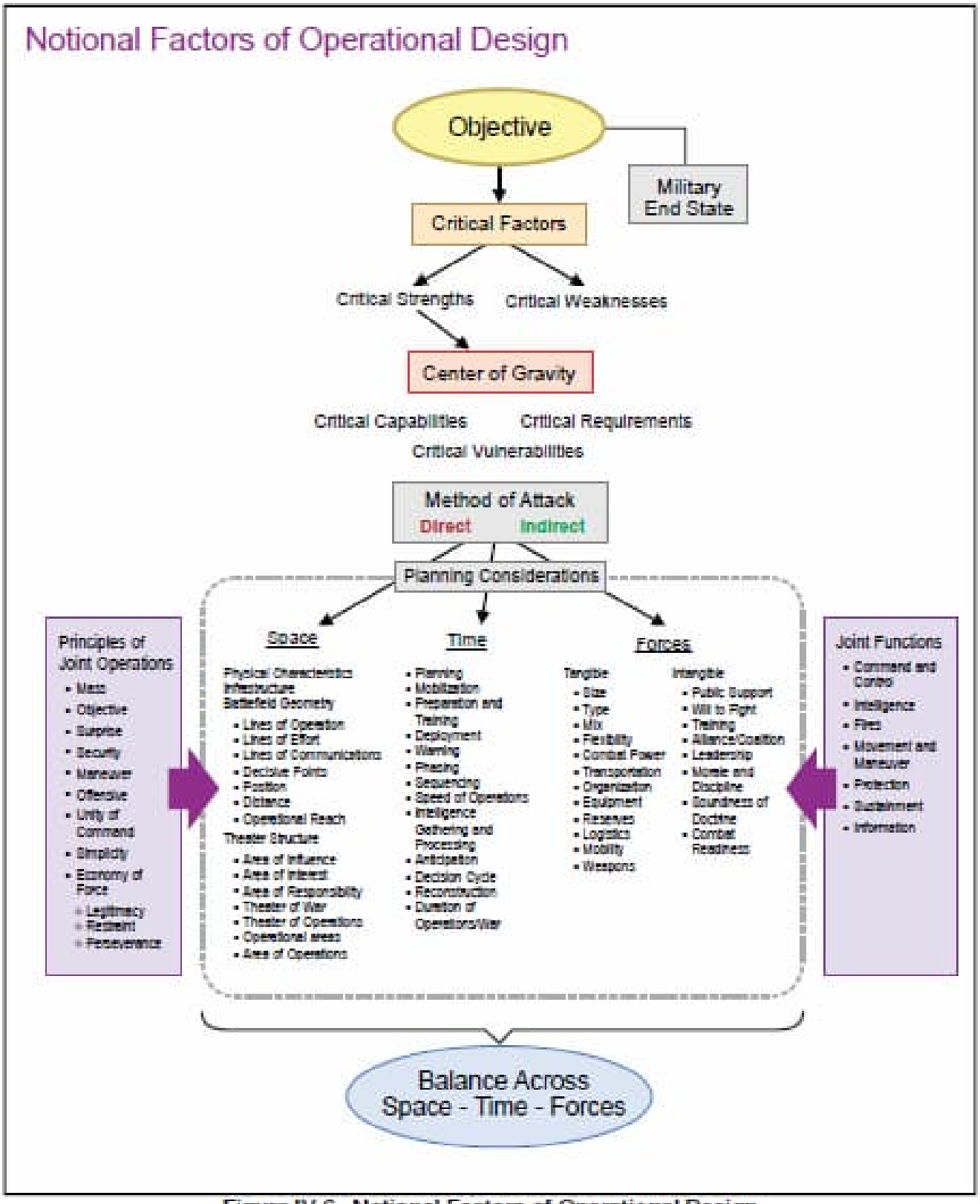


Figure IV-6. Notional Factors of Operational Design

Notional factors of operational design according to JP 5-0[480]

[480] Joint Publication*: Joint Planning 5-0*. Joint Chiefs of Staff 2020, p. IV-20.

Comparison of JP 5-0 and AJP-5

	Definition of COG	Basis (of what COG is or what it does)	COGs can change	COG is a holistic systemic structure	COGs are physical / moral (tangible / intangible)	Application	Definition of critical capability (CC)	Definition of critical requirement (CR)	Definition of critical vulnerability (CV)	Doctrine origin	Notes
JP 5-0	**The source of power or strength that enables a military force to achieve its objective**	**Something that an opposing force can orient its actions against that will lead to enemy failure.**	Yes	Yes	Both	Levels of war	The primary abilities essential to the accomplishment of the mission	Essential conditions, resources, and means the COG requires to employ the critical capability	Aspects of critical requirements vulnerable to attack	**USA**	COGs exist in an adversarial context. COGs do not exist in a strategic or operational vacuum; they are formed out of the relationships between adversaries and enemies.
AJP 5	**The primary source of power that provides an actor its strength, freedom of action, or will to fight.**	**It is always an entity.**	Yes	Yes	Both but separately and as physical entities	Levels of war	What the CoG can do – its primary abilities – in relation to achieving the actor's objectives at the given level in the context of a given environment	Specific conditions, resources, and/or means that are essential for a CoG to perform its critical capabilities	Those critical requirements, or components thereof, that are deficient, missing, or vulnerable to influence in a way that will contribute to a CoG failing to perform one or more of its critical capabilities	**NATO**	At the political-strategic level, moral-strength as well as physical-strength CoGs exist; At lower levels of command, only physical-strength CoGs normally exist

Compilation of themes risen from the material

This appendix collects all the themes that have risen from the source material through content analysis. Each section is names and highlighted with bold text and explanation to signify which part of the analysis it originates.

Themes from sub-chapter 2.1.1 'Schwerpunkt or Center of Gravity?'

The three (3) themes below (schwerpunkt translations, the time of translation and the translator/user), are highlighted by the red boxes.

Translator	Translation of schwerpunkt	Year
J.J. Graham	center of gravity	1874
Tom Wintringham	thrust-point	1942
Michael Howard & Peter Paret	center of gravity	1976
Antulio J. Ecchevarria II	focal point	2004
Milan Vego	weight (or focus) of effort	2007
German Bundeswehr (according to Vego)	center of gravity	2007
Austrian Bundesheer (according to Vego)	gravitationspunkt	2007
Stephen L. Melton	main point, focal point, heavy point	2012
Kurt P. VanderSteen	heavy point, focal point, highlight, emphasis, heavy emphasis, grave emphasis, center of gravity	2012
Google translate	main emphasis, center of gravity, main focus, main stress	2022

Themes from sub-chapter 2.1.2 'Evolution of Schwerpunkt to COG'

The four (4) themes below (*interpretation, definition, analogue and metaphor*), are highlighted by the red boxes.

Original term (year)	Translation (year)	Interpretation	Definition	Analogue (if any)	Metaphor (if any)
Schwerpunkt (ca. 1832)	Howard and Paret (1976)	Howard and Paret	**Source** (or center) **of power**	• Concentration of mass • Army • Capital • Community of interest • Army of the protector • Personality of a leader • Public opinion	• Hub of power and movement • Duel • Wrestling match
Schwerpunkt (ca. 1832)	Ecchevarria (2002)	Ecchevarria	**Focal point**	• Factor of balance	• Effect-based approach (EBO): Focal points that hold the system or structure together
Schwerpunkt (ca. 1832)	Vego (2007)	Vego	**Weight** (or focus) **of effort**	• Massed strength — physical or moral — or a source of leverage	• Massed effect for accomplishing military objective
Schwerpunkt (ca. 1880)	Vego (2007)	Vego, Eikmeier	**Point of focus**	• Capital	• "Target"
Schwerpunkt (after 1880 until WWI)	Vego (2007)	Vego, Eikmeier	**Section of the front**	• A location where a bulk of one's forces is employed to reach decision	• "Arrow"

Thrust-point (ca. 1942)	Wintringham (1942)	Wintringham, Miksche	**Concentrated forces**	• Objective	• Rolling concentration
Center of Gravity (1976 /1986)	Howard and Paret (1976)	FM 100-5	**Source of strength or balance**	• Mass of the enemy force • Boundary between two major combat formations • Vital C2 center • Logistical base • Lines of communication • Cohesion among allied forces • Key economic resource or locality • Strategic transport capability • Vital part of the homeland • Moral thing (intangible)	• Hub of all power and movement • Key to all operational design • Characteristic, capability, or locality from which the force derives its freedom of action, physical strength, or will to fight
Center of Gravity (1987)	Schneider & Izzo (1987)	Schneider & Izzo	**Greatest concentration of combat force**	• Hub of all power and movement	• Directed against one or more decisive points

Themes from sub-chapter 2.2.1 'Evolution of Schwerpunkt to COG'

The eight (8) themes below (*Definition of COG, Basis, Context, Ability to change, COG as a systemic structure, Utility, COG as tangible/ intangible,* and *Applicability within levels of war* are highlighted by the red boxes

	Definition of COG	Basis (of what COG is or what it does)	Context	COGs can change	COG is a holistic systemic structure	COG has utility	COGs are physical / moral (tangible / intangible)	Application	School of thought	Notes
Echevarria	**A focal point**	Provides cohesion (a centripedal force)	Type of war and force	Yes	Yes	Yes	Both	Selective	**Effects based traditionalist**	Selective inside a system, not separate levels of war
Strange & Iron	**Physical or moral entities that are the primary components of physical or moral strength, power and resistance**	Components of strength, power and resistance	Adversarial and system of systems	Yes	Yes	Yes	Both	Levels of war	**Capability based accommodators**	COGs are physical *or* moral entities
Vego	**A source of massed strength—physical or moral—or a source of leverage**	Source of power	Objective and situation	Conditionally yes	No	Conditionally yes	Both	Levels of war	**Capability based accommodators**	Utility of the COG is dependent on objective to be accomplished
Eikmeier	**The primary entity that possesses the inherent capability to achieve the objective**	Attains the objective	Objective and system of systems	Yes	Yes	Yes	Only physical	Universal	**Capability based accommodators**	

Themes from sub-chapter 2.2.2 'Joint Planning 5-0' and 2.2.3 'Allied Joint Doctrine for Planning of Operations AJP-5

The eight (8) themes below (*Definition of COG, Basis, Ability to change, COG as a systemic structure, COG as tangible/ intangible, Applicability within levels of war* and *definition of CCs, CRs, CVs*) are highlighted by the red boxes. **Note:** most of the themes are the same as with the theorists.

	Definition of COG	Basis (of what COG is or what it does)	COGs can change	COG is a holistic systemic structure	COGs are physical / moral (tangible / intangible)	Application	Definition of critical capability (CC)	Definition of critical requirement (CR)	Definition of critical vulnerability (CV)	Doctrine origin	Notes
JP 5-0	**The source of power or strength that enables a military force to achieve its objective**	**Something that an opposing force can orient its actions against that will lead to enemy failure.**	Yes	Yes	Both	Levels of war	The primary abilities essential to the accomplishment of the mission	Essential conditions, resources, and means the COG requires to employ the critical capability	Aspects of critical requirements vulnerable to attack	**USA**	COGs exist in an adversarial context. COGs do not exist in a strategic or operational vacuum; they are formed out of the relationships between adversaries and enemies.
AJP 5	**The primary source of power that provides an actor its strength, freedom of action, or will to fight.**	**It is always an entity.**	Yes	Yes	Both but separately and as physical entities	Levels of war	What the CoG can do – its primary abilities – in relation to achieving the actor's objectives at the given level in the context of a given environment	Specific conditions, resources, and/or means that are essential for a CoG to perform its critical capabilities	Those critical requirements, or components thereof, that are deficient, missing, or vulnerable to influence in a way that will contribute to a CoG failing to perform one or more of its critical capabilities	**NATO**	At the political-strategic level, moral-strength as well as physical-strength CoGs exist; At lower levels of command, only physical-strength CoGs normally exist

Criteria used for the comparison of COGTMC components and MDO tenets

This appendix shows the criteria used for the comparison of COGTMC component parts (C2 to C4) and MDO tenets (agility, convergence, endurance and depth) and an example of the comparison.

Example of Tenet 'X'	YES	PARTIALLY	NO 0 points	Notes
Can the tenet be seen as exhibiting one or more of the following COGTMC component attributes: *property, functionality, practical tool*	**YES**			E.g. provides focus, enables faster action/decision making, creates advantage, a way to influence, tangible/intangible.
Does the tenet have a conceptual connection to the COGTM component?		**PARTIALLY**		E.g. holistic view of the operational environment, a systemic structure or a tangible/intangible attribute.
Does the tenet have a common element with the COGTMC component?			**NO**	E.g. systemic analysis of critical factors and elements of the OE, adversarial positioning or a focal point/ focus.
Does the tenet have utility?	**YES**			E.g. provides information or advantage, is applicaple in all levels of war, creates effects or focus, enables analysis of one's own and adversary capabilities.
Meets / does not meet the criteria	With a result 2 or more 'YES' the tenets can be seen to meet the criteria.			**Conclusion:** **4/4** **Tenet 'X' meets the criteria**

Systems warfare example from ukraine according to FM 3-0[481]

Systems Warfare and Sanctuary: Eastern Ukraine, 2014

During the Russia-Ukraine conflict, an attack on Ukrainian forces demonstrated the lethality of the modern battlefield and the impact created by the threat's use of sanctuary and systems warfare. In July 2014, the Armed Forces of Ukraine moved several mechanized brigades into a position near the Russian border to prevent the illegal movement of military equipment across the frontier to rebels in eastern Ukraine. Early on the morning of 11 July, soldiers at the position noticed a drone orbiting above them for some time. Not long after the drone disappeared, rockets fired from 9A52-4 Tornado multiple launch rocket systems located in Russian territory began landing on one of the brigades. Reporting indicated that the UAS was cued by other systems that located civilian cell phones in the assembly area.

The barrage lasted four minutes. Rockets carrying a mixture of high explosive, cluster, and thermobaric munitions impacted the unit's position. Cannon rounds followed the rockets with devastating effect. The Ukrainian units took heavy losses. One battalion was virtually destroyed, and others were rendered combat ineffective due to heavy losses in vehicles and personnel. Casualties quickly overwhelmed army and local medical facilities. In the days that followed, rocket and cannon strikes continued, disrupting the Ukrainian army's ability to defend that region of eastern Ukraine.

The lethality of the attacks was enabled by a sophisticated real-time targeting system that used inexpensive unmanned aircraft systems for ISR, target acquisition, and fire control. Rockets were likely fired from within a town in Russian territory, hampering potential Ukrainian military responses due to the sanctuary provided by both an international border and proximity to civilian noncombatants. Additionally, Russia extended its integrated air defense system, located within Russian territory, over the conflict zone in Ukraine. This action denied Ukraine's ability to use its air power, which separated Ukraine's air capability from its ground forces. Without air power for close air support and counter-UAS operations, the Ukrainian ground forces were left vulnerable to the sophisticated targeting systems used by Russian and pro-Russian forces.

Over the following months and years, Ukraine military forces adapted. In 2022, Russia began an unprovoked conventional attack along multiple axes throughout Ukraine. Ukrainian forces responded effectively. They exercised a more disciplined and efficient use of the electromagnetic spectrum, complicating Russian detection efforts. Ukrainian forces also defended in more mobile, dispersed formations, providing fewer lucrative targets for Russian fires.

[481] Department of the Army, Headquarters: *Field Manual 3-0 Operations.* Washington, D.C. 2022, p. 2.9.

Compilation of the comparison of COGTMC and MDO tenets (Part 1 of the analysis)

This appendix shows the compilation of MDO tenets compared to the COGTMC as a whole using specific criteria drawn from the model itself. This is done in order to the get a general impression of the MDO concept.

Tenet 'AGILITY'	YES	PARTIALLY	NO	Conclusions
Can the tenet be seen as exhibiting one or more of the following COGTMC component attributes: *property, functionality, practical tool*	**YES**			Agility is ability to move and adjust forces faster than the adversary, thus it can be seen both as a property and an enabler.
Does the tenet have a conceptual connection to the COGTM?	**YES**			Agility draws heavily from historical roots of maneuver warfare as well as Clausewitzian tradition of massing of force and effect in time and place to achieve desired outcome
Does the tenet have a common element with the COGTMC component?	**YES**			Agility is present throughout the competition continuum and various levels of war.
Does the tenet have utility?	**YES**			Tempo brings utility to agility and provides it focus.
Meets / does not meet the criteria	With a result 2 or more 'YES' the tenets can be seen to meet the criteria.			**Conclusion:** **4/4** **Tenet 'AGILITY' meets the criteria**

Tenet ''CONVERGENCE'	YES	PARTIALLY	NO	Conclusions
Can the tenet be seen as exhibiting one or more of the following COGTMC component attributes: *property, functionality, practical tool*	**YES**			Convergence uses comprehensive analysis of the adversary system as practical tool for exploitation of built-in vulnerabilities in order to create a systemic collapse in all phases of the continuum.
Does the tenet have a conceptual connection to the COGTM?	**YES**			The adversary is perceived as a system of interconnected structures and processes (SoS). The goal is to use convergence to strike multiple vulnerabilities at the same time to create a definitive effect. This has conceptual connection to COG-CC-CR-CV analysis.
Does the tenet have a common element with the COGTMC component?	**YES**			Convergence can be seen as a Clausewitzian massing of effect and capabilities through time and space aimed at creating the desired effect.
Does the tenet have utility?	**YES**			The utility of convergence comes from using integration and synchronization of capabilities in joint and service levels In order to create opportunities that can be exploited.
Meets / does not meet the criteria	With a result 2 or more 'YES' the tenets can be seen to meet the criteria.			**Conclusion:** **4/4** **Tenet 'CONVERGENCE' meets the criteria**

Tenet ''ENDURANCE'	YES	PARTIALLY	NO	Conclusions
Can the tenet be seen as exhibiting one or more of the following COGTMC component attributes: *property, functionality, practical tool*		**YES**		Preparation, dispersion and pre-stacked supplies create resilience and ability to maneuver. This can be seen as practical tool, of sorts.
Does the tenet have a conceptual connection to the COGTM?	**YES**			Moral endurance is an intangible attribute of the force and it is portrayed in various ways, such as leadership skill and ability as well as the level of training.
Does the tenet have a common element with the COGTMC component?	**YES**			Through resilience endurance enables maneuver which makes it possible to mass military power from various locations in order to focus it for effect.
Does the tenet have utility?	**YES**			Endurance provides the capability and ability to project military power and sustain it in depth within the OE over long periods time.
Meets / does not meet the criteria	With a result 2 or more 'YES' the tenets can be seen to meet the criteria.			**Conclusion:** **3/4** **Tenet 'ENDURANCE' meets the criteria**

Tenet ''DEPTH'	YES	PARTIALLY	NO	Conclusions
Can the tenet be seen as exhibiting one or more of the following COGTMC component attributes: *property, functionality, practical tool*		**YES**		It can be argued that depth has a function, of sorts, of providing purpose via operational design.
Does the tenet have a conceptual connection to the COGTM?	**YES**			Focus of depth is on the enemy/adversary and its dispositions. To achieve this a comprehensive and holistic systemic view of both the OE and the adversary is required.
Does the tenet have a common element with the COGTMC component?	**YES**			To achieve in-depth focus of the enemy/adversary in multiple domains, a comprehensive and holistic systemic view of both the OE and the enemy/adversary is required.
Does the tenet have utility?	**YES**			Depth makes it possible to utilize 'operational reach' e.g. simultaneous operations in depth across multiple domains. It is also an enabler of convergence.
Meets / does not meet the criteria	With a result 2 or more 'YES' the tenets can be seen to meet the criteria.			**Conclusion:** **3/4** **Tenet 'DEPTH' meets the criteria**

Compilation of the comparison of COGTMC and MDO tenets (Part 2 of the analysis)

This appendix shows the compilation of MDO individual tenets compared to the COGTMC components parts (from C2 to C4)

COGTMC component (2-5)	MDO tenet: AGILITY	MDO tenet: CONVERGENCE	MDO tenet: ENDURANCE	MDO tenet: DEPTH	Conclusions
Component 2 (C2): A (friendly / enemy) holistic systemic structure that can change and is applicable in all levels of war	Meets criteria	Meets criteria	Meets criteria	Meets criteria	• **Agility** and C2 connect through systemic analysis. Both are properties and enablers that create framework and provide context. • **Convergence** and C2 connect via SoS view and the need to specify and determine the overall effect with a purpose of striking multiple vulnerabilities at the same time. • **Endurance** and C2 connect through moral, or intangible, aspects within the friendly/adversary systems. • **Depth** and C2 connect through the OE and adversary. The focus of depth is on 'enemy locations and dispositions' across all domains.
Component 3 (C3): Concentrated force/effect	Meets criteria	Meets criteria	Meets criteria	Metsä criteria	• **Agility** and C3 are both functionalities that create advantage over the adversary by rapidly utilizing massing of force and capabilities to attack systemic vulnerabilities. • **Convergence** and C3 connect through massing of effect. A key element of both is the principle of massing of force and combat power as one part of cumulative effect. • **Endurance** and C3 connect through resilience and maneuver as means to mass force. • **Depth** and C3 connect through focusing force and effect in time and space in order to influence the adversary throughout the continuum.
Component 4 (C4): The (main) thing to focus on	Meets criteria	Meets criteria	**Does not meet criteria**	Meets criteria	• **Agility** and C4 connect mainly through tempo. It brings utility to agility and provides it focus. Constant assessment of tangible and intangible elements is required in order to adapt and adjust the tempo. • **Convergence** and C4 connect through synchronization. C4 relates to something to focus on whereas for convergence focus lies in synchronization and integration. • **Endurance** and C4 do not connect. There are no contributing evidence in the source material to implicate a connection. • **Depth** and C4 connect mainly through purpose and objective. Depth in plans enables focusing on the most essential task at any given time thus providing a clear purpose. Through tempo there is also a connection to the tenet agility.
Component 5 (C5): Critical Capabilities, Critical Requirements and Critical Vulnerabilities	Meets criteria	Meets criteria	Meets criteria	Meets criteria	• **Agility** and C5 connect through tempo. The CC–CR—CV model provides focus, clarity and structure to analysis which enables faster tempo and a way to influence the OODA-loop. **Convergence** and C5 connect through the comprehensive analysis of the adversary system and they can also be seen as practical tools for achieving desired results. Both look ways to find and exploit systemic vulnerabilities in order to create a cascading effect that causes a systemic collapse in all phases of the continuum. • **Endurance** and C5 connect through systemic analysis (CC–CR–CV). This analysis can provide essential information about endurance related issues in all phases of the continuum. **Depth** and C5 connect through the analysis of one's own and adversary systems. CC–CR–CV matrix can be used to asses depth related issue of operational reach.

A simplified graphic illustration of the MDO concept and COGTMC correspondence.

Note! The graphic illustration below and comparison is a simplified version and as such does not describe all of the corresponding elements between the COGTMC and MDO. A more detailed listing is found on the tables in appendixes 13 and 14.

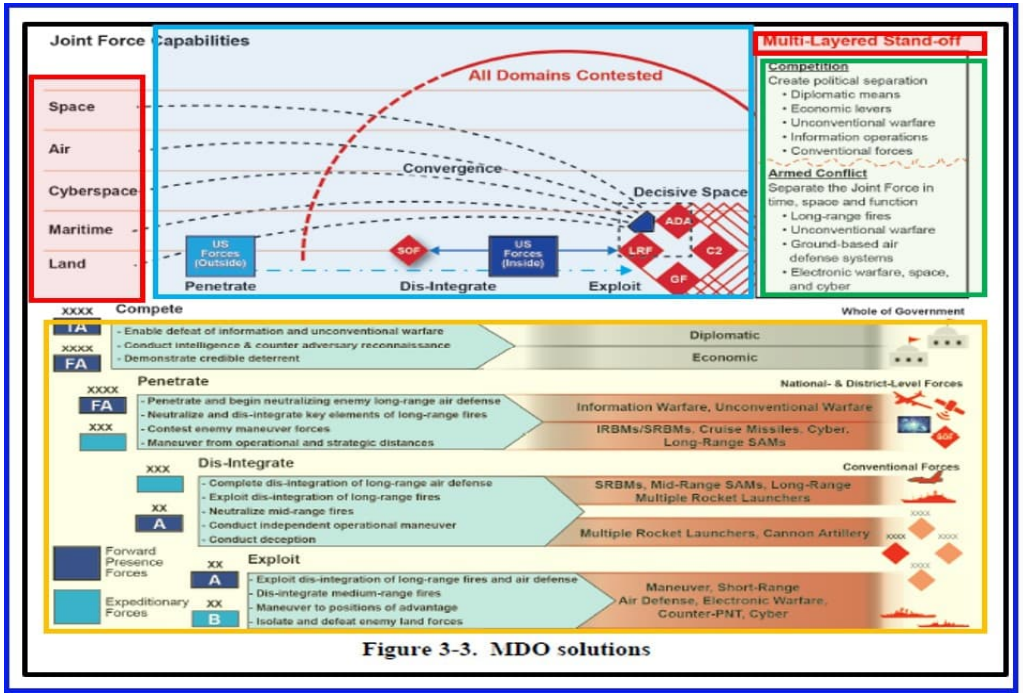


Figure 33: MDO solutions according to TPT 525-3-1 with an overlay of COGTMC colors[482]

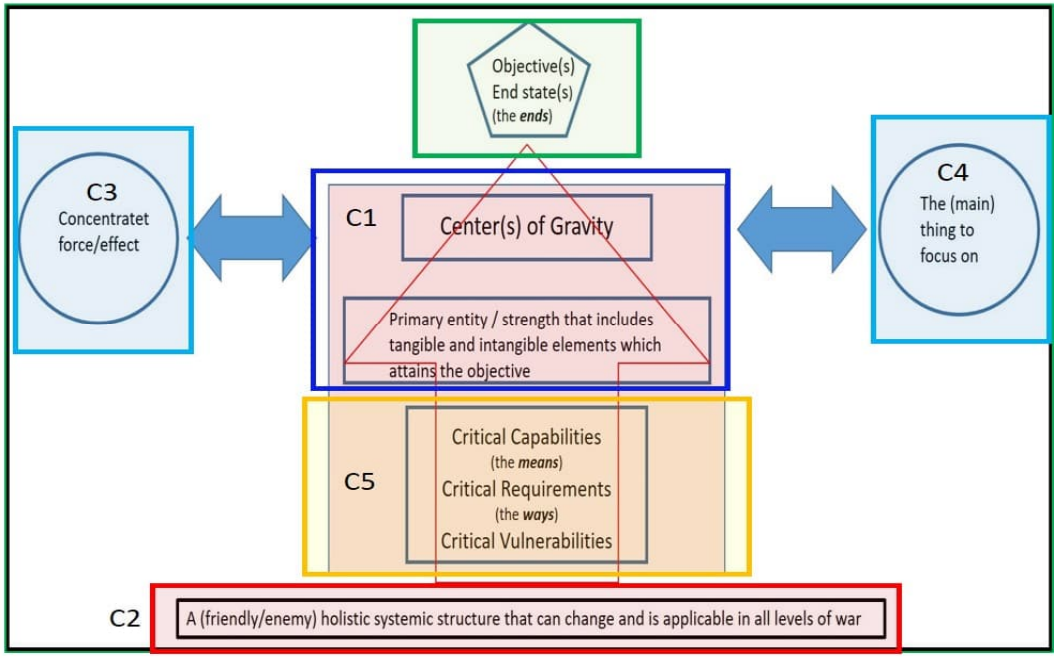


Figure 34: COGTMC with components designated by numbers and colors

Legend:

Green box: COGTMC objective / end-state correspondence

Blue boxes: COGTMC components C1 and C4 correspondence

Yellow box: COGTMC component C5 correspondence

Red boxes: COGTMC component C2 correspondence

[482] Training and Doctrine Command, Pamphlet 525-3-1: *The US Army in Multi-Domain Operations 2028,* p. 26.