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Cognitive Superiority: Human-Autonomy Systems in EDGE Operations

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ABSTRACT

This paper constructs a unified theoretical and strategic framework for the development of future defense and security capabilities, grounded in cognitive systems science, autonomous adaptation, and Human-Autonomy Command (HAC). Drawing on three interrelated research programs addressing autonomy in conflict, cognitive superiority in Human-Autonomy Systems (HAS), and command in safety-critical Emergent, Dynamic, Global and Evolutionary (EDGE) operations, the paper outlines a coherent Mission System Architecture (MSA). It demonstrates why deterministic orchestration architectures are inherently insufficient for complex Operating Environments (OE) due to their violation of the Law of Requisite Variety, and proposes a shift toward cognitive systemic action coordinated through the Joint Cognitive Command and Influence System (JC2IS). Ethical dimensions of autonomous lethality, Meaningful Human Control (MHC), and legal responsibility are critically examined. Furthermore, it necessitates the alignment of internal operational dynamics with the turbulent external environment, adhering to the principle of requisite variety. Three strategic propositions for policy and governance are identified: i) Operational and Academic Excellence; ii) Long-Term STEMM Investment and Triple-Helix Collaboration; and iii) Cognitive Architecture as Strategic Infrastructure, emphasizing the necessity of a Human-Autonomy Command approach for current and future conflict.The propositions demonstrate the need for a framework for autonomous technologies while ensuring ethical considerations and effective human-machine interaction. The paper concludes with recommendations for defense Science, Technology and Innovation (ST&I) investment and actionable proposals for Triple-Helix collaboration among government, industry, and academia, underscoring the necessity for continuous innovation, research, and development of robust policy frameworks to navigate the complexities of modern conflict and future challenging operating environments.

Keywords: Human-autonomy command, Cognitive superiority, Multi-domain operations, Autonomous adaptive agents, EDGE operations, Requisite variety

INTRODUCTION

In current conflicts across Europe, the Middle East, and in Hybrid and Grey Zone conflict globally, inexpensive autonomy-enabled systems operate independently within specific tasks, timespans, and battlespace domains. Future conflict will demand high-efficiency, mission-tailored autonomous technologies and intelligently coordinated human-machine interaction fundamentally different in typology from today's deployments. This paper synthesizes three research programs:

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1. The role of autonomy-relevant technologies, complexity, ethics, and policy implications in conflict (Norlander, 2025a);
2. Cognitive Superiority in EDGE operations and the architectural principles of Human-Autonomy Systems (Norlander, 2026); and
3. Human-Autonomy Command in safety-critical EDGE operations (Norlander, 2025b).

Together, these research strands build a theoretical edifice from the battlefield utility of autonomous systems, through the cognitive architecture required for superiority in a complex Operating Environment (OE), to the command philosophy necessary to direct such systems effectively and ethically.

FOUNDATIONS: AUTONOMY, COGNITION, AND JOINT COGNITIVE SYSTEMS

To understand the strategic implications of autonomous defense technologies, it is first necessary to establish precise conceptual foundations in cognitive systems science. The following formal definitions, drawn directly from the source literature, constitute the terminological bedrock of this research endeavor.

Core Concepts: Definitions

Definition 1: Autonomy (McNeese et al., 2018) *"A technology that is capable of working with humans as teammates to include the essential task work and teamwork function of a human teammate."*

Definition 2: Cognitive System (Rasmussen et al., 1994) *"A cognitive system operates by using knowledge about itself and its environment to plan and modify its actions based on that knowledge."*

Definition 3: Cognition (Vernon, 2014) *"Cognition is the process by which an autonomous system perceives its environment, learns from experience, anticipates the outcome of events, acts to pursue goals, and adapts to changing circumstances."*

These definitions constitute the foundation for Human-Autonomy Teaming (HAT) (Lyons et al., 2021; McNeese et al., 2018; NASEM, 2022; O'Neill et al., 2022), and establish that cognition is fundamentally relational, anticipatory and adaptive. A cognitive system must possess three capabilities (Worm, 2000): **(i)** Adaptation to varying environmental conditions; **(ii)** Prediction of how the OE evolves; and **(iii)** Regulation to reach equilibrium matching current conditions. Definitions 1 to 3 and capabilities (i) to (iii) must all collectively satisfy the model condition, or Conant and Ashby's law of required model-regulatory identity (1970), stipulates that every good regulator of a system must be a model of that system. This principle applies in equal measure to internal machine models and to human mental models, imposing a fundamental constraint on autonomous system design: a system that cannot adequately model its OE cannot adequately regulate its behavior within it.

Joint Cognitive Systems, MDO, and Cognitive Architecture

A cognitive system in the defense domain is functionally structured as a Joint Cognitive System-of-Systems (JCS), arranging mission-critical Sensors, Processors, Effectors, and Support subsystems in a unified cognitive Mission System Architecture (MSA) that enables systemic Understanding, through model building, reasoning, prediction, planning, and action selection Control (through Observation and Influence), and achievement of Operational Effects. Multi-Domain Operations (MDO) (Gilli et al., 2025; NATO, 2023a) require high-performance cognitive capabilities to build and sustain situational understanding, with human and agents as co-constitutive JCS elements.

Situated cognition, described through the 5E framework (Norlander, 2026), characterizes this architecture through five modalities: Embodied (cognition involves the entire JCS and its context); Embedded (layers of physical, informational, social, and cultural co-determination); Extended (cognition offloaded into biological and non-biological devices); Emergent (autonomy maintained through Adaptation, Exaptation, and Learning); and Enactive (adaptive bidirectional exchanges between agents and the environments they inhabit). Cognitive Superiority is sustained through eight Core Cognitive Functions (CCF): Perception, Attention, Action Selection, Memory, Learning, Reasoning, Meta-Cognition, and Prediction (Norlander, 2025b; 2026; Kotseruba & Tsotsos, 2020).

EDGE OPERATIONS AND THE FAILURE OF ORCHESTRATION

The EDGE Operational Paradigm

Definition 4: EDGE Operations (Norlander, 2024a; 2025b) *"The cognitive systemic coordination of asymmetric kinetic and non-kinetic means of power, in the physical, information, and cognitive domains, to understand the adversary's functionalities and exploit vulnerabilities, with the aim to defeat or render irrelevant the adversary's capabilities, structures, systems, and will to fight."*

EDGE operations exhibit four capability characteristics. **Emergent:** interdependent cognitive systems create effects with interdependent structure, qualitative novelty, mutual causality, increased system capacity, and irreducibility (Gignoux et al., 2017; Lichtenstein, 2014; Norlander, 2025b); Gell-Mann's (1995) formulation of Edge-of-Chaos Complexity applies: "effective complexity can be high only in a region intermediate between total order and complete disorder". **Dynamic:** nonlinear interaction, feedback-feedforward loops, and the ever-present risk of model error accretion, whereby inaccurate knowledge of the past generates inaccurate knowledge of the future (Norlander, 2026), underscore the critical importance of time-critical, high-reliability situational understanding. **Global:** actions are integrated in planning and synchronized across unlimited reach, exhibiting recursive, self-maintaining circular causality across physical, informational, and cognitive domains (Bickhard, 1993). **Evolutionary:** capabilities encompass behavioural, technological, and organizational adaptability, learning (translating campaign experience into action), and exaptation i.e. radical repurposing under stress through niche construction (Dew et al., 2004; Dew & Sarasvathy, 2016).

Orchestration vs. Cognitive Systemic Action

Orchestration entails deterministic coordination of discrete functional components within a predefined, stable mission state space, operating through feed-forward control and fixed teleology, relying on static ontologies, rendering orchestrated systems unavoidably brittle. The primary reason for the brittleness of orchestrated systems is their violation of Ashby's Law of Requisite Variety (Ashby, 1956); the internal variety of a regulator must be at least as great as the variety of the system being regulated. Encountering ontological drift, an orchestrated system suffers catastrophic failure. Cognitive Systemic Action, by contrast, sustains a dynamic trajectory through feedback control and open etiology, updating their internal world model to maintain alignment with reality (Norlander, 2026). Table 1 summarizes the contrasting responses to three essential aspects of mission perturbations.

Table 1: Orchestrated vs. cognitive systemic responses to mission perturbation (adapted from Norlander, 2026).

System State	Orchestrated Response	Cognitive Response
Ontological drift	Protocol conflict: Forces new data into fixed model categories; model error and erroneous action result.	Re-categorization: Representational plasticity updates the latent internal model through adaptation, exaptation, and learning.
Environmental & system disturbances	Entropy accretion: Disturbances suppressed; excess variety or energy causes system collapse.	Dissipative Structure: Disturbance energy drives self-organization into higher complexity.
Structural collapse	Catastrophic, brittle failure: System stops due to model collapse or spatiotemporal logic violation.	Graceful Degradation: Core functions maintained through structural overhead, model simplification, or heuristic bypass.

AUTONOMOUS ADAPTIVE AGENTS AND HUMAN-AUTONOMY SYSTEMS

Autonomous Adaptive Agents (AAAs) (Worm, 2000; NATO, 2023b, Norlander, 2024a) are the operational instantiation of cognitive systems theory in defense and security operations. Four central behavioral traits characterize AAAs:

1. An AAA senses the environment and acts through its actuators or collaborating agents;
2. An AAA possesses internal decision-making capabilities, anticipating future states based on internal models;
3. The internal models of AAAs are often incomplete and must be continuously updated; and
4. An AAA's anticipatory ability significantly alters aggregate system behavior.

Definition 5: Human-Autonomy System (Norlander, 2025a; 2025b; 2026): *"A joint cognitive system comprising at least one human operator and one adaptive artificial entity, with the capability to autonomously engage with its environment in direct interaction, involvement and/or interdependency with humans and other artificial entities in order to meet a specific mission objective."*

A HAS is predicated on human operators and technological artifacts constituting co-equal capability components, operating symbiotically towards a common mission objective. A HAS is capable of creating, sustaining, and evolving Comprehensive Cognitive Superiority as a joint, collective entity, continuously outperforming an adversary through comprehensive situation understanding, faster and more accurate learning, and superior information access (Hartley & Jobson, 2020).

HUMAN-AUTONOMY COMMAND: ARCHITECTURE AND OPERATIONAL DYNAMICS

Human-Autonomy Systems can be classified as Viable Systems (Beer, 1981; 1985), requiring Human-Autonomy Command (HAC) capabilities that are Hierarchical, Recursive, and Dynamic. To define HAC, Command must be decoupled from Control (Pigeau & McCann, 2000; 2002); only humans command, but both artificial and human agents continuously control and execute missions and tasks. Creativity and anticipation remain distinctly human capacities, grounding HAC's ethical architecture in a stable analytical and doctrinal foundation (Norlander, 2024b; 2026). HAC encompasses four fundamental components: Competency, Authority, Responsibility, and Situation Understanding. A Joint Human-Autonomy Command System (JHAC) interacts dynamically within and between an aggregate of HAS in response to mission demands and OE perturbations (Norlander, 2025a; 2025b). The Joint Cognitive Command and Influence System (JC2IS) connects and supports MSA components; as a cognitive system it is unstable without feedback, and the balance between feedback (compensatory) and feed-forward (anticipatory) control is critical for adaptability and stability. Table 2 maps JC2IS functions to MSA components.

Table 2: JC2IS mission system architecture. Adapted from Norlander, (2025b; 2026).

JC2IS Function	MSA Components
Information Acquisition	Effects – Control (Observation) – Understanding
Joint Human-Autonomy Command (JHAC) / Command Directives	Control (Observation and Influence) – Effects
Situation Assessment	Control (Observation) – Understanding
Cognitive Systemic Action Coordination (CSAC)	Understanding – Control (Influence) – Effects
Joint Cognitive System Aggregate	Control (Influence) – Effects
Support Systems	Understanding – Control (Observation and Influence)

COMPLEXITY, INFORMATION, AND UNCERTAINTY

Increasing system complexity compromises a commander's ability to predict system behavior across four dimensions: (**i**) system complexity, (**ii**) mission complexity, (**iii**) OE complexity, and (**iv**) complexity of system models and representations. Corning (2001) introduced control information to address the absence of functional information properties in Shannon and Weaver's (1949) entropy framework:

> *"Control information is not a thing but an attribute of the relationships between things. It is the capacity (know-how) to control the acquisition, disposition, and utilization of matter/energy in purposive (cybernetic) processes."*

Information utility in command and control depends critically on three properties (Norlander, 2025b):
Information asymmetry: Potential for exploitation of operational uncertainty more effectively than an asymmetry is a decisive factor in military operations, exemplified by hybrid threat actors directing cascading and combinatorial effects on the edge of chaos (EU Joint Research Centre, 2023).
Information relevance: The clarity of use and purpose of a specific control information aggregate, acquired from the operating environment, and relating operational variables to mission variables.
Information diagnosticity: Whether that aggregate represents what must be known in the current mission phase. Information diagnosticity is conceptually related to Kolmogorov complexity (Li & Vitanyi, 2008). Actionable diagnostic information is the complexity (coding length) of a maximal statistic remaining invariant to the disturbances linked with a specific task. Risk must be managed while uncertainty is actively exploited. Knight (1921) defined uncertainty's central characteristic:

> *"The higher the uncertainty, the more possible outcomes, both positive and negative."*

ETHICS, MEANINGFUL HUMAN CONTROL, AND LEGAL RESPONSIBILITY

AI-enabled decision support tools used extensively in recent conflicts improve operational efficiency but carry risks of collateral damage and fatal consequences. Individual responsibility is predicated on the principle of ***volition***: that individuals possess control over their actions and can distinguish ethical from unethical behaviors (Haggard, 2008). Legal systems require both a physical act (actus reus) and conscious intent (mens rea) to establish criminal liability. Provision of cognitive cues about system state and agent self-confidence yields positive effects in Human-Machine trust calibration (Gebru et al., 2022). The concept of Meaningful Human Control (MHC) for Lethal Autonomous Weapons (LAW) is fraught with ambiguity (Cummings, 2019; 2025); viewed from the perspective of agency, MHC remains ethically ambiguous in the context of hybrid autonomous and human-operated weaponry. The most significant aspect of human oversight in HAC lies in the pre-emptive designation of targets and the conditions under which engagement is authorized (Norlander, 2025a), adhering to the principles of proportionality and distinction of the Law of Armed Conflict. The operational utility of ethically informed HAC is condensed into a single principle:

Knowing more, Deciding better, Acting sooner.

This principle implies that ethically informed HAC for LAW deployment must: (i) sharpen Reliability, Relevance, and Diagnosticity requirements on Command, Control, Communications, Computers, Intelligence, Surveillance, Target Acquisition, and Reconnaissance (C4ISTAR) information; and (ii) identify, select, and prioritize correct targets earlier with higher confidence, eliminating last-moment target reprioritization.

POLICY IMPLICATIONS AND STRATEGIC PROPOSITIONS

HAC is contingent on policy, setting the framework for strategic, operational, and tactical decision-making. In this work, four unresolved policy challenges have been identified:

1. **Understanding the Utility and Hazard of Autonomy:** Advanced hazard analysis of human-autonomy systems, grounded in systems safety theory (Cummings, 2025), is indispensable for understanding moral and legal responsibility shaped by cultural and educational paradigms.
2. **Investment and Risk Appetite:** Investments in scientific discovery and practice are inadequate; Development, Testing, Evaluation, Implementation, and Deployment must be directed with credibility and broad governance mandates, as accessible autonomy has accelerated military AI experimentation under ambiguous ethical and legal standards.
3. **Government, Academia and Business Alignment:** The lack of multilateral export controls facilitates technology proliferation to hostile actors; autonomous capabilities require a fundamental mindset shift toward knowledge, dynamism, and cooperation permeating defense policy, Science, Technology and Innovation programs, education, training, and operational planning.
4. **Access to a Solid Body of Knowledge:** Government policy must enable a future-oriented scientific and operational Body of Knowledge integrating technology, organizations, and people across system, conceptual, and capability perspectives.

Three strategic propositions are identified as enduring and operationally decisive. **First, Operational and Academic Excellence:** future capability development requires high knowledge readiness, a proactive intelligence-driven doctrine, and an exceptional ability to seize tactical initiative. **Second, Long-Term STEMM Investment and Triple-Helix Collaboration:** sustained investment in Science, Technology, Engineering, Mathematics, and Medicine (STEMM) and international cooperation must be maintained over extended timeframes; Government, industry, and academia can together shape a strong Defense Technological and Industrial Base (DTIB) for a Whole-of-Government, Knowledge-Based Defense. **Third, Cognitive Architecture as Strategic Infrastructure:** the MSA and JC2IS constitute a strategic capability infrastructure, not platform specifications. The shift from orchestration-based to cognitive-systemic architectures requires a fundamental reorientation of how defense organizations conceptualize, procure, train, and employ autonomous capabilities. This reorientation aligns with the eight EDA APAS (2024) priority areas: (**i**) Sensing; (**ii**) Thinking/Decision; (**iii**) Acting; (**iv**) Mobility; (**v**) Human-Autonomy Teaming; (**vi**) Self-Monitoring and (**vii**) Self-Protection; Communications and Networking; and (**viii**) System Architecture.

CONCLUSION

The proliferation of autonomy and the dawn of Multi-Domain Human-Autonomy Systems in conflict signify an evolution in policy, strategy, and doctrine with far-reaching implications for international security and global power dynamics. The central theoretical contribution is the rigorous distinction between orchestration and cognitive systemic action, and the demonstration that future conflict, characterized by the EDGE operations concept, demands the latter. Deterministic, rule-based autonomous systems will fail catastrophically in high-entropy OEs.

Only cognitive systems possess genuine agency and are capable of adaptation, exaptation, and learning. Only cognitive systems can sustain the requisite variety demanded by future conflict. The MSA of the JC2IS, grounded in the eight core cognitive functions and the five 5E cognitive modalities, provides a technology-agnostic blueprint for defense capabilities that achieve cognitive superiority as a joint, collective property of human-machine systems.

Meaningful Human Control is most effectively realized through disciplined, pre-emptive target designation, rigorous C4ISTAR information quality standards, and the institutional cultivation of human judgment: Knowing more, Deciding better, Acting sooner. Strategic investments in STEMM, Triple-Helix collaboration, and a future-oriented Body of Knowledge are indispensable preconditions for realizing this vision.

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REFERENCES

Ashby, W. R. (1956). An Introduction to Cybernetics. London: Chapman & Hall.
Beer, S. (1981). Brain of the Firm (2nd ed.). Chichester: Wiley.
Beer, S. (1985). Diagnosing the System for Organizations. Hoboken, NJ: Wiley.
Bickhard, M. H. (1993). Representational content in humans and machines. Journal of Experimental and Theoretical Artificial Intelligence, 5, 285–333.

Conant, R. C., & Ashby, W. R. (1970). Every good regulator of a system must be a model of that system. International Journal of System Science, 1, 89–97.
Corning, P. A. (2001). Control information: The missing element in Norbert Wiener's cybernetic paradigm. Kybernetes, 30(9), 1272–1288.
Cummings, M. L. (2019). Lethal autonomous weapons: Meaningful human control or meaningful human certification? IEEE Technology and Society Magazine, 38(4), 20–26.
Cummings, M. L. (2025). Identifying AI hazards and responsibility gaps. IEEE Access, 13, 54338–54349.
Dew, N., Sarasvathy, S. D., & Venkataraman, S. (2004). The economic implications of exaptation. Journal of Evolutionary Economics, 14, 69–84.
Dew, N., & Sarasvathy, S. D. (2016). Exaptation and niche construction: Behavioral insights for an evolutionary theory. Industrial and Corporate Change, 25(1), 167–179.
European Defence Agency. (2024). Action Plan on Autonomous Systems (APAS). ISBN: 978-92-95075-92-4. DOI: 10.2836/6119972.
European Union Joint Research Centre. (2023). Hybrid Threats: A Comprehensive Resilience Ecosystem. Document JRC129019. Brussels: European Commission.
Gebru, B., Zeleke, L., Blankson, D., Nabil, M., Nateghi, S., Homaifar, A., & Tunstel, E. (2022). A review on human–machine trust evaluation. IEEE Transactions on Human-Machine Systems, 52(5), 952–962.
Gell-Mann, M. (1995). What is complexity? Complexity, 1(1). John Wiley and Sons.
Gignoux, J., Chérel, G., Davies, I. D., Flint, S. R., & Lateltin, E. (2017). Emergence and complex systems: The contribution of dynamic graph theory. Ecological Complexity, 31, 34–49.
Gilli, A., Gilli, M., & Grgic, G. (2025). NATO, multi-domain operations and the future of the Atlantic Alliance. Comparative Strategy, 44(1), 73–91.
Haggard, P. (2008). Human volition: Towards a neuroscience of will. Nature Reviews Neuroscience, 9(12), 934–946.
Hartley, D. S., & Jobson, K. O. (2020). Cognitive Superiority: Information to Power. Springer, Cham. ISBN 978-3-030-60183-6.
Knight, F. H. (1921). Risk, Uncertainty and Profit. New York: Houghton Mifflin.
Kotseruba, I., & Tsotsos, J. K. (2020). 40 years of cognitive architectures: Core cognitive abilities and practical applications. Artificial Intelligence Review, 53(1), 17–94.
Li, M., & Vitanyi, P. M. B. (2008). An Introduction to Kolmogorov Complexity and Its Applications (3rd ed.). New York: Springer.
Lichtenstein, B. B. (2014). Generative Emergence: A New Discipline of Organizational, Entrepreneurial and Social Innovation. Oxford University Press.
Lyons, J. B., Sycara, K., Lewis, M., & Capiola, A. (2021). Human–autonomy teaming: Definitions, debates, and directions. Frontiers in Psychology, 12, 589585.
McNeese, N. J., Demir, M., Cooke, N. J., & Myers, C. W. (2018). Teaming with a synthetic teammate: Insights into human-autonomy teaming. Human Factors, 60(2), 262–273.
NASEM National Academies of Sciences, Engineering, and Medicine. (2022). Human-AI Teaming: State-of-the-Art and Research Needs. Washington, DC: The National Academies Press. https://doi.org/10.17226/26355.
NATO. (2023a). Alliance Concept for Multi-Domain Operations. Enclosure 1 to SH/SDP/SDF/TT-010038 ACT/SPP/CNDV/TT-5856.
NATO. (2023b). SAS-143: Agile Multi-Domain C2 of Socio-Technical Organizations in Complex Endeavors Operating in a Contested Cyberspace Environment. Final Technical Report. Report No: STO-TR-SAS-143.

Norlander, A. (2024a). Human-Autonomy Command: Leading and harmonizing humans and artificial agents as cognitive capabilities. Annals of C2, Vol. 1. NATO Command and Control Center of Excellence (C2CoE).

Norlander, A. (2024b). Human-Autonomy Command (HAC): Directing and coordinating human-machine systems as cognitive capabilities. Proceedings of IEEE International Conference on Recent Advances in Systems Science and Engineering (RASSE). IEEE.

Norlander, A. (2025a). Autonomy in conflict: Technology, complexity, ethics, and policy implications. IEEE Access, 13. https://doi.org/10.1109/ACCESS.2025.3571225

Norlander, A. (2025b). Human-Autonomy Command in safety-critical EDGE operations. Human-Intelligent Systems Integration. Springer Nature. https://doi.org/10.1007/s42454-025-00075-x

Norlander, A. (2026). Autonomy in Complexity: Cognitive Superiority of Human-Autonomy Systems. *IEEE Access*. Vol. 14. Mahwah, NJ. IEEE. Open Access. https://doi.org/10.1109/ACCESS.2026.3706306

O'Neill, T., McNeese, N., Barron, A., & Schelble, B. (2022). Human–autonomy teaming: A review and analysis of the empirical literature. Human Factors, 64(5), 904–938.

Pigeau, R., & McCann, C. (2000). Redefining command and control. In C. McCann & R. Pigeau (Eds.), The Human in Command (pp. 163–184). New York: Kluwer Academic/Plenum Publishers.

Pigeau, R., & McCann, C. (2002). Re-conceptualizing command and control. Canadian Military Journal, 3(1), 53–64.

Rasmussen, J., Pejtersen, A. M., & Goodstein, L. (1994). Cognitive Systems Engineering. New York: Wiley.

Shannon, C. E., & Weaver, W. (1949). The Mathematical Theory of Communication. Chicago: University of Illinois Press.

Vernon, D. (2014). Artificial Cognitive Systems: A Primer. Cambridge, MA: MIT Press.

Worm, A. (2000). On Control and Interaction in Complex Distributed Systems and Environments. Linköping Studies in Science and Technology, Dissertation No. 664. Linköping University.