

**Socio-technical Synthesis: Firefighting Aircraft and Japanese Whaling Scandal**

Socio-technical Synthesis  
Presented to the Faculty of the  
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By

Yicong Fu

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

Signed: Yicong Fu

Approved: \_\_\_\_\_ Date \_\_\_\_\_  
Benjamin J. Laugelli, Assistant Professor, Department of Engineering and Society

Actor Network Theory (ANT) is useful for evaluating the successfulness of a complex system involving many human and non-human participants. When applied to international policy, the organic integration of different stances from various social entities is emphasized by ANT to guarantee a fair and sustainable resolution. While in the context of technological development, ANT helps achieve practicality, affordability, and accessibility, instead of merely advancing the scientific novelty idealistically. In both my technical capstone design and STS research paper, I scrutinized the system through the lens of ANT to either anticipate and accommodate each actant to form a balanced network or understood the failures in the translational processes that led to the collapse of a network.

My technical project is to design a firefighting tanker aircraft with an estimated entry into service in 2030. With the help of professional software, the final concept is able to satisfy all the requirements stated in the AIAA aircraft designing competition RFP and achieve some of the most influential objectives. The final configuration includes a flat-bottom fuselage with retardant tank trains, high-mounted anhedral swept wings, a T-tail, and four wing-mounted turboprop engines. This aircraft is designed to combat wildfires within a mission radius of 400 nmi by precisely deploying fire retardant from a low-and-slow flight condition. ANT was applied in the design process for trade studies to determine the necessity of features with considerations from technology readiness, manufacturers' profitability, customers' demand, and competitiveness among comparator aircraft. The final design was made with a holistic evaluation of technological and human factors to ensure the proposal is feasible for acceptance.

My STS research paper is using ANT to analyze why the 1982 IWC moratorium was a failure that indirectly led to the Japanese scientific and commercial whaling scandal. After evaluating examples of participating nations in the moratorium and relevant social groups, I

identified their specific faults in the ANT translational processes and explained why this network was made unsustainable and eventually collapsed in the 21<sup>st</sup> century. The US politicized the IWC moratorium and overlooked the concerns of pro-whaling countries, which led to failed intersement and enrolment processes. Japan focused on the exterior relations and neglected the impact on the internal economy and culture, which made an unsuccessful problematization. USSR, Norway, and Iceland declined their engagement or responsibility within the network which further made the actors' composition biased toward anti-whaling. Japanese whalers' and whale meat consumers' values were also ignored, which showed a weak connection between major and peripheral actors. All these failures contributed to the collapse of the network and manifested as the Japanese whaling scandal.

Simultaneously working on both projects had a positive influence on the analysis. The research on ANT for the STS paper reminded me not to only satisfy the demand from one actor group, but to strive for the best trade-off solution among all competing opinions. It is better to design an aircraft that satisfies every actor by 90% than one that fulfills one actor by 100% and is rejected by the rest. Conversely, the technical project made me contemplate whether the IWC could reach a sustainable moratorium if better technologies were available at that historic moment. If non-lethal scientific sampling techniques were easily identified and discussed, consensus may have been made to eliminate the possibility of a scientific whaling scandal.

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