From initial observations of arterial structure Harvey determined a process, and from detailed examination of that process he determined required elements with functions, which in turn produced new identification of function-bearing structures, in a sequence of iterative development.

As demonstrated in the cases of cardiac valves and atria, Harvey's systems analysis was capable of discerning functions that were not evident either by direct examination of the structures, or by analogy with other structures of known function.

The rest of Harvey's analysis involved tracing the impact of the systolic process and unidirectional flow of blood through the heart on the traditional explanations of heart, liver, and lung function, showing that food transformed in the liver cannot be the source of all blood, that the pulmonary veins do not carry anything aerial or ethereal (like *pneuma*) from the lungs, that there is no support for the function of the heart being a furnace, and that the blood expelled through the aorta must return to the heart via the venae cavae. This last observation lead to the hypothesis of circulation, which Harvey could not demonstrate but firmly concluded on the basis of the inadequacy of all explanations requiring generation and expiration of blood at the beginning and end of a noncircular flow.

Three striking features of Harvey's analysis arise in contrast to the contemporary Galenic physiology that Harvey was overturning:

1. Harvey never determined the functions of the lungs, liver, or even of blood itself. He refuted legacy functional ascriptions without substituting new ones.
2. Harvey constructed necessary rather than plausible explanations.
3. Harvey ended on an unsolved problem (the hypothesis of "pores" or capillaries).

The first point underscores a characteristic feature of systems analysis: there is no infinite regression of functions, nor even a finite chain of functions leading from every level of hierarchical analysis to some reference level at which an ultimate end, e.g., survival or reproduction, can be defined. Evolutionary biology's coronation of a privileged hierarchical reference level, variously the gene, organism, or species, is inconsistent with systems analysis as done by Harvey.

The second point above stresses that Harvey is everywhere insisting on functional justification of elements, or Weinberg's criterion of elegance. This is particularly evident in Harvey's correction of Fabricius' interpretation of the venuous valves in extremities. Fabricius' descriptive interpretation of their function was that they regulated blood distribution and held pooled blood in the manner of weirs, but Harvey correctly deduced a need for blocking blood flow rather than simply holding blood, and identified the structures as valves rather than weirs. Had Harvey been content with plausible explanations he could have let his mentor's (Fabricius') interpretation of venuous valves stand unchallenged, as it did not contradict any of the rest of Harvey's analysis, but for Harvey function was rooted in necessity rather than plausibility, specifically the requirements of structure and process in a joint producer/product relation with function.

The third point above illustrates that although systems analysis involves no infinite regression and therefore can close, it need not close; it is enough to establish a manifold of relations that cannot be modified without contradiction. In this respect

systems analysis is like modern theoretical physics, where the problem of a unified theory remains unsolved yet confidence in quantum mechanics being fully true, and not merely an approximation of truth, remains high, because quantum mechanics seems insusceptible to modification without contradiction (Weinberg, 1992, 88).

5.2 Soviet National Missile Defense

Sparked by a 1953 joint letter from seven Soviet Marshals recommending a national missile defense (NMD), the Soviet Politburo approved their first plan for NMD in 1954. This plan, implemented in stages, adapted the SA-1 surface-to-air missile (SAM) in an anti-ballistic-missile (ABM) role, and developed the Sary Shagan missile test range, the Triad targeting radar and the Hen House phased-array radar. Among the achievements of this first Soviet NMD program was the successful 1961 interception of an SS-4 warhead by a modified SA-1 interceptor (called V-1000) at an altitude of 25 kilometers over Sary Shagan, using a conventional explosive warhead. This interception integrated all of the elements of NMD, with a Hen House radar initially acquiring the target at a range in excess of 1000 kilometers and passing targeting data to Triad radars and the interceptor launch site (Lee, 1997).

Following the successful test, operational deployment of missile defense systems began in 1962–63, with simultaneous construction of the Moscow zonal missile defense system, with its characteristic Dog House and Pillbox radars, and the Soviet national system, with its Hen House and Pechora-class large phased array radars (LPAR), most famously the LPAR at Krasnoyarsk.

American intelligence analysis of Soviet missile defense development could only rely on external observations of various kinds, such as operating frequencies and pulse durations collected from Soviet radars, observation of tests at Sary Shagan, and overhead photographs of missile installations. Analyses of this evidence relied on the methods of systems analysis, introduced from industry by US defense secretary, and former Ford Motor Company president, Robert McNamara. During the mid-1960s, while systems analysis of Soviet missile defense failed to understand the significance of many tests conducted at Sary Shagan or the relationship between the Hen House radar network and the Moscow missile defense network, US national intelligence estimates (NIE) nonetheless correctly determined that the Soviets were deploying NMD. These assessments were ultimately challenged in the late 1960s as the USA and the Soviet Union began negotiating what would become the 1972 Anti-Ballistic Missile (ABM) treaty, and diplomacy demanded a change in the nature of evidence for those claiming that the Soviets had deployed NMD (Lee, 1997), since Soviet authorities denied deploying NMD and the treaty forbade it.

The 1960s-era systems analyses of Soviet NMD proceeded from fixing observed Soviet interceptor limitations (especially their slow speed, about 2 kilometers per second, and their languid initial acceleration) as technological design constraints under the razor of economy, and concluding from this that any Soviet NMD would