

# **How Can We Improve the Blood Donation Process in the United States?**

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# The Problem with Blood Donation

- The supply of donated blood available is not large enough to accommodate all the sick or injured people who need blood transfusions.
- According to the 2007 National Blood Collection and Utilization Survey Report, 38,000 donations are needed daily in the United States; this translates into over 4.5 million patients who need blood transfusions each year in the United States.

## The Problem (continued)

- However, less than one third of the U.S. population that is eligible to donate blood actually does so each year.
- Therefore, the goal of this model is to figure out the best way to improve the blood donation process so that more people will donate blood and thus more blood will be available in life-threatening situations which require blood transfusions.

# The Problem (continued)

- This graph shows what has happened in the past, the current level of donors, and both the hope and fear for the future level of donors.
- The fear is that the number of donors will continue to drop while the hope is that the number of donors will increase until it reaches a steady, high level.

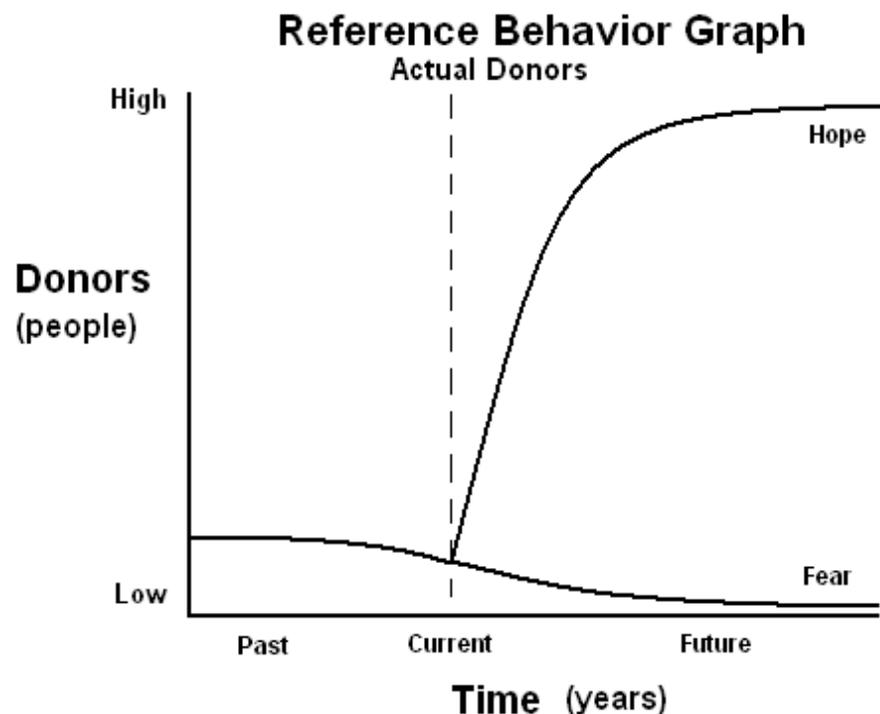


Figure 1: Reference Behavior Graph of Actual Donors

# The Problem (continued)

- At first, we predicted that the number of potential donors would decrease inversely with an increase in actual donors since those who are no longer potential donors are assumed to have become actual donors.

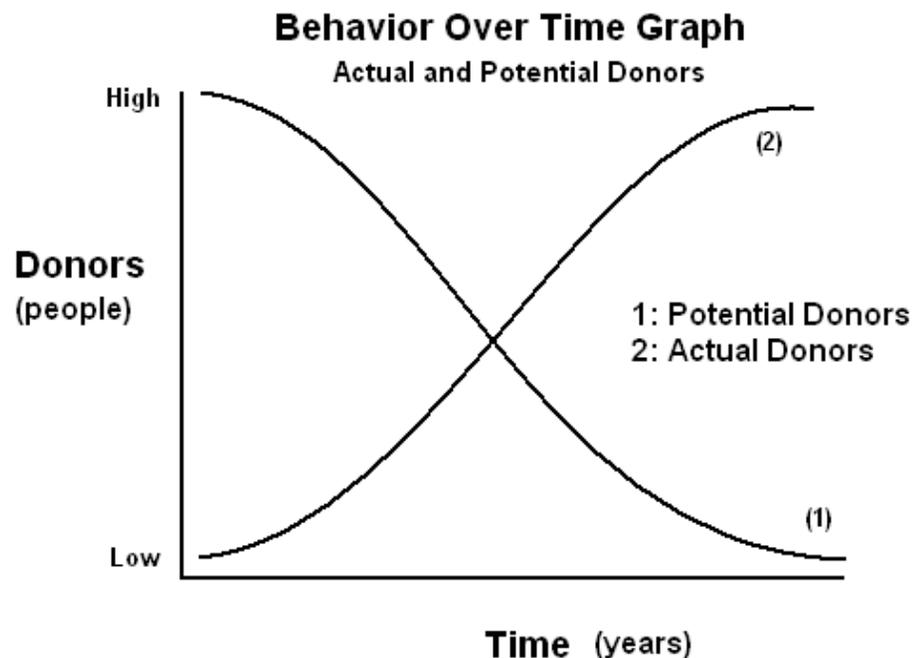
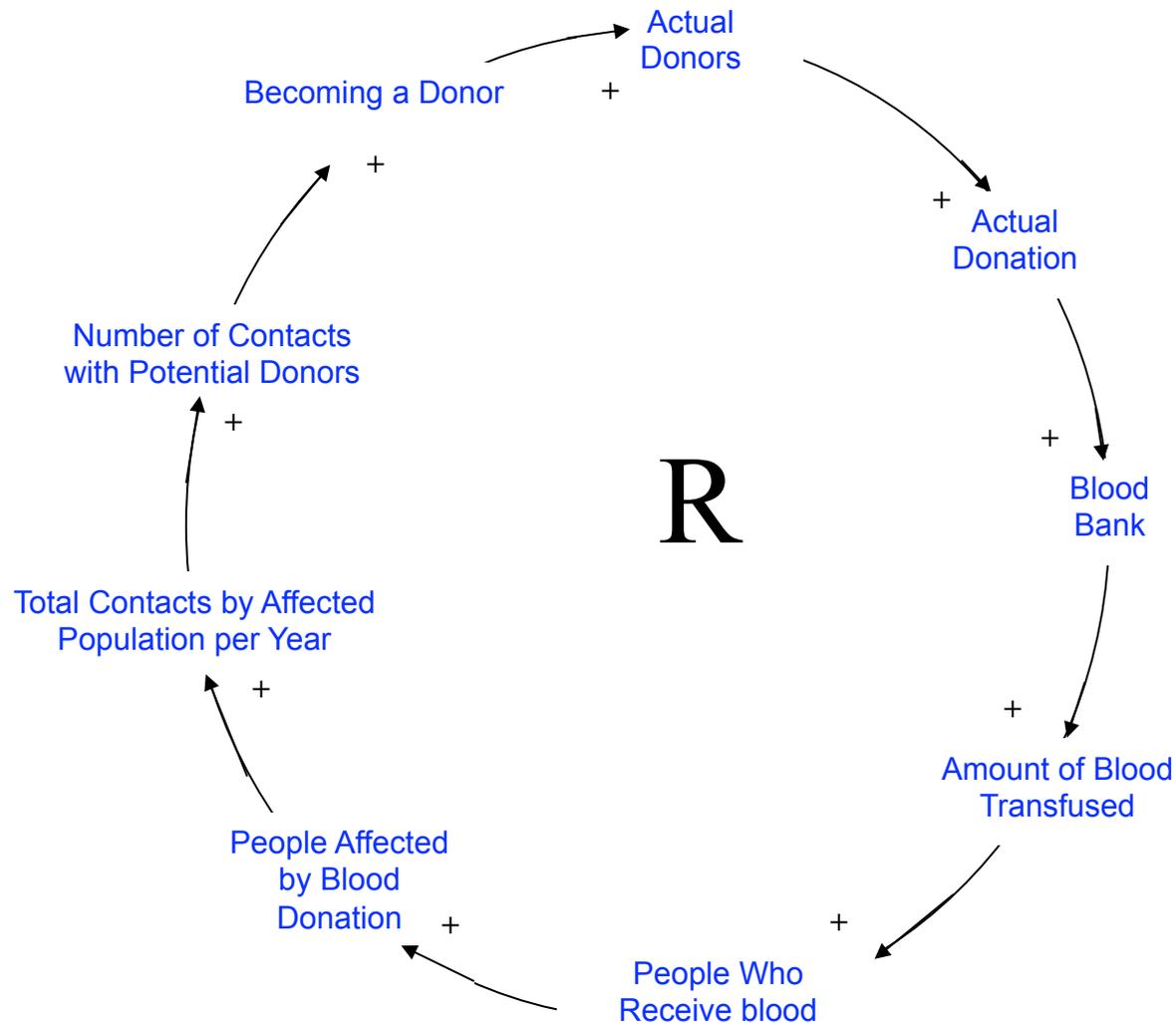
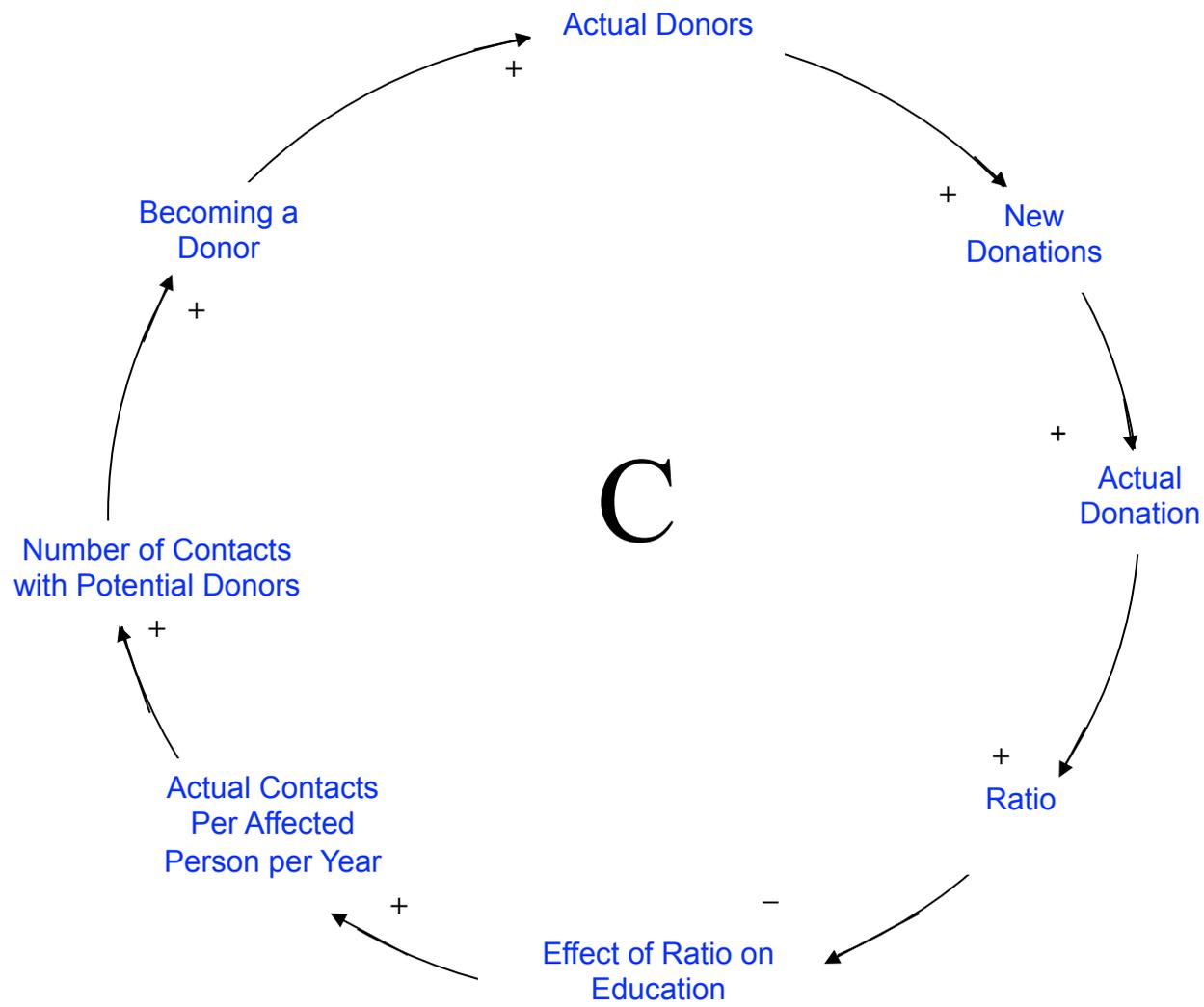


Figure 2: Behavior over Time Graph of Actual and Potential Donors

# Feedback Loop 1-Actual Donors

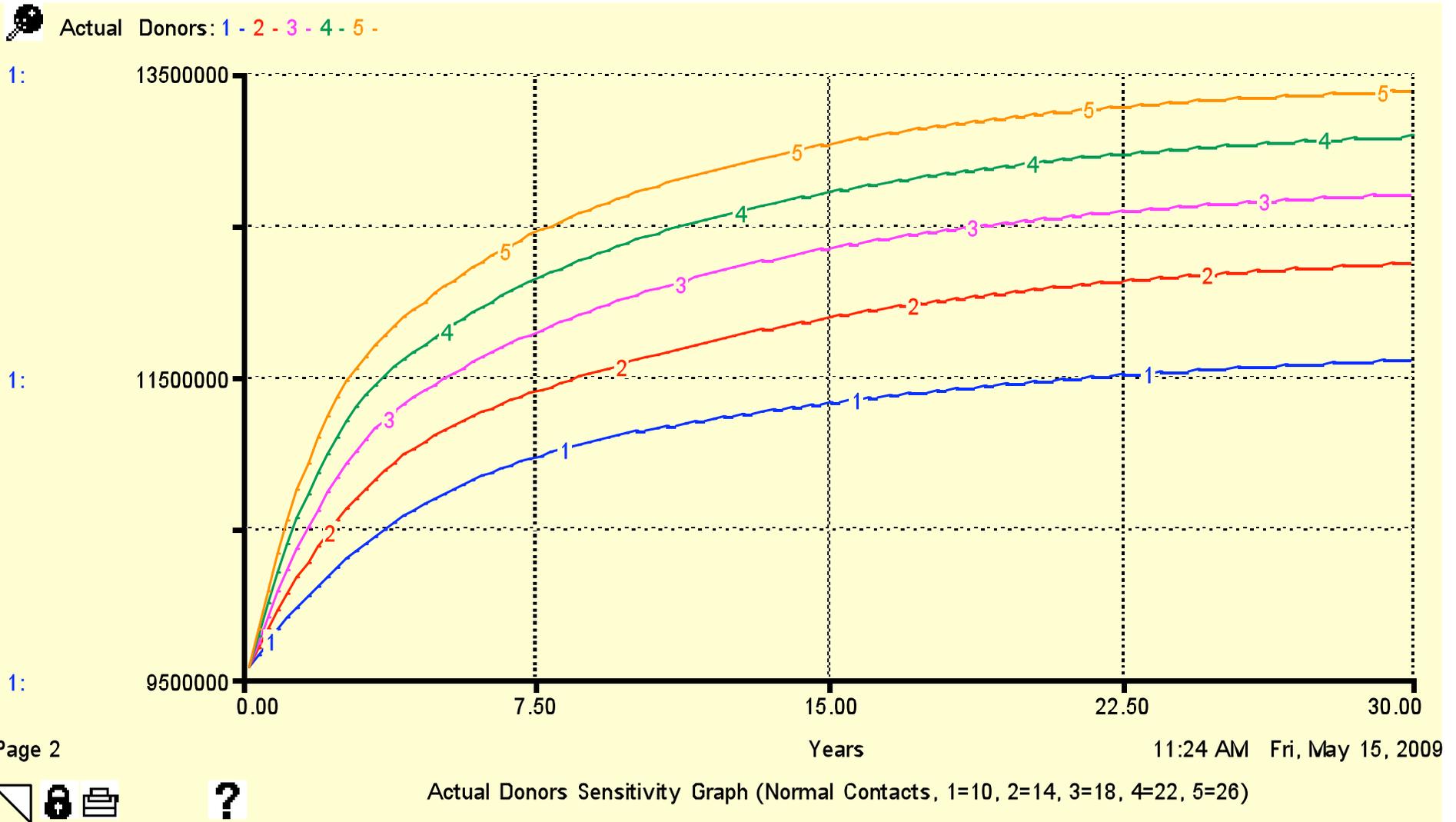


# Feedback Loop 2-Actual Donors



# One Policy

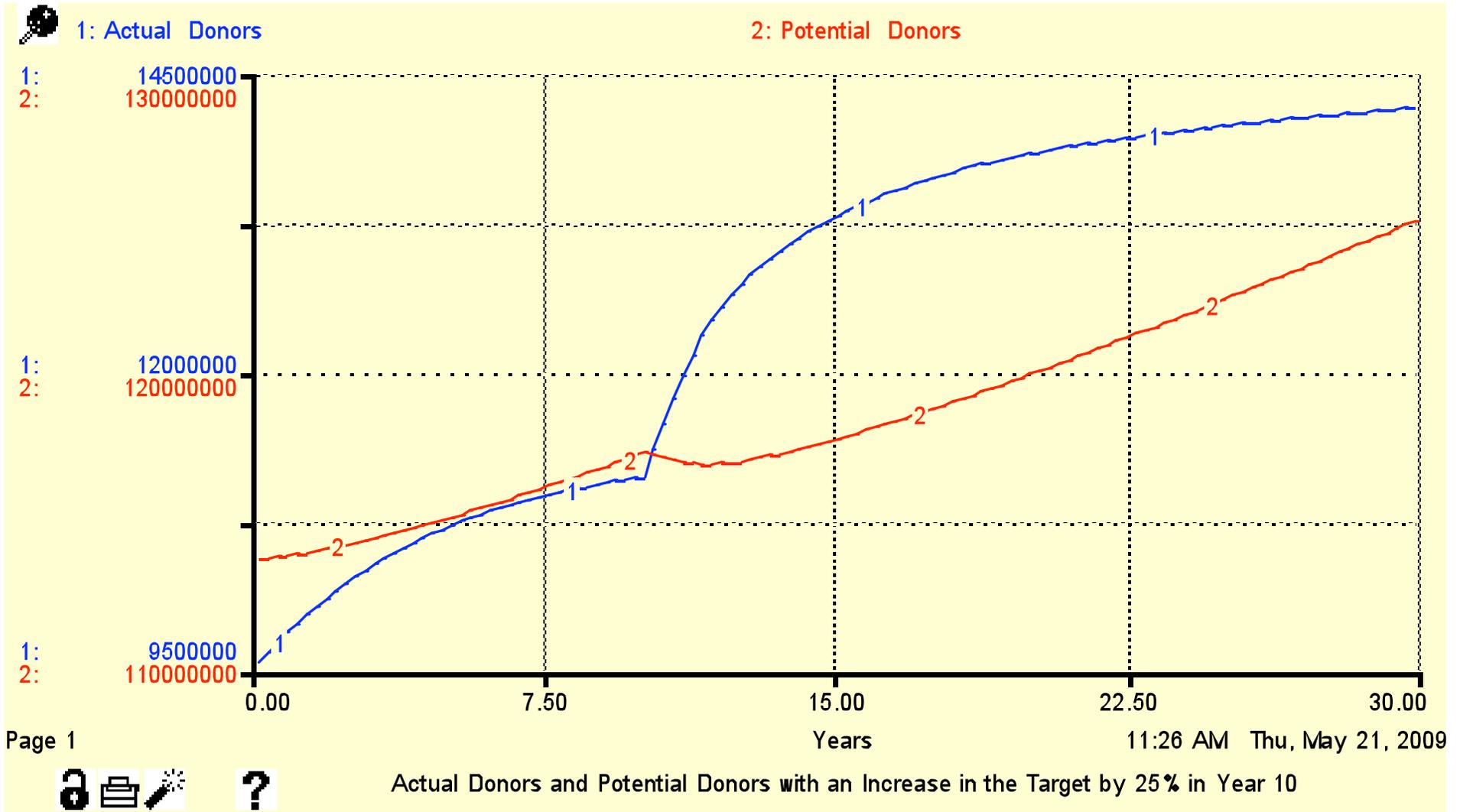
- For one policy, we changed the normal contacts per affected person per year by increments of four with the first parameter value at 10 contacts per year and the fifth parameter value at 26 contacts per year.
- The main effect that this has on the actual donors is that it makes the initial increase of the donors less gradual and the donor level remains slightly higher.
- Therefore, it would be beneficial to increase the number of normal contacts per affected person per year when the need for blood transfusions is urgent and consistently high.



This is what the sensitivity analysis graph looked like when we changed the Number of Normal Contacts per Person per Year

# Another Policy

- Our second policy demonstrates what would occur if there was an immediate increase in the target (the amount of blood ideally available) by 25 percent in the tenth year.
- An example of a realistic situation in which this could occur is if the United States entered a war in the tenth year of the simulation, and the need for blood transfusions increased in accordance with the number of injured soldiers.
- This graph will demonstrate the counteracting feedback loop involving the effect of ratio on education converter. When the ratio of the actual donations to the target decreases dramatically in the tenth year, the effect of the ratio on education stimulates a major increase in the education component of the model, thus also increasing the number of actual donors to reflect that.



The graph of this policy shows that the actual donor level will change in accordance with the target (the need for blood).

# What We Learned

- We learned that the process of model building is a multi-step process; we continually add on components to our model and change it until it reflects what we believe to be realistic behavior.
- We learned how serious the issue blood donation is; there are hundreds of people who are waiting for blood transfusions and die before the blood supply is large enough to accommodate them.
- We learned about the main reasons why people do and do not choose to donate. The major reason people choose not to donate is because they don't realize that their blood is needed. This was important to learn because it proved to us that it will be easier to convince someone to donate through education.

# What Else We Learned

- We learned how to think critically and determine what policies and ideas could lead to success in improving the blood donation process in the United States.
- Extrapolating from the data, and the crucial role of information transfer, blood drives are efficient and effective ways of collecting blood because they encourage people to share their experiences within the community, and it consolidates collection.
- We learned that one donation can save three lives.

# So Donate!

