# Complexity

Team 7

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# 1 Prototype I

First we know the following information

- We have a budget of $600k
- The protype is going to around 5 KSLOC
- Average cost of developer is 8k per person per month
- All the parameters are nominal except for:
  - RELY: Low; since the prototype will not be operational
  - CPLX: High; some complex cross-device and external interfaces
  - ACAP: Very High; prototype needs top talent
  - PCAP: Very High; prototype needs top talent
  - APEX: High; prototypers are familiar with medical field
  - PLEX: Low; prototypers unfamiliar with new devices
  - RUSE: Low; prototype code will not be reused

## 1.1 Estimated Effort and cost

For the effort we have an scaling component of:

E = 0.91 + 0.01 (3.72 + 3.04 + 4.24 + 3.29 + 4.68) = 1.10

The constant **A** has a value of 2.94, we are going to calculate the Effort Adjustment Factor (EAF) for that we are going to use the values RELY, CPLX, ACAP, PCAP, APEX, PLEX and RUSE because are the only values that are not nominal, meaning that they contribute to change in the effort.

**EAF** = RELY * CPLX * ACAP * PCAP * APEX * PLEX * RUSE
**EAF** = 0.92 * 1.17 * 0.71 * 0.76 * 0.88 * 1.09 * 0.95
**EAF** = 0.53

Now that we have the EAF, KSLOC and the constant we can calculate the effort and the cost of the prototype:

**Effort** = A * KSLOC ** (1.10) * EAF
**Effort** = 2.94 * 5 KSLOC ** (1.10) * 0.53 = 9.15 PM

**Cost** = 9.15 PM * $8K/PM = $73.2k

**Schedule** = 3.67 * 9.15 PM ** 0.318 = 7.42 month

This prototype is going to take **7.42 months** to develop and it will cost **$73.2k**.

# 2 Prototype II

The following changes have been applied after the first version of the prototype:

- From 5 KSLOC to 21 KSLOC
- The salary for hour becomes 7k per person per month
- CPLX and PLEX becomes nominal
- PLEX becomes nominal
- ACAP and PCAP becomes high because of new prototypers and less experienced developers
- RUSE increase to High

## 2.1 Estimated Effort and cost

We need to recalculate the EAF because the priorities changed, so we are going to use RELY, RUSE, ACAP, PCAP and APEX because all the other metrics became nominal:

**EAF** = RELY * RUSE * ACAP * PCAP * APEX
**EAF** = 0.92 * 1.07 * 0.85 * 0.88 * 0.88
**EAF** = 0.65

Now that we have the new EAF we can recalculate the effort with the new KSLOC:

**Effort** = A * SLOC ** (1.10) * EAF
**Effort** = 2.94 * 21 KSLOC ** (1.10) * 0.65 = 54.4 PM

**Cost** = 54.4 PM * $7K/PM = $380.8k

**Schedule** = 3.67 * 54.4 PM ** 0.318 = 13.1 months

The prototype with the changes are going to cost **$380.8k** to develop and it will take **13.1 months**.

# 3 Full system

For the full system all parameters are the same as the prototype except for this:

- RELY become Very High
- ACAP become High
- PCAP become High
- APEX become High
- RUSE become High

## 3.1 Estimated Effort and cost

For the full system we need to calculate first the EAF:

**EAF** = RELY * ACAP * PCAP * APEX * RUSE
**EAF** = 1.26 * 0.85 * 0.88 * 0.88 * 1.07
**EAF** = 0.89

Now that we have the new EAF we can calculate the effor of the full system:

**Effort** = A * SLOC ** (1.10) * EAF
**Effort** = 2.94 * 21 KSLOC ** (1.10) * 0.89 = 74.5 PM

**Cost** = 74.5 PM * $7K/PM = $521.5k

**Schedule** = 3.67 * 74.5 PM ** 0.318 = 14.4 months

# 4 Conclusion

Does the total cost and schedule of the prototype and full development fit within the $600K budget and 24-month schedule?

No, if we take into account that we did 2 versions of the prototype and the full development it would be:

**Total cost** = Prototype 1 + Prototype 2 + full development
**Total cost** = $73.2k + $380.8k + $521.5k
**Total cost** = $975.5k

**Total time** = Prototype 1 + Prototype 2 + full development
**Total time** = 7.42 months + 13.1 months + 14.4 months
**Total time** = 34.92 months

With this number we are overbudget and we don't have enough time to deliver.