

What's holding back my squad?

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An informal exploration of team scalability using performance models

Work per Sprint

The total number of points that will be burned down in a Sprint is,

- ▶ The average number of points for one person
- ▶ Times the number of people in the team

Work per Sprint - Model

$$\textit{Performance}(\textit{people}) = \textit{storypoints} * \textit{people}$$

Expectation - More people = More value

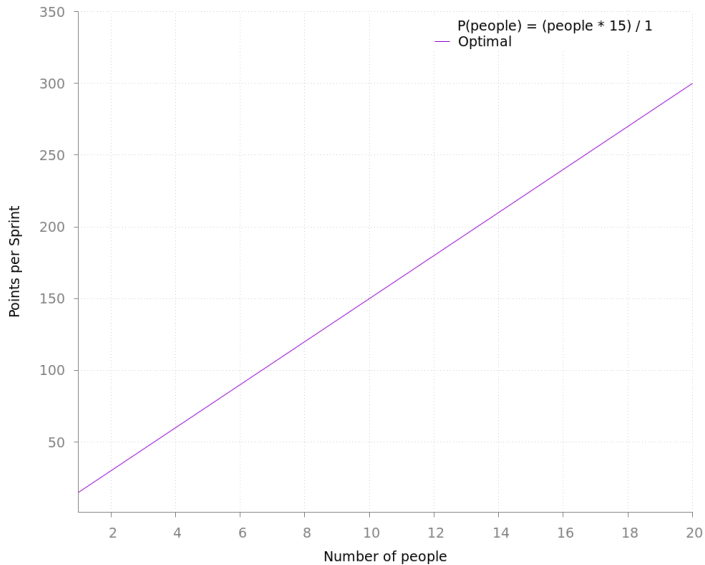


Figure 1: $P(\text{people}) = \text{people} * 15$

Caveats

- ▶ Models are reductive
- ▶ This one needs work

$$\textit{ExpectedPerformance}(\textit{people}) = \textit{storypoints} * \textit{people}$$

Points of friction

- ▶ **Contention** - Usage of a *shared, finite resource*
 - ▶ Usually a delay in starting or continuing work
 - ▶ Example : **One person runs the tests**
- ▶ **Crosstalk** - A form of *direct or indirect communication*
 - ▶ Usually an interruption of work
 - ▶ Example : **Daily standup**

Contention



Figure 2: *Three person team : The bone is our tester*

Contention - Model

- ▶ Sharing resources will not affect a team of 1
- ▶ Contention has a numeric value (weight) that we can tweak

$$\textit{ContentionCost}(\textit{people}) = \textit{contention} * (\textit{people} - 1)$$

Contention

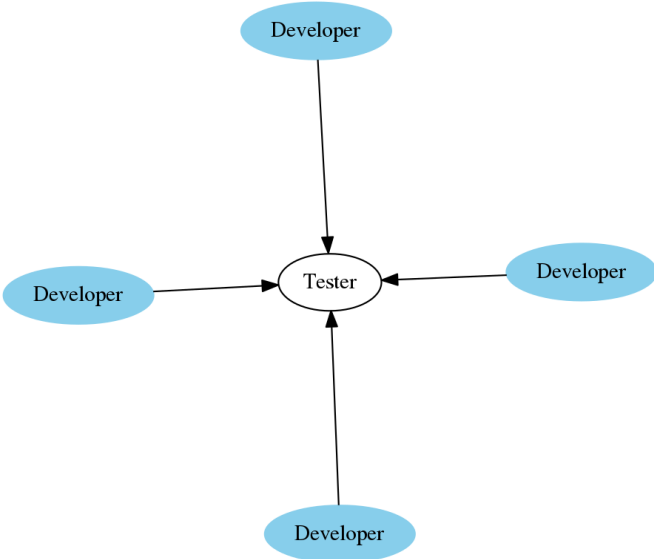


Figure 3: Team of five, one person runs the tests

Work per Sprint - Model

$$Performance(people) = \frac{ExpectedPerformance(people)}{1}$$

$$ContentionCost(people) = contention * (people - 1)$$

Contention - relation to model

$$Performance(\textit{people}) = \frac{ExpectedPerformance(\textit{people})}{1 + ContentionCost(\textit{people})}$$

Contention - Hitting the wall

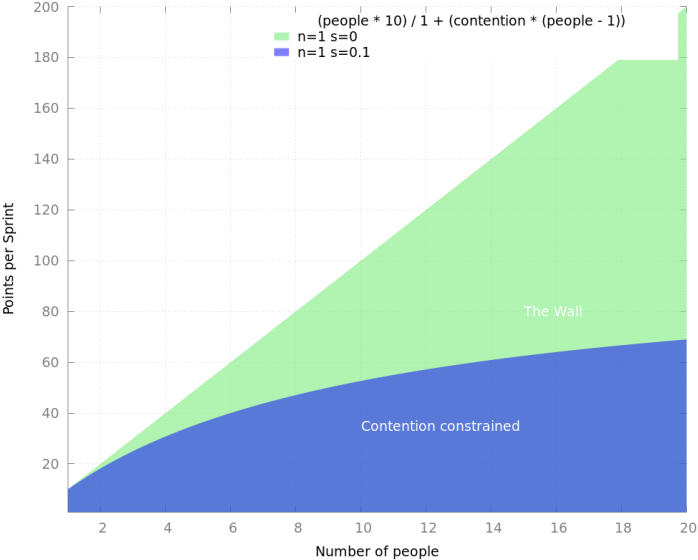


Figure 4: Diminishing returns

Crosstalk

A form of *direct or indirect communication* between people. Also known as **coordination**.

Crosstalk - Making an announcement

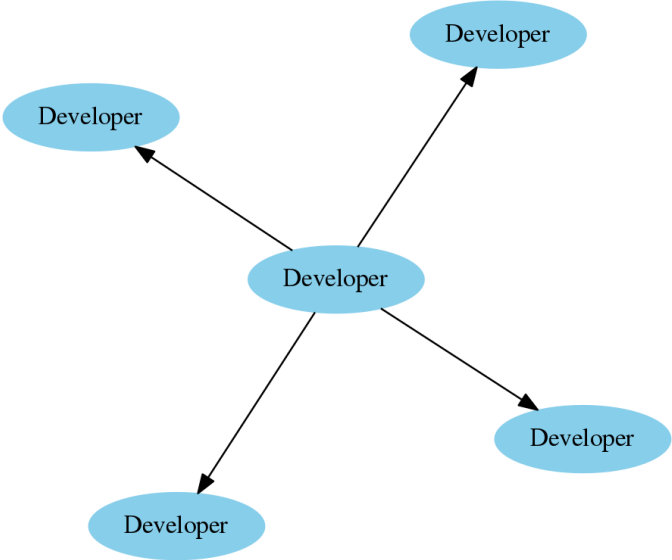


Figure 5: One person communicating with everyone

Crosstalk - Standup

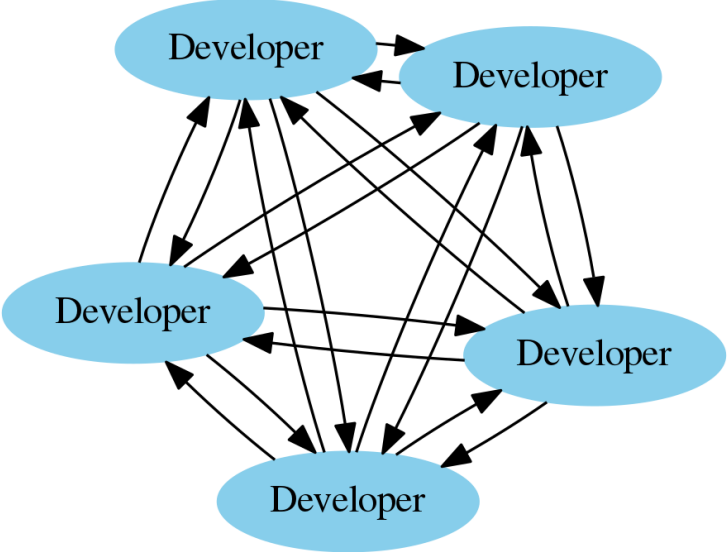


Figure 6: Everyone communicating with everyone

Crosstalk - Model

Everybody communicates with everybody else so the number of channels for a groups is:

- ▶ Everyone can communicate with everyone else
 - ▶ But not themselves
 - ▶ $channels = people * (people - 1)$
- ▶ Crosstalk has a numeric value (weight) that we can tweak

$$CrosstalkCost(people) = crosstalk * people * (people - 1)$$

Crosstalk - relation to Model

$$Performance(\textit{people}) = \frac{ExpectedPerformance(\textit{people})}{1 + CrosstalkCost(\textit{people})}$$

Crosstalk - Drowning in the tar pit

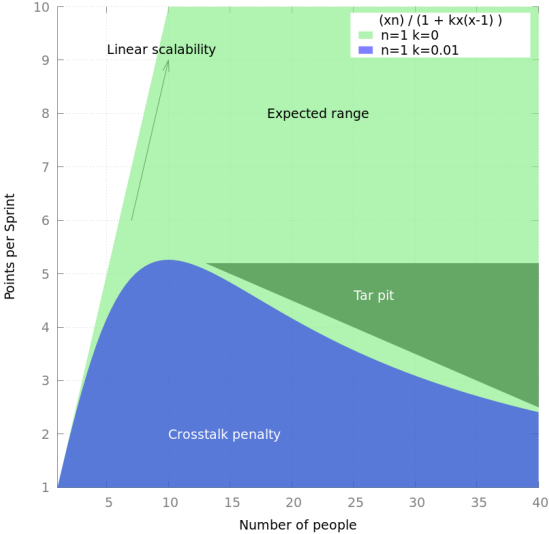


Figure 7: Negative returns

Black box models - Team

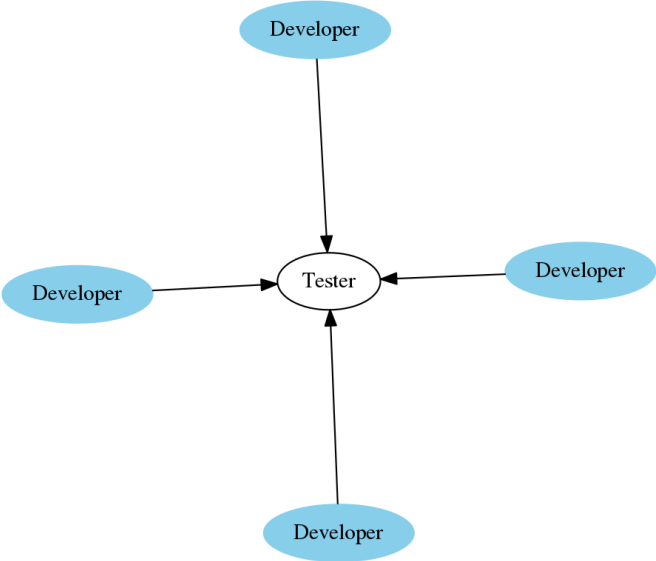


Figure 8: One person runs the tests

Black box models



Figure 9: *“And for my next trick ..”*

Black box models - Organization

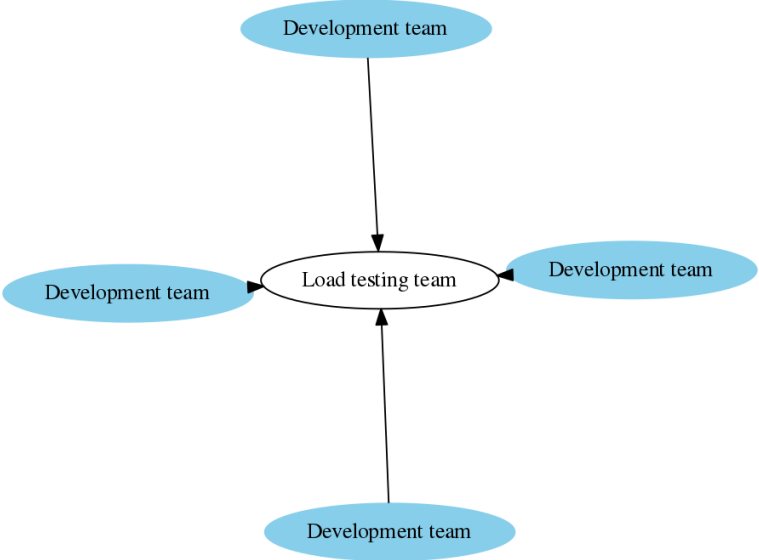


Figure 10: One team runs the performance tests

Black box models - Organization

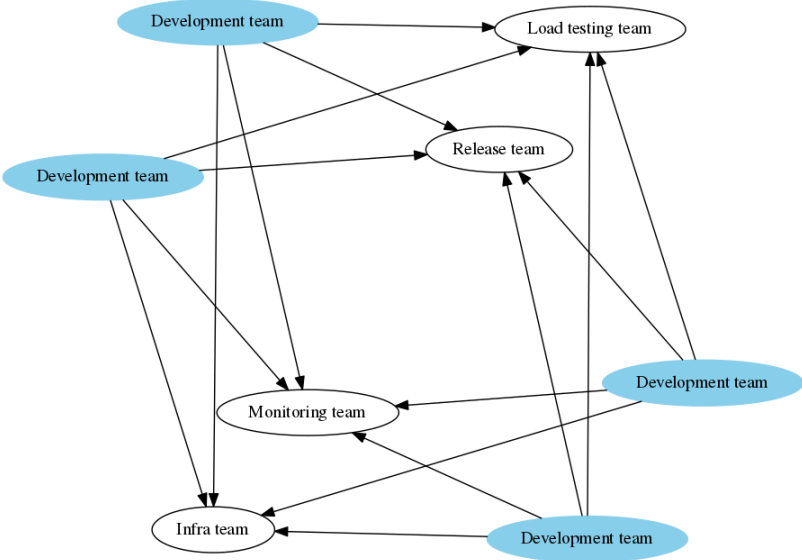


Figure 11: One team per non-dev function

Work per Sprint - Model

$$\text{ExpectedPerformance}(\text{people}) = \frac{\text{storypoints} * \text{people}}{1}$$

$$\text{ContentionCost}(\text{people}) = \text{contention} * (\text{people} - 1)$$

$$\text{CrosstalkCost}(\text{people}) = \text{crosstalk} * (\text{people} * (\text{people} - 1))$$

Full Model

$$\text{Performance}(\text{people}) = \frac{\text{ExpectedPerformance}(\text{people})}{1 + \text{ContentionCost}(\text{people}) + \text{CrosstalkCost}(\text{people})}$$

Universal Scalability Law

$$f(x) = \frac{nx}{1 + \sigma(x - 1) + \kappa x(x - 1)}$$

- ▶ x is *scale*
- ▶ n is *work* - ideal parallelism
- ▶ σ is *contention* - cost of sharing resources
- ▶ κ is *cohesion* - time waiting for data to become coherent

Universal Scalability Law - II

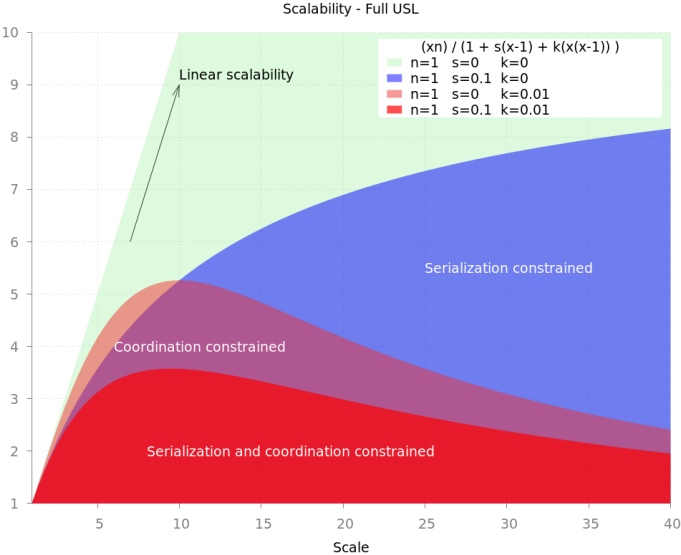


Figure 12: Full USL Comparison

Interactive exploration

<https://www.desmos.com/calculator/ekkdy5mlhc>

Further reading

- ▶ How to quantify scalability
- ▶ [usl4j](#) and you
- ▶ [usl4j github](#)
- ▶ [LISA17 - Scalability is quantifiable](#)
- ▶ [Nelson Rules](#)