Team Scaling Limits

v1.0.2

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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

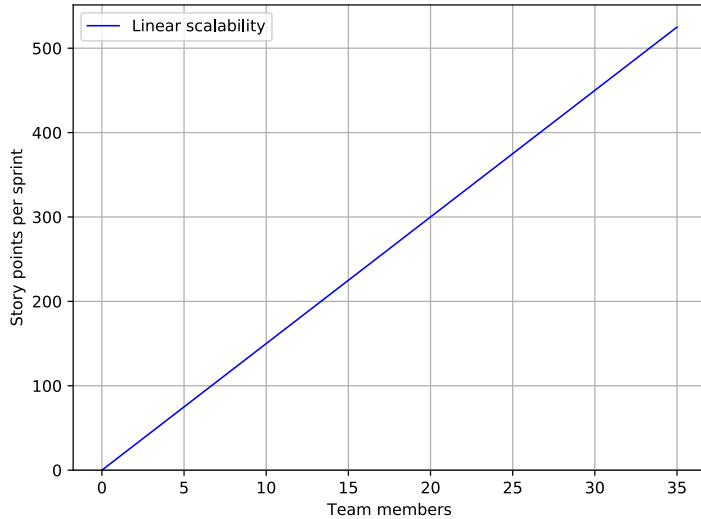$$Performance(people) = storypoints * people$$

Expectation

Figure 1: P(people) = people * 15

Reality

$$Performance(people) \neq ExpectedPerformance(people)$$

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

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

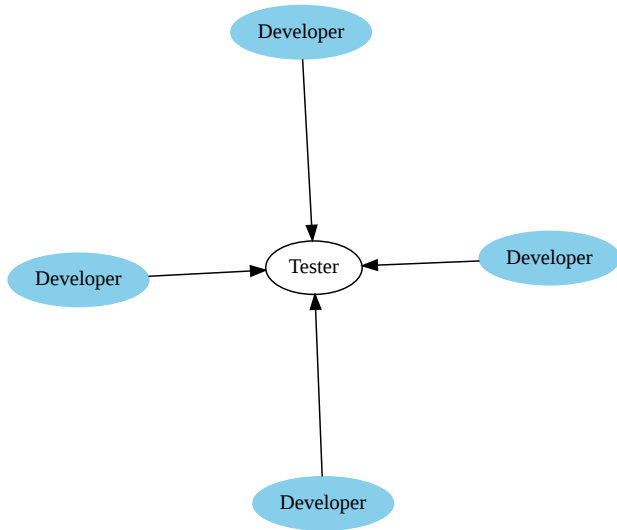$$ContentionCost(people) = contention * (people - 1)$$

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

$$Performance(people) = \frac{ExpectedPerformance(people)}{1 + ContentionCost(people)}$$
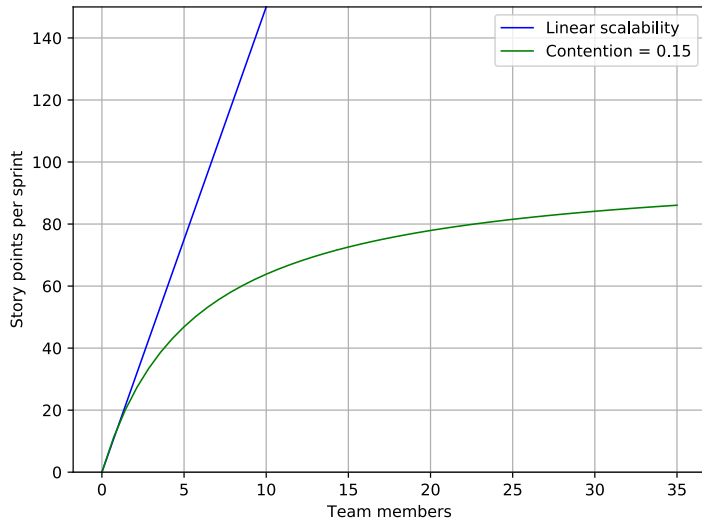
Contention - Diminishing returns

Figure 4: Hitting the wall

Contention - Examples

- Every change needs the test suite run. Only one person can run the tests
- Everyone updates tasks in a central spreadsheet.
- Requirements need constant clarification. Only one person has the knowledge

Crosstalk

Crosstalk

A form of *direct or indirect communication* between people.
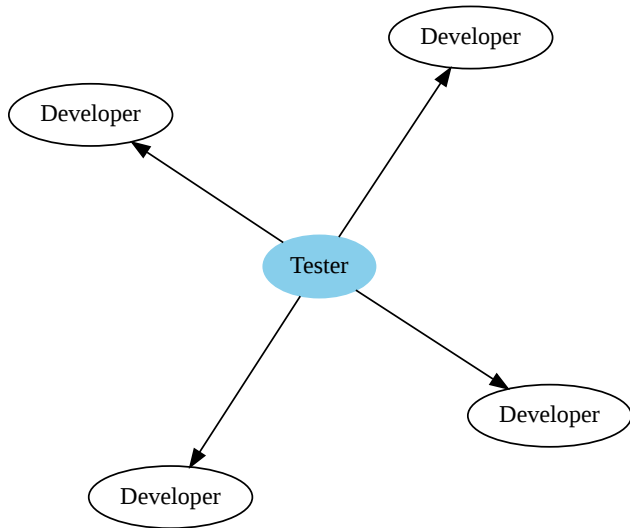
This is also called **cohesion** or **coordination**.
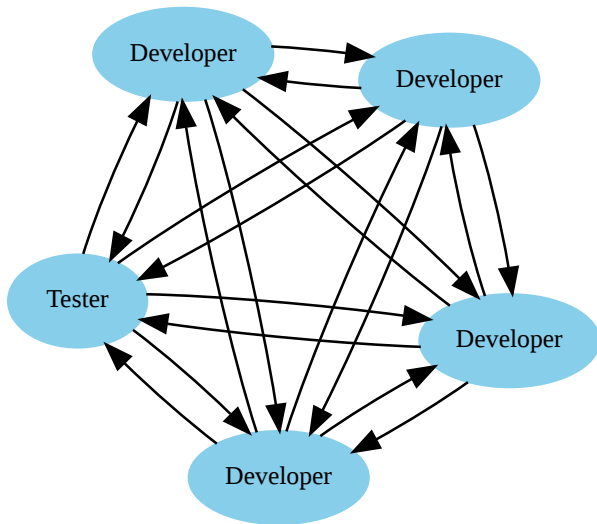
Figure 5: One person communicating with everyone

Figure 6: Everyone communicating with everyone

Crosstalk - Model

Eveybody 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

$$Performance(people) = \frac{ExpectedPerformance(people)}{1 + CrosstalkCost(people)}$$
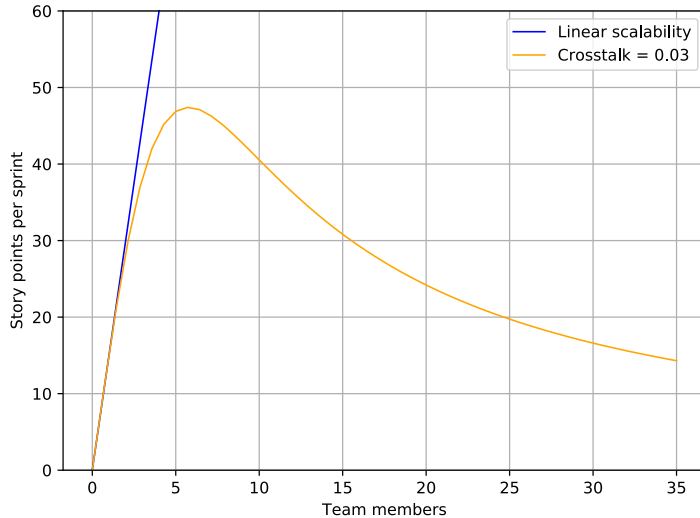
Crosstalk - Negative returns

Figure 7: Drowning in the tar pit

Crosstalk - Examples

- Pull requests suck in the entire team
- Meetings, including standups
- Ad-hoc grooming and requirements analysis
- Production incidents
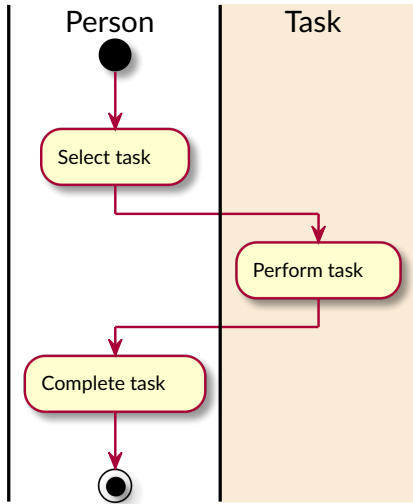- Walk-ups
- Onboarding

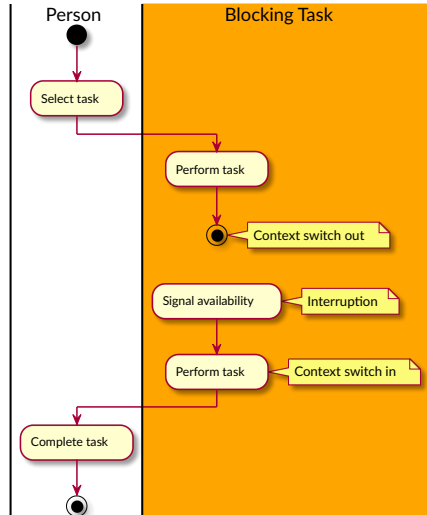# Combined Effect

Flow of work

Figure 8: Unconstrained

Figure 9: Constrained

Response times

Response time limit	User experience
0.1 (s)	Instantaneous
1.0 (s)	Loss of direct control
10.0 (s)	Loss of attention

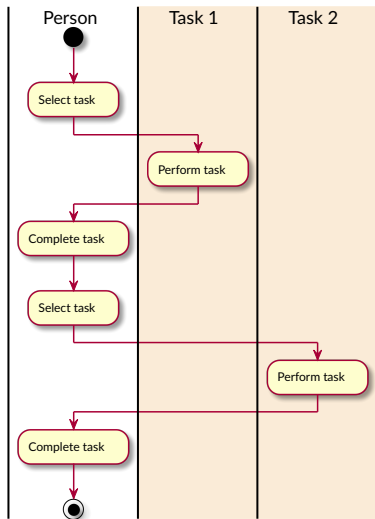Research finds similar limits across technologies [Miller 1968; Card et al. 1991]

Figure 10: Unconstrained

Figure 11: Constrained
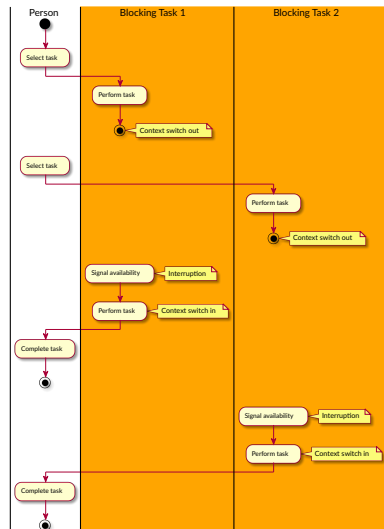
Work per Sprint - Model

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

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

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

Full Model

$$Performance(people) =$$

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

Combined effect
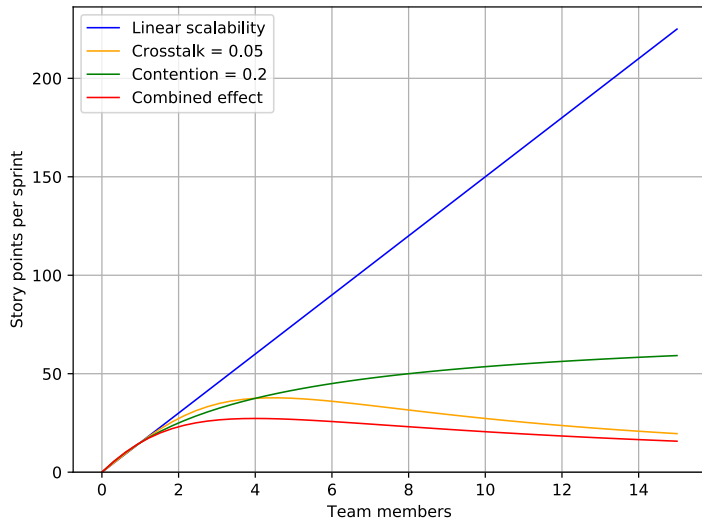
Figure 12: Contention + Crosstalk

Interactive exploration

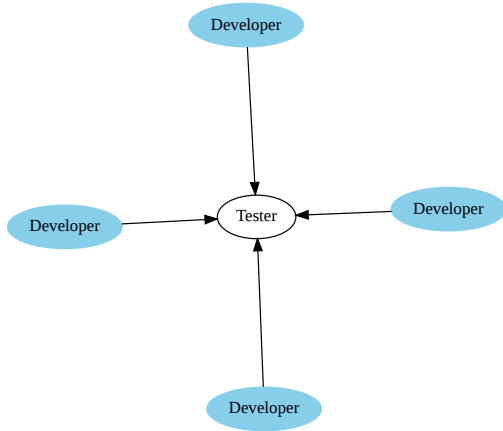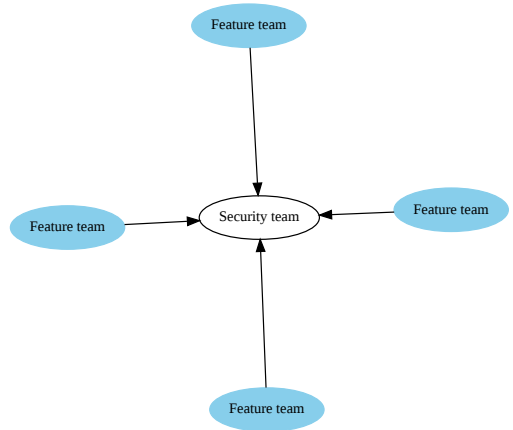https://www.desmos.com/calculator/ekkdy5mlhc

General applicability

Team

Organisation

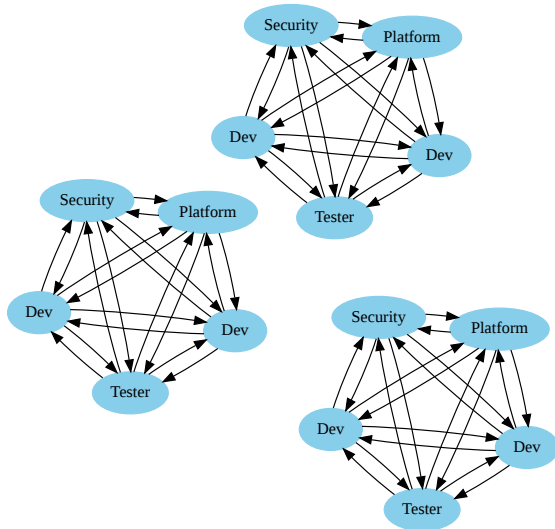Figure 13: One team per non-feature capability

Modern Enterprise

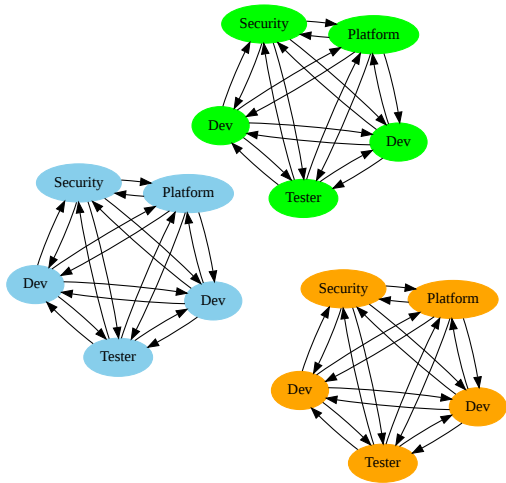Figure 14: Capabilities embedded in teams

Modern Enterprise - Team Variation
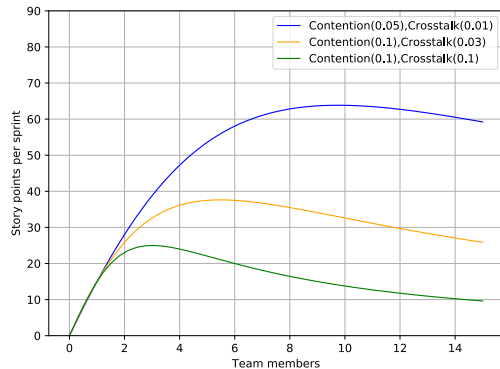

Figure 15: Variation across teams

Figure 16: Variation across teams

Further reading

- Little's Law
- Amdahl's Law
- Nielsen Normal Group - Response Time Limits
- LISA17 - Scalability is quantifiable

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