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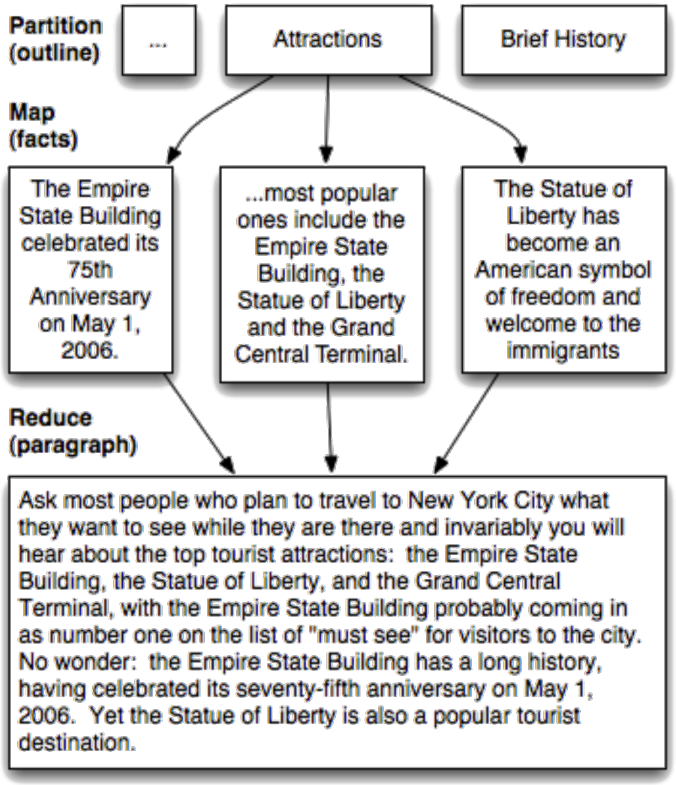
  Yuan et al. [12] and Fuge et al. [2]
- Can crowds create things from whole cloth?

  Kim and Monroy-Hernández [5], Kim et al. [6], Hahn et al. [4], and Lasecki, Kushalnagar, and Bigham [9]

What does the crowdsourcing literature say?

- Build complexity into the process
  - **Apply CS methods to people**
    Kittur et al. [8]



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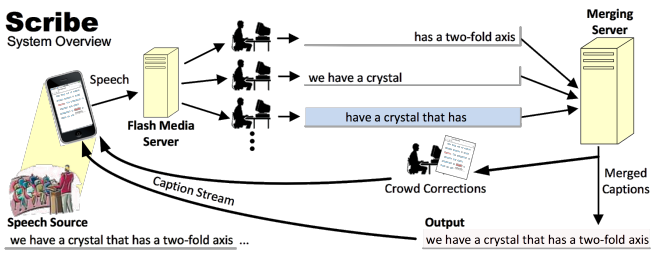

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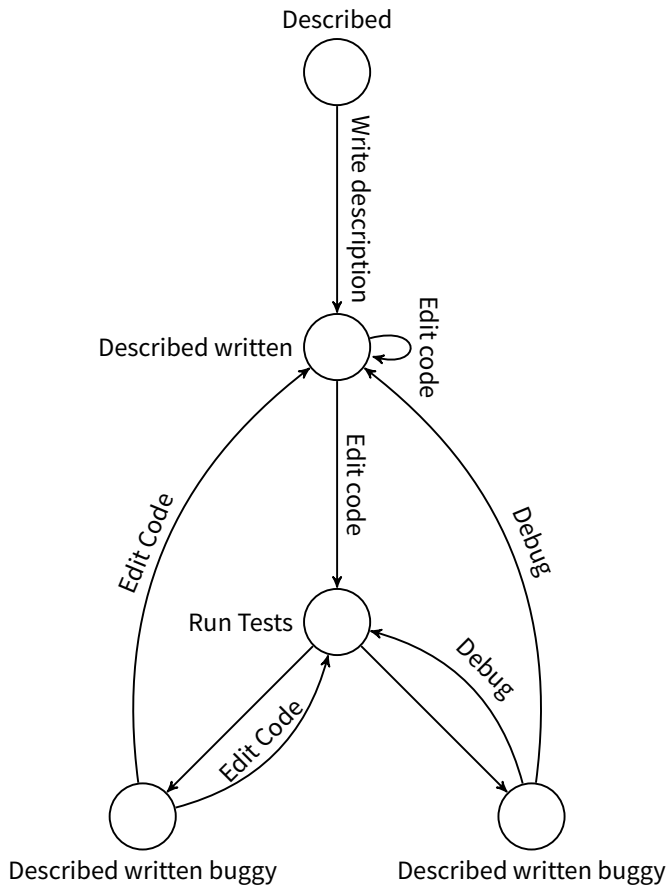
  - **Crowdsourcing workflows as function state machines**
    LaToza et al. [10]



What does the piecework literature say?

George Airy (astronomer) used a very similar approach [3]

- Employed computers
- 13–20 years old
- Overworked
- Underpaid
- Could be fired at will

George Airy — whiz kid

Airy built complexity into the process, assigning *human computers* to compute, verify, and correct the right ascension and declination of stars.

No. of Swing.	Approximate Time (Astronomical Reckoning).		Number of Signals.	Mean of Times by Shelton.	Mean of Times by Earnshaw.	Interval by Shelton.	Interval by Earnshaw.	Rate $\frac{\text{Earnshaw}}{\text{Shelton}}$	Logarithm of Rate $\frac{\text{Earnshaw}}{\text{Shelton}}$	Corrected Logarithm of Rate $\frac{\text{Earnshaw}}{\text{Shelton}}$
	Oct.	h		h m s	h m s	h m s	h m s			
1	1.	23	22	3 19 36·505	21 23 28·764	4 0 23·100	4 0 38·722	1·0010831	0·00047012	
2	2.	3	21	7 19 59·605	1 24 7·486	3 58 21·652	3 58 37·400	1·0011011	0·00047793	
3	2.	7	21	11 18 21·257	5 22 44·886	4 45 27·829	4 45 46·421	1·0010855	0·00047117	0·00047387
4	2.	11	29	16 3 49·086	10 8 31·307	4 17 6·532	4 17 23·234	1·0010827	0·00046995	
5	2.	16	17	20 20 55·618	14 25 54·541	3 13 21·898	3 13 34·795	1·0011116	0·00048249	
6	2.	19	25	23 34 17·516	17 39 29·336	3 49 42·503	3 49 57·654	1·0010994	0·00047720	0·00047990
7	2.	23	31	3 24 0·019	21 29 26·990	3 55 2·071	3 55 17·433	1·0010893	0·00047282	
8	3.	3	21	7 19 2·090	1 24 44·423	4 2 41·510	4 2 57·445	1·0010944	0·00047503	
9	3.	7	25	11 21 43·600	5 27 41·868	4 31 5·786	4 31 23·591	1·0010947	0·00047516	0·00046316
10	3.	11	22	15 52 49·386	9 59 5·459	3 27 49·747	3 28 3·324	1·0010888	0·00047260	
11	3.	15	24	19 20 39·133	13 27 8·783	3 59 47·292	4 0 3·188	1·0011049	0·00047959	
12	3.	19	24	23 20 26·425	17 27 11·971	4 3 30·416	4 3 46·029	1·0010686	0·00046384	0·00047194

Cottage Industry

First appearances of piecework:

Cottage Industry

First appearances of piecework: farms

Cottage Industry

First appearances of piecework: farms, textiles

Cottage Industry

First appearances of piecework: farms, textiles, and matchsticks.

Planes, trains, and automobiles

. . . not in that order

Trains

- Train engineers were among the first skilled workers to experience piece–rate payment systems
- “Efficiency experts” occasionally came by to evaluate how long it took to do various jobs
- This led to slow–walking the job, to offset the fact that efficiency experts weren’t accounting for liminal work.

Planes, trains, and automobiles

... not in that order

Automobiles

- Ford, Taylor, and others moved quickly monitor and measure professionals.

- *Manufacturing* proved amenable to assembly line processes.

Planes, trains, and automobiles

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Planes

Planes, trains, and automobiles

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Trains

Automobiles

Planes

Ford

Comparisons

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