The State We're In:

Threats & Opportunities for Workers in Colorado's Information Industries

innovation economics
shaping change - creating growth

Prepared by Dr. Philip McCready; Innovation Economics
&
Bob Powell, PhD, MBA; Continuous Improvement Associates

Presented June 15th 2005 to:

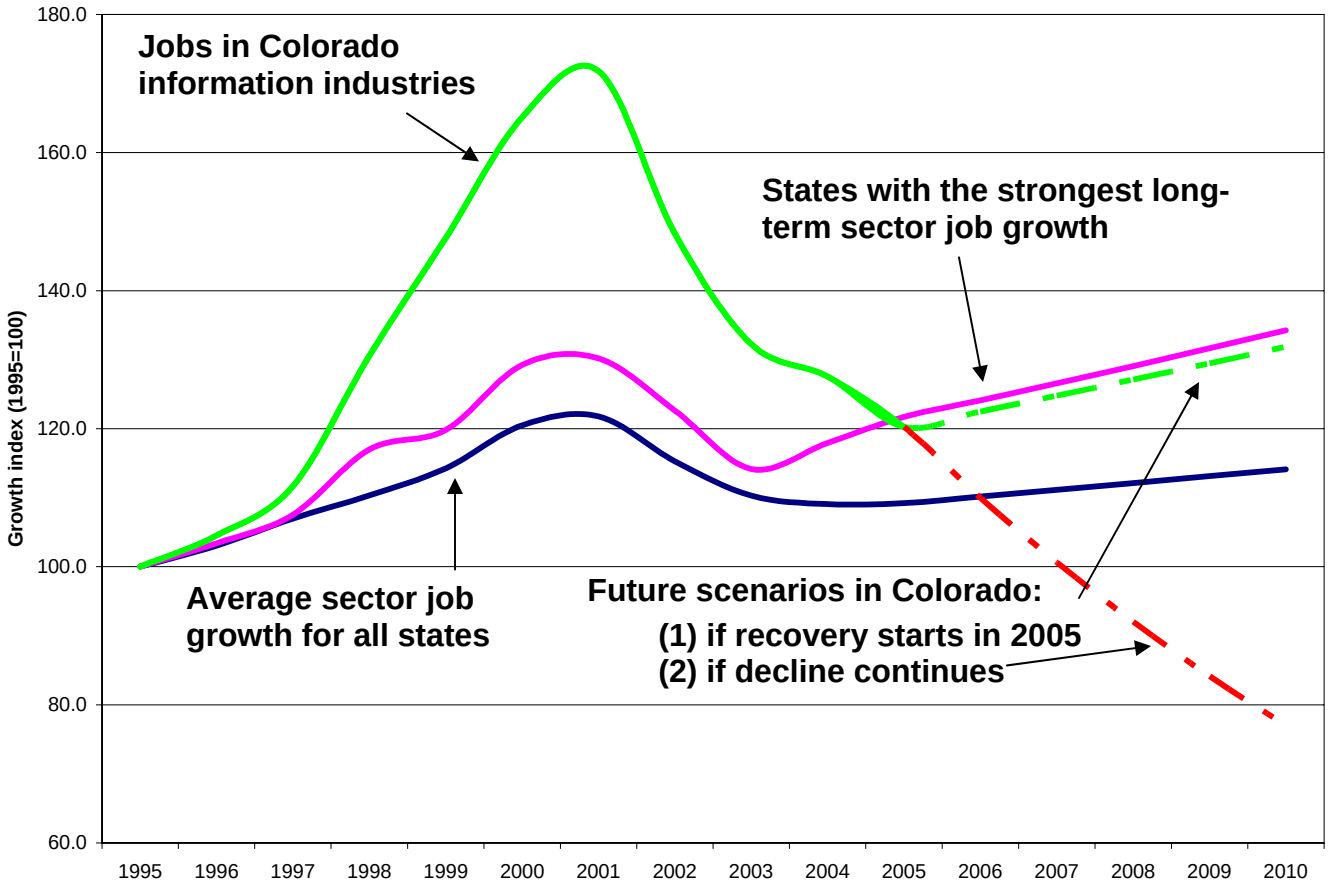
Colorado Workforce Development Council

The State We're In: Threats & opportunities for workers in Colorado's information industries

Jobs continue to decline in the state

- **From 1997 to 2001 Colorado had the highest rate of job growth, at 54%, in the country in its information industries [telecommunications, software, publishing and media].**
- **In the past four years (April 2001 – April 2005) Colorado had the highest rate of job losses: -30%. The state risks losing its competitive advantage as other states recover faster and Colorado's talent base begins to erode (see chart below).**

The rise and fall of Colorado's information industry workforce



Contact: Phil McCready 303-984-6165

- **Despite the downturn, other states are doing better in creating new technology jobs, for example in the past two years [April 2003 to April 2005]:**

  - **California (rank 1st) created 22,300 new jobs across all information industries in the past two years. By comparison, Colorado lost 7,700 jobs and ranks 47th (see Chart below).**

Top States for Job Growth in Information Industries (2001 to 2005)

	Job total 2001	Job total 2003	Job total 2005 (p)	Job change 01-03	Job change 03-05	% job change 03-05
1. California	570,900	470,800	493,100	-100,100	22,300	5%
2. Utah	33,800	29,400	31,200	-4,400	1,800	6%
3. Idaho	9,600	9,200	10,400	-400	1,200	13%
4. Iowa	38,100	33,400	34,300	-4,700	900	3%
5. New Hampshire	13,800	12,100	12,900	-1,700	800	7%
6. Washington	99,400	91,000	91,800	-8,400	800	1%
7. Wisconsin	54,000	49,900	50,600	-4,100	700	1%
8. Maine	12,300	11,300	11,800	-1,000	500	4%
9. Hawaii	11,800	10,500	11,000	-1,300	500	5%
10. Virginia	121,300	100,700	101,100	-20,600	400	0.4%
47. Colorado	**110,300**	**84,900**	**77,200**	**-25,400**	**-7,700**	**-9%**

p = Preliminary figures for April 2005

  - **In telecommunications two states have led the way with job growth in the past two years: Idaho (1,000 new jobs) and Utah (700 new jobs). By comparison, Colorado lost 4,700 jobs and ranks 36th (see Chart below).**

Top States for Job Growth in Telecommunication Industries (2001 to 2005)

	Job total 2001	Job total 2003	Job total 2005 (p)	Job change 01-03	Job change 03-05	% job change 03-05
1. Idaho	3,300	3,100	4,100	-200	1,000	32%
2. Utah	6,400	5,300	6,000	-1,100	700	13%
3. Puerto Rico	na	11,200	11,800	na	600	5%
4. Oklahoma	17,500	15,000	15,100	-2,500	100	1%
5. Alaska	4,300	4,000	4,100	-300	100	3%
6. Wisconsin	na	14,000	13,800	na	-200	-1%
7. Arkansas	8,600	8,700	8,500	100	-200	-2%
8. Hawaii	5,100	4,000	3,800	-1,100	-200	-5%
9. Kentucky	10,700	10,300	10,100	-400	-200	-2%
10. Louisiana	14,000	12,900	12,700	-1,100	-200	-2%
36. Colorado	**48,100**	**35,000**	**30,300**	**-13,100**	**-4,700**	**-13%**

p = Preliminary figures for April 2005 na = not available

Telecommunications is included in the Information Industries supersector data.

Contact: Phil McCready 303-984-6165

- **In computing services, four states have led the way in creating new jobs: Virginia (10,900 new jobs); Pennsylvania (6,600 new jobs); Florida (6,400 new jobs) and Texas (6,300 new jobs). By comparison, Colorado created 1,900 new computing jobs and ranks 8th (see Chart below).**

Top States for Job growth in Computing Design & Related Services (2001 to 2005)

	Job total 2001	Job total 2003	Job total 2005 (p)	Job change 01-03	Job change 03-05	% job change 03-05
1. Virginia	102,100	96,500	107,400	-5,600	10,900	11%
2. Pennsylvania	41,100	37,200	43,800	-3,900	6,600	18%
3. Florida	52,000	46,900	53,300	-5,100	6,400	14%
4. Texas	87,500	70,300	76,600	-17,200	6,300	9%
5. Illinois	55,200	43,000	46,500	-12,200	3,500	8%
6. Missouri	20,200	17,100	19,500	-3,100	2,400	14%
7. Dist. of Columbia	9,500	12,800	15,000	3,300	2,200	17%
8. Colorado	**45,000**	**32,900**	**34,800**	**-12,100**	**1,900**	**6%**
9. Maryland	50,000	49,700	51,600	-300	1,900	4%
10. Ohio	46,700	38,800	40,500	-7,900	1,700	4%

p = Preliminary figures for April 2005

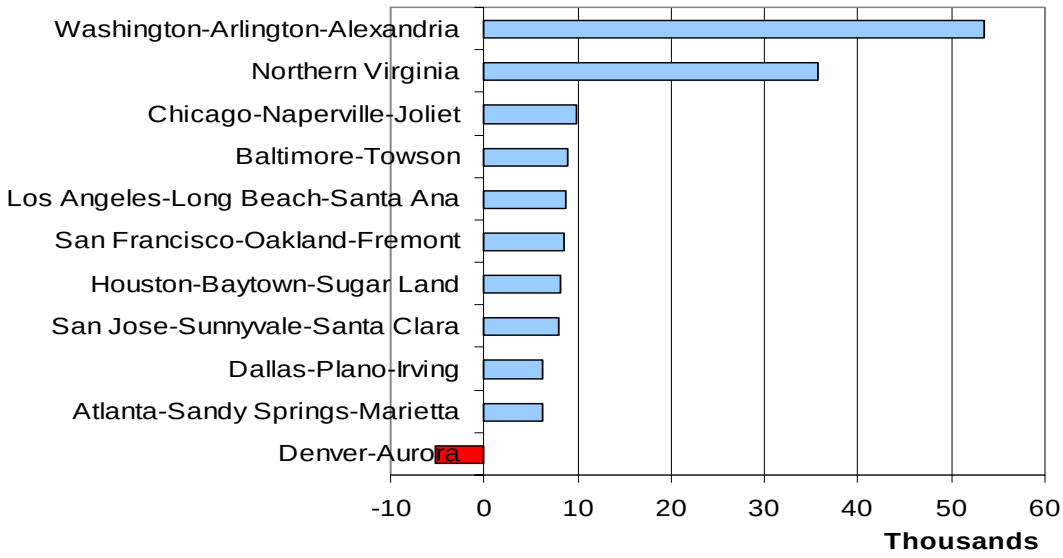
Computing services is part of Professional Services and is NOT included in the Information Industries data.

At the Metro Level

- **The Denver- Aurora metro area lost 900 jobs in Computer Systems Design and Related Services from April 2004 to April 2005.**

- **The Denver- Aurora metro area distinguished itself for being virtually the only city out of 30 major US cities to have less jobs [some 5,300] in Computer Services now that it had in 1997 (see chart below).**

Top Cities for Job creation in Computing Services (1997 - 2005)



Contact: Phil McCready 303-984-6165

- **The Denver- Aurora metro area lost a further 2,300 jobs in Telecommunications from April 2004 to April 2005.**

- **From April 2001 to April 2005 the Denver- Aurora metro area lost a total of 15,000 jobs in telecommunications, or 40% of its workforce since 2001.**

Wages continue to decline in the state

- **Colorado has suffered the biggest decline in wages in its information industries from 2001 to 2004; a loss of 20% or $288 from the average weekly wage. Colorado ranks last for wages growth over the past four years, 49th out of 49 states with available data (see Chart below).**

Private sector wages in the Information industries (NAICS 51)

	Average weekly wage 2004 (Q3)	Compared to national median wage	$ change 2001 (Q1) - 2004 (Q3)	% change 2001 (Q1) - 2004 (Q3)	Rank
North Dakota	$822	0.90	$200	32%	1
Montana	$653	0.72	$85	15%	2
Kansas	$1,026	1.13	$117	13%	3
Nevada	$908	1.00	$86	10%	4
West Virginia	$716	0.79	$65	10%	5
Vermont	$740	0.81	$67	10%	6
South Dakota	$653	0.72	$52	9%	7
Iowa	$744	0.82	$53	8%	8
Oregon	$1,003	1.10	$65	7%	9
New Mexico	$661	0.72	$38	6%	10
Colorado	**$1,178**	**1.29**	**-$288**	**-20%**	**49**

- **Interestingly, information sector workers in California unlike Colorado did not taken a significant hit to their wages despite the tech industry downturn. In the past four years the average weekly wage in California rose by 1% to $**1,434.

- **However, Colorado still ranks as 8th nationally for having the highest paid workers in its information industries. The average weekly wage in Colorado's information sector is $1,178. This is almost 30% above the median industry wage of $913.**

- **The findings suggest that tech industry wages in Colorado may continue to fall faster than other states. The high rate of wage decline combined with the high rate of job losses suggests that the state's competitive advantage in information and communication industries is being seriously undermined.**

Contact: Phil McCready 303-984-6165

- **Interestingly, the Chart above shows that rural states had the strongest wage growth in the sector in recent years. This suggests that some firms may be relocating to take advantage of the lower wages in less developed states.**

Key messages

- **The state is rapidly losing its competitive advantage in info tech.**
- **Despite the recession in telecommunications and IT of recent years, information technologies will remain a key engine of growth in the coming decade. It is crucial for Colorado to remain competitive in these industries.**
- **Colorado's reputation as one of the most innovative and entrepreneurial states during the 1990s was founded on its Information Industries. If the state is to continue to attract entrepreneurs and innovative companies here, then it is vital that competitive advantage and entrepreneurial reputation are maintained.**
- **If Colorado is to keep its base of expertise and talent, both in companies and from its universities, then it is crucial that the state does not lose the capacity to develop cutting edge information and communication technologies. Currently, the state is NOT creating enough opportunities for its info tech workforce.**
- **The current wave of acquisitions of Colorado companies is a further indicator of declining competitive advantage. Evidence shows that when corporate decisions are taken elsewhere then branch locations are the first to be cut back in a downturn. These takeovers may further accelerate the current wave of job losses.**
- **The supply and quality of technology workers is currently very high in Colorado relative to the level of demand. The time is right for a major focus on attracting, creating and expanding technology companies in the state.**

How to arrest industry decline?

- **One option may be to create a high level coalition of government and industry to find new ways to harness local, state, federal and industry resources to drive company attraction, formation and innovation.**
- **Explore new ways to create opportunities for sector workers/graduates to retain and reapply talent.**
- **Better research to understand the new drivers of competition which Colorado could use to compete more effectively. We would need to investigate:**
  - **the factors that influence the gaining and losing of companies;**
  - **the factors that influence job recruitment and shedding in our companies**
  - **the options for introducing high impact policies that strengthen our regional system of innovation and job creation.**

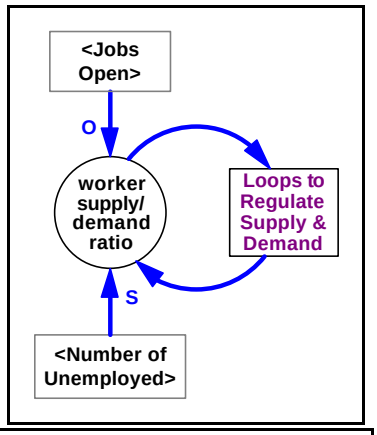
Contact: Phil McCready 303-984-6165

The State We're In

Points for workforce policymakers

Robert E. Powell, Ph.D., MBA, Continuous Improvement Associates

Figure 1. Regulating Workforce Supply and Demand

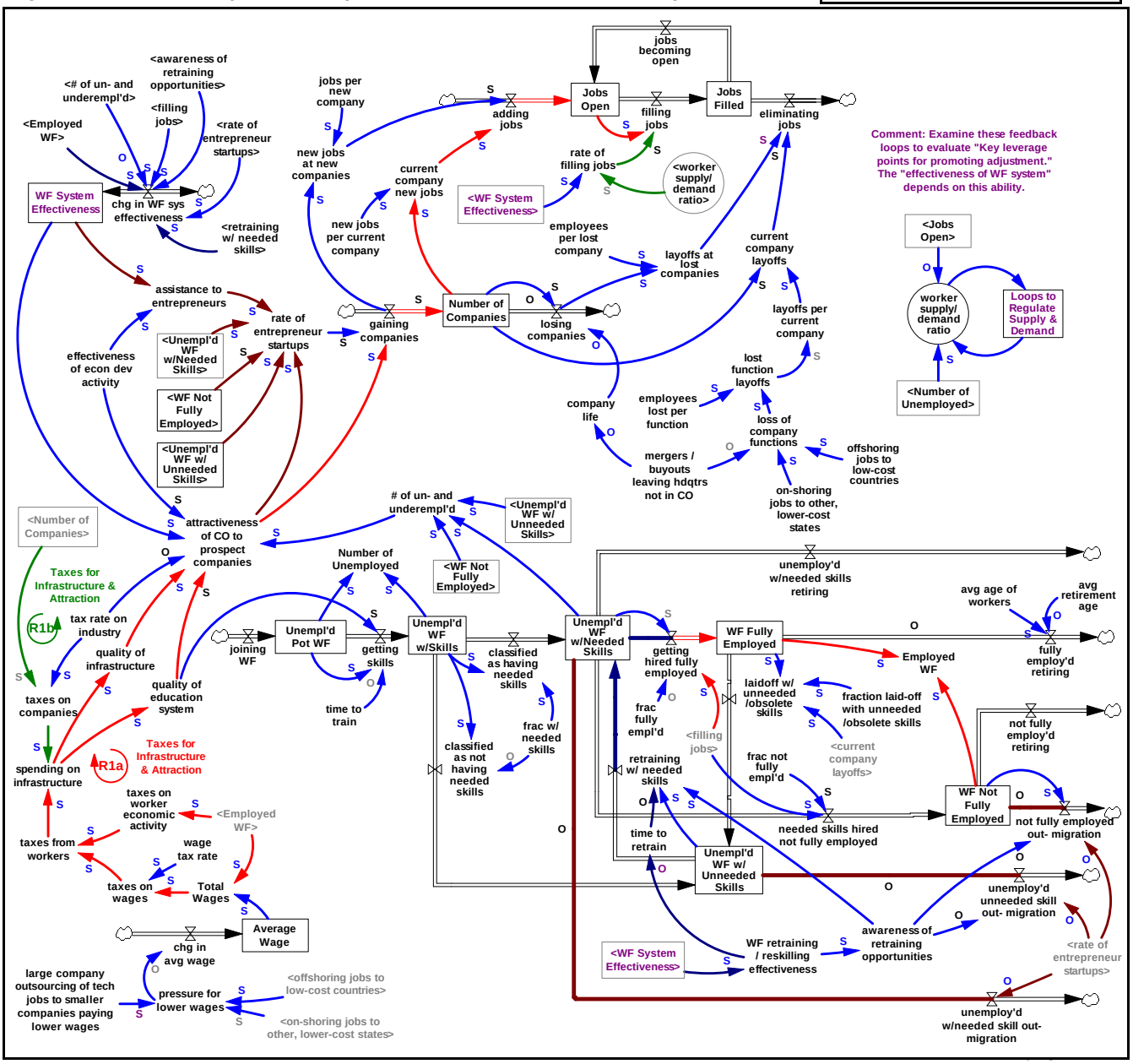


- Figure 1. At this point in the economic cycle the worker supply/demand ratio is very positive and the focus, obviously, must be on attracting, creating and expanding companies. One way to do this is to maintain a workforce that supplies needed skills as shown in later diagrams.

- Figure 2. A system dynamics diagram shows operationally how a system works, distinguishing between entities and the flow of entities.

  The situation is complicated. It's not that diagram is too complex; it's that it reflects the complexity of the system with which workforce policy makers must deal. The system is actually much more complex than shown.

Figure 2. The workforce system is complex as shown in this stock & flow diagram.



- Figure 3. Illustrates the main chain stocks & flows in the system.

Figure 3. Primary stocks & flows that make up the main chains of the workforce system.

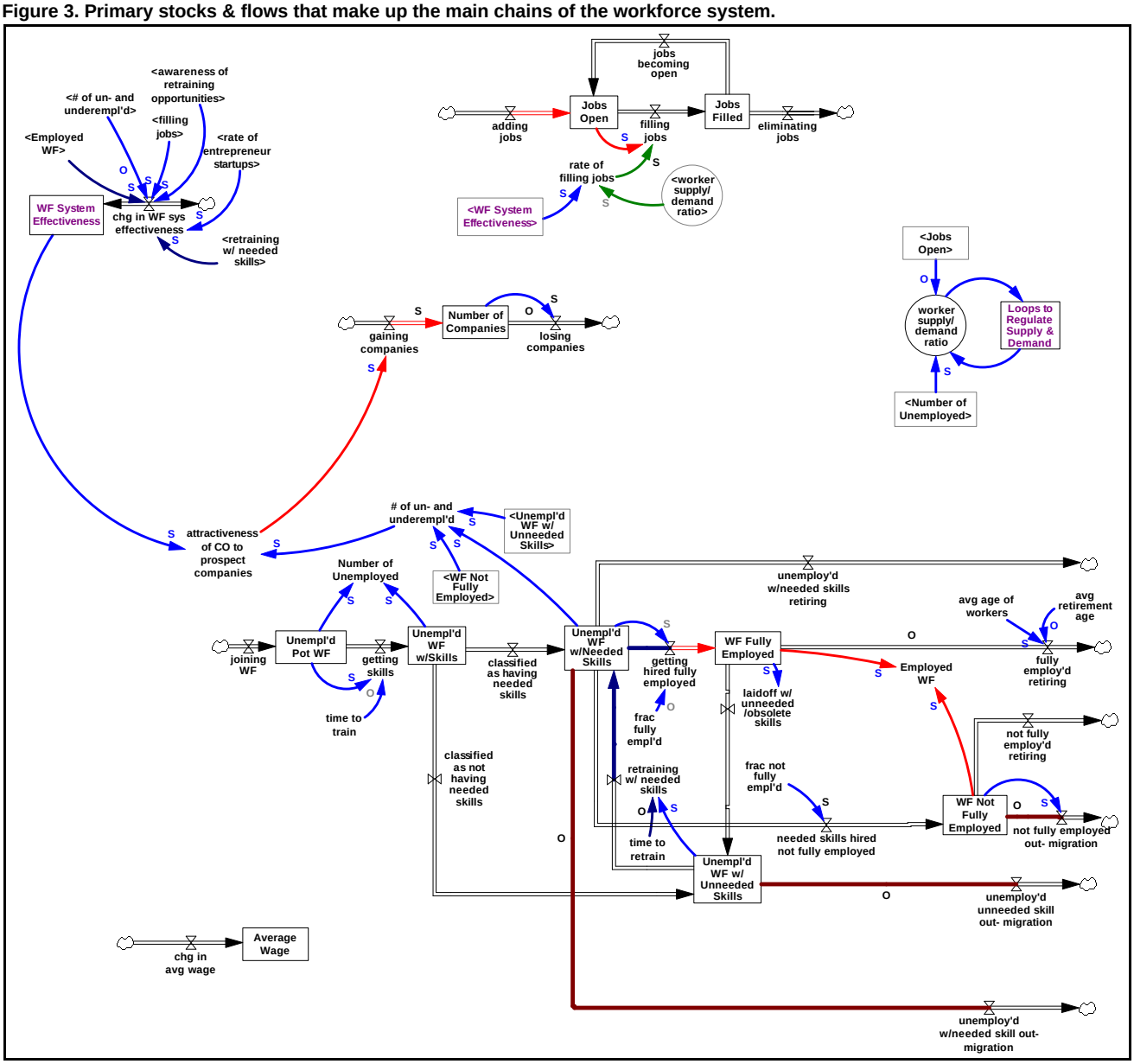
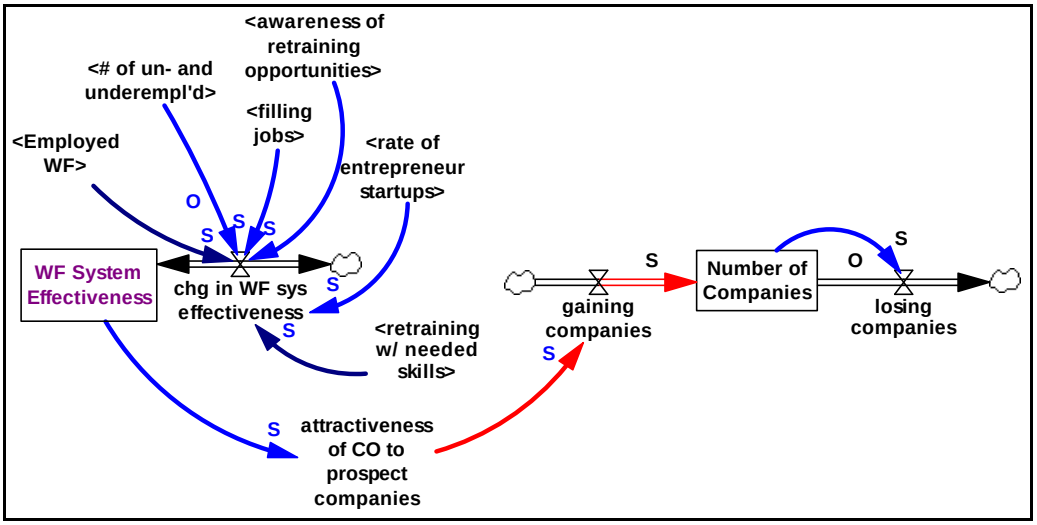


Figure 4. Some potential influences on Workforce System Effectiveness.

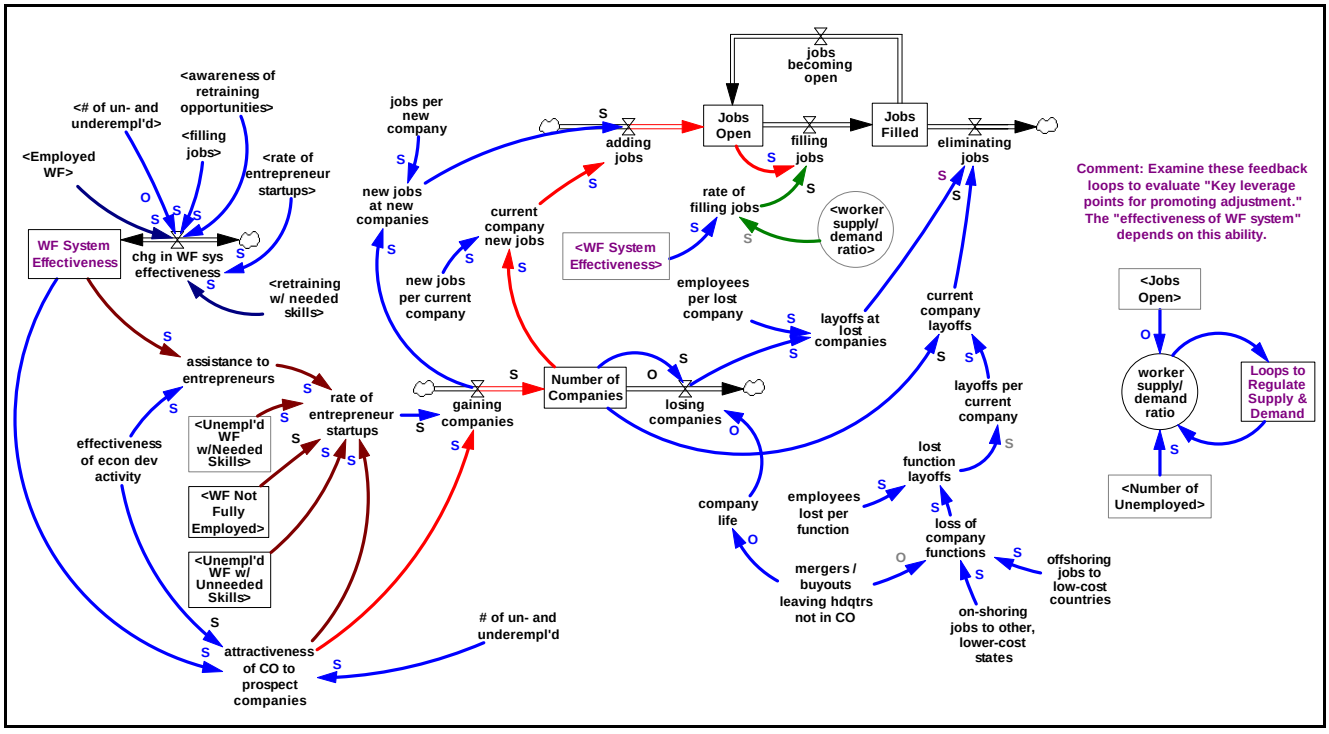
- Figure 4. At this point in the economic cycle primarily interest is on the gaining and losing of companies.

  One influence on CO attractiveness is Workforce System Effectiveness.

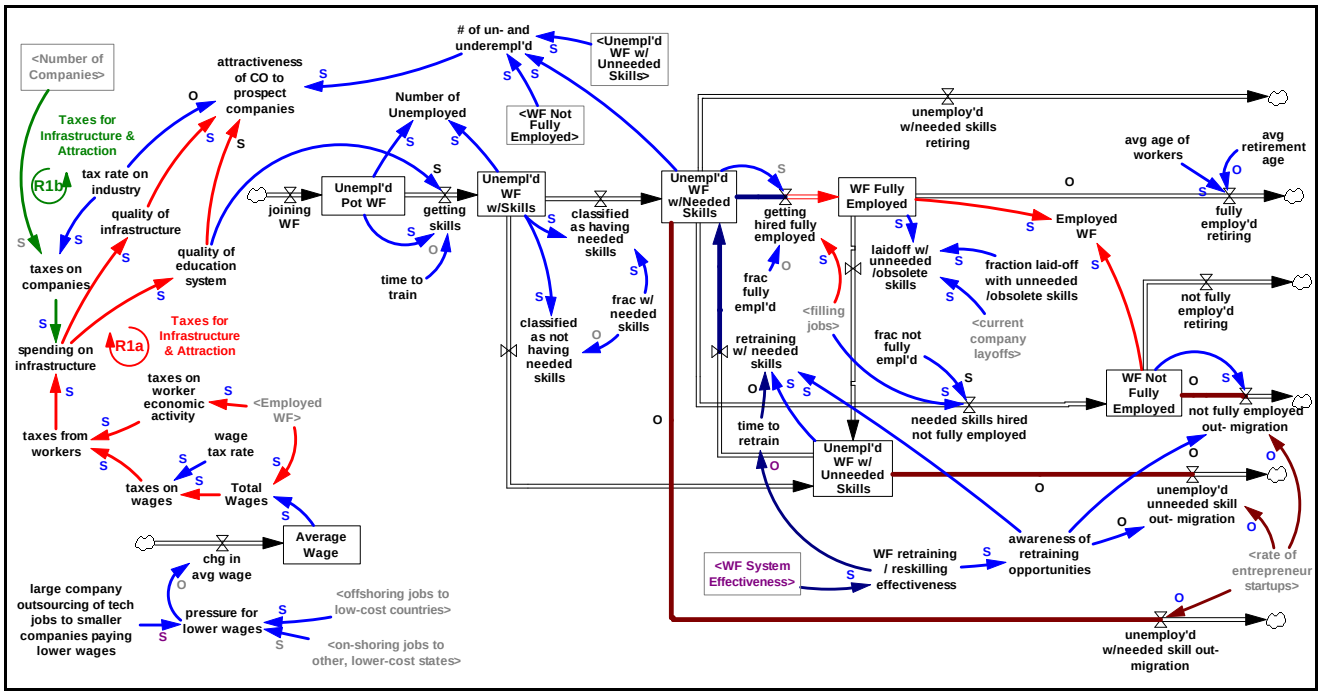
  This simple diagram can be used to explain the systems language.



- Figure 5. Top portion of the WF System diagram.



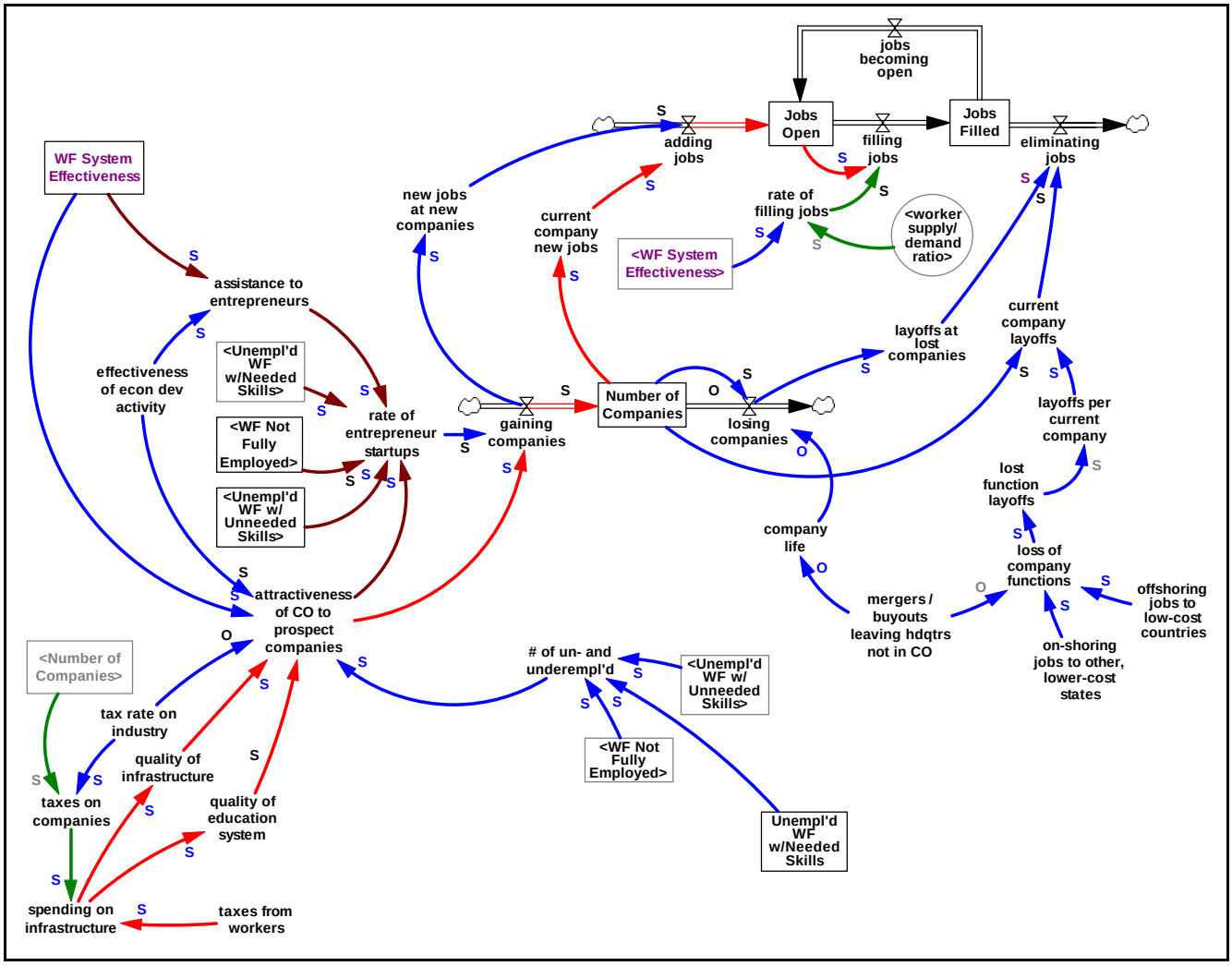
- Figure 6. Bottom portion of the WF System diagram.



- Figure 7. What are the factors that influence the gaining and losing of companies and that influence the jobs added and lost at current companies?

  The figure shows a few factors. There are, of course, many more. Workforce policy makers can show and examine all factors and determine actions that can be taken to influence the factors in the desired direction.

Figure 7. A few of the factors that influence gaining and losing companies and job gains/losses at companies.



- Figure 8. Consider suggested actions using a priority matrix. Often, but not always, priority is given to actions that are easy with high impact.

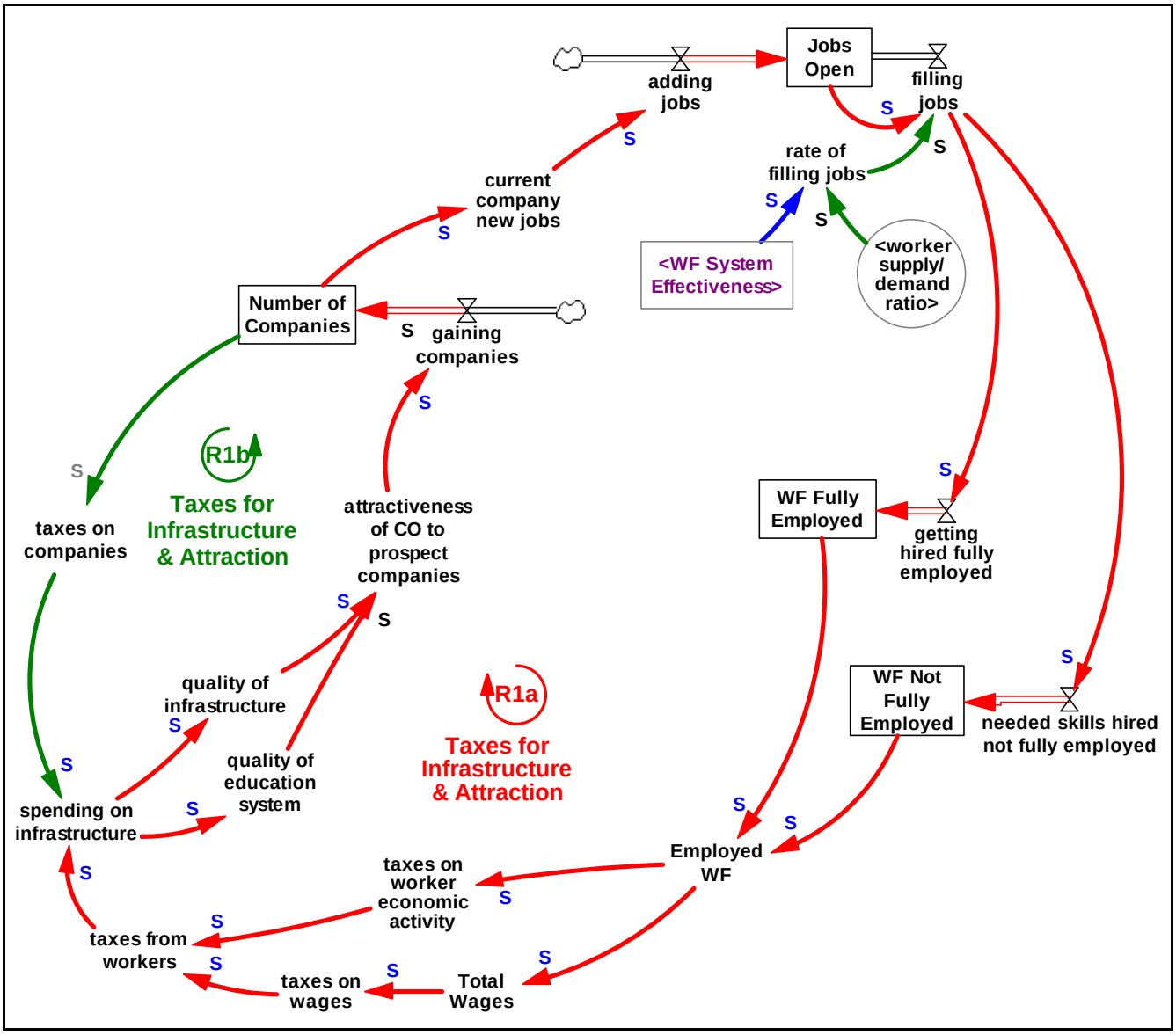
Figure 8. Action Priority Matrix

		Difficulty	
		Easy	Hard
Impact	High		
	Low		

- Figure 9. Feedback loops within the system, not external influences, primarily determine system behavior over time. Here are two: more companies and employed provide taxes for infrastructure.

  It is helpful to examine factors and actions that influence key feedback loops.

Figure 9. Reinforcing feedback loops for infrastructure



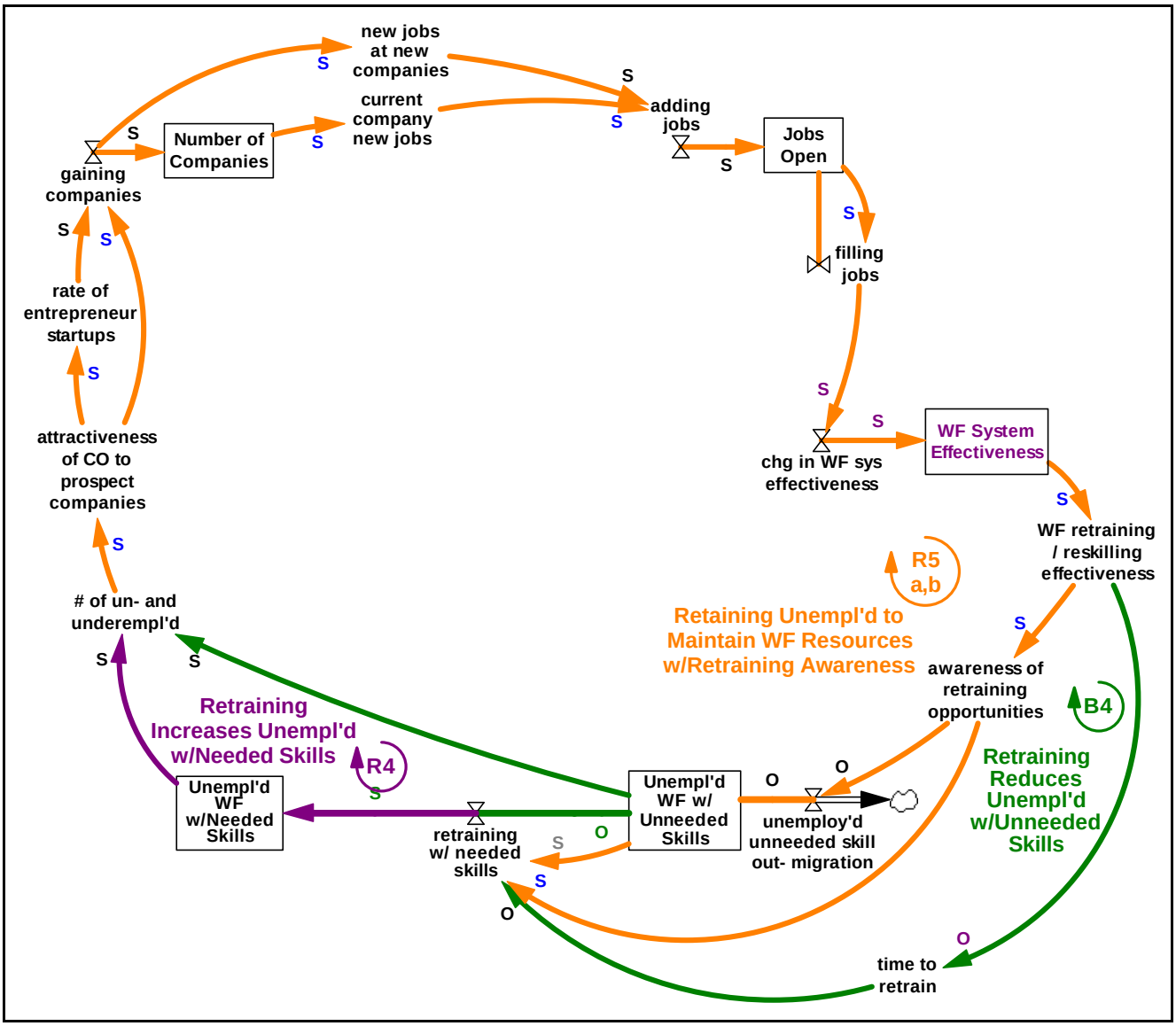
- Figure 10. WF retraining / reskilling feedback loops.

  Loop B4 shows that retraining reduces the number of "Unemployed WF w/Unneeded Skills"

  Loop R4 shows that retraining increases the number of "Unemployed WF w/Needed Skills."

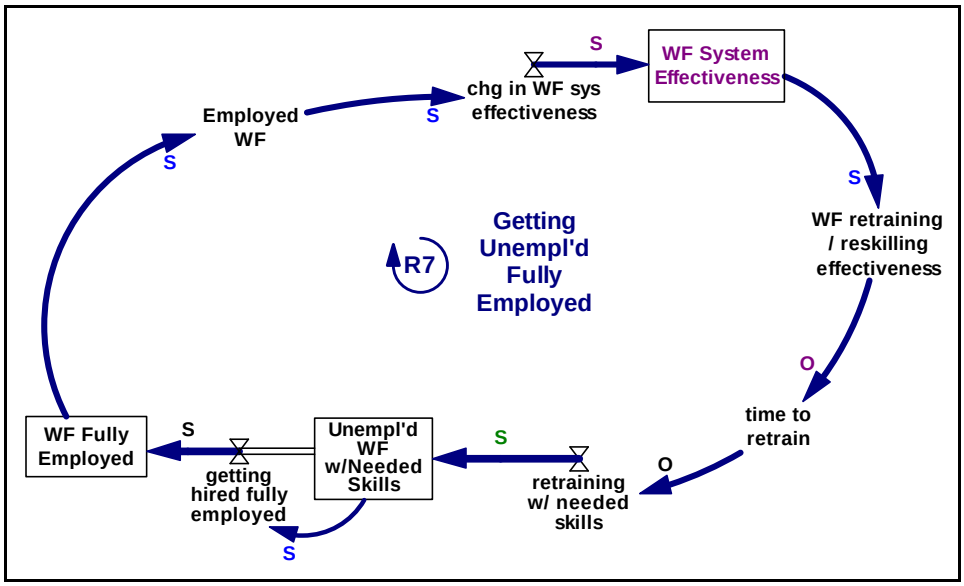
  Loops R5a and R5b show that "awareness of retraining opportunities" both increases the number of workers being retrained and reduces "unemployed unneeded skill outmigration" to maintain a pool of workers to be retrained (usually easier than training from scratch).

Figure 10. Retraining feedback loops



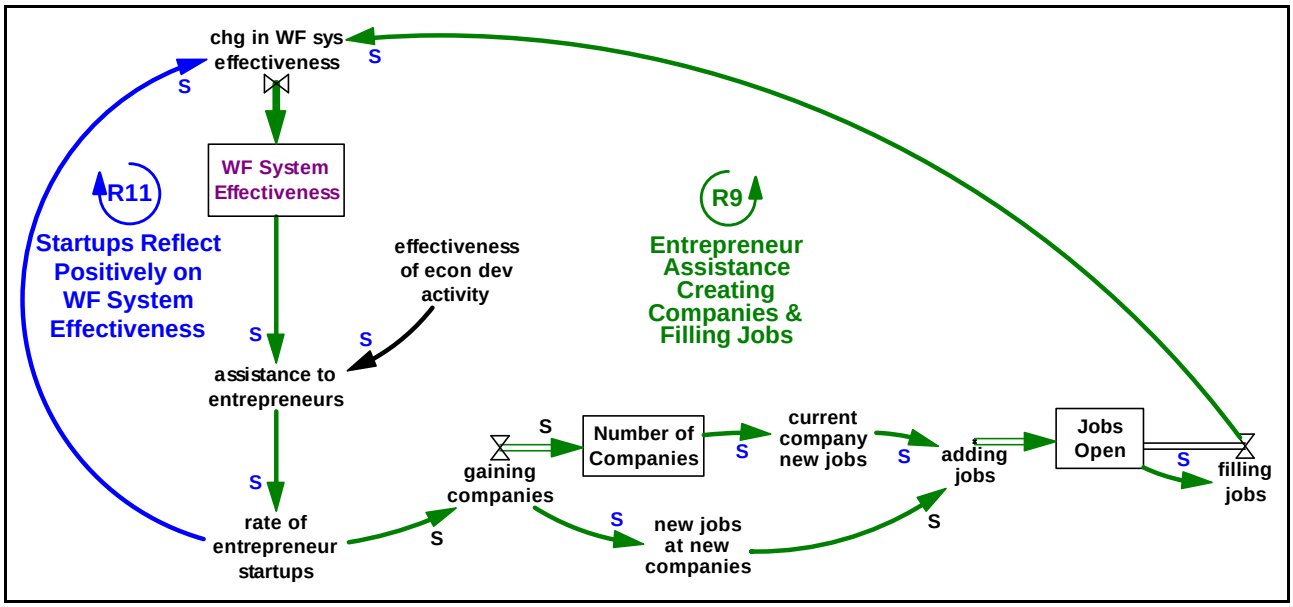
- Figure 11. Loop R7 shows that greater "WF retraining / reskilling effectiveness" reduces the time to retrain and increases the number "WF Fully Employed."

Figure 11. Retraining for greater full employment.



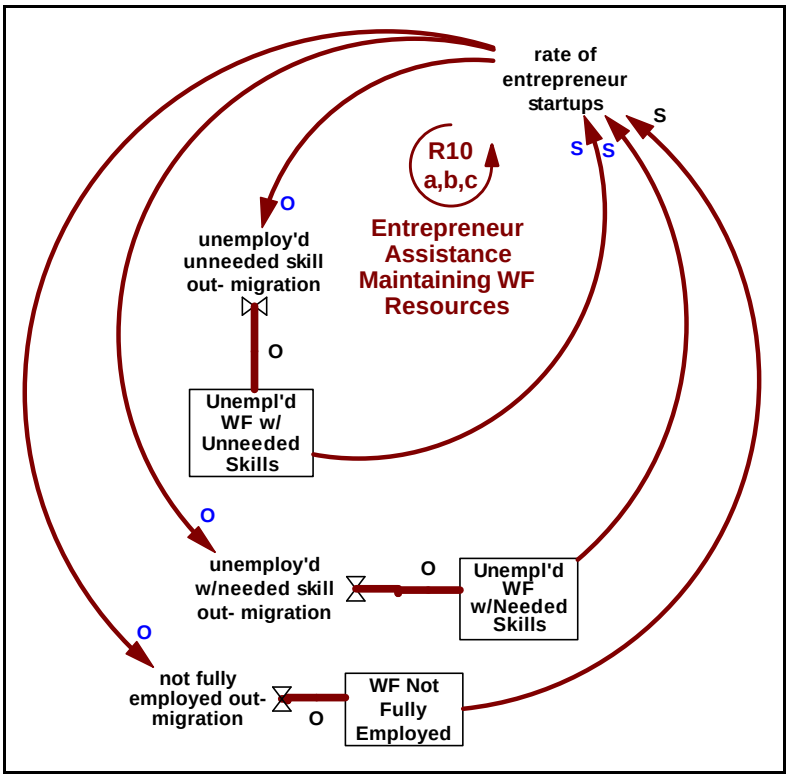
- Figure 12. Loop R9 shows "Entrepreneur Assistance ... " helps create companies and jobs to increase "WF System Effectiveness." Loop R11 shows the influence of startups on "WF System Effectiveness."

Figure 12. Assistance to entrepreneurs.



- Figure 13. Entrepreneur startups reduce the ranks of the un- and under- employed.

Figure 13. Entrepreneur startups effect on un- and under- employed.

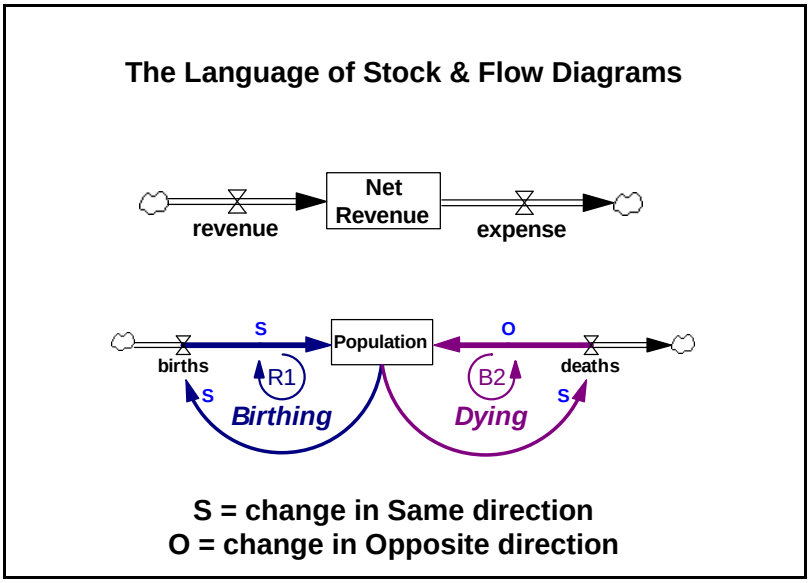


- Figure 14. What is systems thinking?

  Seeking to understand system behavior by examining “the whole” …… instead of by analyzing the parts.

  When we understand structure, we can understand behavior and design policies & structures to give the desired behavior.

Figure 14. Stock and flow diagram examples



Here are examples of the system dynamics language of structure.

- For an explanation of the language and methodology, see the papers at www.exponentialimprovement.com:
  - "Practical ST, Reading Systems Diagrams"
  - "What is Systems Thinking?"