

**Future Trends Written Report  
Based on Analysis of the Team's Chosen Community / Organisation in Mid-Term  
and Final Evaluation**

Group ID: 10-33

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**Community / Organisation Studied: Construction Workers**

**STEP 1. Identify Challenges**

Read the Future Scene carefully and generate ideas for challenges, concerns, and possible related problems. Choose the 5 most important challenges and write them in the space provided. Include applicable research with appropriate in-text citations.

**Challenge #1:**

**Construction workers are at risk of being automated by robots.**

**Observations:**

1. Many worldwide construction companies, such as Komatsu, CAT, and Volvo CE are already investing huge amounts on research to perfect machinery to replace their current construction workers due to cheaper cost and higher efficiency.

**Source:**

Kendall Jones (2018). *Will Robots & Automation Replace Construction Workers?* Retrieved from [https://www.constructconnect.com/blog/construction-technology/will-robots-automation-replace-construction-workers/amp/\)&\(https://www.google.com/amp/s/www.bbc.com/news/amp/world-us-canada-42170100/](https://www.constructconnect.com/blog/construction-technology/will-robots-automation-replace-construction-workers/amp/)&(https://www.google.com/amp/s/www.bbc.com/news/amp/world-us-canada-42170100/)

2. A two-year study from McKinsey Global Institute suggests that by 2030, intelligent agents and robots could replace as much as 30 percent of the world's current human labor, which includes construction workers.
3. McKinsey reckons that, depending upon various adoption scenarios, automation will displace between 400 and 800 million jobs by 2030, requiring as many as 375 million people to switch job categories entirely.

**Source:**

Calum McClelland (August 17, 2018). *The Impact of Artificial Intelligence – Widespread Job Losses.* Retrieved from <https://www.iotforall.com/impact-of-artificial-intelligence-job-losses/>

**Challenge #2:**

**Employment rates will go down, creating less jobs for the workforce.**

**Observations:**

1. Robots will replace humans and therefore the human workers have to look for other jobs. This creates less jobs for the rest of the workforce. In the graph shown below (Fig. 1), we can see that the employment rate of low-skilled workers (this includes construction workers) are going down significantly compared to the intermediate and high-skill employment.

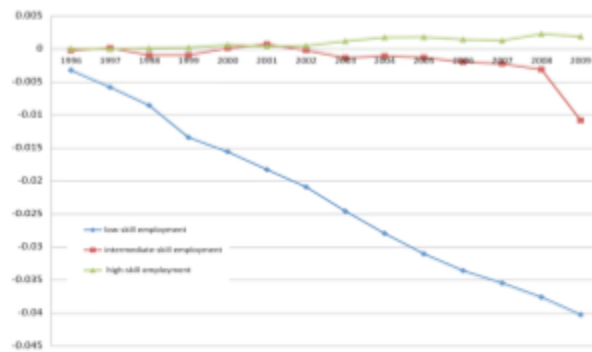


Fig. 4 Estimated year coefficients for employment of different skill types

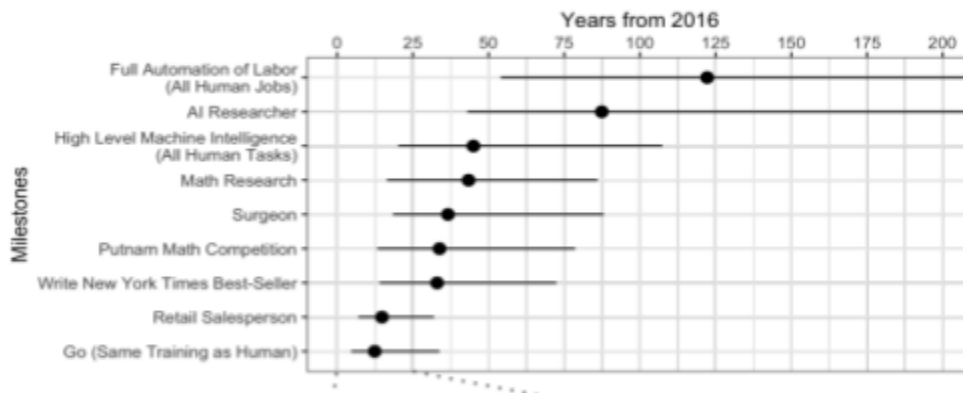
Fig. 1

**Source:**

Ross Harvey (31 Mar 2017). *The 'fourth industrial revolution': potential and risks for Africa*. Retrieved from <https://theconversation.com/the-fourth-industrial-revolution-potential-and-risks-for-africa-75313>

**Challenge #3:****Artificial Intelligence(AI) can do jobs better than humans.****Observations:**

1. In our interviews and surveys, 93% of construction workers and all employers believe that AI are much better than humans for the job due to the major reason that robots hardly ever make mistakes, and are much more efficient than humans. Robots seldom make mistakes and are predictable of how they are coded. Thus, robots are a better choice when handling dangerous objects or doing things that are repetitive. (Fig. 2)

**Fig. 2****Source:**

Emerging Technology from the arXiv (31 May 2017). *Experts Predict When Artificial Intelligence Will Exceed Human Performance*. Retrieved from

<https://www.technologyreview.com/s/607970/experts-predict-when-artificial-intelligence-will-exceed-human-performance/>

**Challenge #4:**

**Displaced jobs will cause Singapore's unemployment and poverty rate to increase, affecting the country's economy, and causing the citizens to be displeased with the government.**

**Observations:**

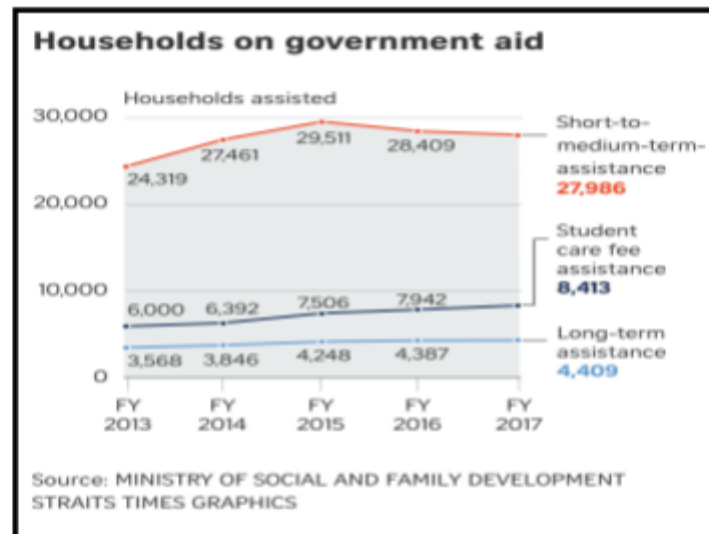
1. A new report from the Midwest Economic Policy Institute (MEPI) and the Project for Middle Class Renewal at the University of Illinois at Urbana-Champaign examined how automation can affect the construction industry in the coming decades. "The Potential Consequences of a Highly Automated Construction Industry" report concluded that automation could displace up to 2.7 million construction workers by 2057, displacing or replacing as much as 49% of America's blue-collar construction workforce. The authors exclusively shared the results with Construction Dive.

**Source:**

Laurie Cowin (17 Jan 2018). *Deep Dive: Automation's opportunities and threats*. Retrieved from <https://www.constructiondive.com/news/automations-opportunities-and-threats/514847/>

**Challenge #5:****Families cannot be supported due to workers' unstable income.****Observations:**

1. A news report from the Straits Times shows that more and more families are relying on long term financial aid from the government to get by their daily lives, There were 4,409 households on the government scheme run by the Ministry of Social and Family Development (MSF) in the 2017 financial year, up from 4,387 families in the preceding 12 months. The 2017 figure was 24 per cent more than the 3,568 families on the scheme in 2013. (Fig. 3)

**Fig. 3****Source:**

The Straits Times (9 Oct 2018). *More families depending on long-term financial aid from Government to get by: MSF*. Retrieved from <https://www.straitstimes.com/singapore/more-families-depending-on-long-term-financial-aid-from-government-to-get-by>

## STEP 2. Craft the Underlying Problem

Using the challenges listed in Step 1, identify a problem of major importance to the chosen community / organization in the future. Write your Underlying Problem making sure your question clearly explains the action that will be taken and the desired results/goal of that action.

Incorporating Challenge(s) #1,2,4

### **Underlying Problem:**

**Given that low-skill (construction workers) employment rate had decreased significantly from 1996 to 2009 (Conditional Phrase), how can we prepare construction workers for the Fourth Industrial Revolution (Key Verb Phrase) so that they will still be able to have a job (Purpose) in the future in Singapore in the year 2030 and beyond (Future Scene Parameters)?**

### STEP 3. Produce Solution Ideas

Generate solution ideas to the Underlying Problem in Step 2. Choose the 5 most effective solutions and write the elaborated ideas in the space provided. Include applicable research with appropriate in-text citations.

#### **Solution #1:**

#### **Train Construction Workers In AI's weaknesses**

#### **Observations:**

1. Since robots do not have a brain of their own, they are not able to think, the most they can do is use algorithms that the programmer programmed. Therefore robots do not have creativity and might not be able to solve complicated problems should one arise.

**Solution #2:**

**Proactively seek out to train displaced workers or soon-to-be ones.**

**Observations:**

1. Let the government or other organisations, such as SkillsFuture SG/Workforce Singapore to seek out the displaced workers and provide them with courses in jobs that are similar to their skill set, so that displaced workers will have a way out of their unemployment and still be able to earn money for their family.

**Source:**

Blake Morgan (5 Sep 2018). *Robots Will Take Our Jobs And We Need A Plan: 4 Scenarios For The Future*. Retrieved from

<https://www.forbes.com/sites/blakemorgan/2018/09/05/robots-will-take-our-jobs-and-we-need-a-plan-4-scenarios-for-the-future/amp/>



**Solution #3:**

**Let the displaced workers take over jobs with insufficient manpower.**

**Observations:**

1. Jobs including sales representatives, drivers, engineers, researchers, technicians, electricians, mechanics, accounting and finance, IT, manufacturing and customer support can be taken over by the displaced workers. This is so that the displaced workers can still have a source of income and will not have to worry about their unemployment. However, this solution will cause the construction workers to work in a different environment and these jobs require a different skill set compared to construction work.

**Source:**

ManpowerGroup (2018). *2018 Talent Shortage Survey*. Retrieved from <https://manpowergroup.com.sg/talent-shortage-2018>

**Solution #4:**

**The government should put restrictions on fully automated systems such as restricting the number of fully automated systems per company.**

**Observations:**

1. By restricting the amounts of AI used in the construction companies, the workers are likely to face less competition for jobs against these AI, thus allowing both AI and human construction workers to be working so as to minimise unemployment and protect the country's economy.

**Solution #5:**

**The AIs being employed can be used more in ensuring the workplace safe but not replacing the construction workers' jobs.**

**Observations:**

1. AIs can be used to ensure the workplace is safe as in this way, the AIs can protect the construction workers, as AIs have a much higher processing skill than humans and can warn the workers when a danger is about to happen, and at the same time, AI will not take over the construction workers' jobs.

### STEP 4a. Select Criteria

Generate criteria to determine which solution idea does the best job of solving your Underlying Problem and/or addressing the Future Scene situation. Select the 5 most important criteria for measuring solution ideas and write them in the spaces provided.

**Criterion #1:**  
**Whether solution address the problem**

**Criterion #2:**  
**Drawbacks**

**Criterion #3:**  
**Practicability**

**Criterion #4:**  
**Cost**

**Criterion #5:**  
**Duration for implementation of solution**

**STEP 4b. Apply Criteria**

List the solution ideas from Step 3 on the grid. Use each criterion to rank the solutions on a scale from 1 (poorest) to 5 (best). The weighting for one important criterion may be doubled if necessary.

Step 3 Sol'n #	Solution Idea	Criteria					Total
		1	2	3	4	5	
#1	Train Construction Workers In AI's weaknesses	5	3	4	3	2	57
#2	Proactively seek out to train displaced workers or soon-to-be ones	5	3	5	3	3	61
#3	Let the displaced workers take over jobs with insufficient manpower	2	3	4	4	3	45
#4	Government putting restrictions on fully automated systems	3	2	3	4	3	43
#5	AI's being employed be used more in ensuring the workplace safe but not replacing the construction workers' jobs	2	2	2	2	1	29

## STEP 5. Develop an Action Plan and Evaluate its Feasibility

Develop your top-scoring solution idea into an Action Plan. Thoroughly explain how the Underlying Problem is solved, how the plan will be implemented, and how the community / organisation will be affected. Explain how this Action Plan is feasible with secondary research consulted, preferably also with primary research (feedback from chosen community / organization)

### **Action Plan derived from Solution #2:**

#### Action Plan:

To proactively seek out to train displaced workers or soon-to-be ones. Let the government or other organisations, such as SkillsFuture SG or Workforce Singapore to seek out the displaced workers and provide them with courses in jobs that are similar to their skill set, so that displaced workers will have a way out of their unemployment and still be able to earn money for their family. Due to a shortage of manpower, the workers will be taking their lessons in batches, so the government should restrict the import of AI used in construction, but slowly import them in so that the construction workers who is yet to learn a new skill can still have a source of income.

#### Implementation timeline:

1. 2030: Government to work more closely with SkillsFuture Singapore (SSG) and Workforce Singapore (WSG) to open up more platforms for the displaced construction workers.
2. 2032: By then, all preparations (setting out of the online registration platforms, training of facilitators) will be done. The first batch of workers are allowed to go to these online portals to register for new skill lessons and as a round of trial.
3. 2033: The first batch of displaced workers will have finished their lessons and be able to look for a new job. One or two months will be taken for new changes and maintenance of website according to the workers' feedback, and the second batch of workers will be able to learn.
4. 2040: All displaced workers will have finished their studies, and there will be no more workers who had to worry for not having a job.

#### Potential Assistors:

- Construction workers, as this will help them in getting a new job and not lose their source of income.
- Government, as this will solve the problem of unemployment rate rising and country's economy being disrupted.

#### Potential Resisters:

- Private construction companies might not agree to displace their workers in stages as they will want to earn as much money as possible, so they will displace their workers earlier and faster.

## Action Plan derived from Solution #2:

### How to manage the potential resistors:

We can get these potential resistors to be the first batch of companies to displace their workers. If there are too much workers being displaced, the government can restrict some of the private sectors from doing so.

### Obstacles:

- Some workers might be unwilling to attend these courses, not attend these courses and unwilling to learn new skills, as they might think these courses are costly etc.
- Some workers might not know how to assess the website to sign up for the courses, check their lesson schedule etc. as they do not have internet accesses in their home/do not know how to use the internet etc.
- It will take time for the website to set up and for facilitators to be trained, and as this period of time the workers will not have a source of income.

### Solutions:

- Make the lessons compulsory for the workers. The course can be set up as free, as this will protect the country's economy.
- Workers who have various problems assessing the online portal can go to the community centers for help. Stations can be set up in the community centers can offer the workers access to the website, and can also teach them how to sign up for courses.
- Subventions can be given to workers. If possible, companies can delay the process of displacing their workers.

### How the action plan solves the underlying problem:

- Given that our key verb phrase is 'prepare construction workers for the Fourth Industrial Revolution', our action plan addresses and solves this problem as by letting the workers to learn new skills, they will be able to look for another job and not lose their source of income for their families.

