

# Digital Transformation in Skills: Enablers for a Data-Driven Skills Ecosystem

Masterclass series “The SKILLS Bridge”

Promoting Lifelong Learning (LLL) for the Future of Work

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**SkillsFuture is a collective effort within the skills ecosystem to achieve a vision of building a nation of lifelong learning and a society that values skills mastery**



**Individuals**: Enable individual ownership of lifelong learning



**Enterprises**: Engage companies to articulate and aggregate skills needs; encourage skills recognition and skills-based HR practices at the workplace

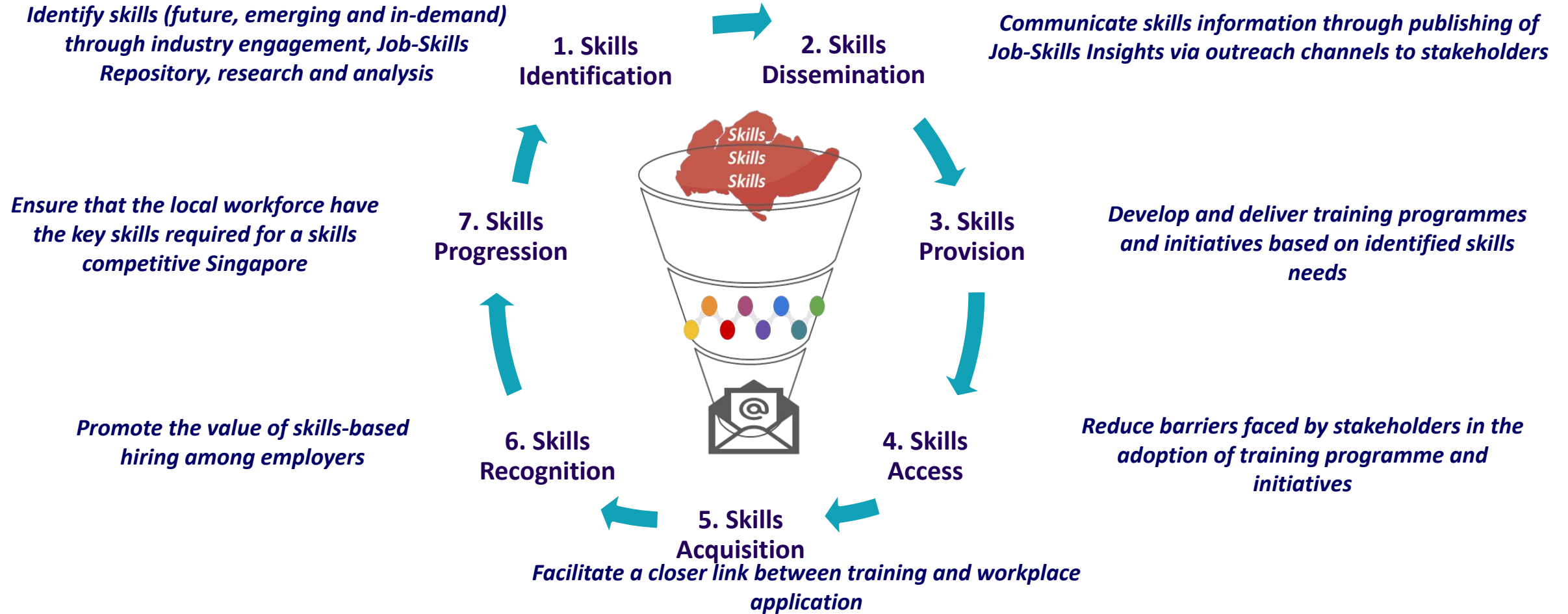


**Training Providers**: Raise the industry relevance, quality, and market responsiveness of the Training and Adult Education sector

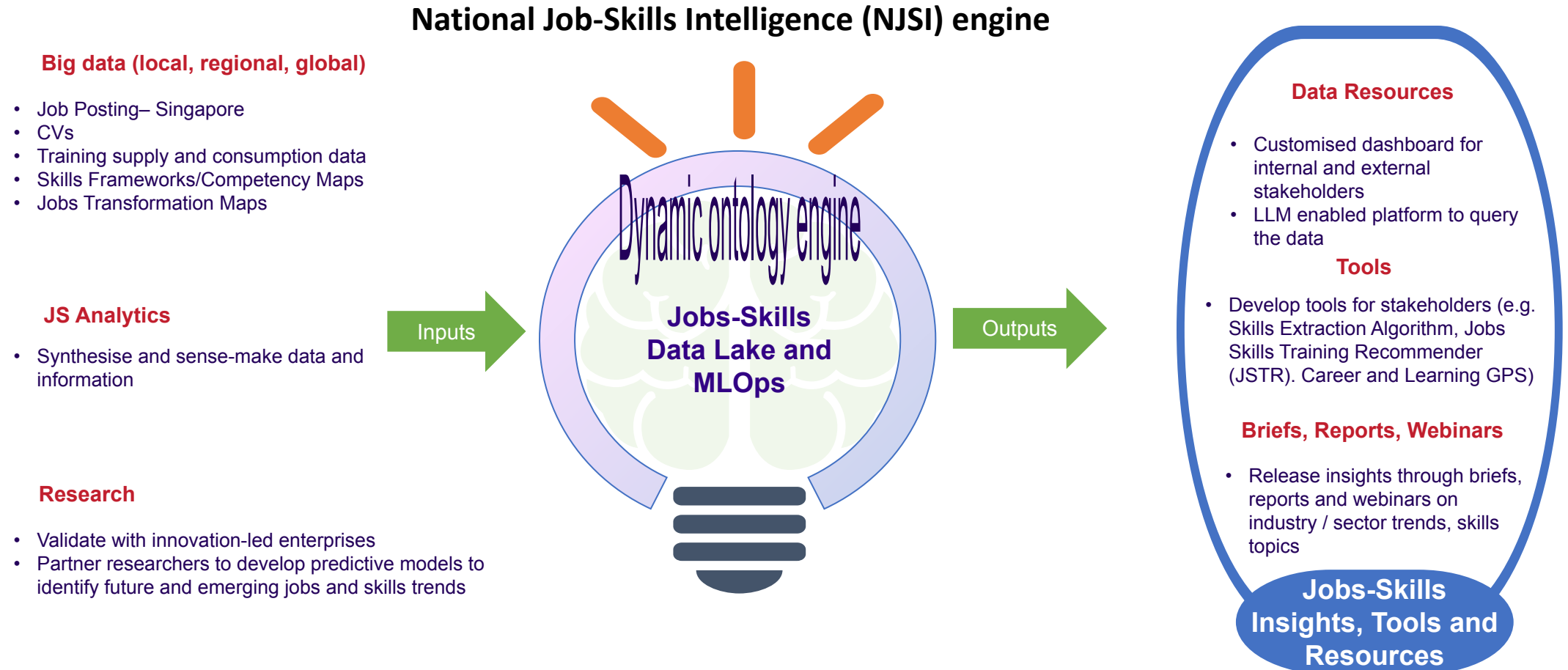


**Ecosystem**: Strengthen the link between skills supply to demand, and tighten the coordination between training and job placements

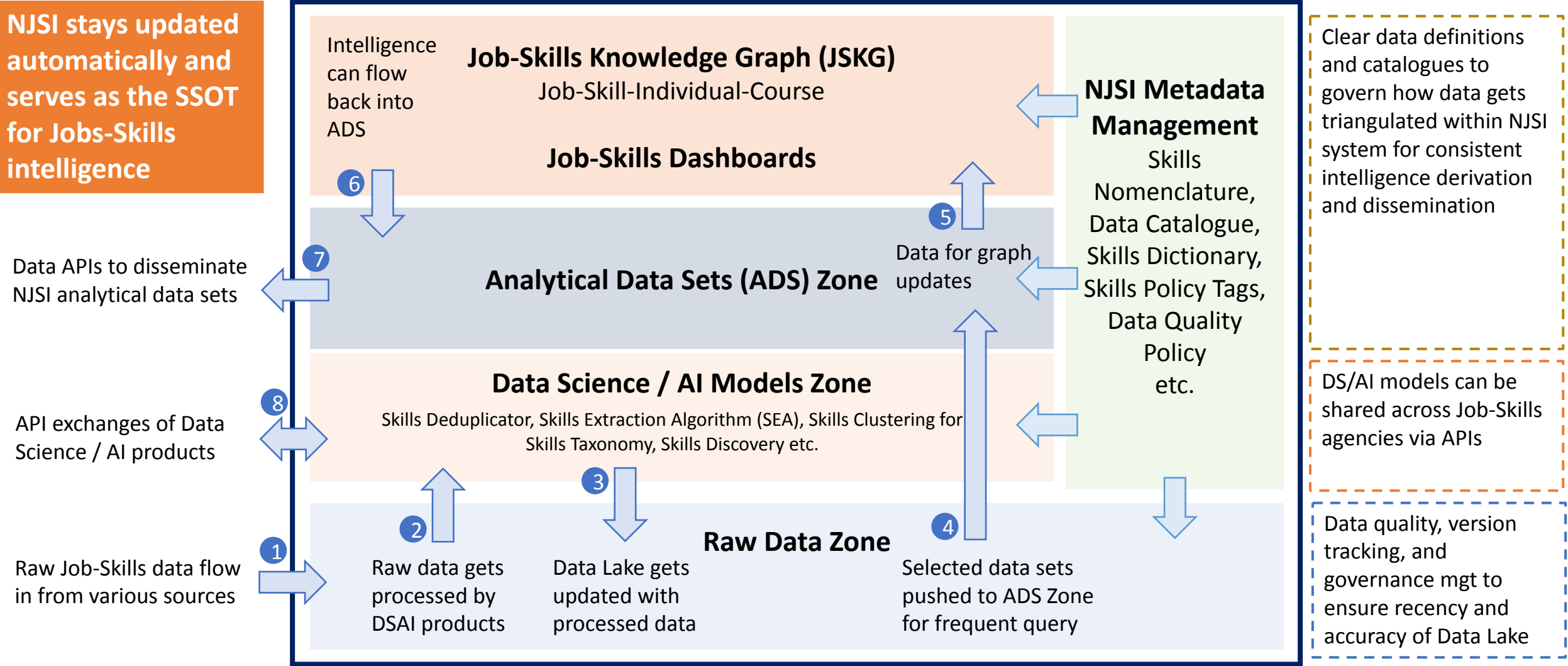
# As the national Skills Authority in Singapore, SkillsFuture Singapore (SSG) facilitates the identification, dissemination, acquisition and recognition of skills, and ensures adequate provision of outcome-based Continuing Education and Training courses



Since 2021, SSG has pivoted to big data to enhance our ability to anticipate jobs and skills changes and harness data analytics and machine learning techniques to provide more responsive, comprehensive and customised jobs-skills insights for stakeholders



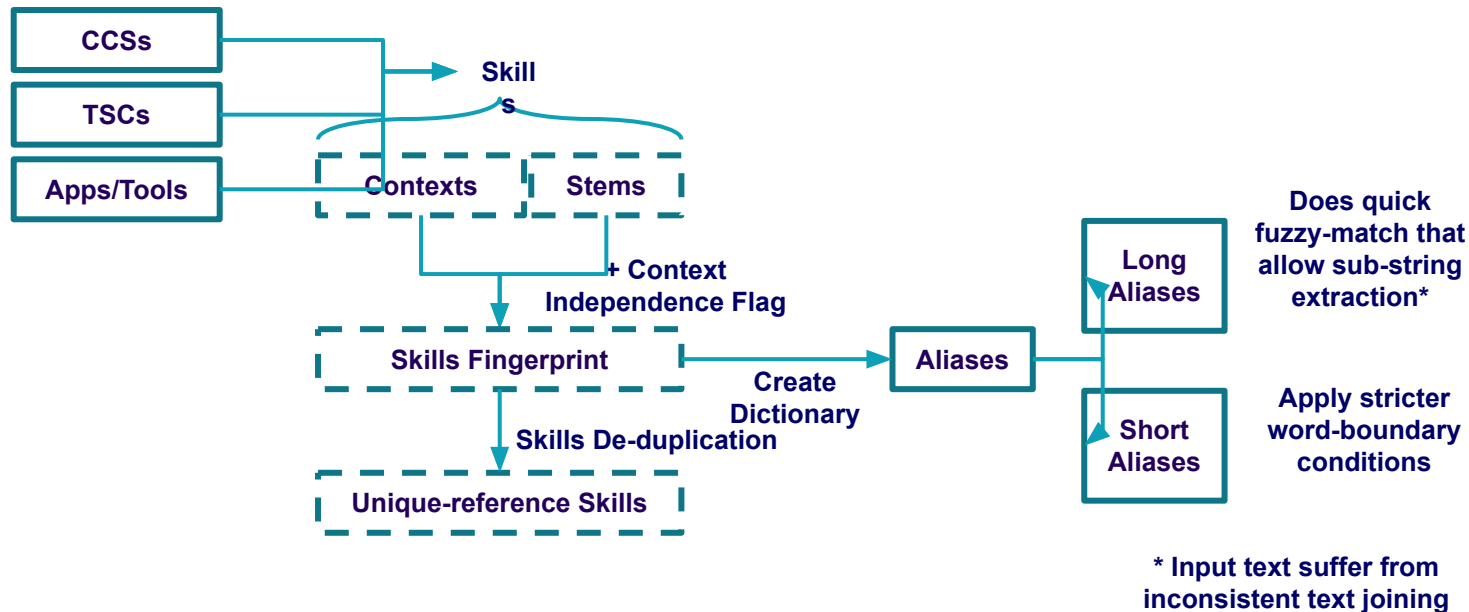
# NJSI Engine: Job-Skills data + Data Science / AI models + Metadata governance policies. Automatically updated, high quality, single-source-of-truth (SSOT)



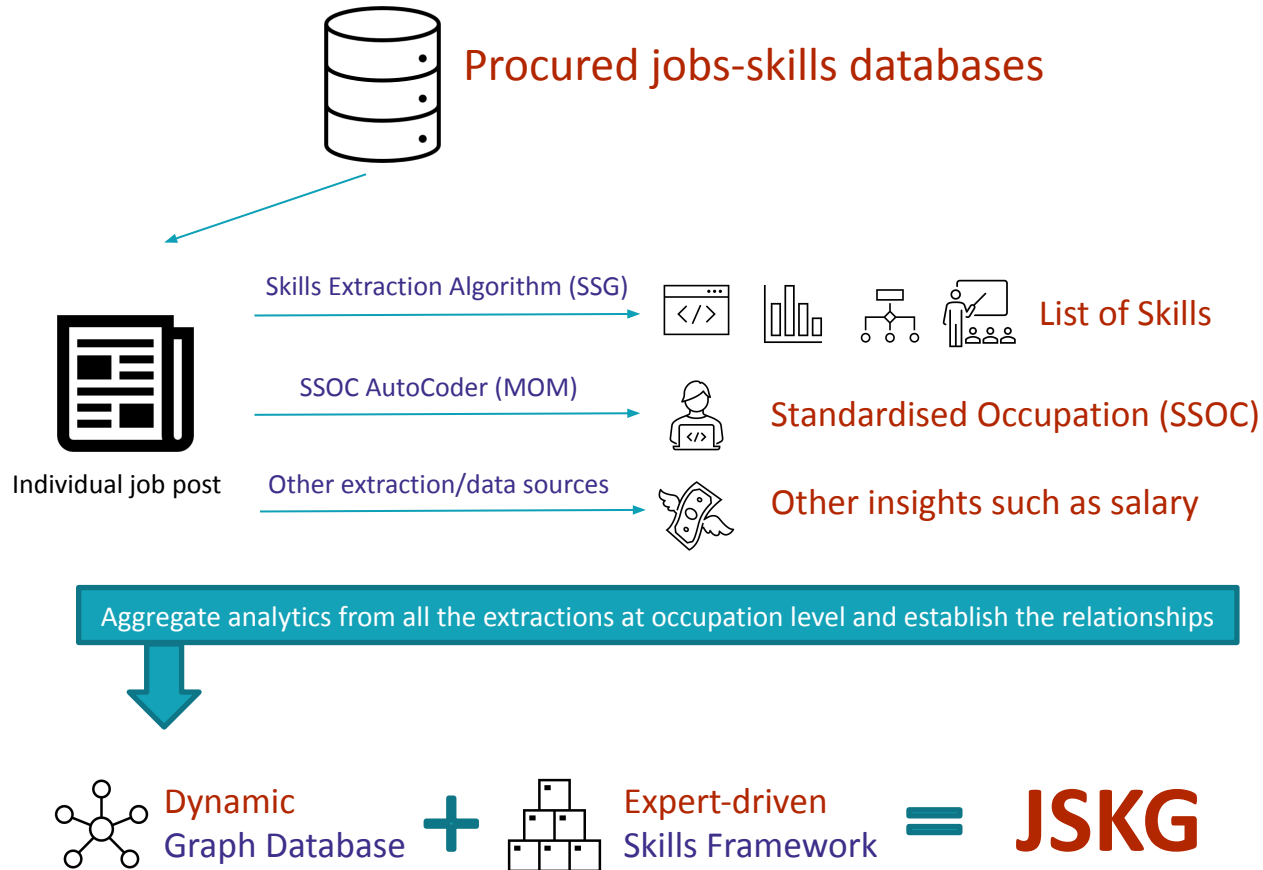
# Innovative tools such as the Skills Extraction Algorithm (SEA) enable partners in the skills ecosystem to identify easily and consistently skills from any unstructured text, and aligns them to a common skills language

- SEA (<https://ssg-sea.streamlit.app/>) is an algorithm that extracts skills from unstructured text e.g. individuals' CVs, job postings, or courses.
- SSG currently uses the algorithm to support courses-to-skills mapping for course approval and for course search/recommender. It can also be deployed via various front ends to partners in the skills ecosystem, e.g. Institutes of Higher Learning, Skills Development Partners, etc

The rules of SEA\_V1. Output from V1 will form the labelled dataset for the V2 Rule-ML-hybrid model.



# The Jobs-Skills Knowledge Graph (JSKG) combines both dynamic insights from job posting data and expertise-driven insights from the Skills Framework



## Components of JSKG (currently at proof of concept stage):

- Graph database with established relationship between occupations using skills as the linking currency
- Insights derived from job postings across multiple years, such as skills counts, salary ranges
- Advanced analytics, such as “differentiator” skills of every occupation (using a technique called TF-IDF)
- Enriched by Skills Framework, an expertise-driven relationship insight between jobs and skills

## It can support timely jobs-skills insights through:

- Time evolution analysis of jobs and skills relationships
- Occupation similarity based on skills commonalities and salary ranges
- Combination of data-driven and expert-driven insights
- Fast and efficient graph queries between occupations through the established NJSI API

# Insights and data are disseminated through anchor publications such as the Skills Demand for the Future Economy Report and SkillsFuture Jobs-Skills Insights

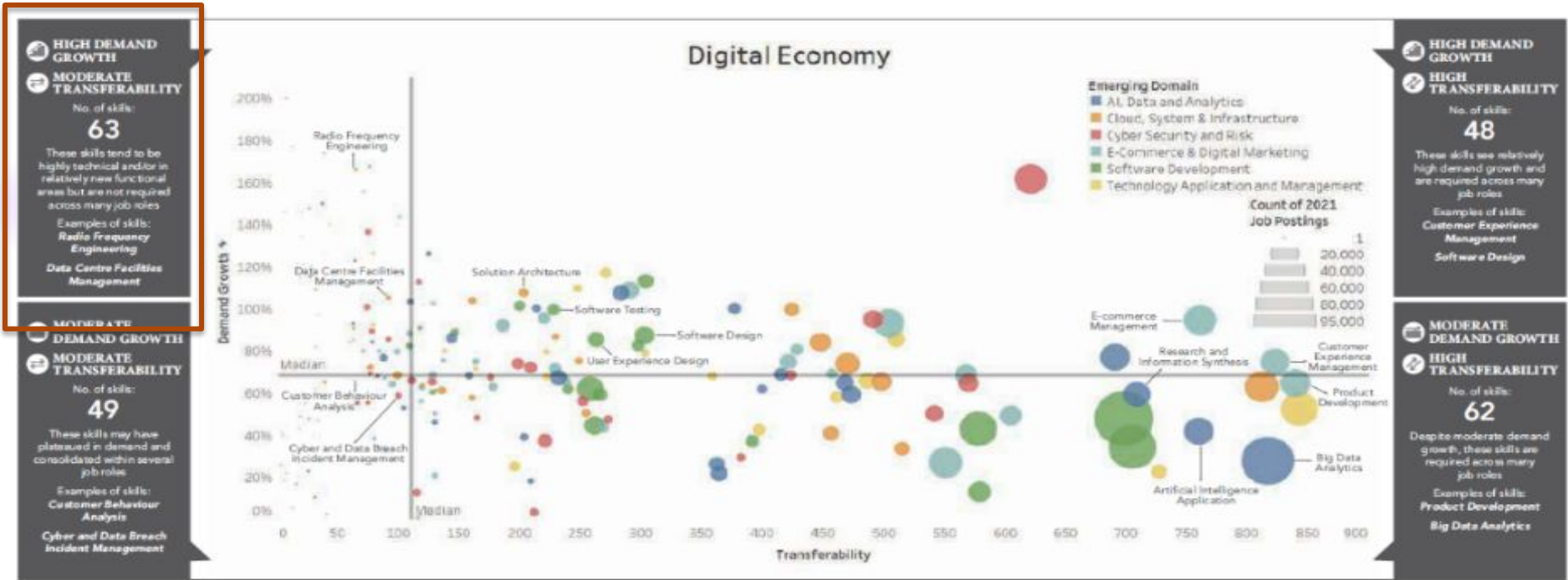
2022 report focuses on the skills that matter and what employers seek



Source: July 2023 Jobs Skills Insights by SSG

# For instance, we highlight priority skills for each economy and deploy visualization tools to help citizens prioritise skills based on demand growth and skills transferability

Call-out boxes highlight variations in demand growth and transferability, and the relevant skills



Skills Demand for the Future Economy (SDFE) Report 2022



<https://go.gov.sg/sdf>

<https://www.skillsfuture.gov.sg/skillsreport>

| SKILL TITLE | RADIO FREQUENCY ENGINEERING                                                                                   | DATA CENTRE FACILITIES MANAGEMENT                                                                                                                            | CUSTOMER EXPERIENCE MANAGEMENT                                                                                                                                                  | SOFTWARE DESIGN                                                                                                  | CUSTOMER BEHAVIOUR ANALYSIS                                                                                                                                                | CYBER AND DATA BREACH INCIDENT MANAGEMENT                                                                                                                                                          | PRODUCT DEVELOPMENT                                                                                                                                | BIG DATA ANALYTICS                                                                                                           |
|-------------|---------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| DESCRIPTION | Design, deploy and maintain radio frequency infrastructure for IT systems and wireless communication networks | Manage and maintain data centre resources, facilities and/or physical infrastructure to ensure smooth, stable and sustainable operations within data centres | Compile and analyse information gathered through various channels and manage communication across customer touch points to ensure a consistent and pleasant customer experience | Create and refine the overall plan for the design of software, including the design of functional specifications | Devise customer behaviour analysis tools and approaches to perform analysis on information pertaining to customer behaviours, leading to improved customer recommendations | Detect and report cyber and data-related incidents, identify affected systems and user groups, trigger alerts and announcements to relevant stakeholders and efficient resolution of the situation | Evaluate consumer and market trends to determine value proposition, cost-effectiveness and profitability of proposed products in different markets | Analyse and validate significant volumes of data to discover and quantify patterns and trends to improve business operations |

Priority skills refer to skills that citizens can prioritise to gain access and thrive in emerging domains. These skills were derived from SSG's National Jobs-Skills Intelligence engine, and validated with expert input from industry, academia and sector agencies. Demand growth (y-axis) refers to the compound annual growth rate of job postings (2018 to 2021) that mentioned a given priority skill. Transferability (x-axis) refers to the total number of unique job roles from job postings (2018 to 2021) that require a given priority skill.

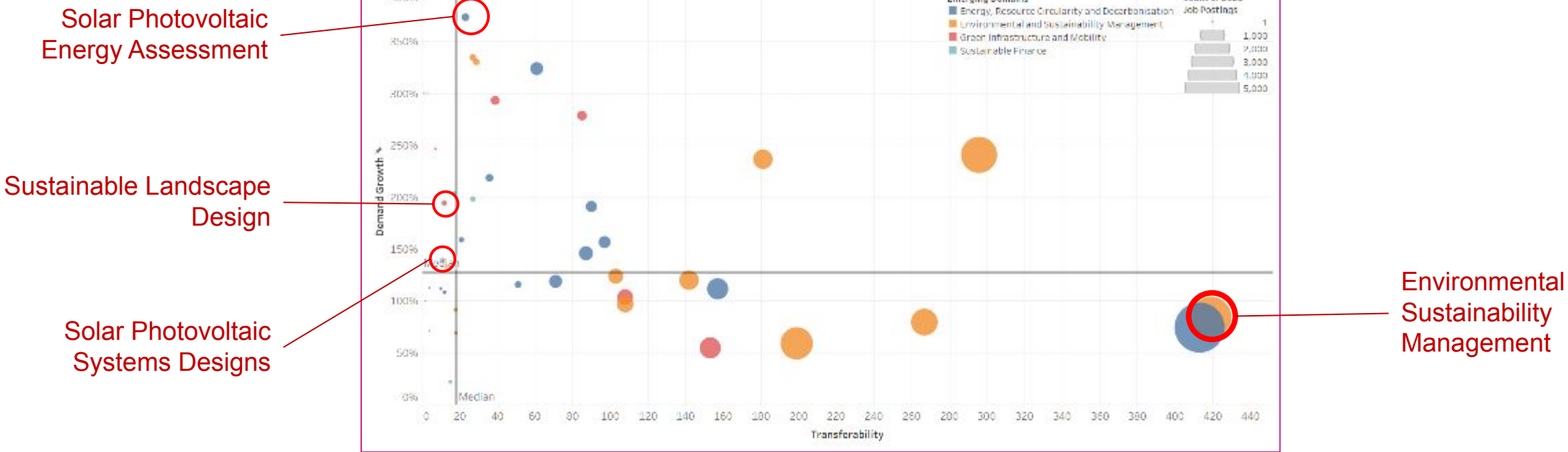
List of skills analysed for SDFE 2022



<https://go.gov.sg/2022skills>

<https://www.skillsfuture.gov.sg/2022skills>

# Example of Green Economy: Priority green skills that are increasingly important in many sectors



**Green goals: Parkroyal Collection Marina Bay adds expansive garden and urban farm**

By Ruth Hegan  
April 13, 2022



Pan Pacific Hotels Group's Parkroyal Collection Marina Bay has introduced what it says is Singapore's first 'Garden-in-a-Hotel' as part of its long-term commitment to sustainability.

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Pan Pacific Hotels Group's Parkroyal Collection Marina Bay has introduced what it says is Singapore's first 'Garden-in-a-Hotel' as part of its long-term commitment to sustainability.

The hotel features over 2,400 plants and trees spread across 15,000 square feet. The hotel is now also home to one of the largest urban farms in the Central Business District, with over 60 varieties of vegetables, herbs and edible flowers, which support the hotel's farm-to-table ethos.

"As the issue of climate change and awareness of business' impact on the environment have grown, so too has adopting policies that have a favourable effect on that impact," said Parkroyal Collection Marina Bay, Singapore, General Manager, Melvin Lim.

Source: [hotelmanagement.com.au](http://hotelmanagement.com.au), 13 Apr 2022

**18 Sentosa sites to be powered by solar energy, installation to begin this month**



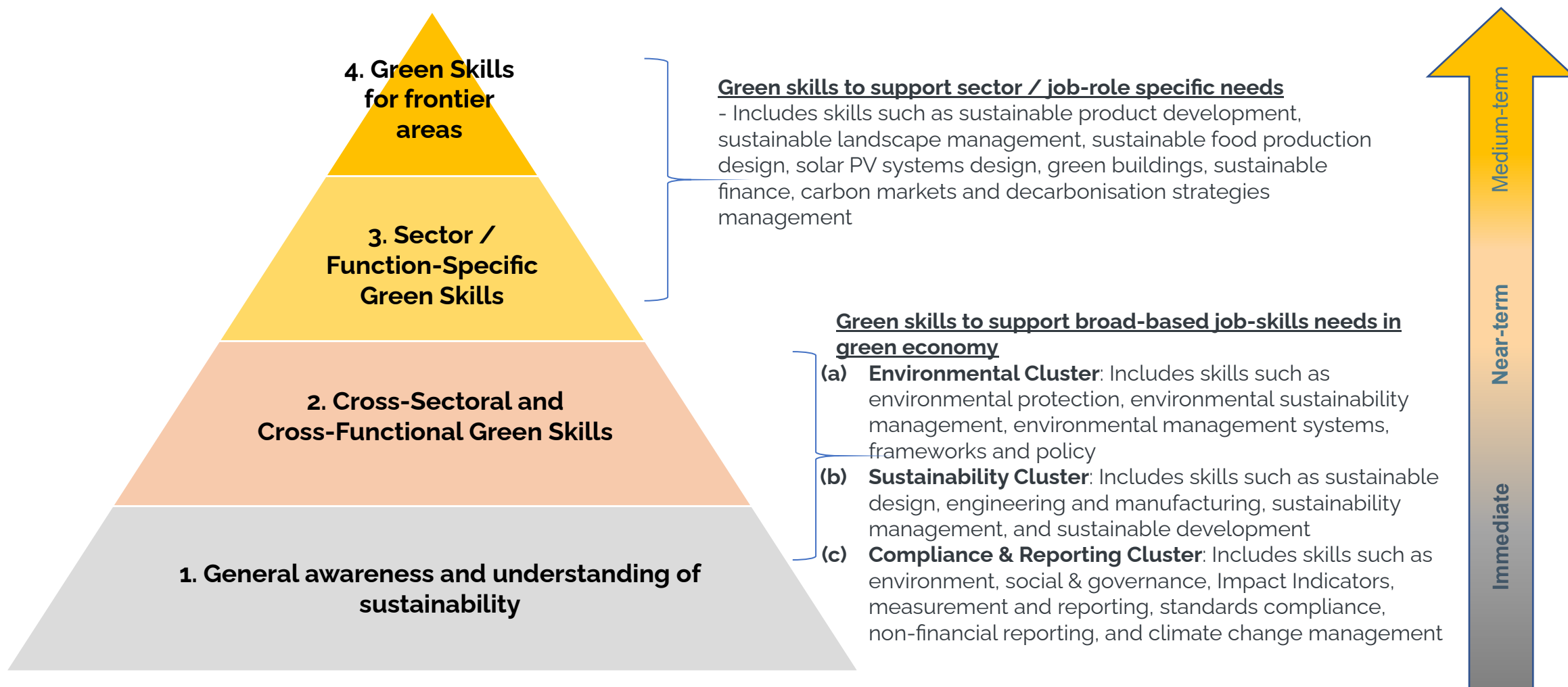
The installation of panels on the roofs of the 18 Sentosa sites is set to begin this month.

SINGAPORE - Solar panels will soon power 18 sites on Sentosa, including well-loved attractions in Universal Studios Singapore (USS), to make the resort island more environmentally friendly.

These panels will be installed on the roofs of attractions such as the Revenge Of The Mummy roller coaster, among others.

The sites were selected based on factors such as sufficient sunlight, renovation plans of buildings and whether they would obstruct guest experience.

# Understanding the different tempo of change using big data allows us to develop a Green Skills Strategy with different CET activation strategies and signposting efforts



# Jobs-skills data analytics and AI within mySkillsFuture portal help disseminate curated information to individuals that meet their career and learning needs

*Self-assessment tools*

*Personalised course recommendations*

*Lifelong account*

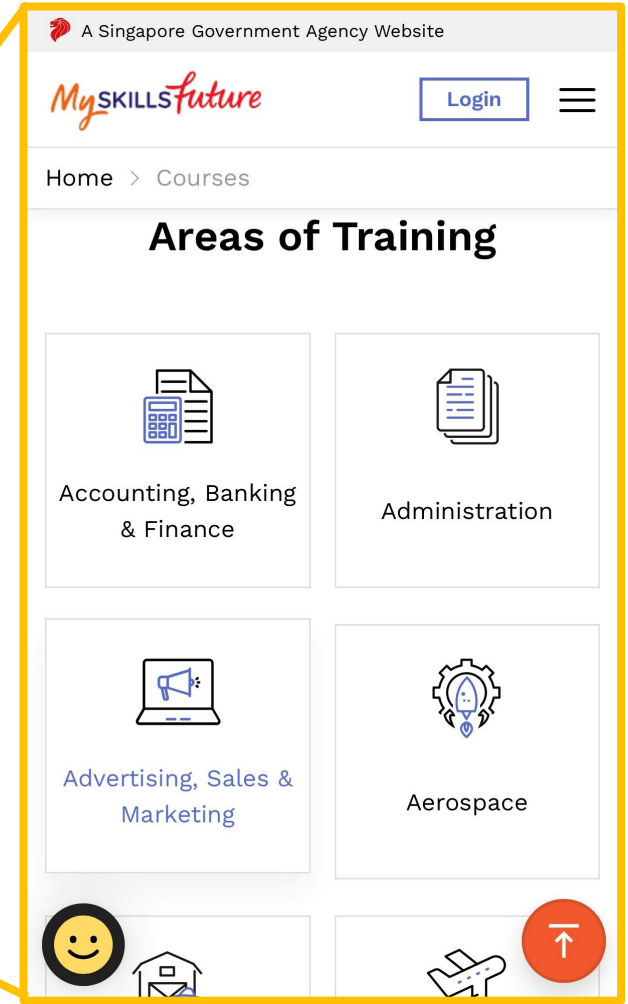
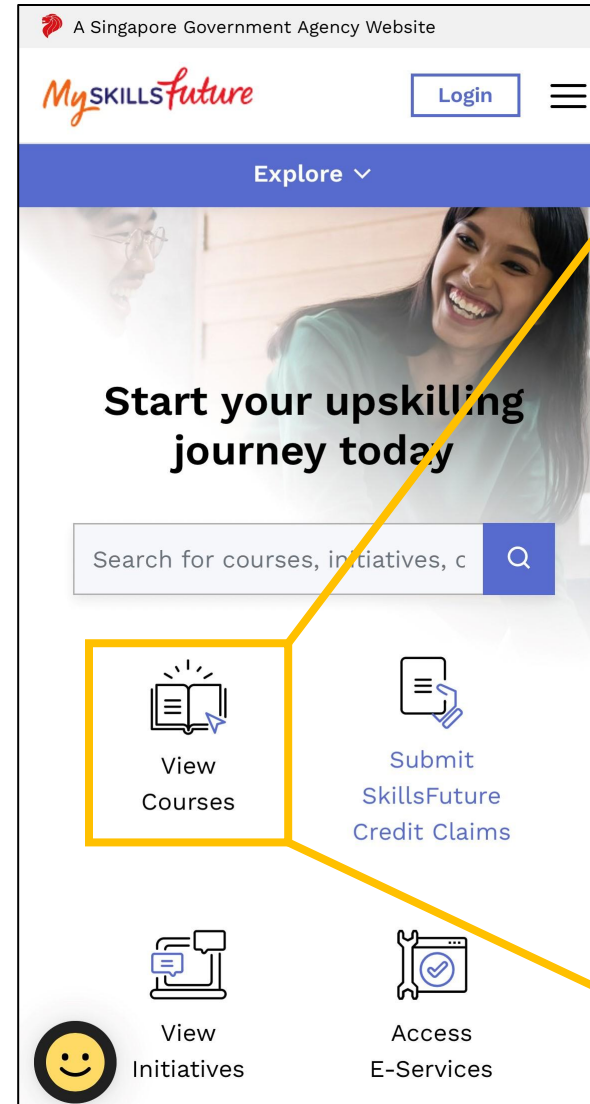
## MySkillsFuture

One-stop education, training and career guidance online portal

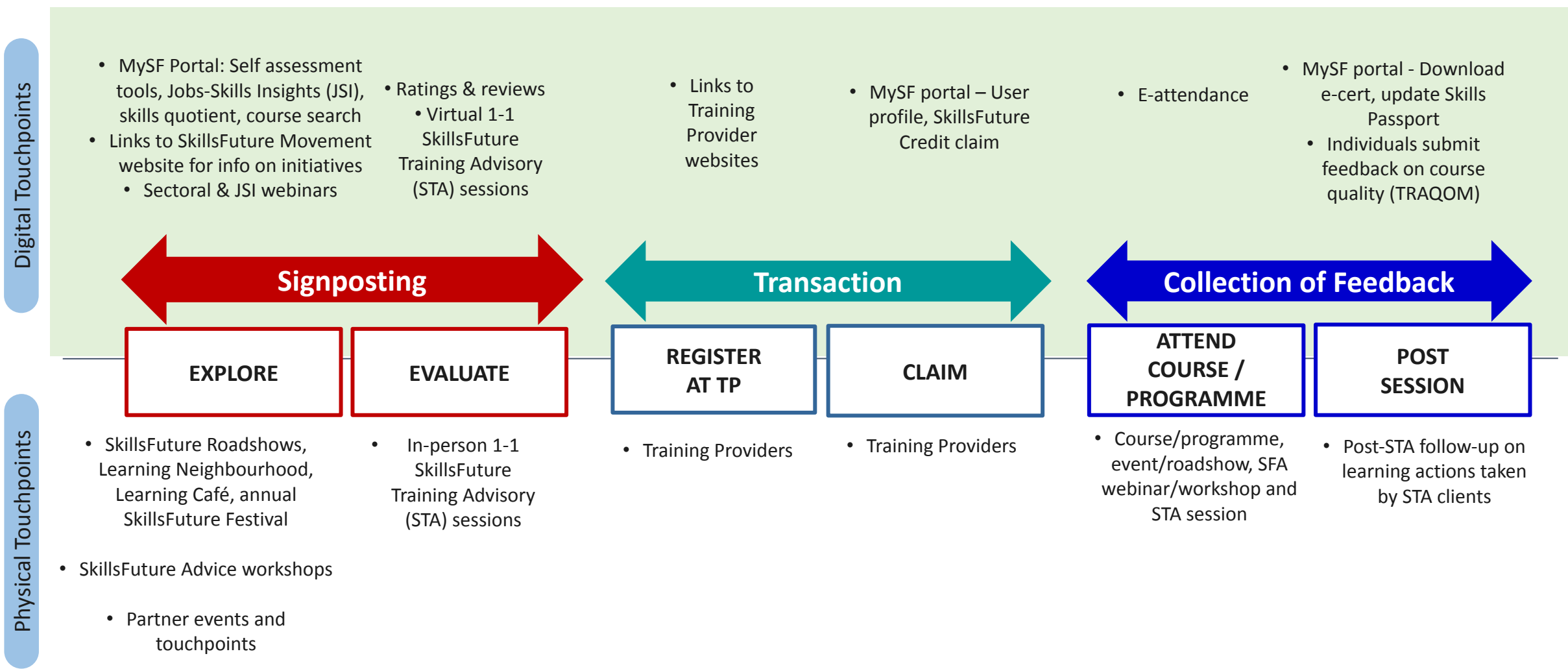
*Training quality and outcome survey results*

*Industry insights*

*Jobs-skills insights*



# These digital touchpoints complement our physical touchpoints to disseminate resources, collect, as well as analyse user feedback from individuals



# Collection of learner feedback through our Training Quality & Outcomes Survey (TRAQOM), which is administered digitally to all learners who completed SSG-funded courses

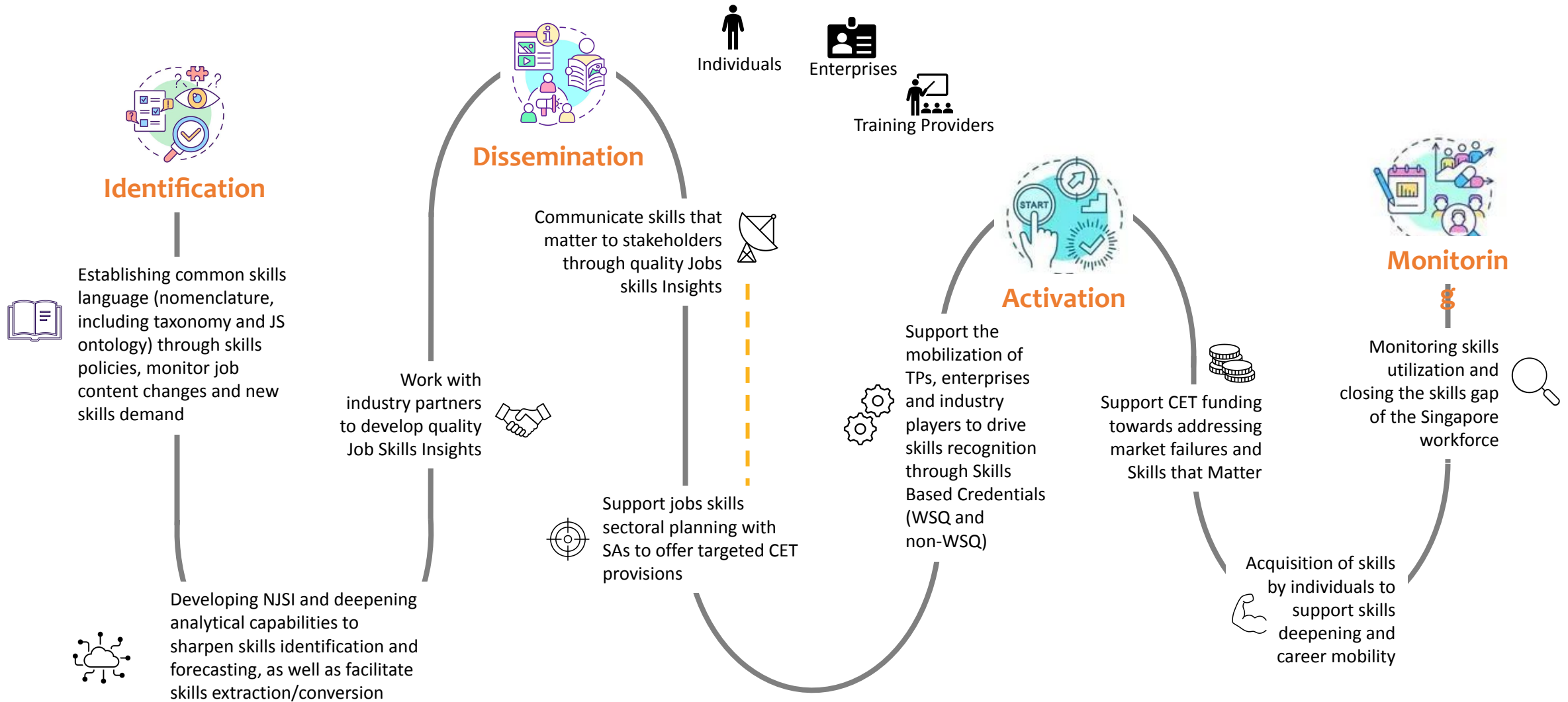
- SSG's Training Quality & Outcomes Survey (TRAQOM) was set up to: (i) **Help individuals make informed decisions on their training choices**, by making reference to course ratings featured on MySkillsFuture portal; and (ii) **Help training providers improve course offerings**, by accessing learners' feedback.
- Administered independently through an online survey administration platform for operational efficiency, TRAQOM comprises of two surveys:

| Quality Survey                                                                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Measures individuals' perception of the quality of learning, trainer and course content and customer service; Administered on course completion date |

| Outcomes Survey                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------|
| Measures individuals' perception of the courses' outcomes on the their work and career; Administered six months after course completion date |

- Both surveys adopt a modular approach i.e. a set of baseline questions is applied to all courses, with additional questions for modules / courses with unique attributes (e.g., SkillsFuture Career Transition Programmes)
- Beyond signposting, TRAQOM data are also used to inform MOE's/SSG's policies and initiatives.

# By building our skills anticipatory and digital capabilities, we will continue to tighten the nexus from skills identification to training activation to outcomes monitoring



# Thank You

For more information, please visit:

[www.skillsfuture.gov.sg](http://www.skillsfuture.gov.sg)