

ROS-Industrial turns four and expands worldwide



Why ROS-Industrial?

Today robots can do much more than preprogrammed motions!

It is mostly a software affair ...

- ... safety regulations are typically implemented in HW
- ... more complex setups require better "gluing" distributed/colaborative development is central
- ... let's bring ROS to industrial robots!

Quick history and some stats

(2011) 2012 2013 2014 2016

ROS-Industrial Consortium members

Activities

Technical

- driver development & maintenance
- capabilities dev
- training

Non technical

- guidance on how to properly use OSS in commercial products
- OSS and safety regulations
- ROS-Industries 2016, Stuttgart Germany, Nov 3-4
- lobby for public funding to be directed towards OSS

The ROS-Industrial expansion ...

... in Asia Pacific

ROS-Industrial Asia Pacific Consortium

ROS-Industrial Software Development Process

Recruiting

Do you have a job?

Yes No

Do you like it?

Yes No

Do you want one now?

Yes No

ROS-I: What we do!

ROSCon 2016



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ROS-Industrial Asia Pacific Consortium



ROS-Industrial Software Process




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ROS-I: What we do!



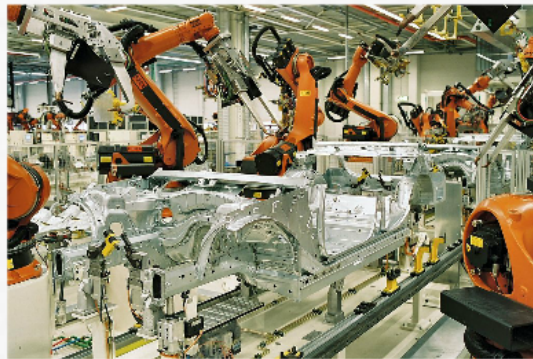
ROSCon 2016



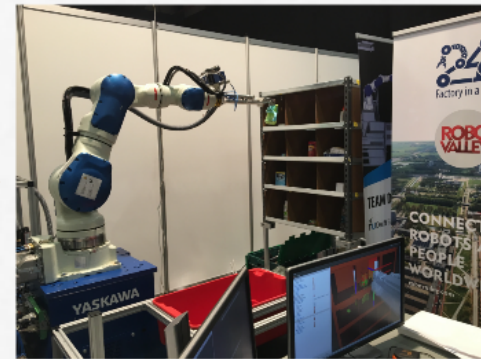
Why ROS-Industrial?



Today robots can do much more than preprogrammed motions!



By BMW Werk Leipzig
[CC BY-SA 2.0 de], via Wikimedia Commons



By Team Delft, Amazon Picking Challenge 2016

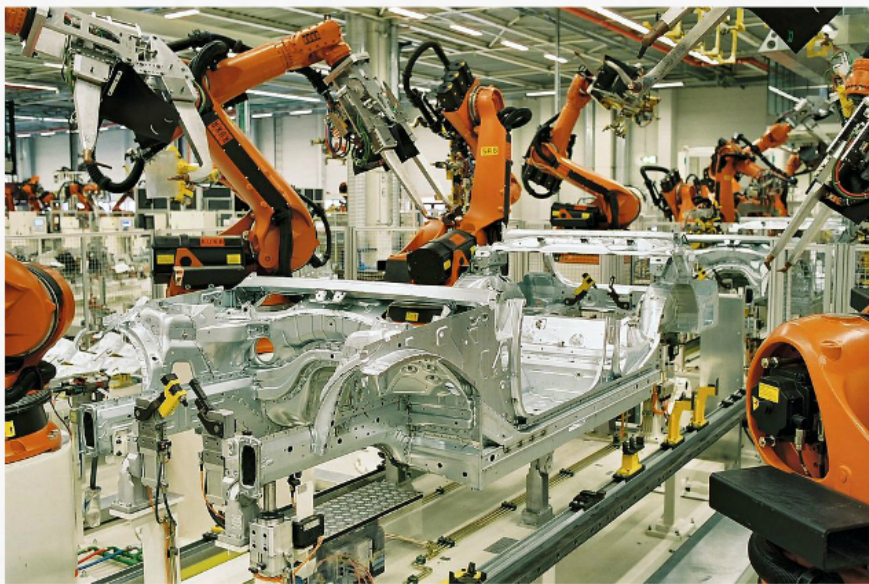
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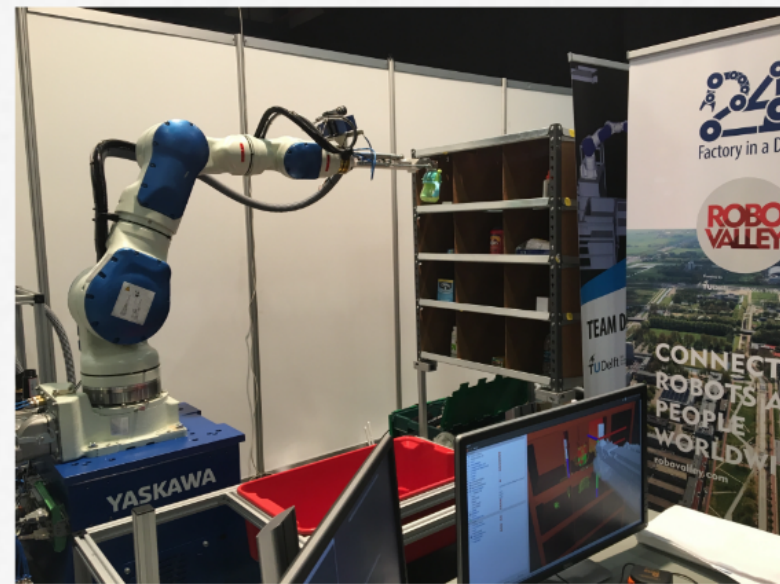
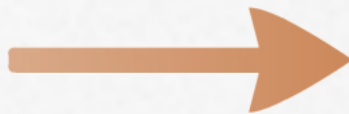
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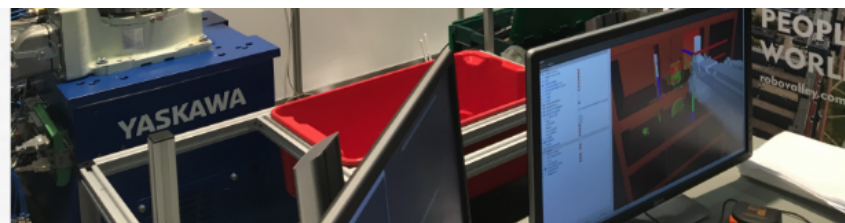
By BMW Werk Leipzig
[CC BY-SA 2.0 de], via Wikimedia Commons



By Team Delft, Amazon Picking Challenge 2016



W Werk Leipzig
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By Team Delft, Amazon Picking Challenge 2

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SwRI and Yaskawa team up to use ROS with Motoman
by kowen September 1, 2011 12:45 PM / No Comments / No trackbacks

first pilot project

public debut at
an industrial forum



RIC-North America
launches



RIC-Europe
launches



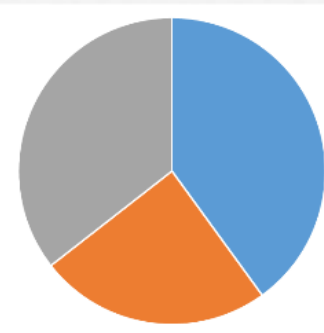
ROS-I expands
into Asia Pacific

ROS-I Consortia members



System integrators &
"power users" (35%)

close to "app dev pain",
need better SW tools and
freedom from vendor lock-in



OEMs (25%)

acknowledge the significance of
a SW "tech enabler", want to focus
on core competence (HW)

Research / gov't (40%)

benefit from a vehicle to market their research,
promote open standards &
provide vendor-agnostic education

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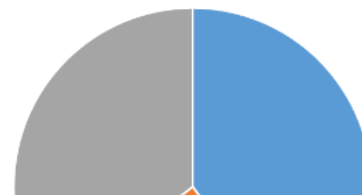
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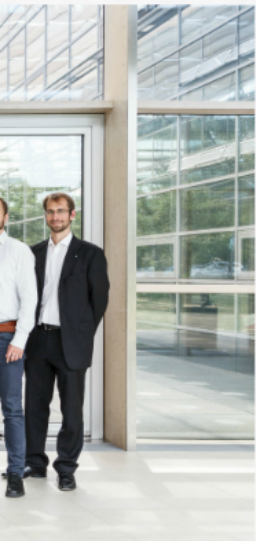
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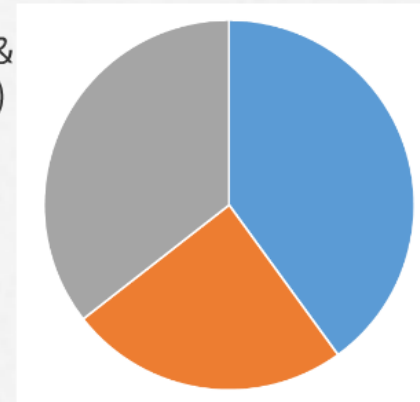


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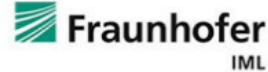
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BOSCH



JOHN DEERE



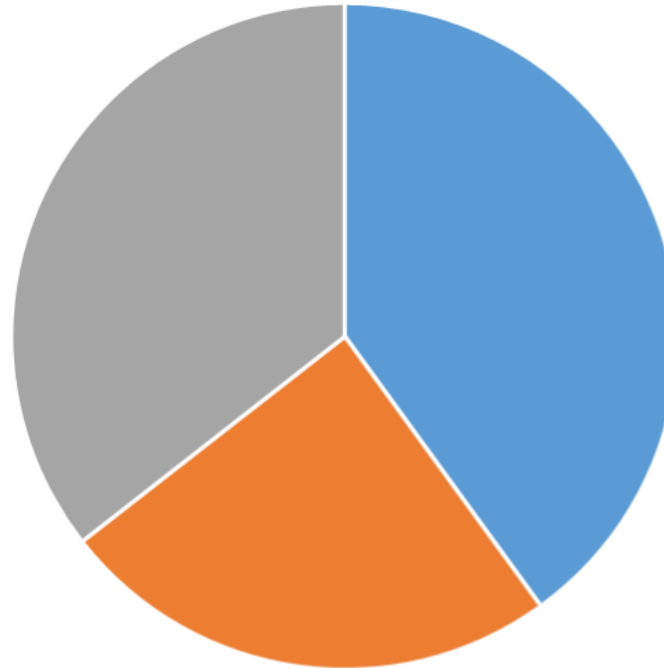
SIEMENS



ROS-I Consortia members

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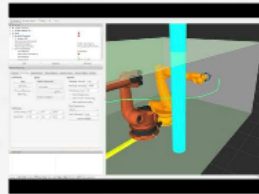
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ROS-I conference 2016
Stuttgart (Germany), Nov 3-4

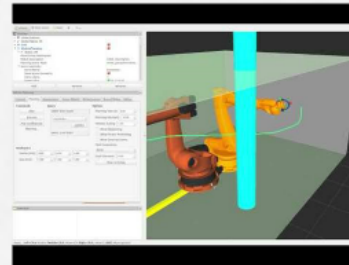
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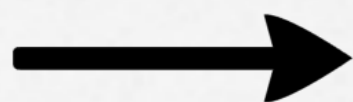
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The ROS-Industrial expansion ...

... in Asia Pacific

Introduction



ROS-Industrial Asia Pacific Consortium



ROS-Industrial Asia Pacific Workshop - July 2016



Introduction



School of Mechanical and Aerospace Engineering

About the ARTC

- An initiative by A*STAR in partnership with NTU
- Model – 1st Centre in Asia adopting the AuRC model of Industry-Led Public-Private Partnership across Supply Chains
- Mission – To Bridge the Gap from Research to Industry Applications for Remanufacturing & Manufacturing for Cross-Sectoral Industries
- Vision – World Renowned Industry-Led Centre of Excellence for Remanufacturing & Manufacturing Technologies, Processes and Systems
- Currently 42 Industry Members



Core Technology Themes

- Repair & Restoration**
 - Integrated adaptive repair processes
 - In situ repair
 - Rejuvenation of end-of-life components
 - Adaptive manufacturing of components
- Surface Enhancement**
 - Adaptive surface grinding and controlled material removal for complex and inaccessible features
 - Environmentally friendly in situ surface modification
 - Residual stress profile control and characterization
- Robotics**
 - Adaptive robot tool handling
 - Intelligent inspection system
 - Autom and sharing system
 - Collaborative robot
- Product Verification**
 - Non-destructive evaluation technology for inspection and monitoring
 - In situ measurement and inspection for process control
 - Contact and non-contact scanning and measurement
 - Condition Monitoring and Lifetime prediction
- Additive Manufacturing**
 - Product design optimisation for additive manufacturing
 - Quality and lifecycle management of finished material
 - Process optimisation for material performance and part validation
 - Post process machining and surface finishing techniques

Currently 42 Industry Members



Our Track Record



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ARTC Grand Opening by S. Iswaran, Minister for Trade and Industry (Industry) on the 28th Jan 2015



AEROSPACE



MACHINERIES



MARINE



LAND TRANSPORT



OIL & GAS



CLEANTECH



Core Technology Themes

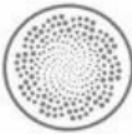
Repair & Restoration

Core Technology Themes



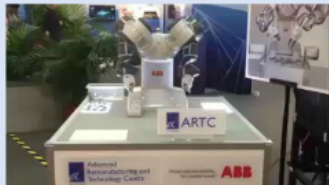
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Surface Enhancement

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Robotics

- Adaptive robotized finishing
- Intelligent inspection system
- Automated cleaning system
- Collaborative robot



Product Verification

- Non-destructive evaluation technology for inspection and sentencing
- In-situ measurement and inspection for process control
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Additive Manufacturing

- Product design optimisation for additive manufacturing
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Currently 42 Industry Members

Focus sectors



Anchor / Tier 1



Tier 2

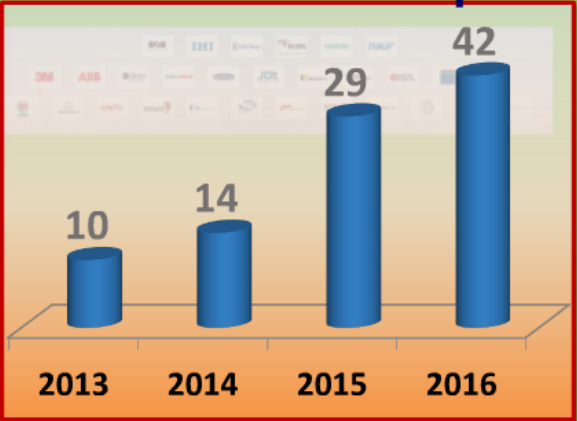


Tier 3

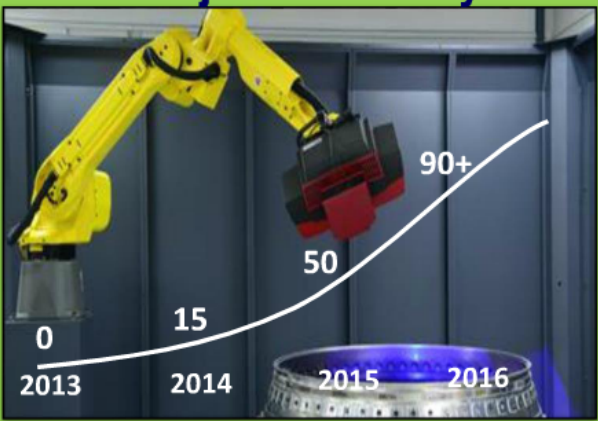


Our Track Record

Our Membership



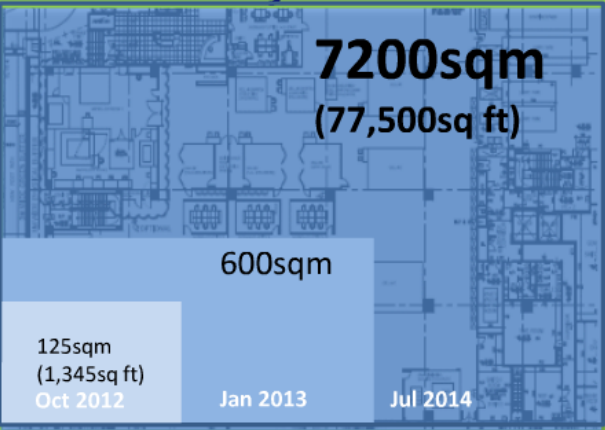
Project Delivery



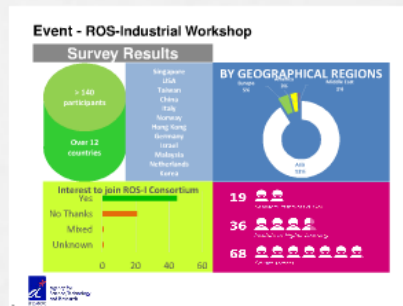
Our Manpower



Facility Growth



ROS-Industrial Asia Pacific Workshop - July 2016



Event - ROS-Industrial Workshop

Held on 14 to 15 Jul 2016

A 2 days workshop to bring together representatives from academia and industry to exchange experiences and knowledge on application development with ROS, and clarify the current and future needs of industry with respect to Robotic Operating System (ROS)

Program includes

- Guest Speakers from Open Source Robotic Foundation
- Expert users and speakers globally
- Lab Demonstration of ROS applications
- Networking dinner

Event - ROS-Industrial Workshop



Event - ROS-Industrial Workshop

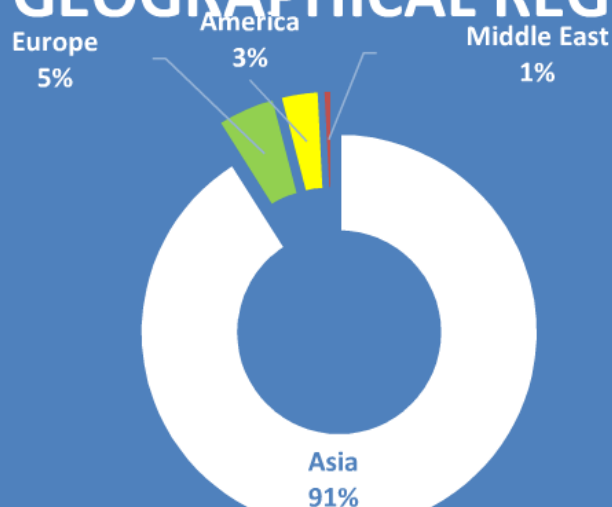
Survey Results

> 140
participants

Over 12
countries

Singapore
USA
Taiwan
China
Italy
Norway
Hong Kong
Germany
Israel
Malaysia
Netherlands
Korea

BY GEOGRAPHICAL REGIONS



Interest to join ROS-I Consortium



19



Research Institutes & Gov

36



Institute of Higher Learning

68

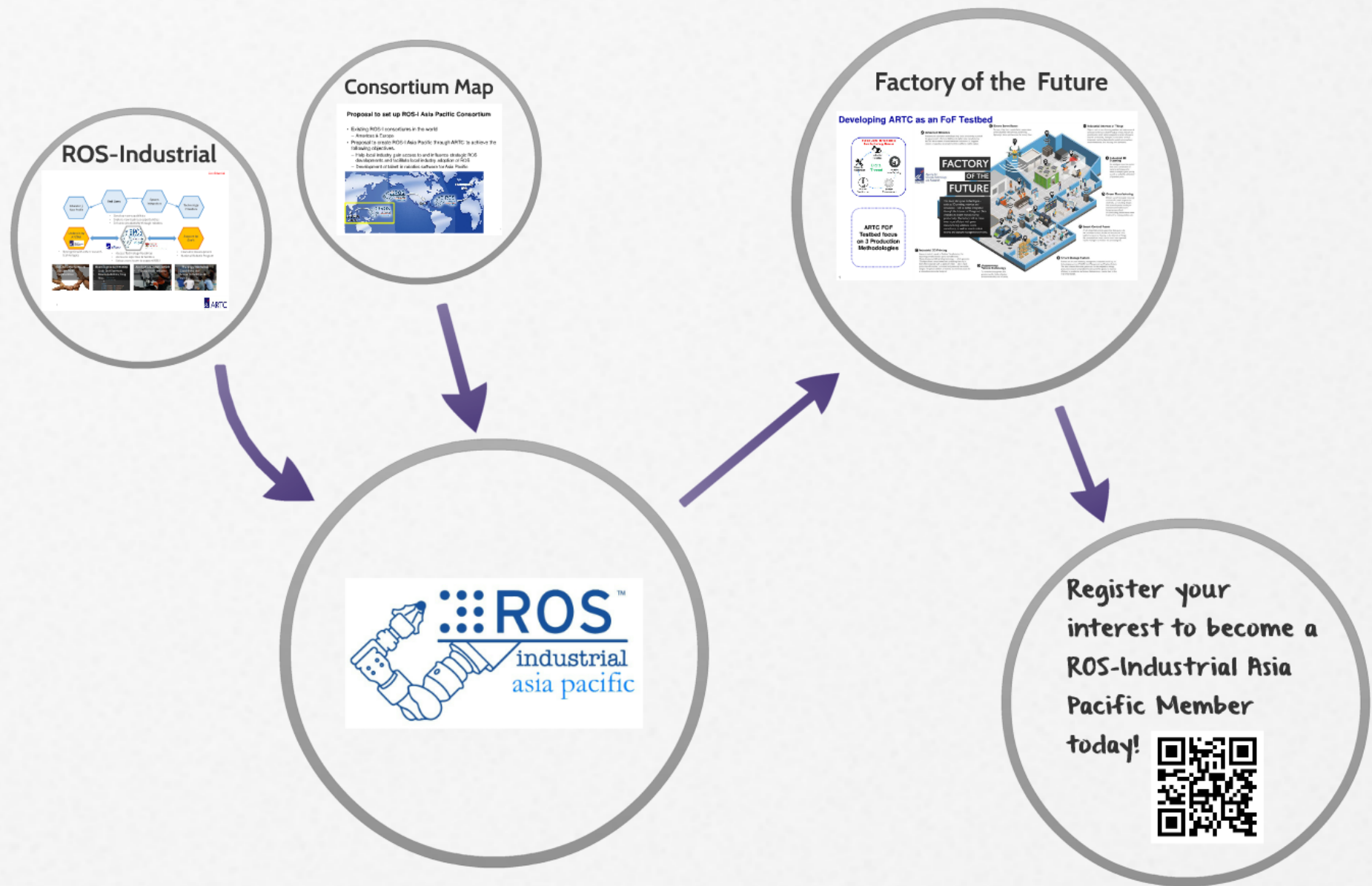


Private sectors

ROS-Industrial Asia Pacific Consortium



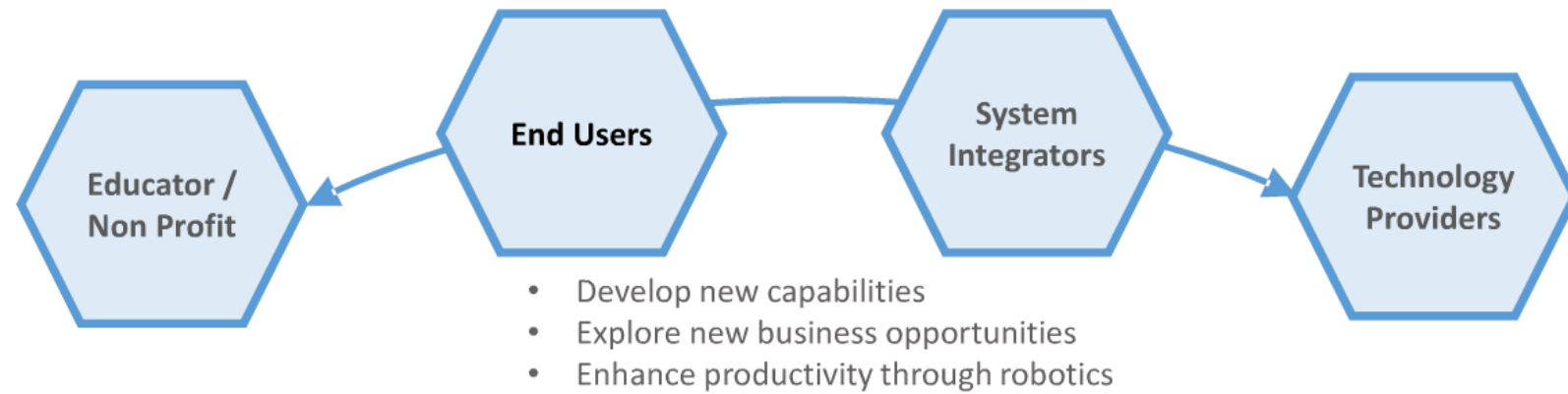
ROS-Industrial Asia Pacific Consortium



ROS-Industrial

Confidential





- Synergetic with other research technologies

- Access Technology Roadmap
- Access to expertise & facilities
- Setup a core team to support ROS-I

- Economic Development
- National Robotic Program



Consortium Map

Proposal to set up ROS-I Asia Pacific Consortium

- Existing ROS-I consortiums in the world
 - Americas & Europe
- Proposal to create ROS-I Asia Pacific through ARTC to achieve the following objectives.
 - Help local industry gain access to and influence strategic ROS developments and facilitate local industry adoption of ROS
 - Development of talent in robotics software for Asia Pacific



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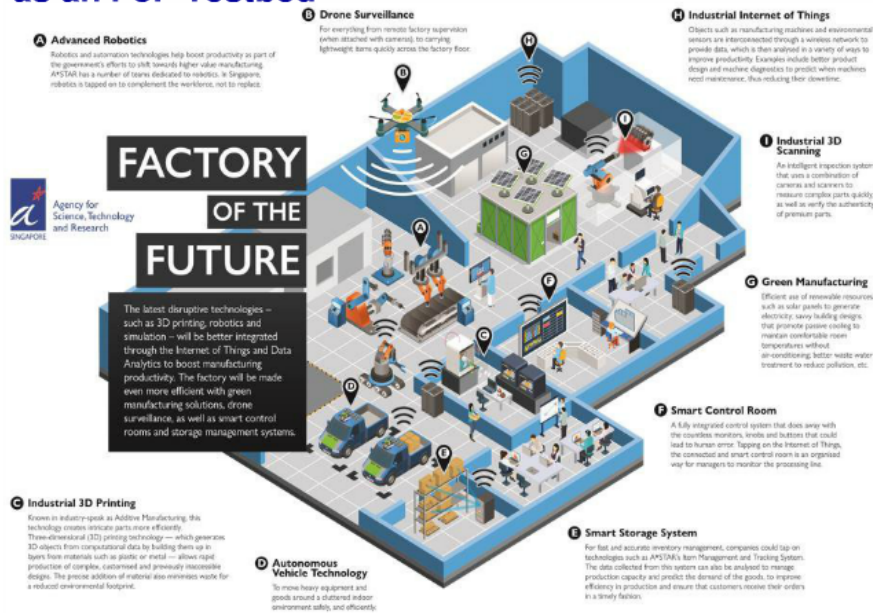


Factory of the Future

Developing ARTC as an FoF Testbed

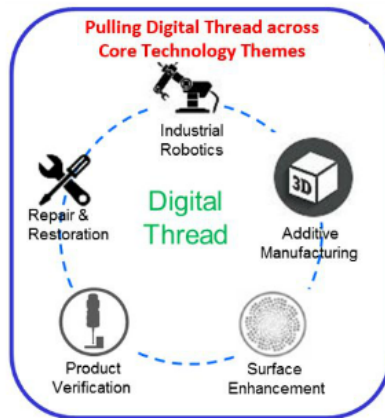


ARTC FOF Testbed focus on 3 Production Methodologies

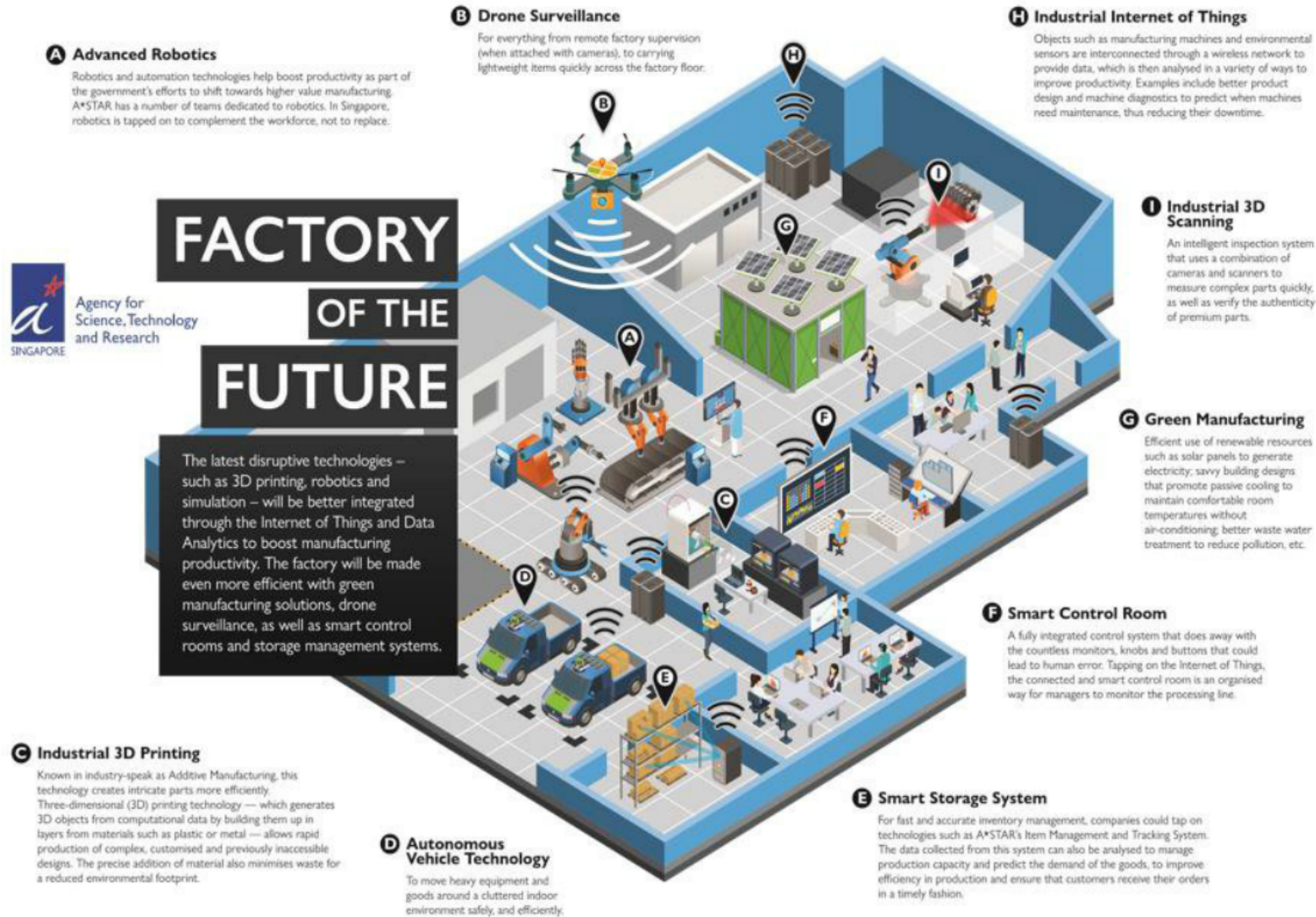


Factory of the Future

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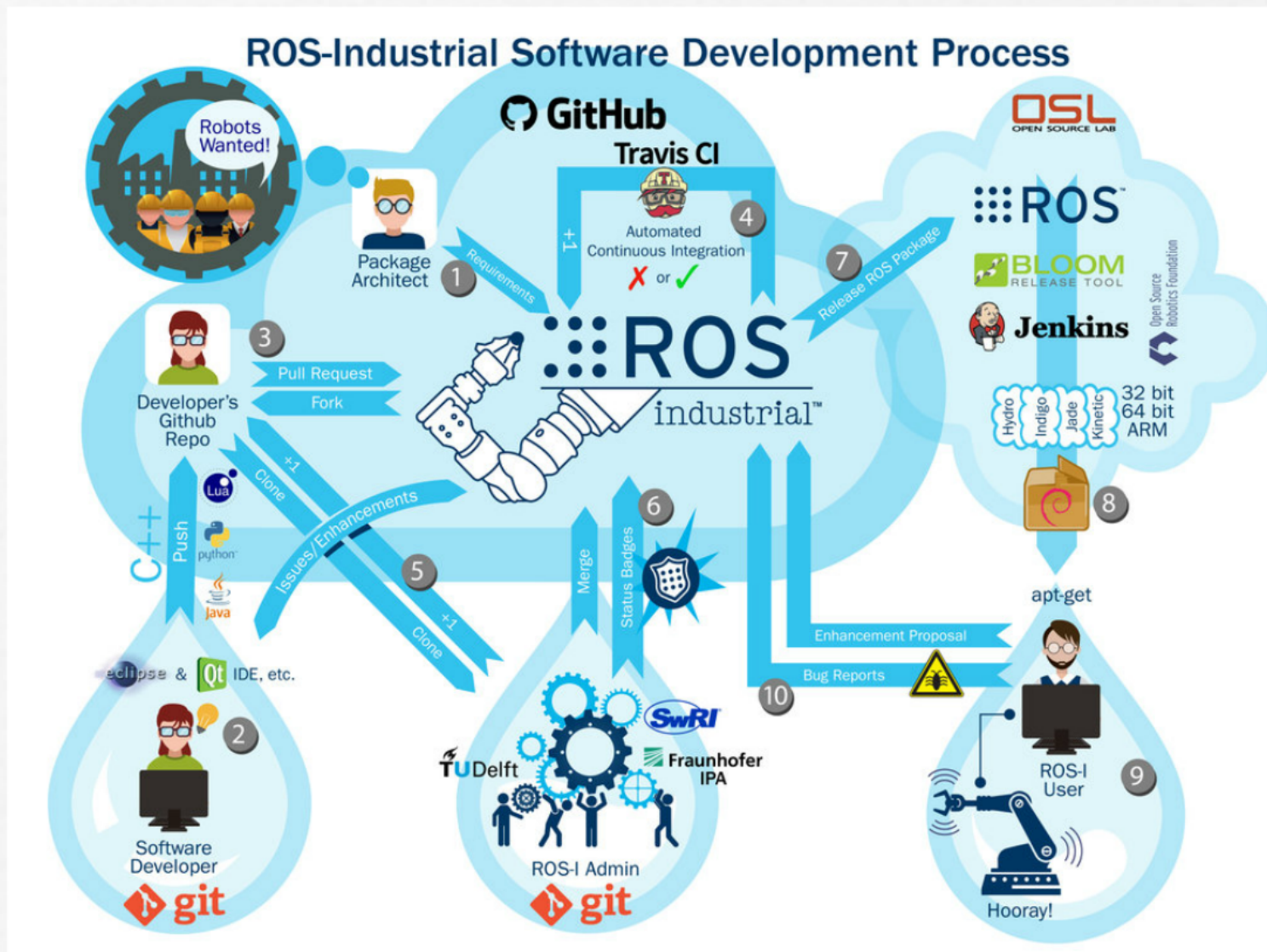
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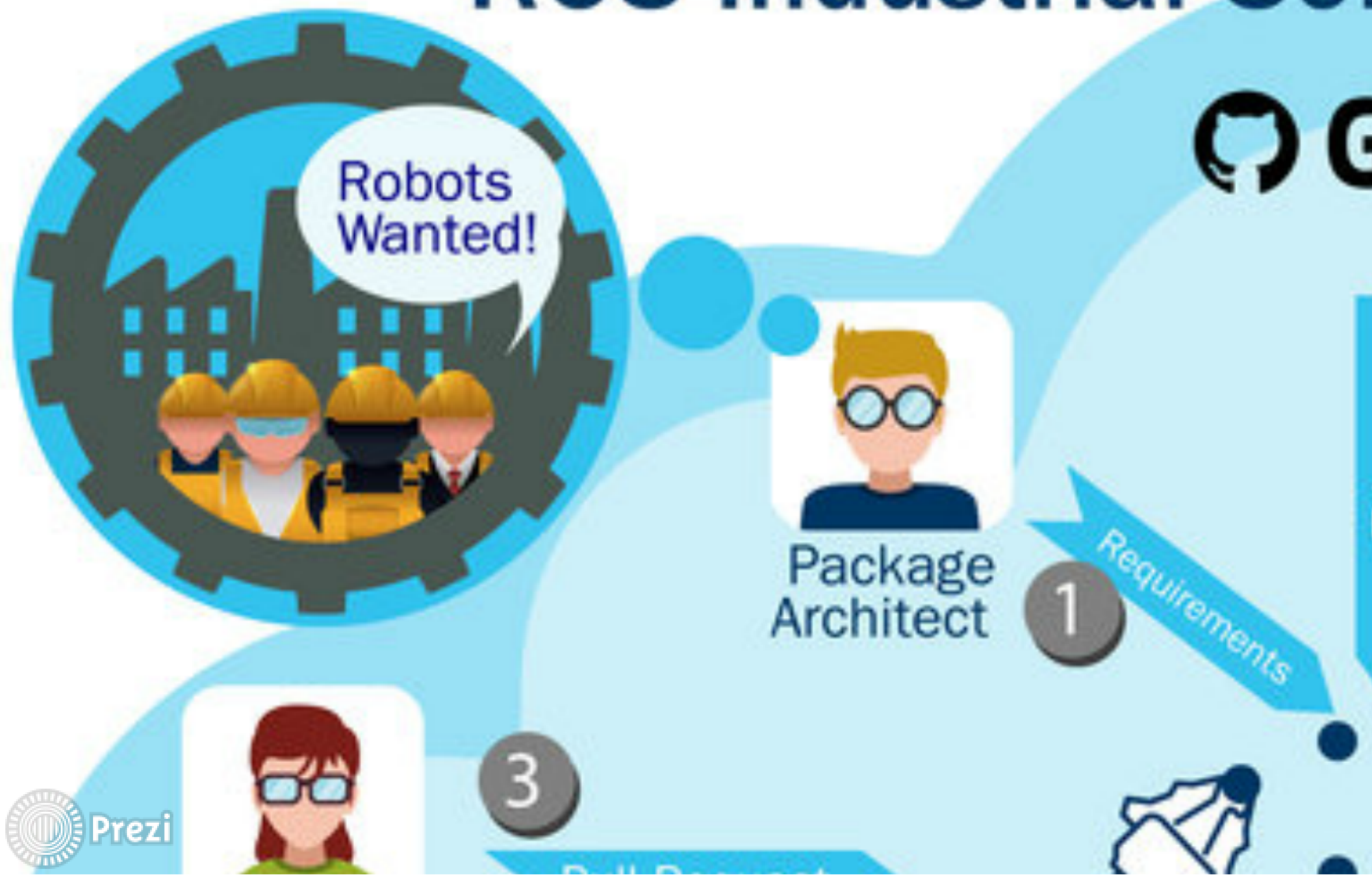
**Register your
interest to become a
ROS-Industrial Asia
Pacific Member
today!**



ROS-Industrial Software Process



ROS-Industrial Soft



ROS

industrial™



Developer's
Github
Repo

3

Pull Request

Fork

+1
Clone



C++
Push

Issues/Enhancements

5

+1
Clone

Eclipse & Qt IDE, etc.



2

Software
Developer



Merge

6

Status Badges



10

Enh

Bug R

TU Delft

SwRI

Fraunhofer
IPA



ROS-I Admin



GitHub

Travis CI



4

Automated
Continuous Integration

X or **✓**

7
Release ROS Package

ROS

industrial™

6

Merge

Status Badges



Prezi

Enhancement Proposal

OSL
OPEN SOURCE LAB

ROS™

BLOOM
RELEASE TOOL



Jenkins

Open Source
Robotics Foundation



Hydro

Indigo

Jade

Kinetic

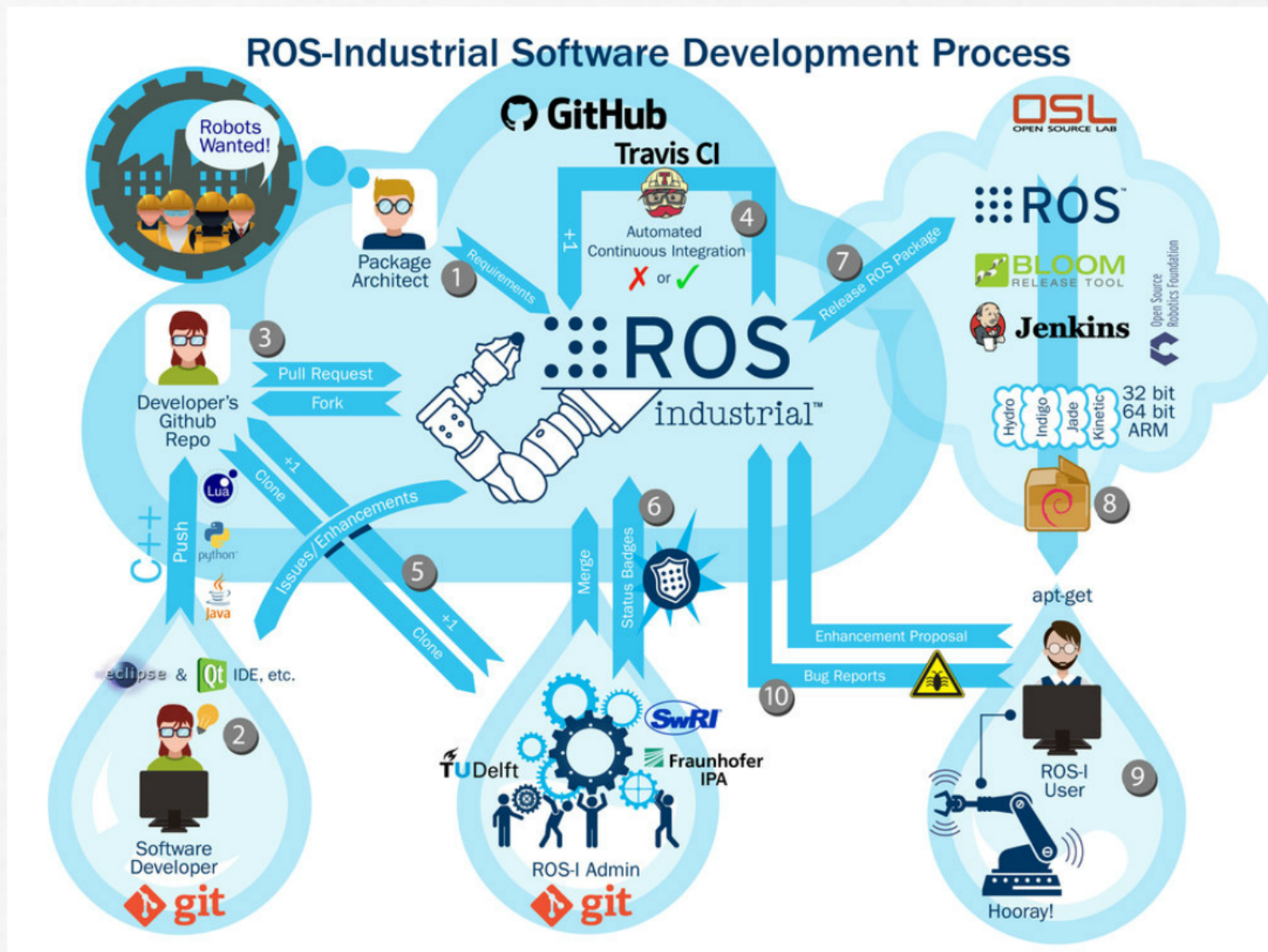
32 bit
64 bit
ARM



8

apt-get

ROS-Industrial Software Process



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Do you want one now?

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ROS-I: What we do!

