

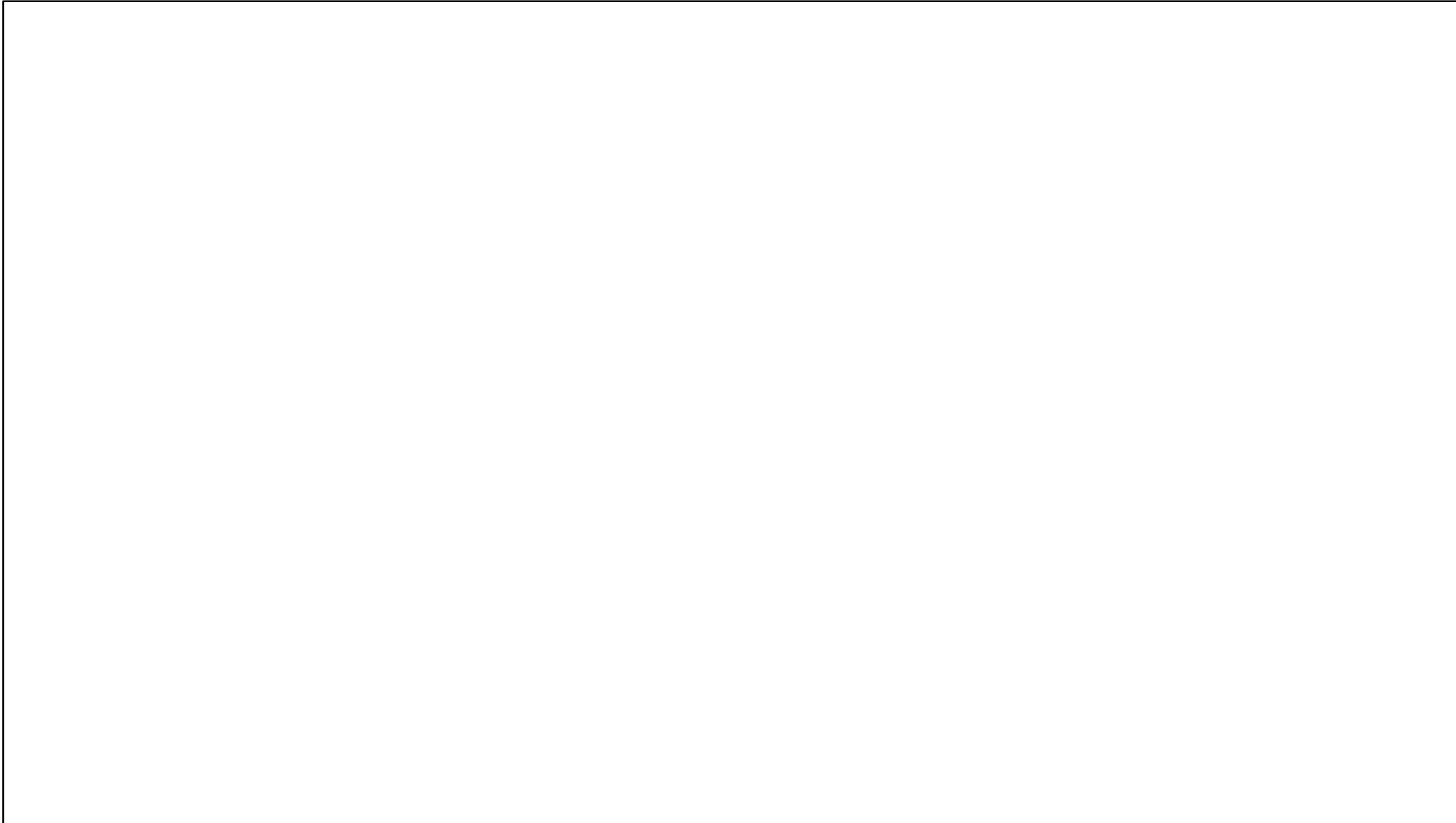
Analysis of ROS for 10 years

ROBOTIS

KAIST

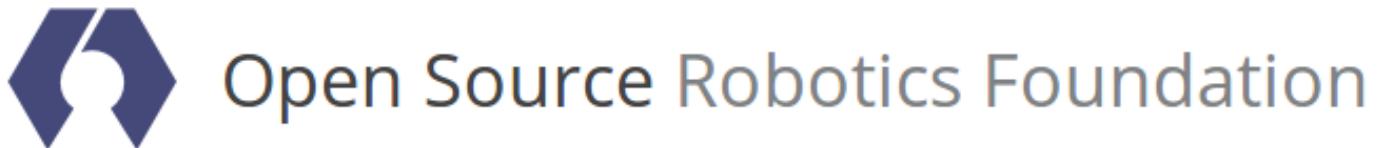
2017 is the 10th anniversary of ROS!

- ROS 10 Year Montage



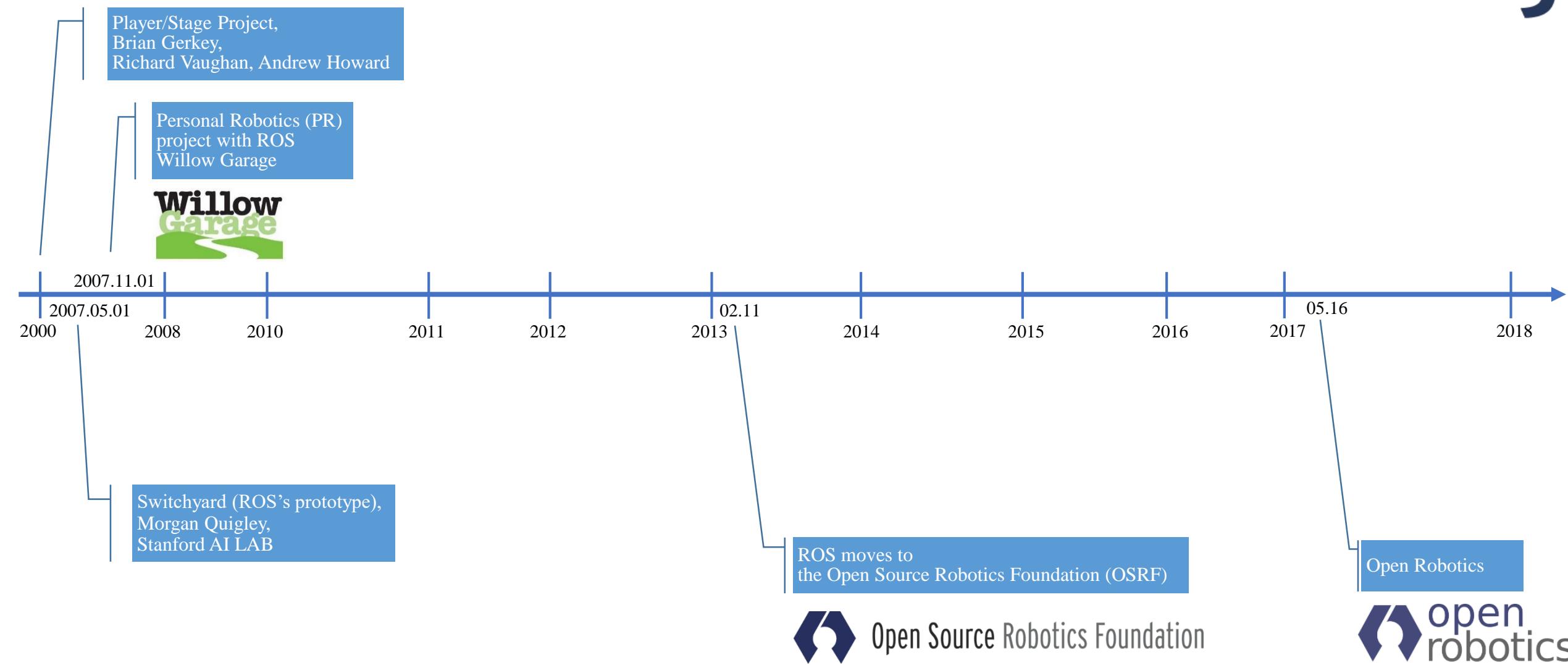
ROS History

- 2017.12.08 - Scheduled release of ROS 2.0
- 2017.09.21 - ROSCon2017 Conference held in Canada
- 2017.05.23 - Lunar Loggerhead release
- 2017.05.16 - Renamed to **Open Robotics** (Old name: OSRF)
- 2016.10.08 - ROSCon2016 Conference held in Korea
- 2016.05.23 - Kinetic Kame release
- 2015.10.03 - ROSCon2015 Conference held in Germany
- 2015.05.23 - Jade Turtle release
- 2014.09.12 - ROSCon2014 Conference held in USA
- 2014.07.22 - Indigo Igloo release
- 2014.06.06 - ROS Kong 2014 Conference held in Hong Kong
- 2013.09.04 - Hydro Medusa release
- 2013.05.11 - ROSCon2013 Conference held in Germany
- 2013.02.11 - **Open Source Robotics Foundation:** development and management
- 2012.12.31 - Groovy Galapagos release
- 2012.05.19 - ROSCon2012 Conference held in USA
- 2012.04.23 - Fuerte release
- 2011.08.30 - Electric Emys release
- 2011.03.02 - Diamondback release
- 2010.08.02 - C Turtle release
- 2010.03.02 - Box Turtle release
- 2010.01.22 - **ROS 1.0 developed**
- 2007.11.01 - **Willow Garage** begins development under the name "ROS"
- 2007.05.01 - Switchyard, Morgan Quigley, Stanford AI LAB, Stanford University
- 2000 - Player/Stage Project, Brian Gerkey, Richard Vaughan, Andrew Howard, University of Southern California



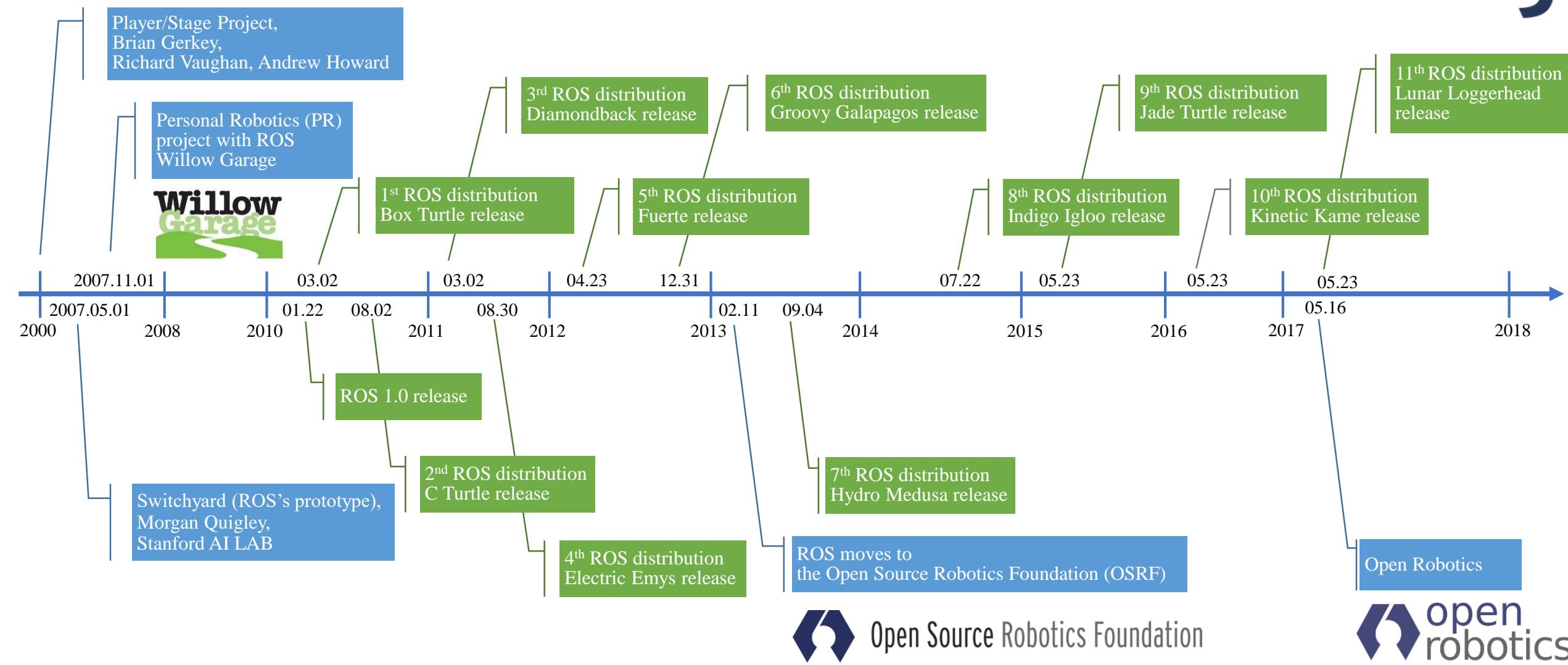
ROS History

ROS.org

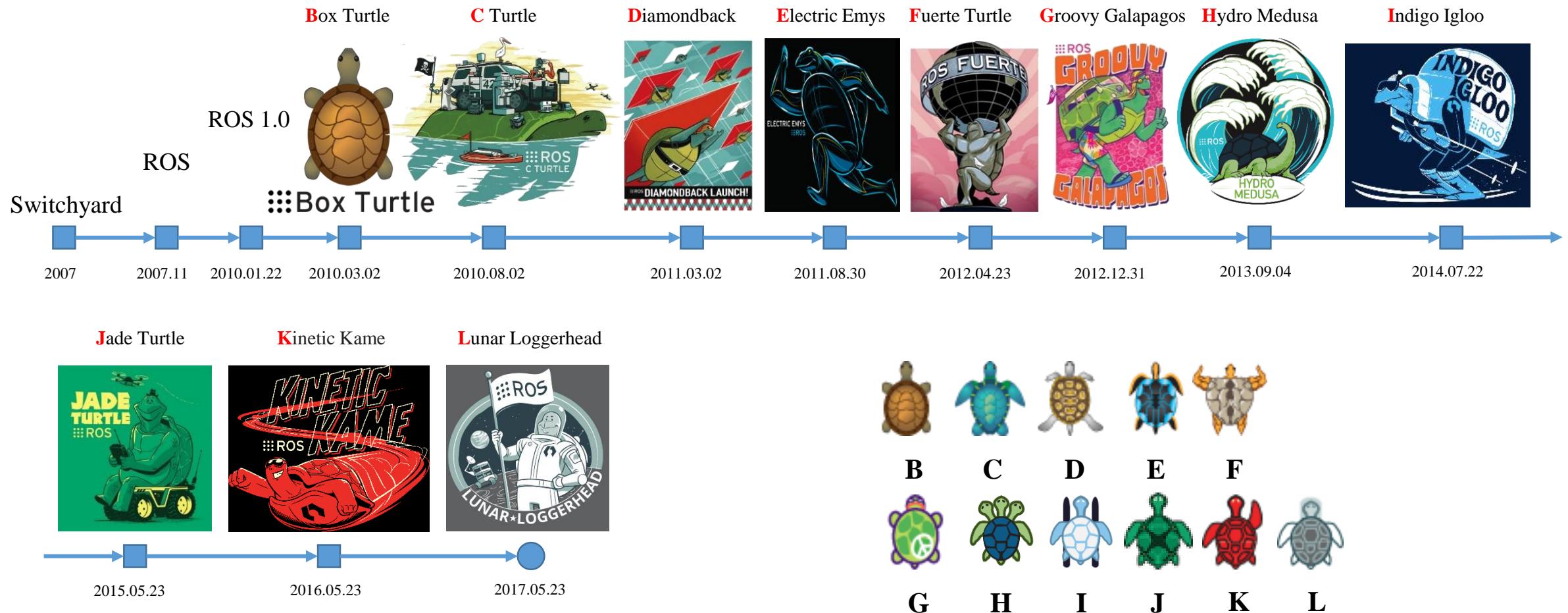


ROS History

ROS.org

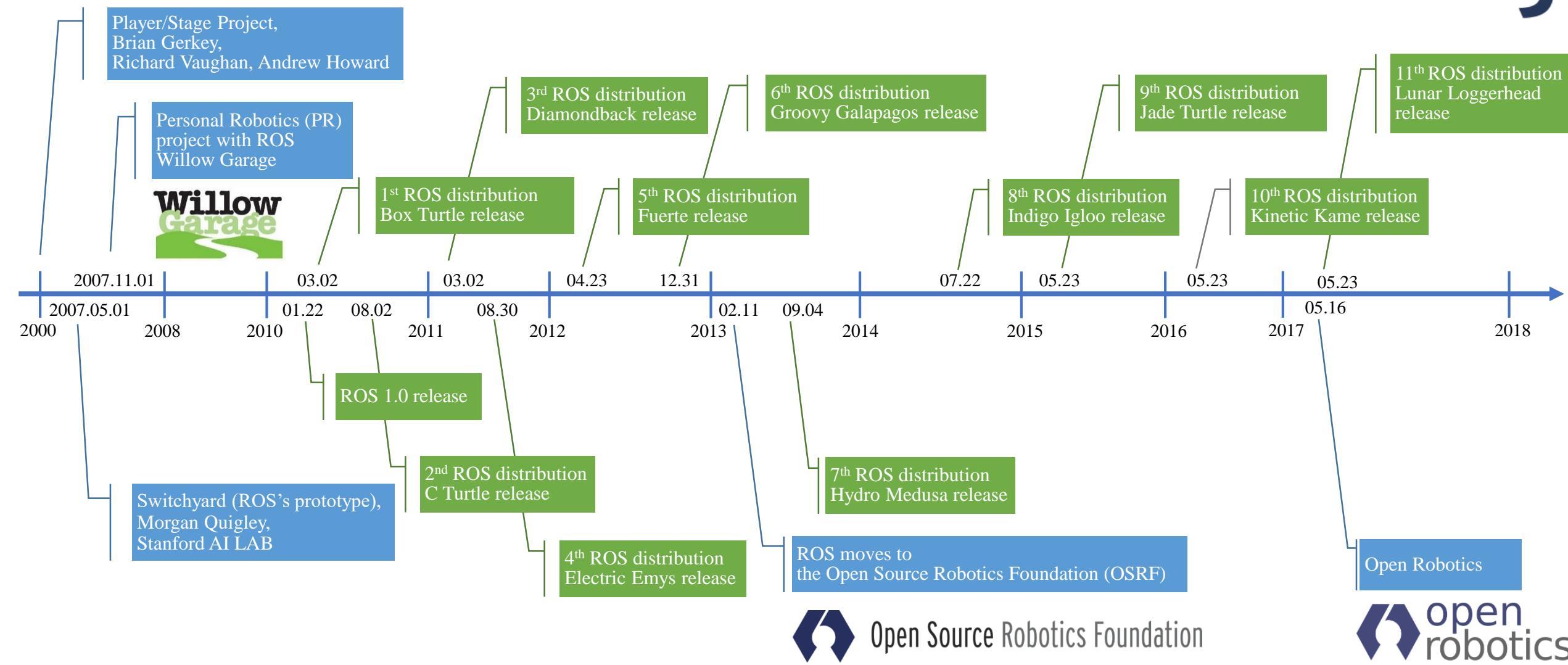


Various Distributions



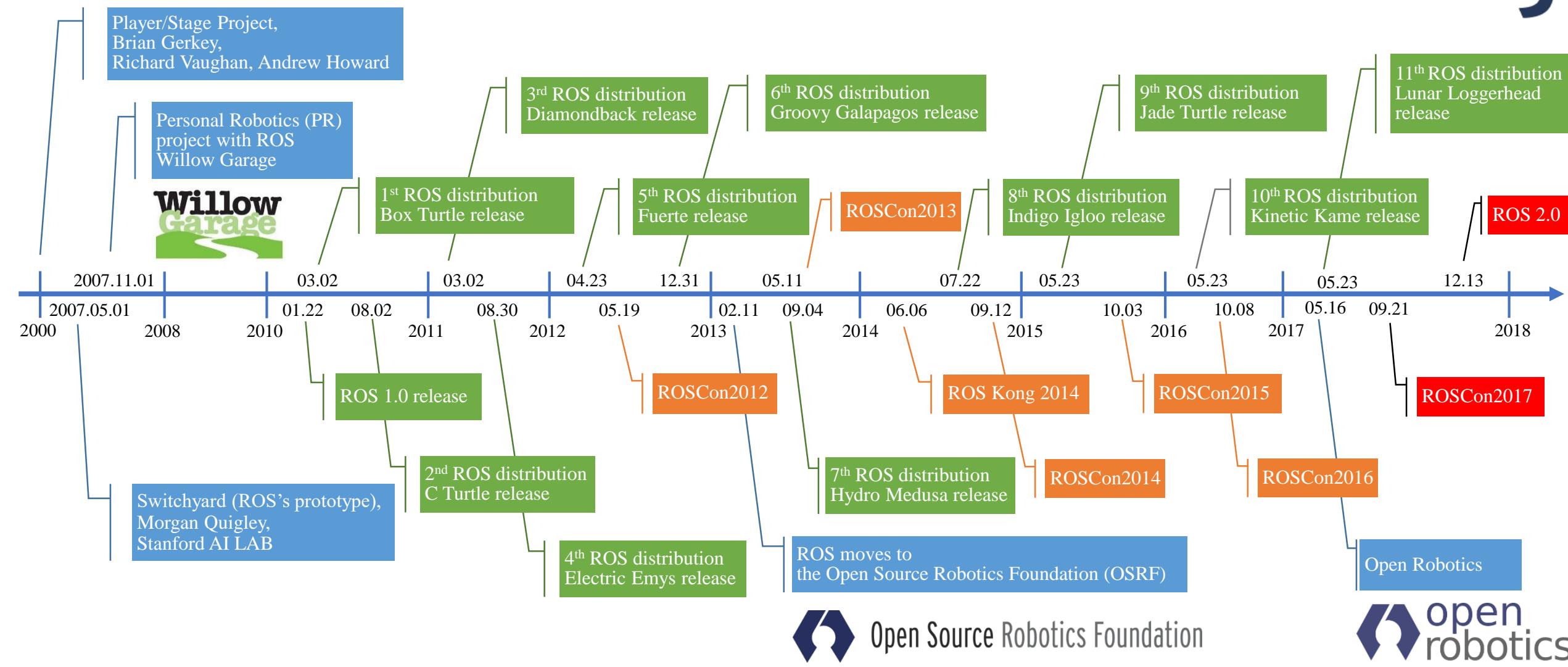
ROS History

ROS.org



ROS History

ROS.org



ROS Conferences



ROSCon 2012

St. Paul, Minnesota, USA
19-20 May 2012



Stuttgart, Germany
11-12 May 2013



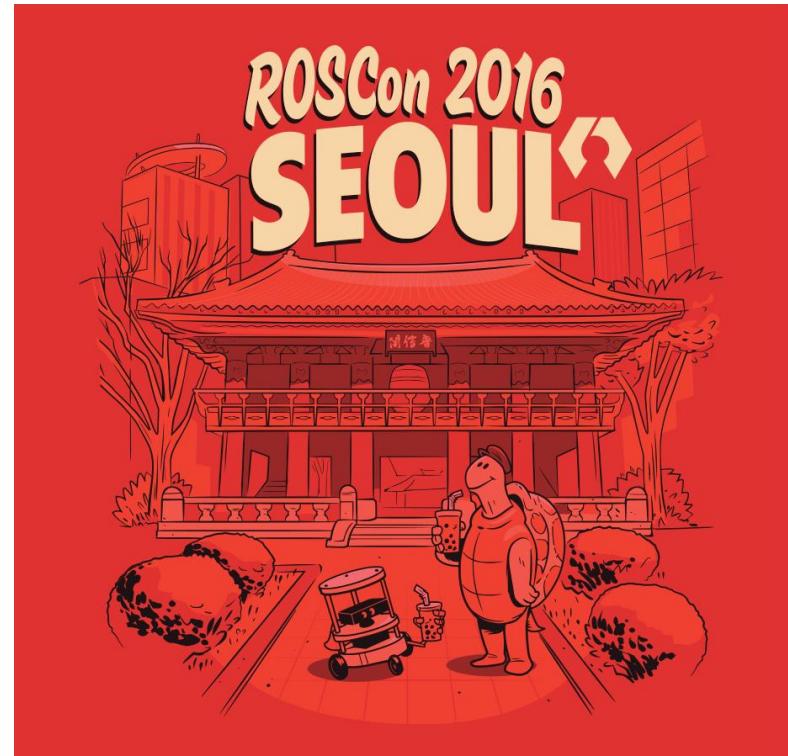
Hong Kong University
June 6, 2014



Chicago, Illinois, USA
September 12-13, 2014



Hamburg, Germany
May 3-4, 2015



Seoul, Korea
October 8th-9th, 2016

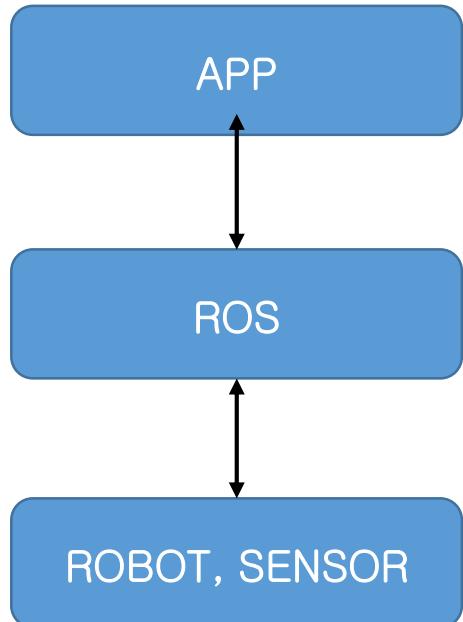


Vancouver, Canada
September 21-22, 2017

<http://roscon.ros.org/>

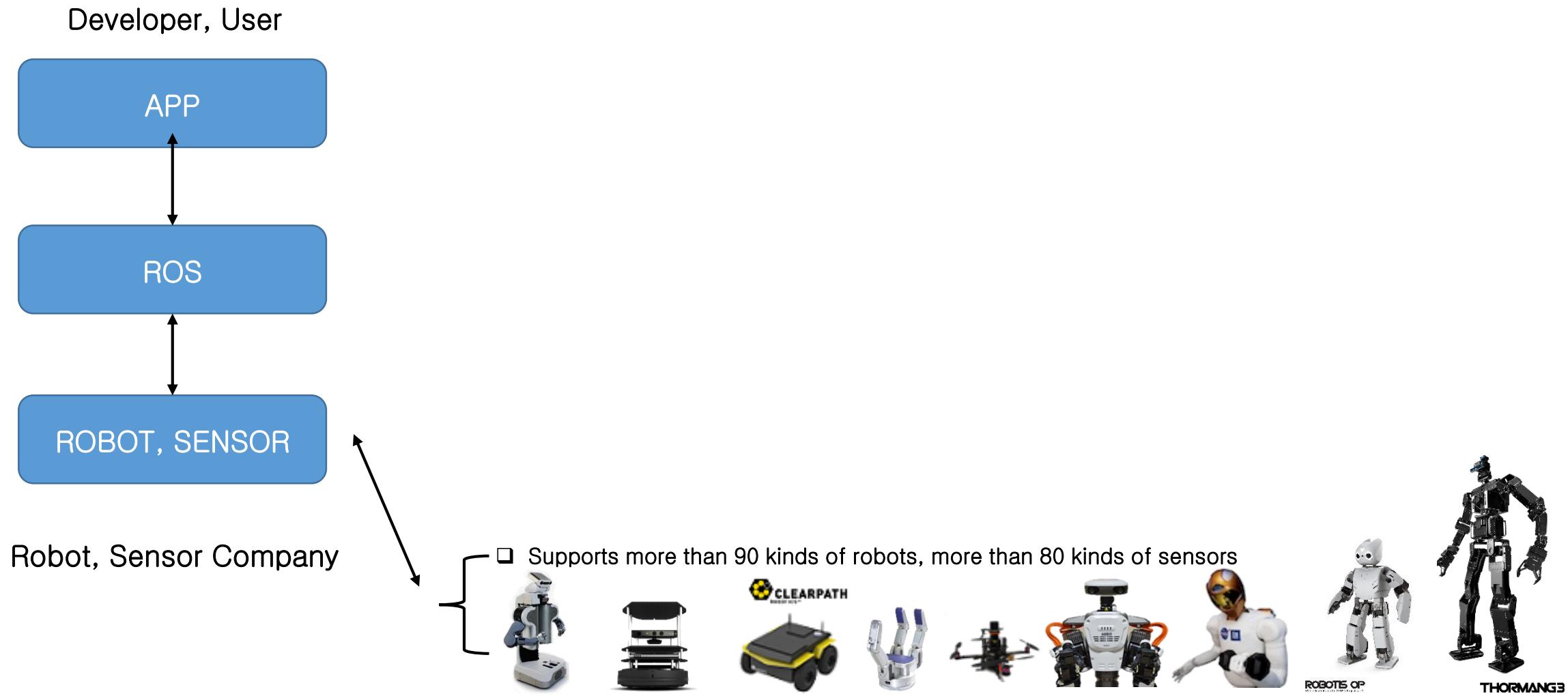
Current ROS ecosystem

Developer, User

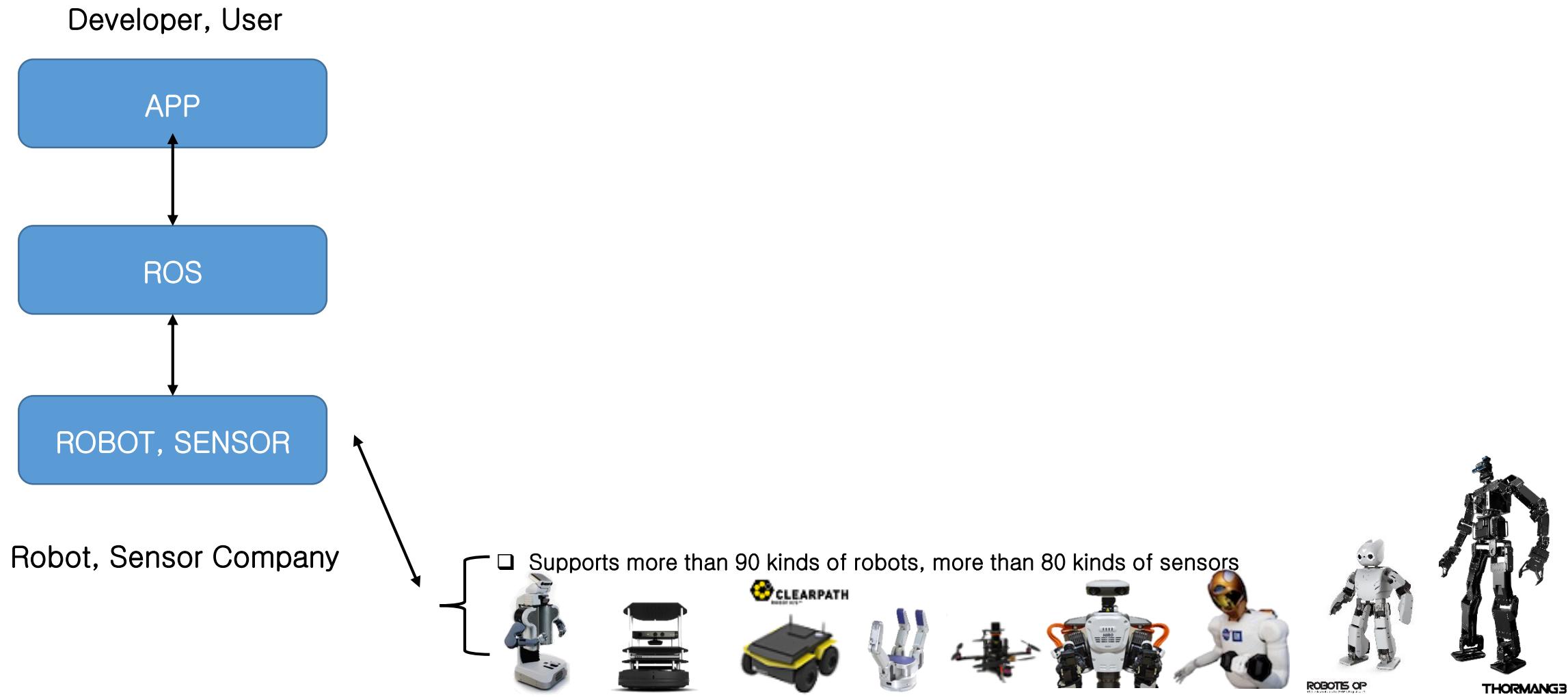


Robot, Sensor Company

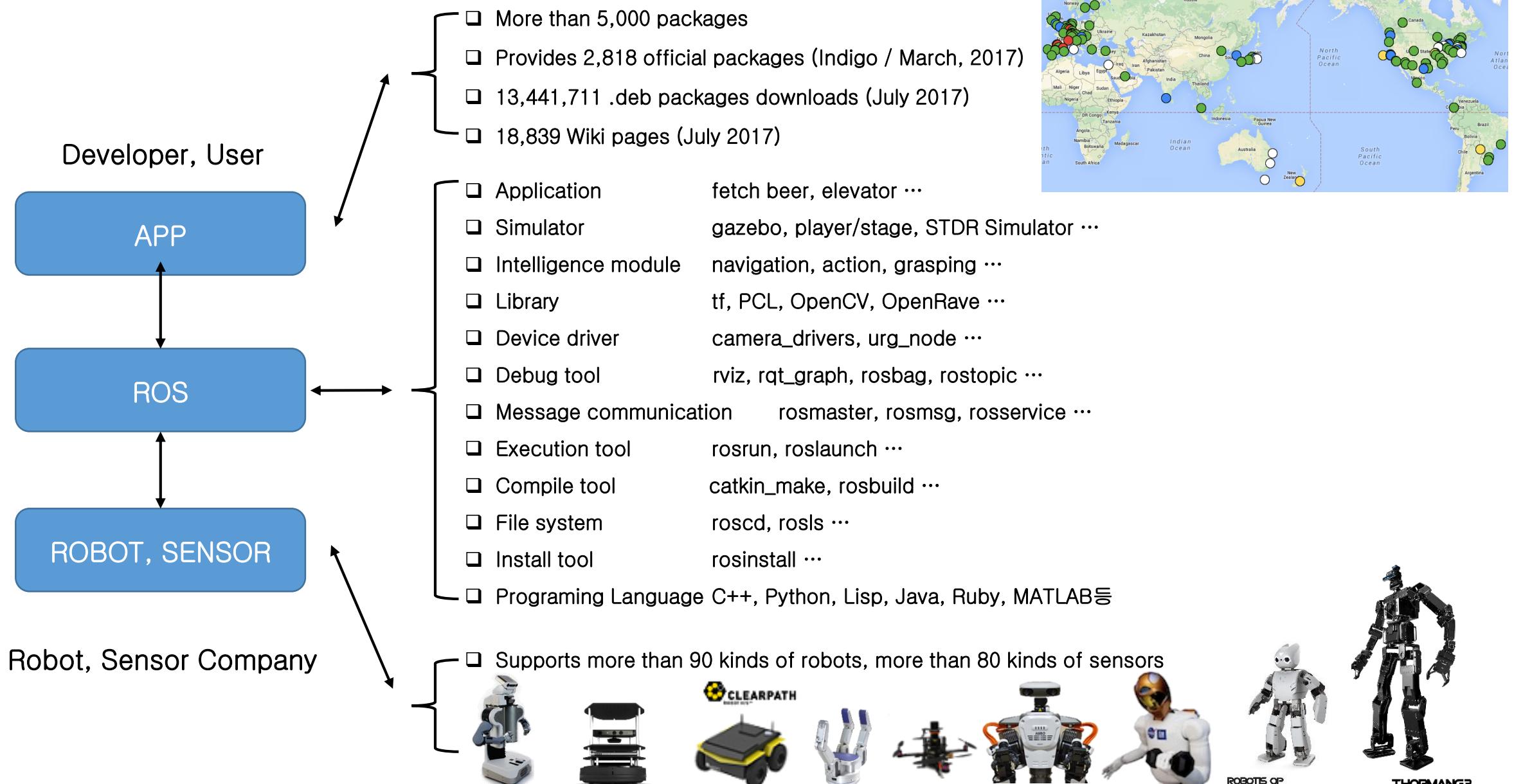
Current ROS ecosystem



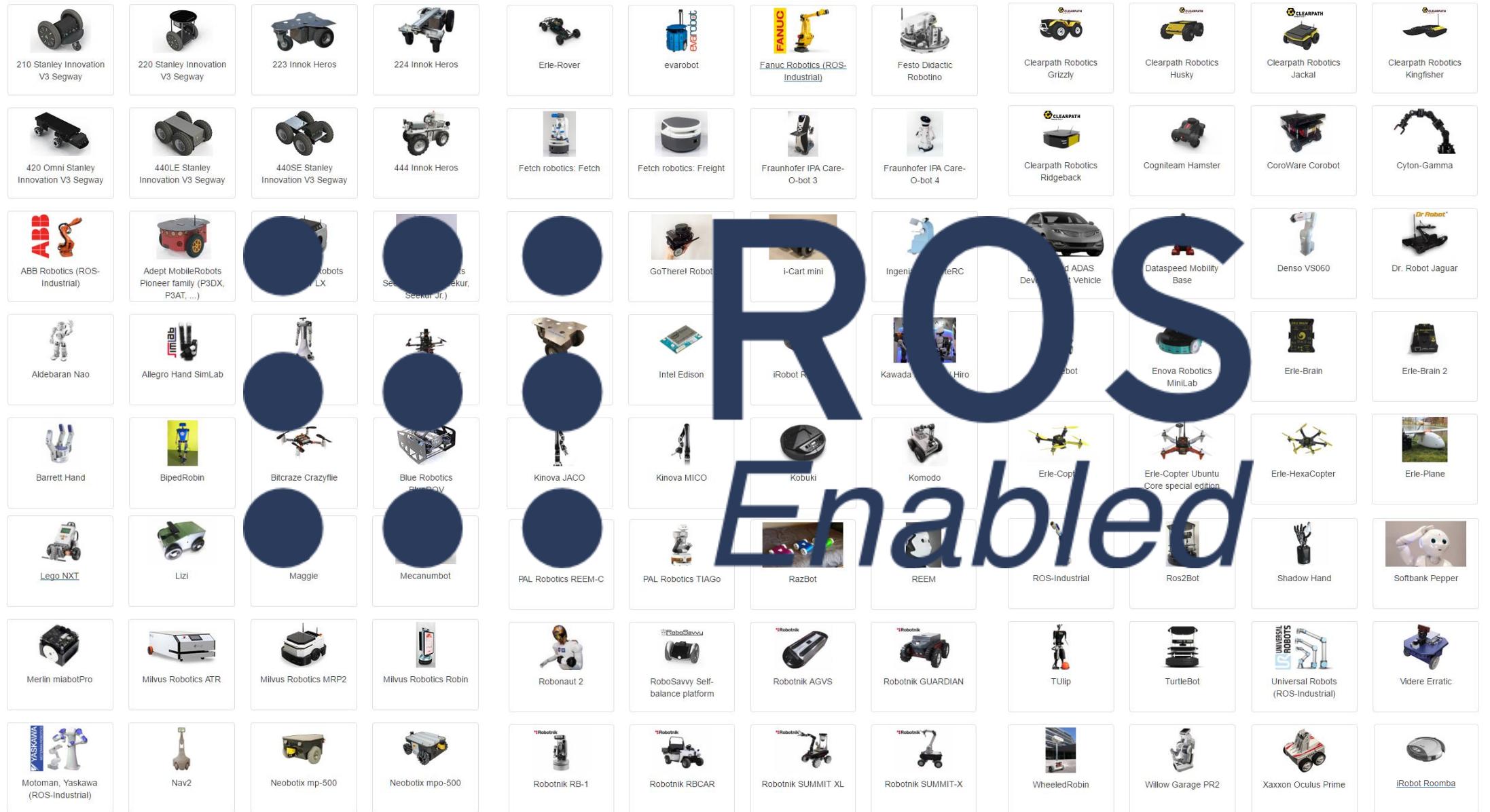
Current ROS ecosystem



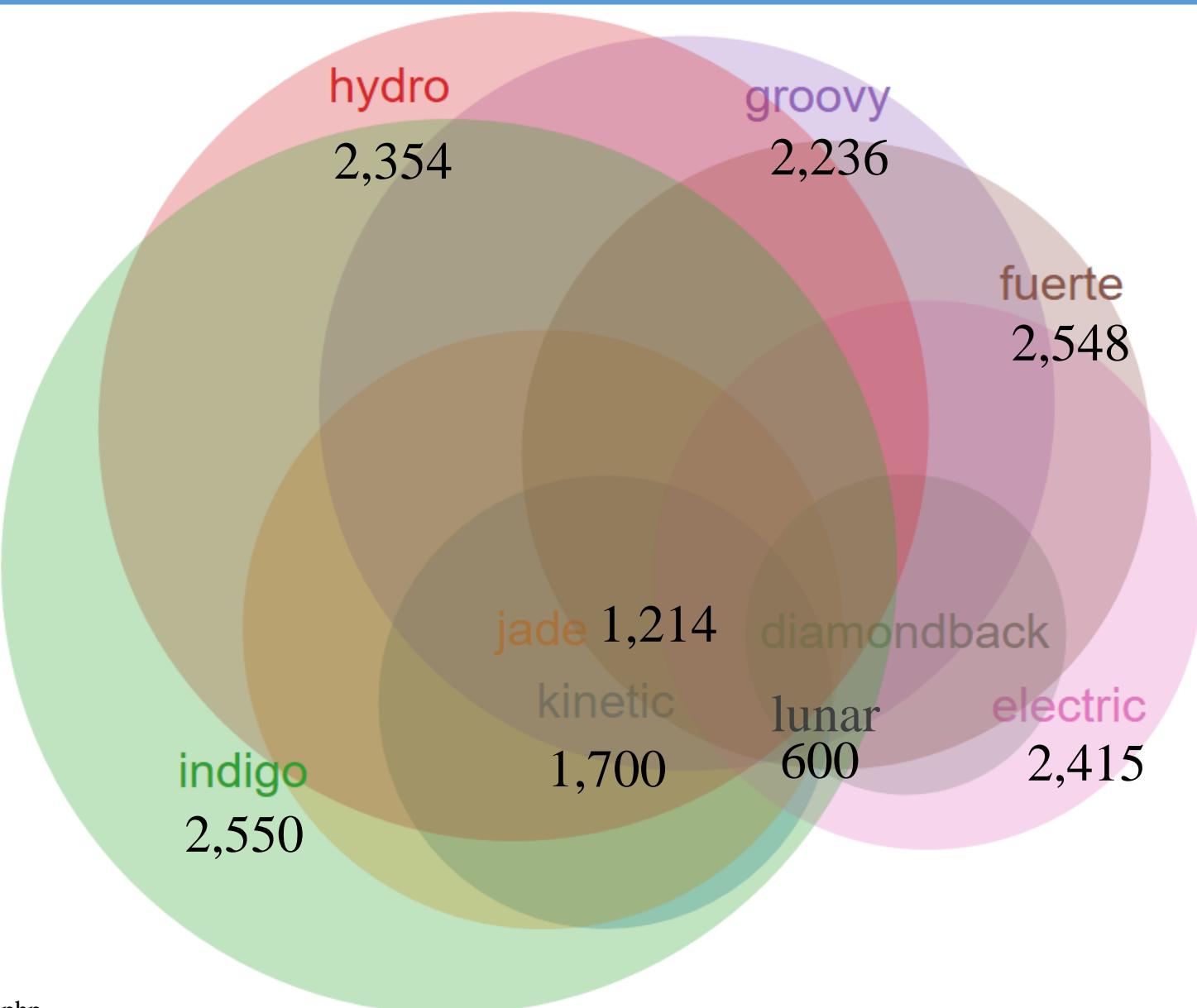
Current ROS ecosystem



ROS enabled robots



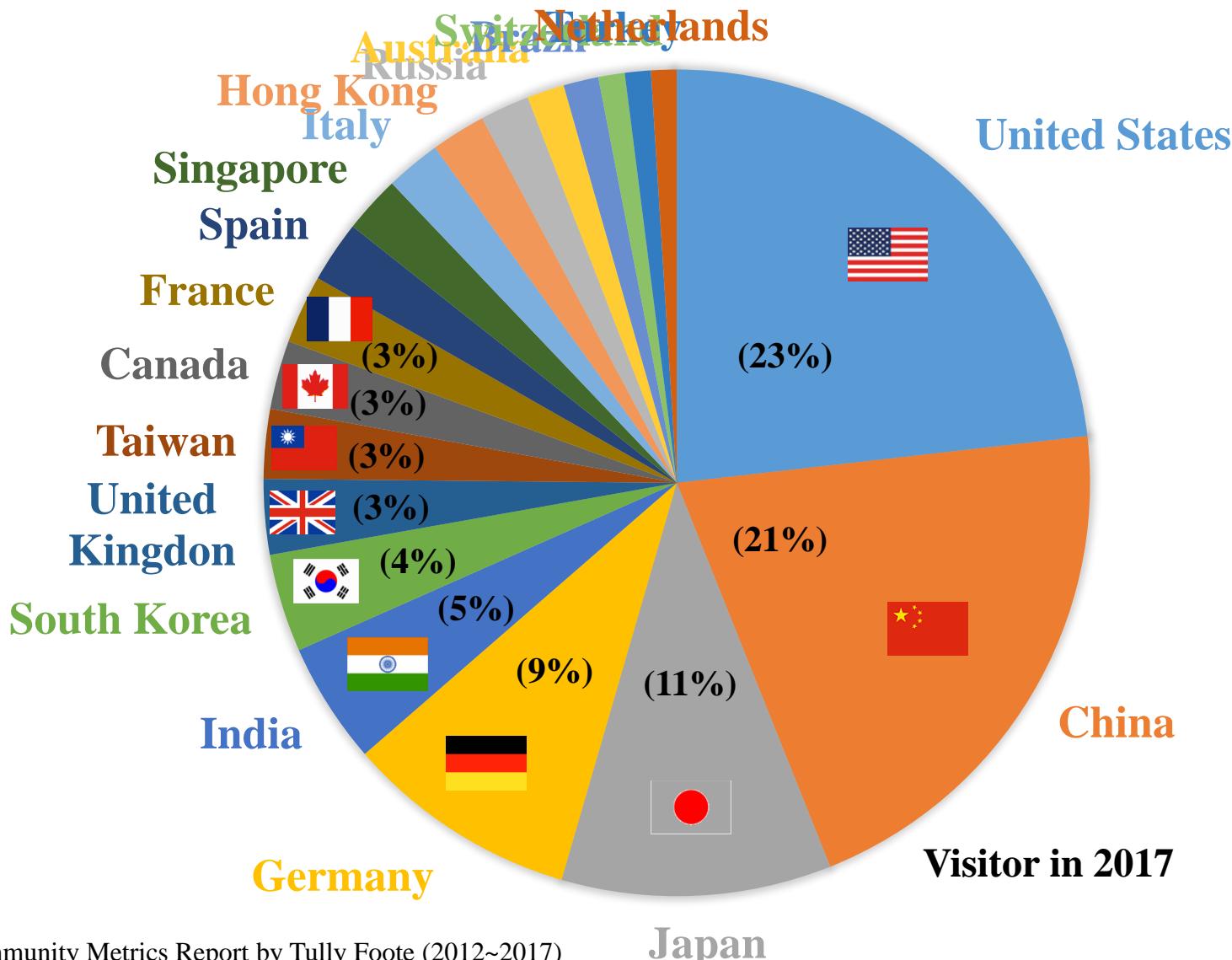
Known packages (November 2017)



Visitor locations (official wiki.ros.org, not include data of mirrors)

2012		2013		2014		2015		2016		2017	
United States	39,112	United States	37,773	United States	53,530	United States	69,989	United States	85,023	United States	100,711
Germany	17,225	Germany	19,666	Germany	25,133	China	31,778	China	62,933	China	90,120
Japan	6,725	China	7,822	China	17,812	Germany	27,080	Japan	30,745	Japan	45,834
Spain	6,563	Japan	7,714	Japan	14,619	Japan	22,867	Germany	28,022	Germany	39,590
India	5,187	United Kingdom	5,672	Spain	9,192	India	9,740	India	12,918	India	20,632
France	5,074	India	4,745	Canada	8,611	France	9,431	Taiwan	11,301	South Korea	16,683
China	4,975	Australia	4,734	France	8,399	United Kingdom	9,143	South Korea	9,990	United Kingdom	12,784
United Kingdom	4,095	Canada	4,145	United Kingdom	7,434	Spain	8,617	Singapore	9,015	Taiwan	11,809
Canada	3,754	Brazil	4,122	India	7,360	Canada	8,497	Canada	8,928	Canada	11,685
Italy	3,549	France	4,074	Italy	6,623	Italy	7,176	Spain	8,517	France	11,651
South Korea	2,890	South Korea	4,050	Brazil	5,837	South Korea	7,022	United Kingdom	8,436	Spain	10,445
Australia	2,706	Spain	3,951	South Korea	4,988	Singapore	5,457	France	7,678	Singapore	9,751
Brazil	2,341	Italy	2,849	Australia	4,828	Taiwan	5,411	Italy	7,663	Italy	9,366
Netherlands	2,214	Singapore	2,612	Singapore	4,688	Russia	4,732	Australia	6,459	Hong Kong	9,289
Mexico	2,168	Russia	2,162	Russia	3,534	Brazil	4,359	Russia	5,171	Russia	8,380
Russia	2,005	Mexico	2,097	Portugal	3,194	Australia	4,252	Brazil	4,805	Australia	6,346
Portugal	1,941	New Zealand	2,073	Netherlands	2,556	Portugal	3,623	Switzerland	3,554	Brazil	5,959
Sweden	1,633	Sweden	2,040	Switzerland	2,454	Switzerland	2,871	Portugal	3,120	Switzerland	4,474
Singapore	1,604	Turkey	1,849	Poland	2,279	Poland	2,706	Netherlands	3,074	Turkey	4,399
Austria	1,447	Switzerland	1,795	Taiwan	2,252	Netherlands	2,431	Turkey	2,603	Netherlands	4,343
New Zealand		Portugal		Mexico		Mexico	2,306	Hong Kong	2,462	Poland	4,176
Turkey		Netherlands		Turkey		Turkey	2,302	Israel	2,386	Sweden	3,519
Switzerland		Poland		Austria		Austria	2,277	none	2,374	Portugal	3,150
Poland		Taiwan		New Zealand		New Zealand	2,019	Mexico	2,314	Mexico	3,124
Taiwan		Austria		Israel		Israel	1,938	Poland	2,076	Greece	2,683
Israel		Israel		Sweden		Sweden					

Visitor locations (official wiki.ros.org, not include data of mirrors)

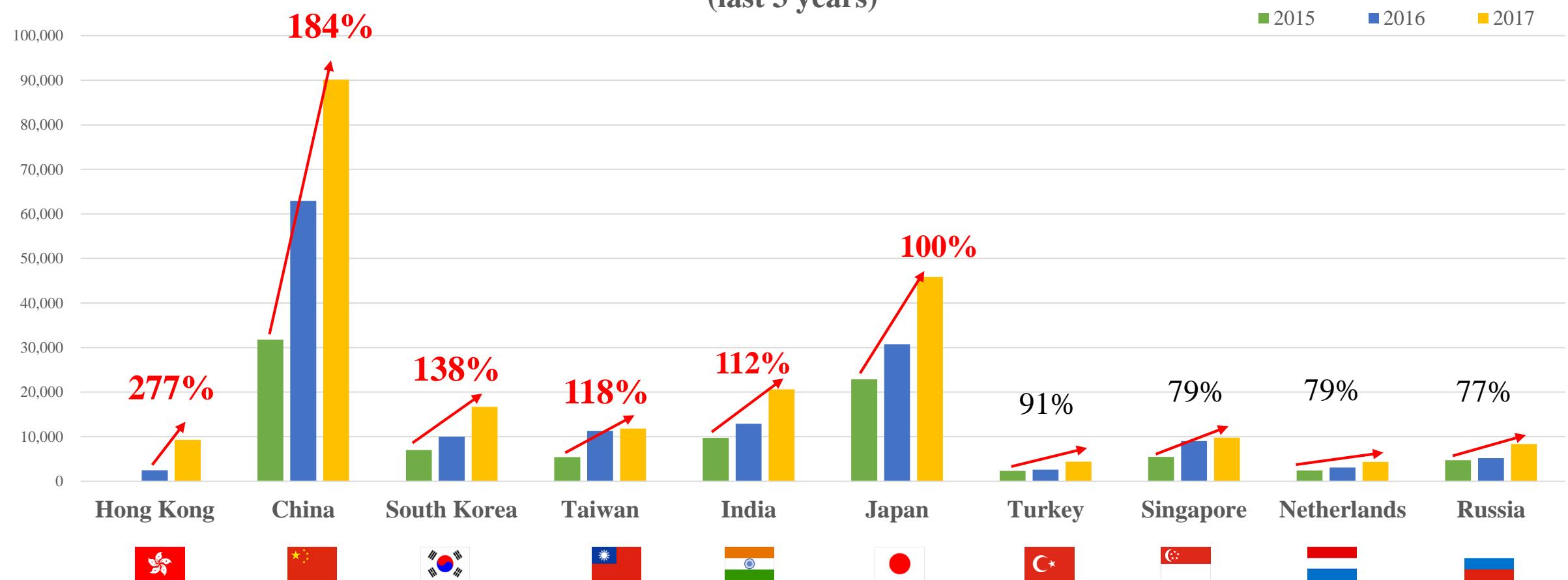


Visitor locations (official wiki.ros.org, not include data of mirrors)



Visitor locations (official wiki.ros.org, not include data of mirrors)

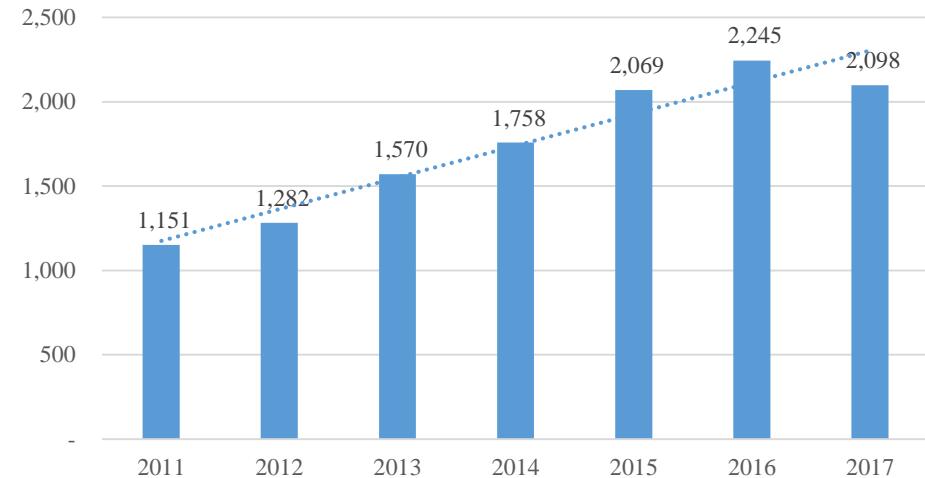
Growth Rate Top10
(last 3 years)



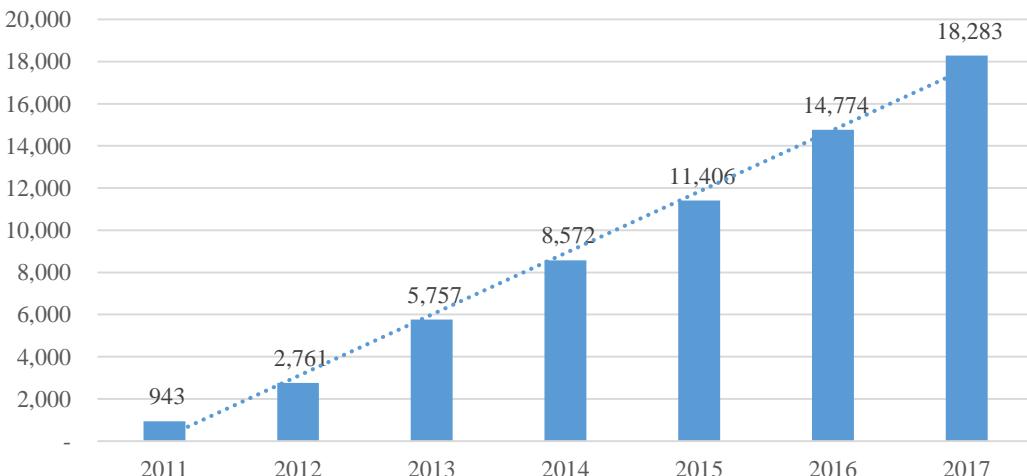
Membership Metrics

	2011	2012	2013	2014	2015	2016	2017
ros-users@lists.ros.org subscribers	1,151	1,282	1,570	1,758	2,069	2,245	2,098
wiki.ros.org users	1,245	2,015	3,359	4,056	4,884	5,875	6,749
answers.ros.org users	943	2,761	5,757	8,572	11,406	14,774	18,283
discourse.ros.org users	-	-	-	-	-	280	462

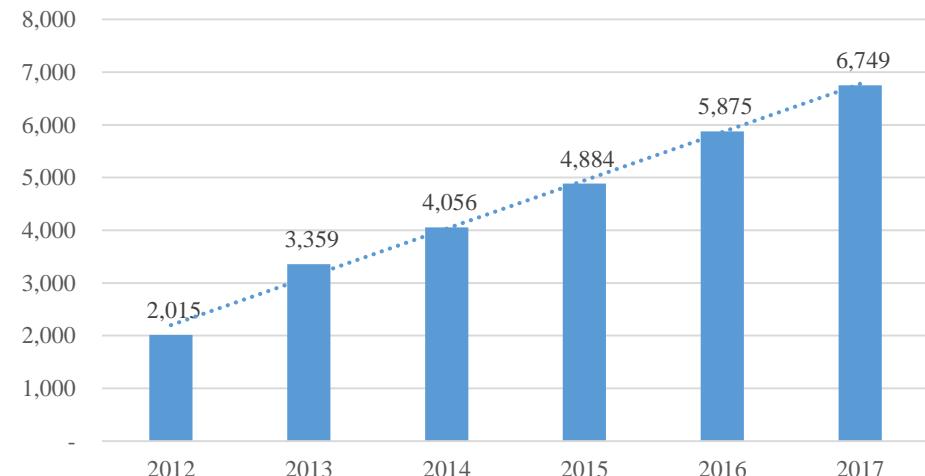
ros-users@lists.ros.org subscribers



answers.ros.org users

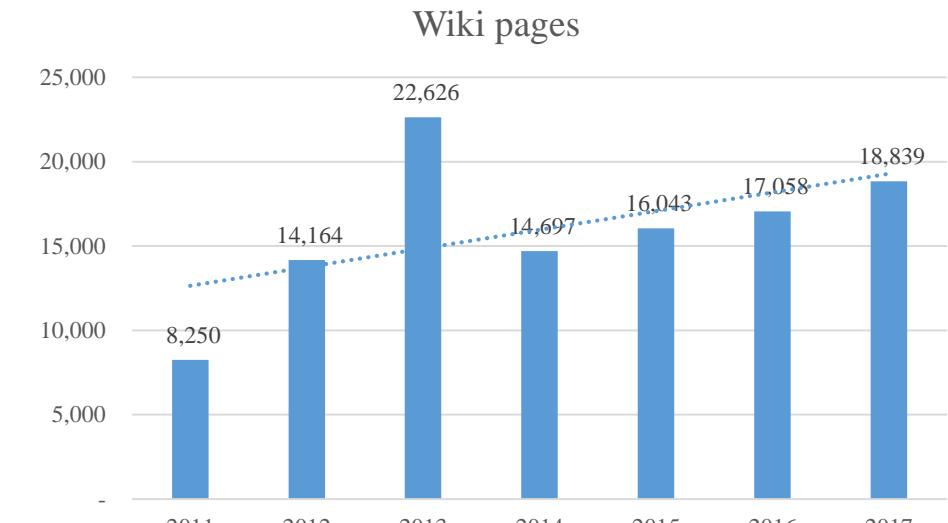


wiki.ros.org users

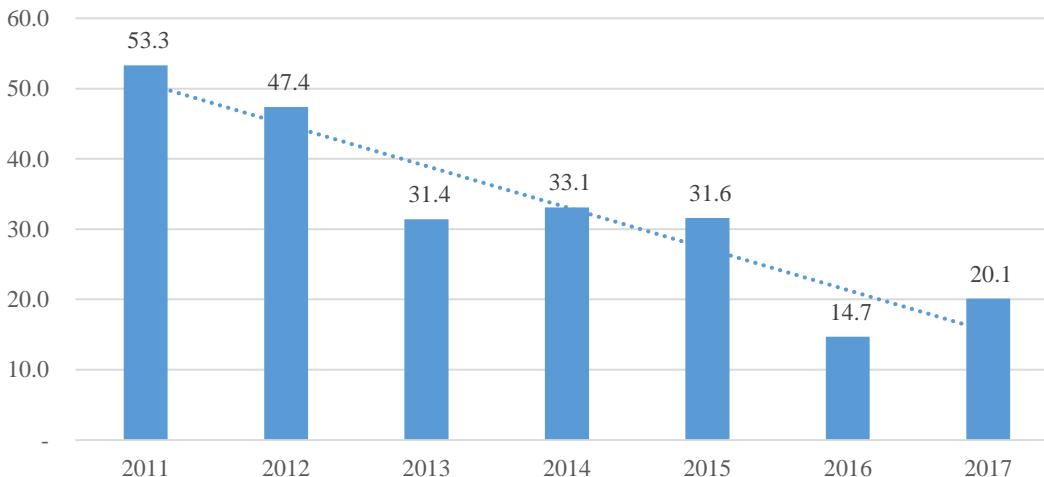


Activity Metrics (wiki.ros.org)

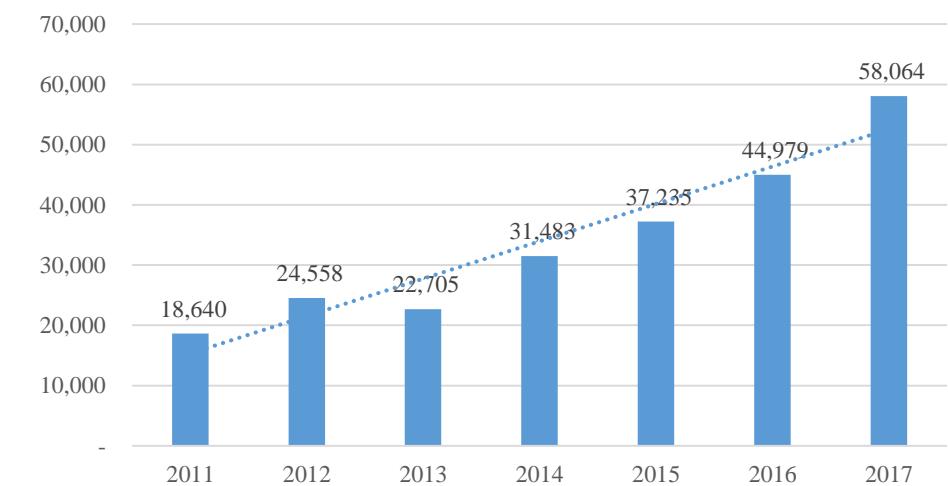
	2011	2012	2013	2014	2015	2016	2017
Wiki pages	8,250	14,164	22,626	14,697	16,043	17,058	18,839
Wiki page edits (/day)	53.3	47.4	31.4	33.1	31.6	14.7	20.1
Wiki page views (/day)	18,640	24,558	22,705	31,483	37,235	44,979	58,064



Wiki page edits (/day)



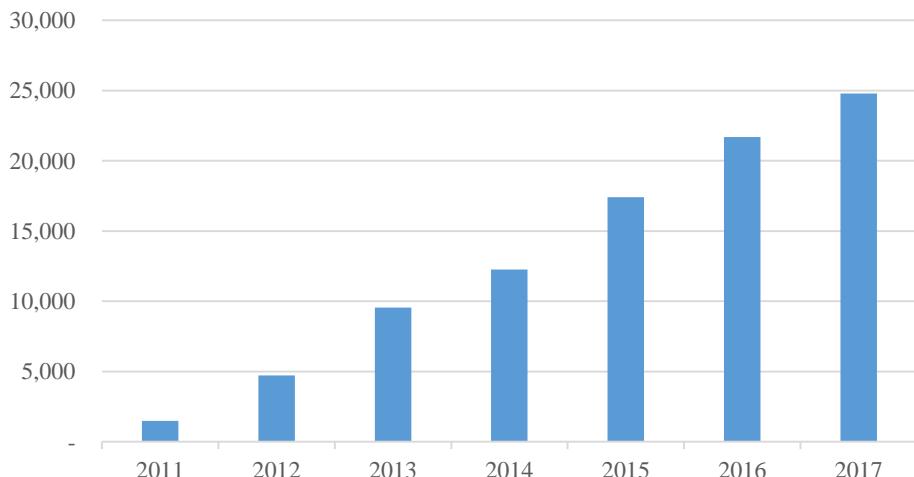
Wiki page views (/day)



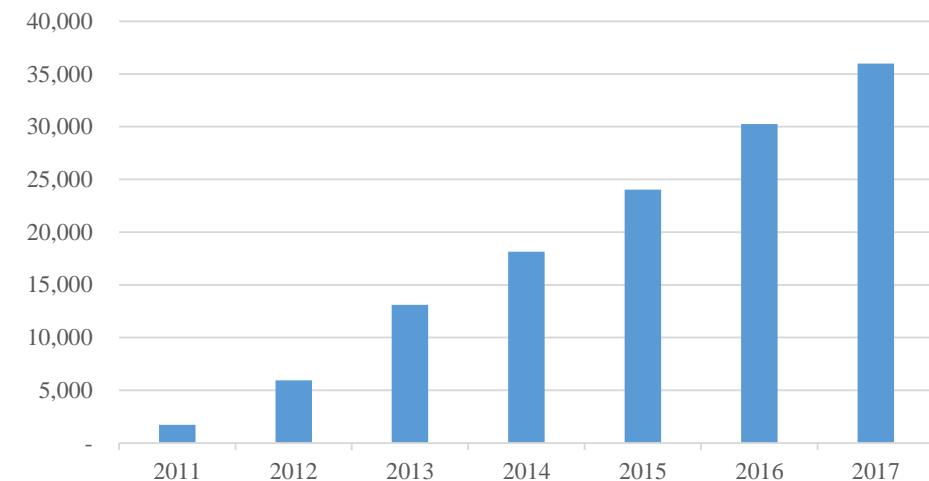
Activity Metrics (answers.ros.org)

	2011	2012	2013	2014	2015	2016	2017
Total Questions	1,731	5,935	13,095	18,144	24,026	30,243	35,998
Answered Questions	1,490	4,728	9,558	12,260	17,414	21,697	24,776
New questions in July	563	394	524	523	533	508	

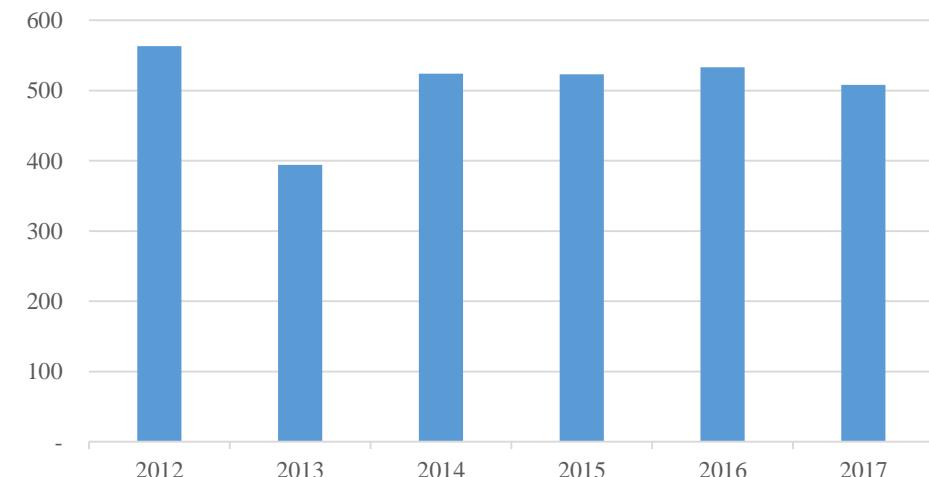
Answered questions



Total questions



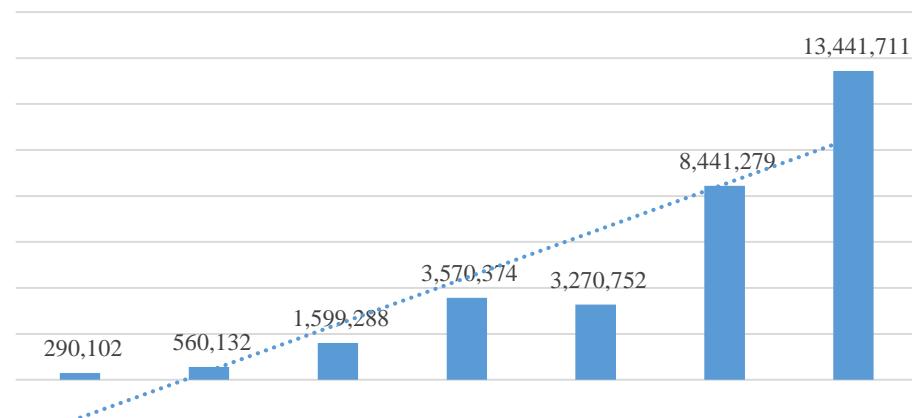
New questions in July



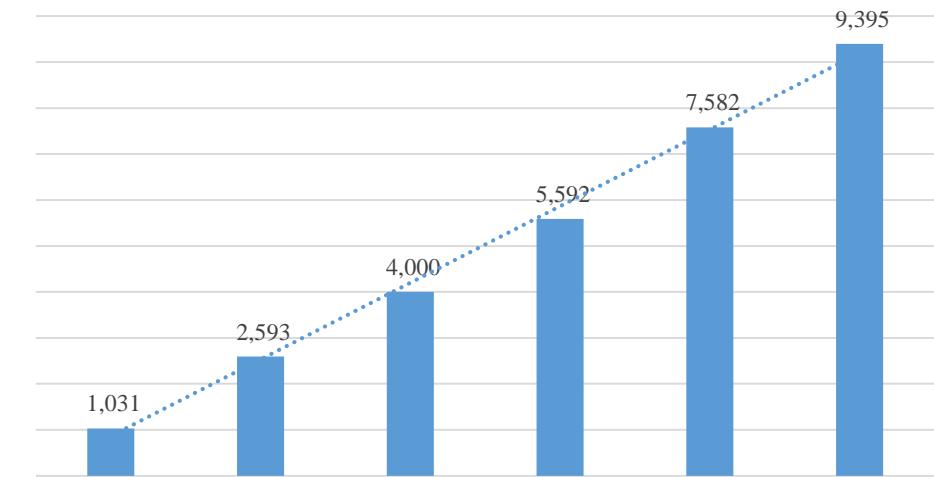
Code Metrics (Binary Downloads)

	2011	2012	2013	2014	2015	2016	2017
Total Unique IP addresses downloading .deb files	4,517	8,139	11,078	49,153	46,611	113,345	
Total downloads of .deb packages	290,102	560,132	1,599,288	3,570,374	3,270,752	8,441,279	13,441,711
	2012	2013	2014	2015	2016	2017	
Unique package names downloaded as .deb files	1,031	2,593	4,000	5,592	7,582	9,395	
Number of unique versions of .deb packages downloaded	16,419	32,591	46,056	38,415	63,636	53,382	

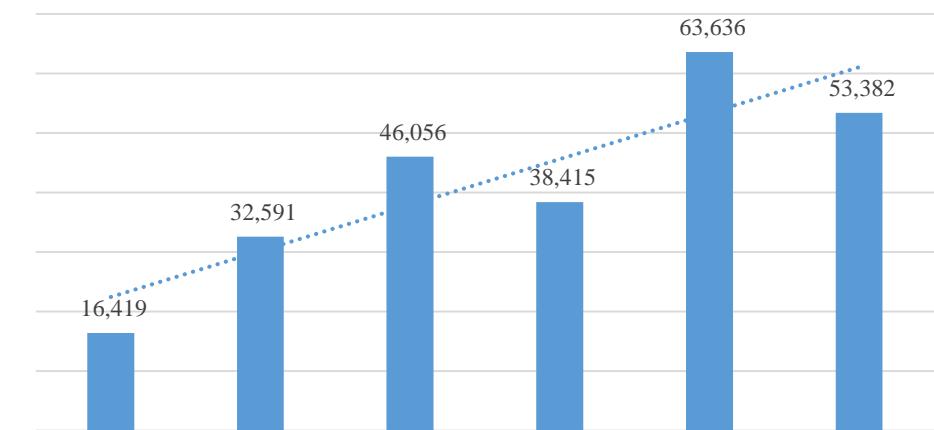
Total downloads of .deb packages



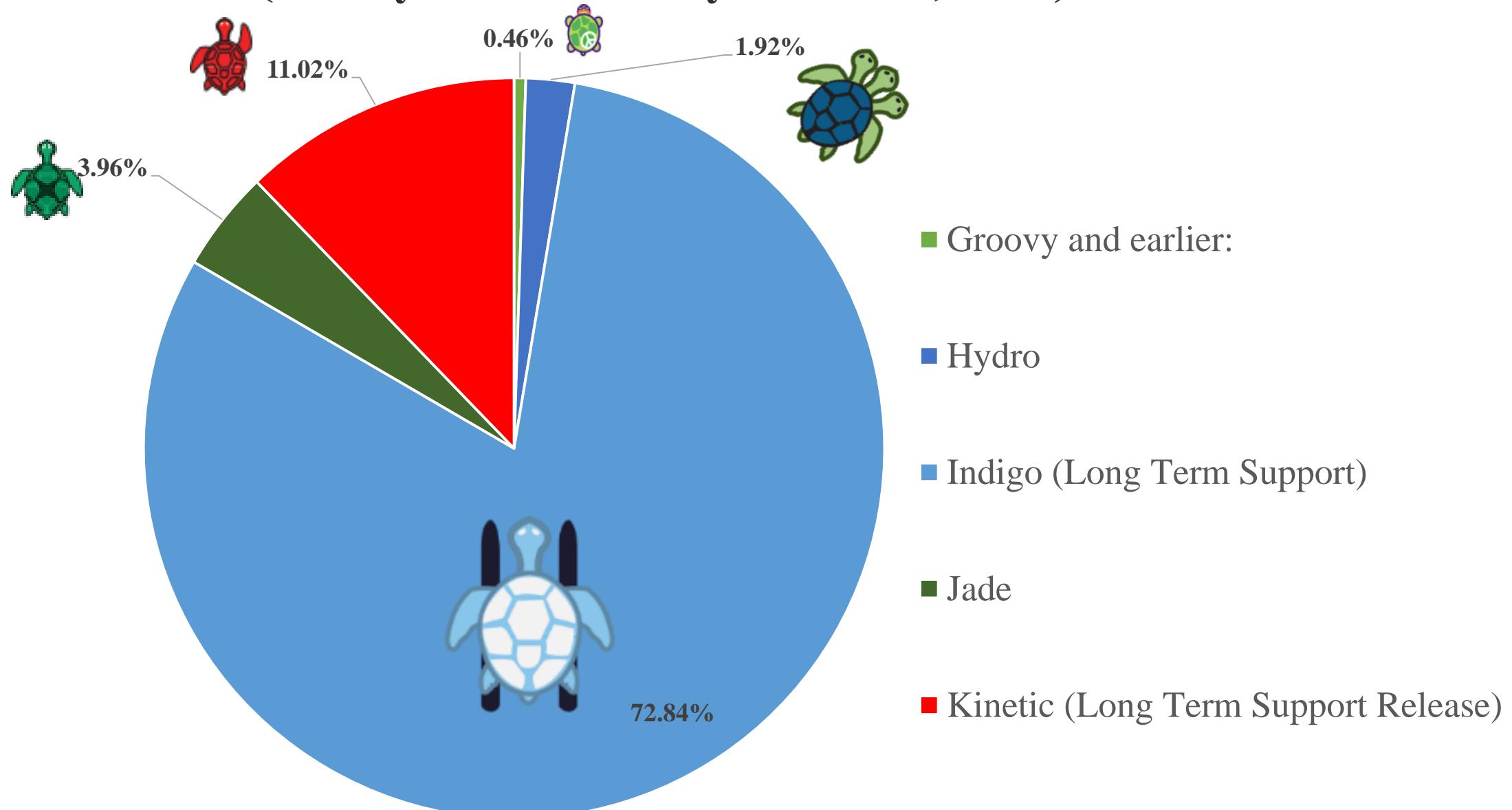
Unique package names downloaded as .deb files



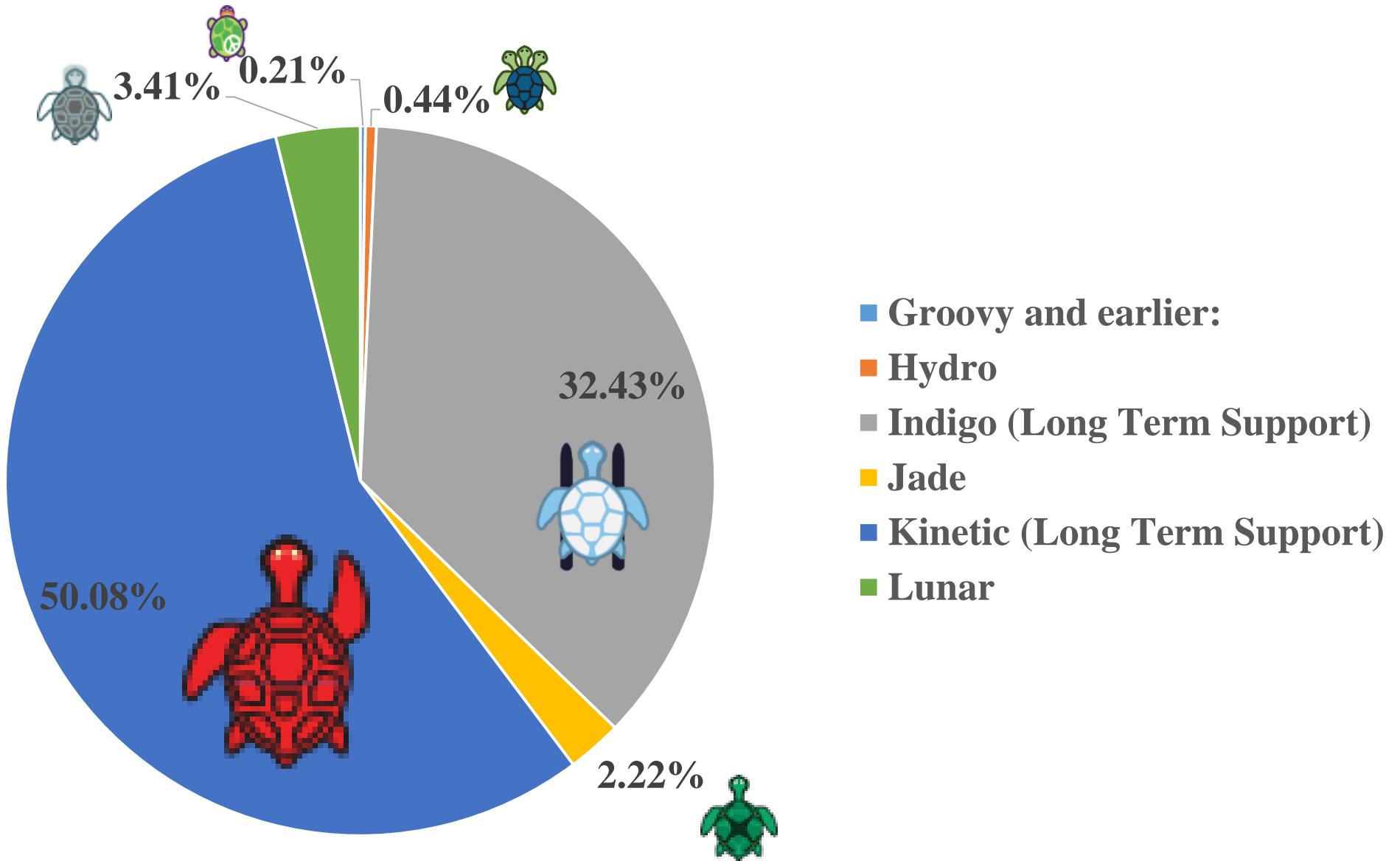
Number of unique versions of .deb packages downloaded



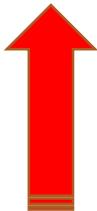
Code Metrics (Binary Downloads by rosdistro, 2016)



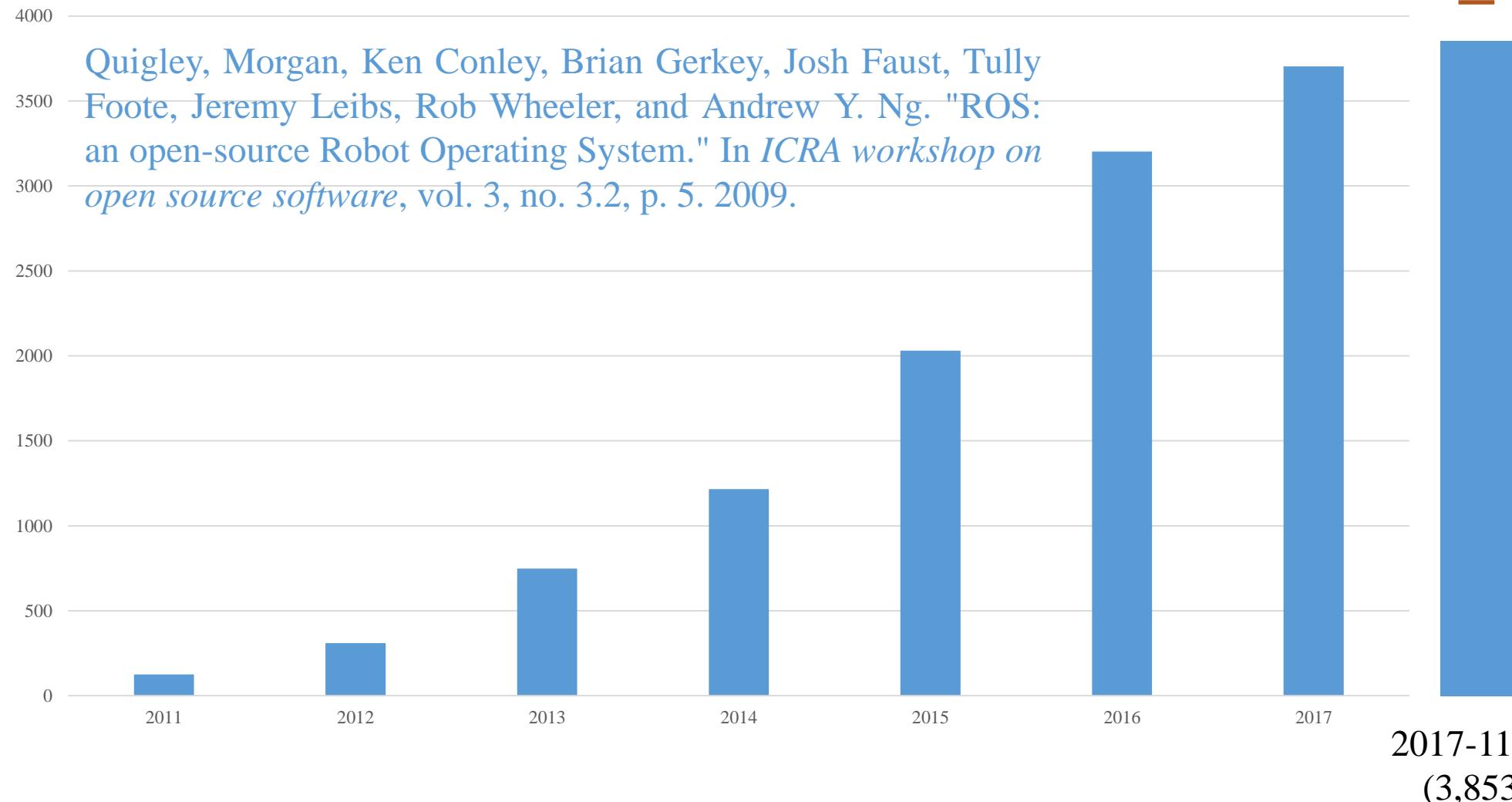
Code Metrics (Binary Downloads by rosdistro, 2017)



Research use



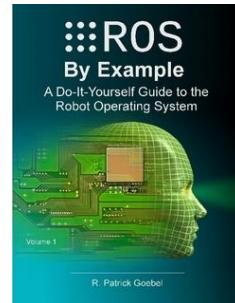
Number of papers citing “ROS: an open-source Robot Operating System”



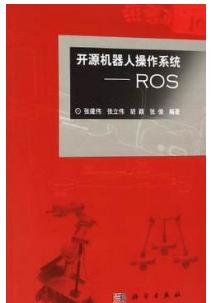
University courses listed on wiki.ros.org/Courses

- Brown University, USA
- Case Western Reserve University, USA
- Cornell University, USA
- CU Boulder, USA
- Northwestern University, USA
- Siena College, USA
- Stanford University, USA
- University at Albany, USA
- University of Pennsylvania, USA
- University of South Carolina, USA
- University of Texas at Austin, USA
- Washington University in St Louis, USA
- KU Leuven, Germany
- Leibniz Universität Hannover, Germany
- DEI - University of Padova, Italy
- Sapienza University of Rome, Italy
- Kyushu University, Japan
- Tokyo University, Japan
- Bar-Ilan University, Israel
- Prince Sultan University, Saudi Arabia
- University of Birmingham, United Kingdom
- Université de Sherbrooke, Canada
- University of Zagreb, Croatia

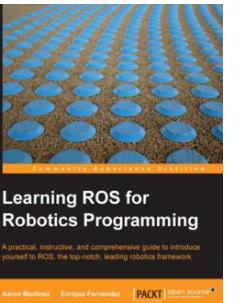




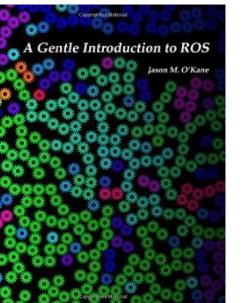
September, 2012



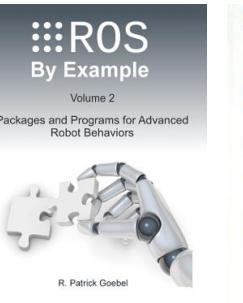
September, 2012



September, 2013



October, 2013



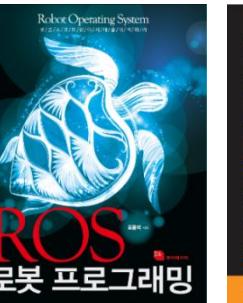
August, 2014



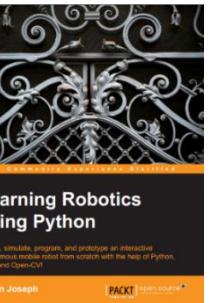
September, 2014



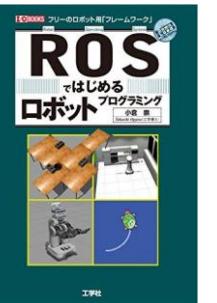
December, 2014



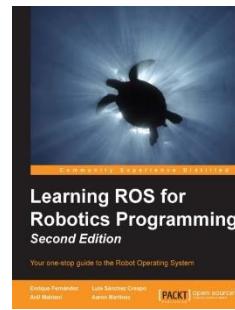
March, 2015



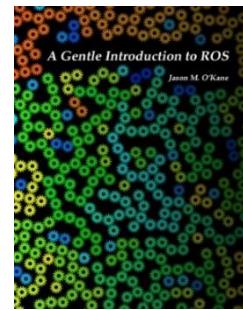
May, 2015



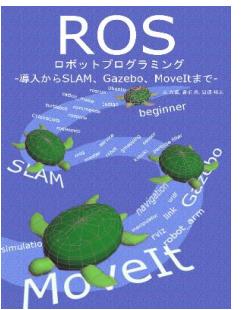
June, 2015



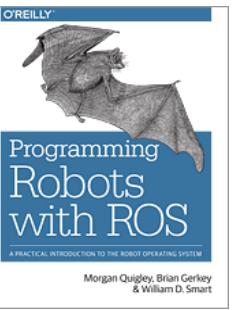
August, 2015



October, 2015



November, 2015



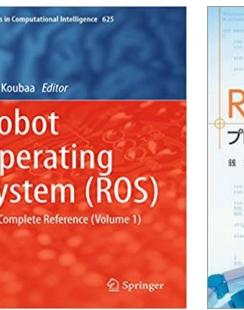
December, 2015



December, 2015



December, 2015



February, 2016



March, 2016



April, 2016



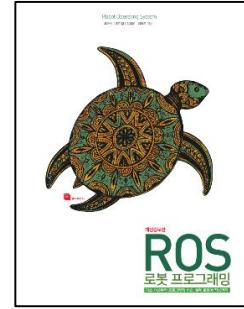
June, 2016



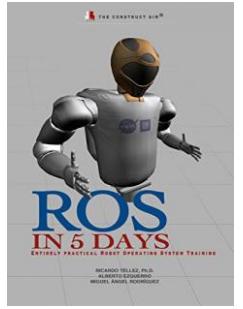
November, 2016



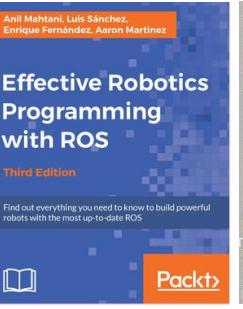
March 2017



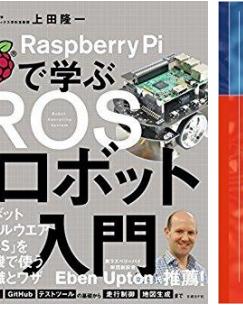
August, 2017



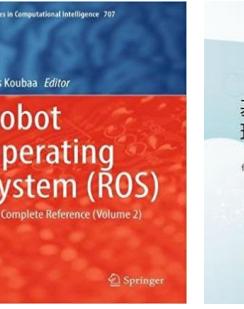
August, 2017



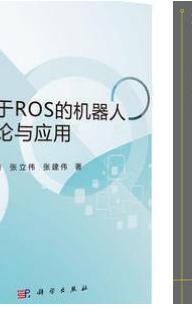
December 2016



March, 2017



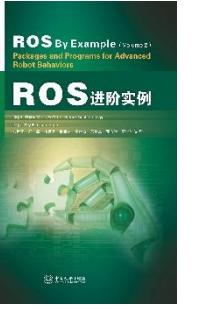
May, 2017



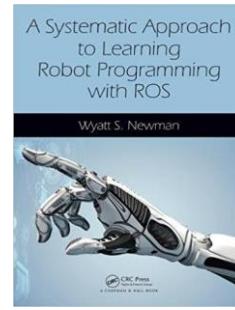
June, 2017



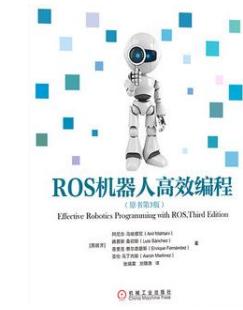
June, 2017



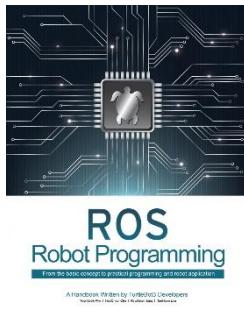
April, 2017



August, 2017



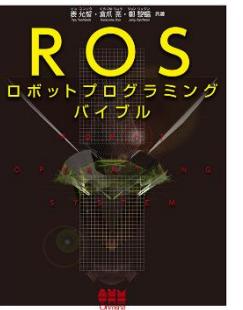
September, 2017



December 2017

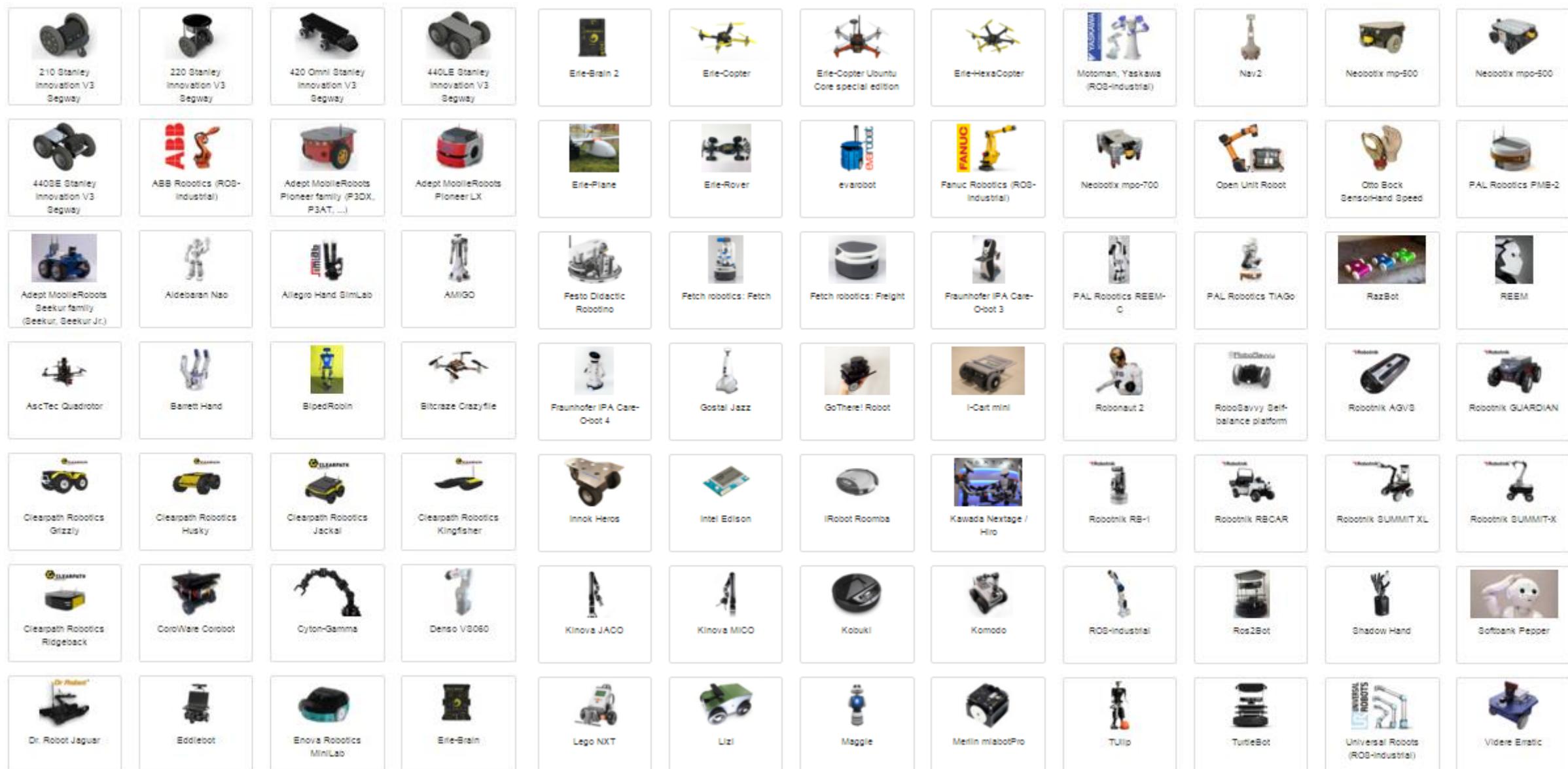


December 2017

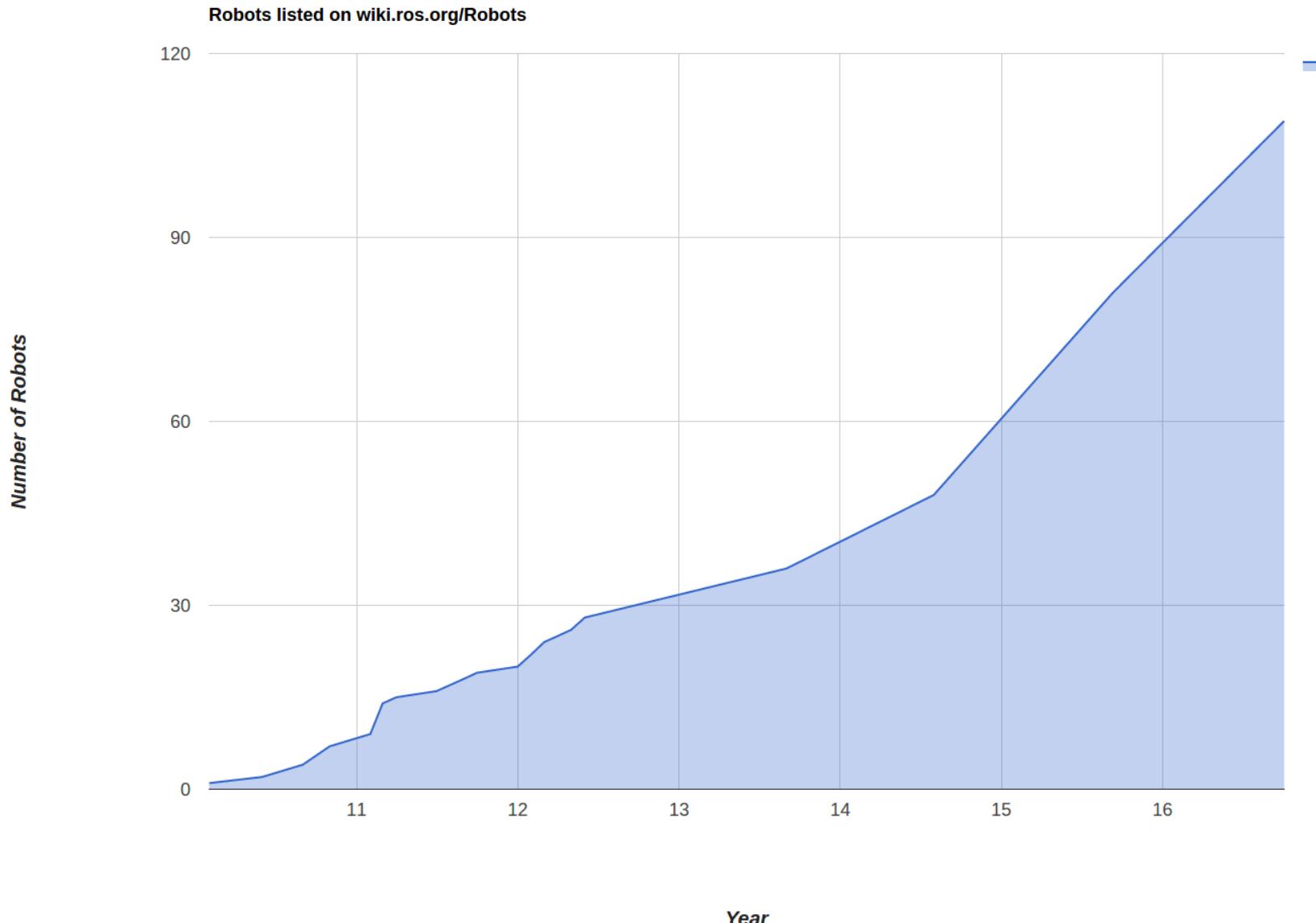


March 2018

Robots listed on wiki.ros.org/Robots



Robots listed on wiki.ros.org/Robots



Sponsors



BOSCH

Invented for life

Fraunhofer
IPA

YUJIN ROBOT

YASKAWA
MOTOMAN ROBOTICS

ROS
industrial
consortium

SICK
Sensor Intelligence.

QUALCOMM®

fetch
robotics



CLEARPATH
ROBOTICS™



Open Source
Robotics Foundation

Webots
robot simulation

CRUISE

rethink
robotics

Willow
Garage



ubuntu

Google

GaiTech International
www.gaitech.hk

THE UNIVERSITY OF HONG KONG

Robotnik

hiDOF

ETRI

3DR

HEARTLAND
ROBOTICS

ROBOTIS



MAGAZINO
simple storage

SCHUNK

oroWare

TOYOTA

I Heart
Engineering

BLUE RIVER

synapticon

McCormick

Northwestern Engineering

Shadow
Robot Company

NVIDIA

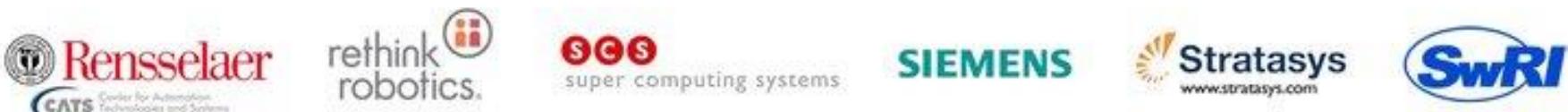
SwRI

Master of Science
in Robotics



Erle Robotics

ROS-Industrial Consortium Worldwide Membership







**Question
Time!**



Advertisement #1



✓ [Download link](#)

✓ [Language:](#)

English, chinese, Japanese, Korean



"ROS Robot Programming"

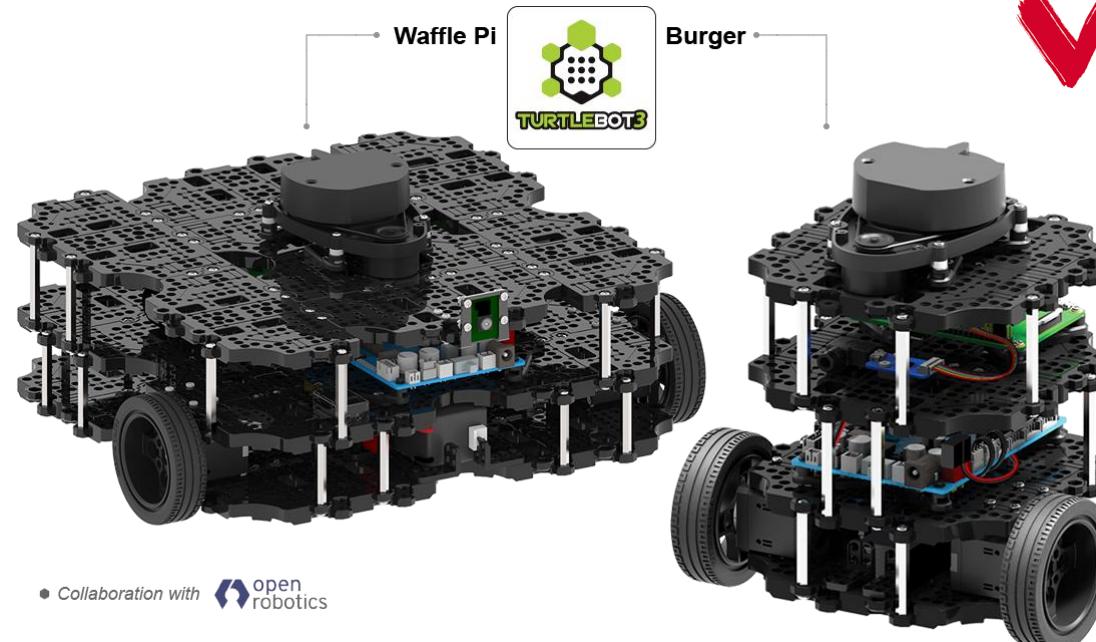
A Handbook is written by TurtleBot3 Developers

Advertisement #2

TURTLEBOT3

AI Research Starts Here
ROS Official Platform

TurtleBot3 is a new generation mobile robot that's modular, compact and customizable. Let's explore ROS and create exciting applications for education, research and product development.



✓ [Direct Link](#)

Advertisement #3



www.robotsource.org

The 'RobotSource' community is the space for people making robots.

We hope to be a community where we can share knowledge about robots, share robot development information and experiences, help each other and collaborate together. Through this community, we want to realize open robotics without distinguishing between students, universities, research institutes and companies.

Join us in the Robot community ~

END.