

Development Strategy of High Speed Railway

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Photo by Daretarō 11.05.04 大宮駅



↑ Tokaido and Sanyo Lines



↑ Tohoku and Joetsu Lines
← Hokuriku Line

CONTENTS

1. Development of HSR Network in Japan
2. World-wide Development of HSR
3. Types of HSR Development
4. Diversity in Design Concept of HSR
5. Diversification of HSR

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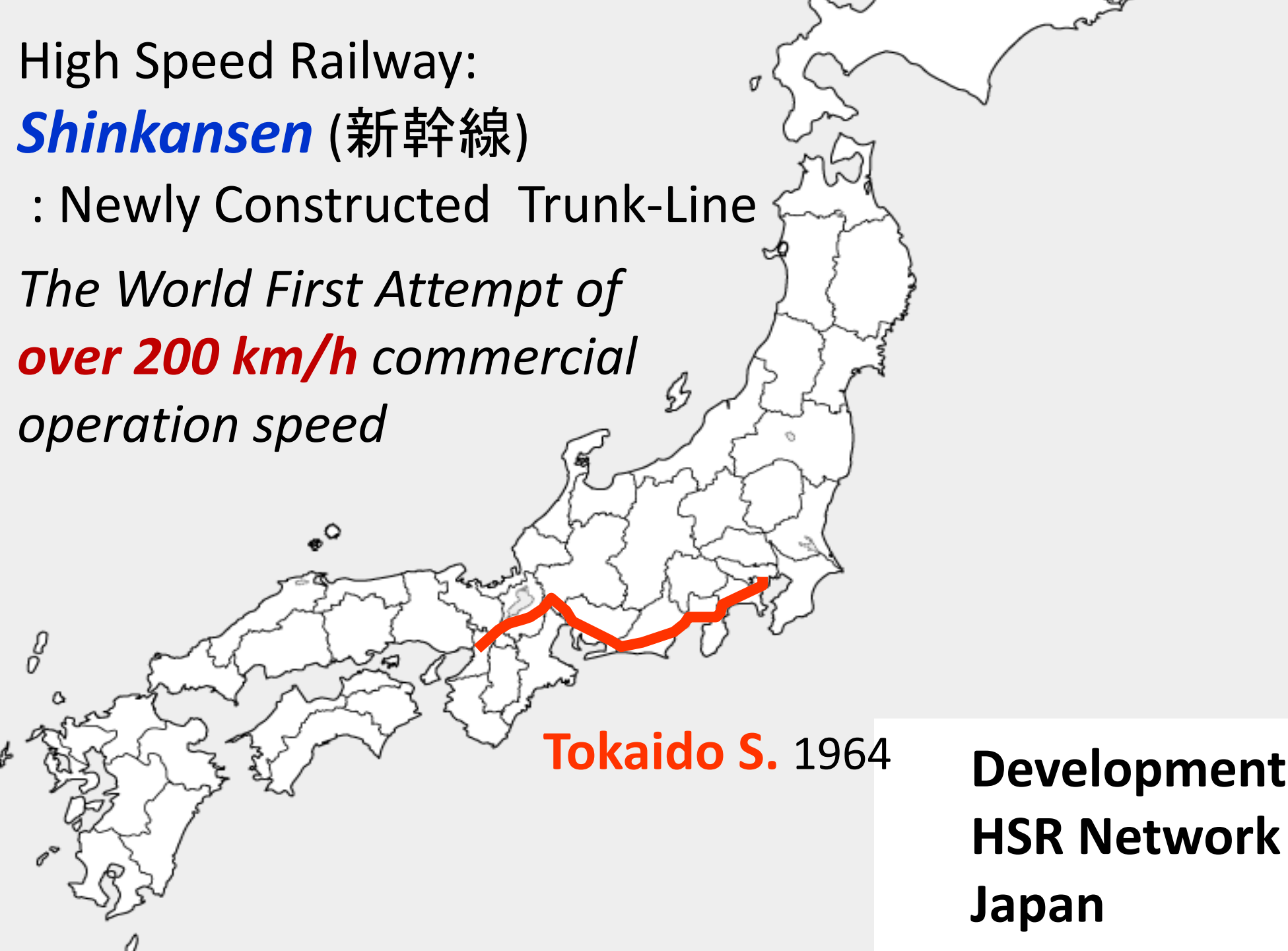
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High Speed Railway:

Shinkansen (新幹線)

: Newly Constructed Trunk-Line

*The World First Attempt of
over 200 km/h commercial
operation speed*



Tokaido S. 1964

**Development of
HSR Network in
Japan**

The Birth of Tokaido Shinkansen 東海道新幹線の誕生

■ 1964 Tokaido Shinkansen Opened 東海道新幹線の開業

- 1st over 200 km/h commercial railway operation in the world **世界初の200キロ営業運転**
- Pacific Corridor of Japan (Tokyo-Osaka)
太平洋ベルトを通過して首都と第二の都市を繋ぐ
- transp. capacity problem in existing narrow gauge railway
狭軌在来線の輸送容量問題
- completely new system on newly constructed standard gauge track
標準軌新線上の完全独立システムの構築

Speed Comparison of Express Trains (early 1960s)

特急列車の速度比較（1960年代前半）

Max. Speed

T-Table Speed

Kodama (NG-Tokaido, Japan)



Red Arrow (USSR)



Edelweis (Belgium)



Rheingold (Nederland)



Cettevelo (Italy)



Schauinsland (W-Germany)



Bristrian (UK)



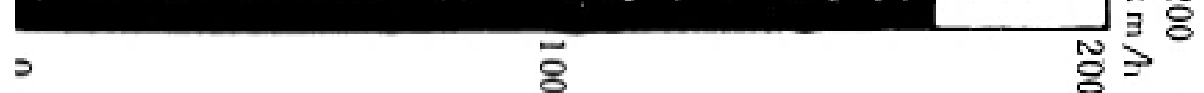
Broadway Limited (USA)



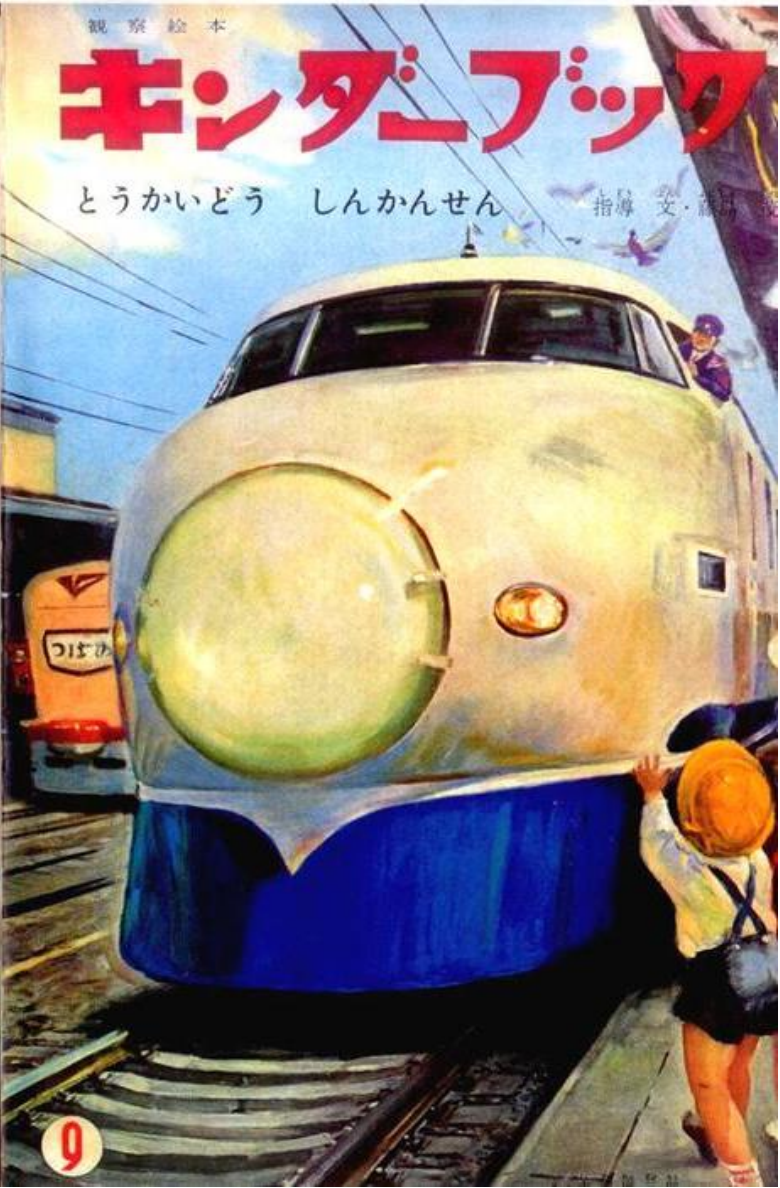
Mistral (France)



Hikari (Shinkansen, Japan)

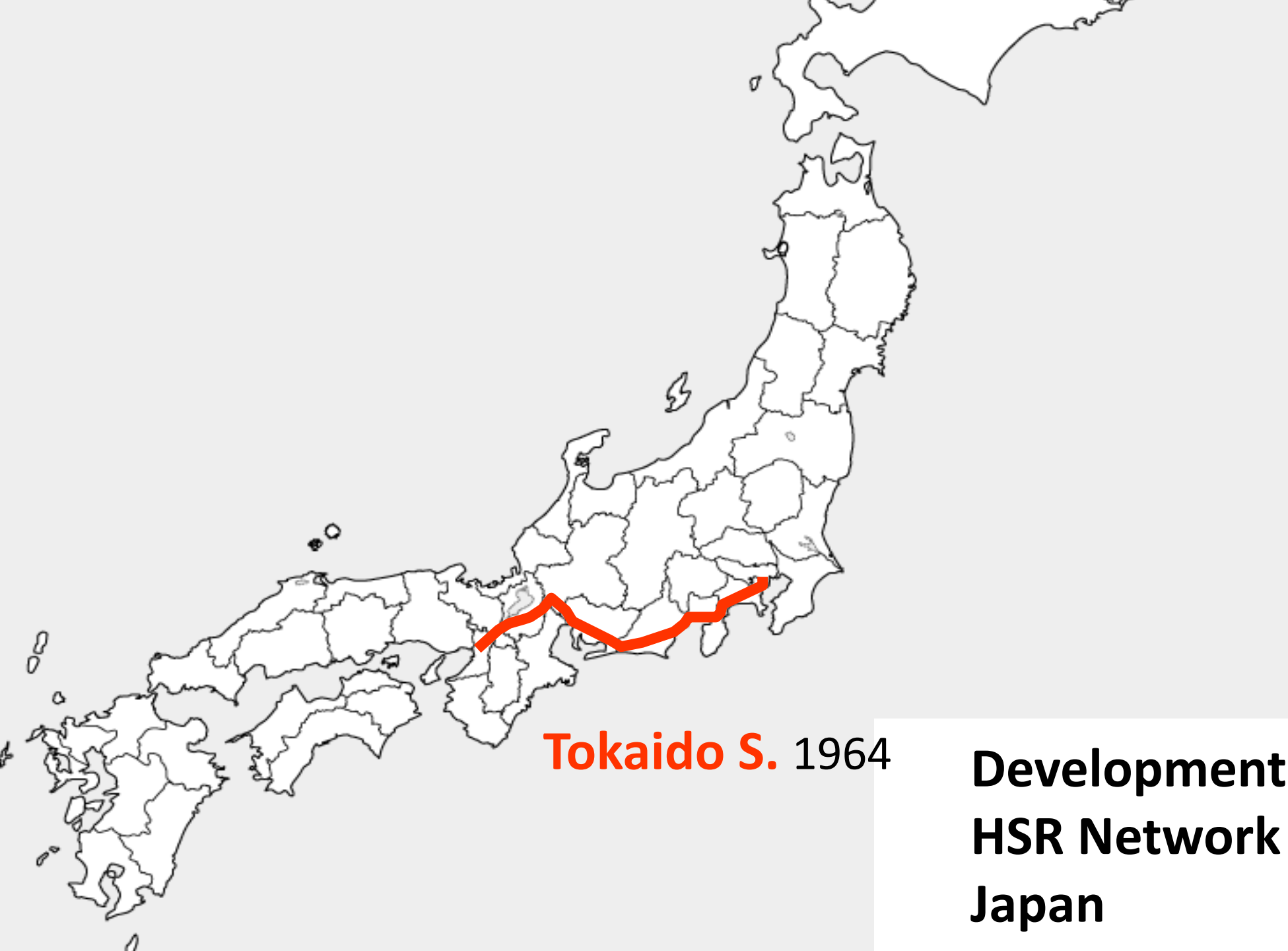


出典：加藤一郎監修「東海道新幹線」(ダイヤモンド社)1964年



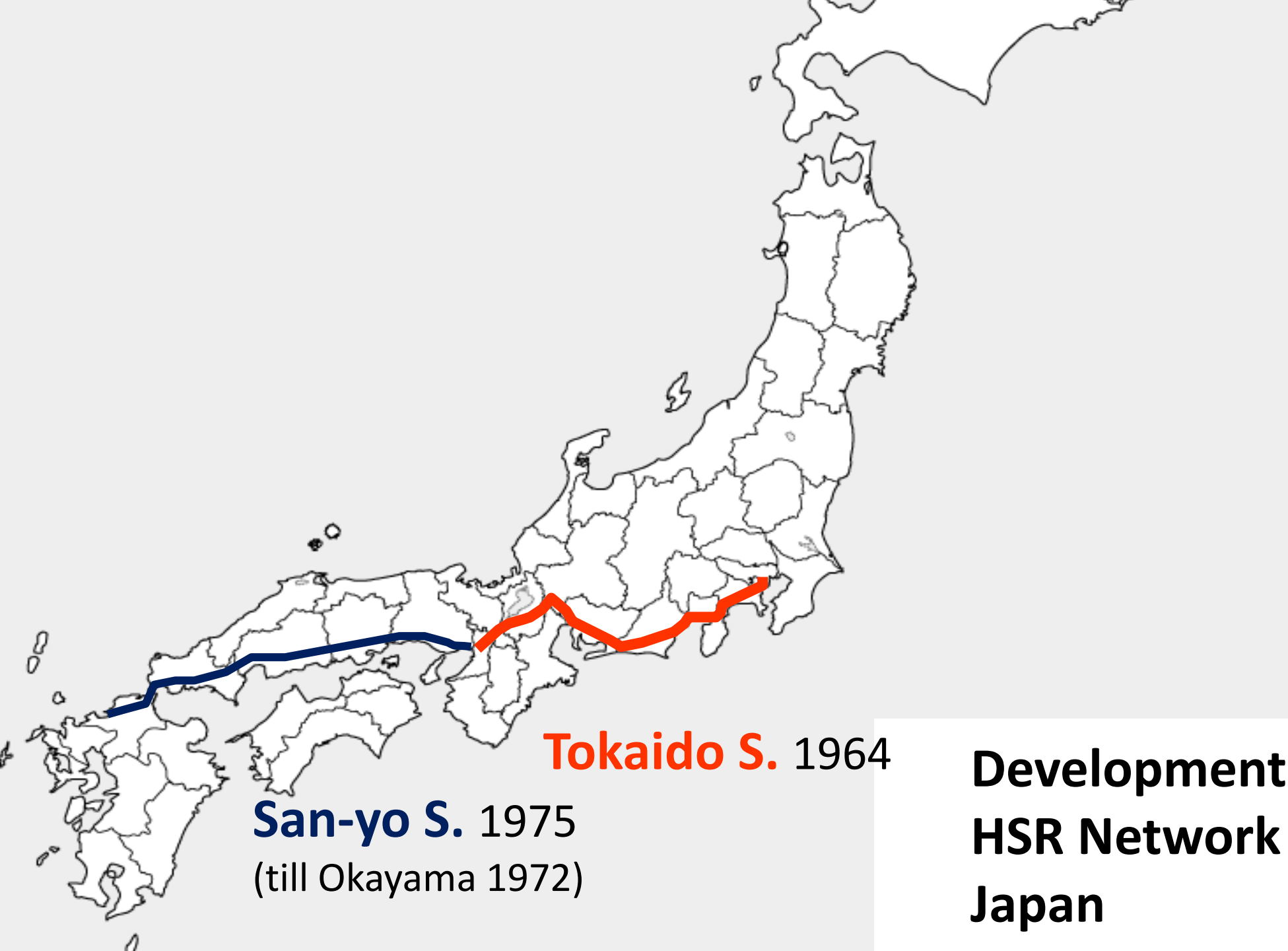
from child books in early 1960s
1960年代初頭のこども用絵本から

“Super Express Train of Dream” 「夢の超特急」



Tokaido S. 1964

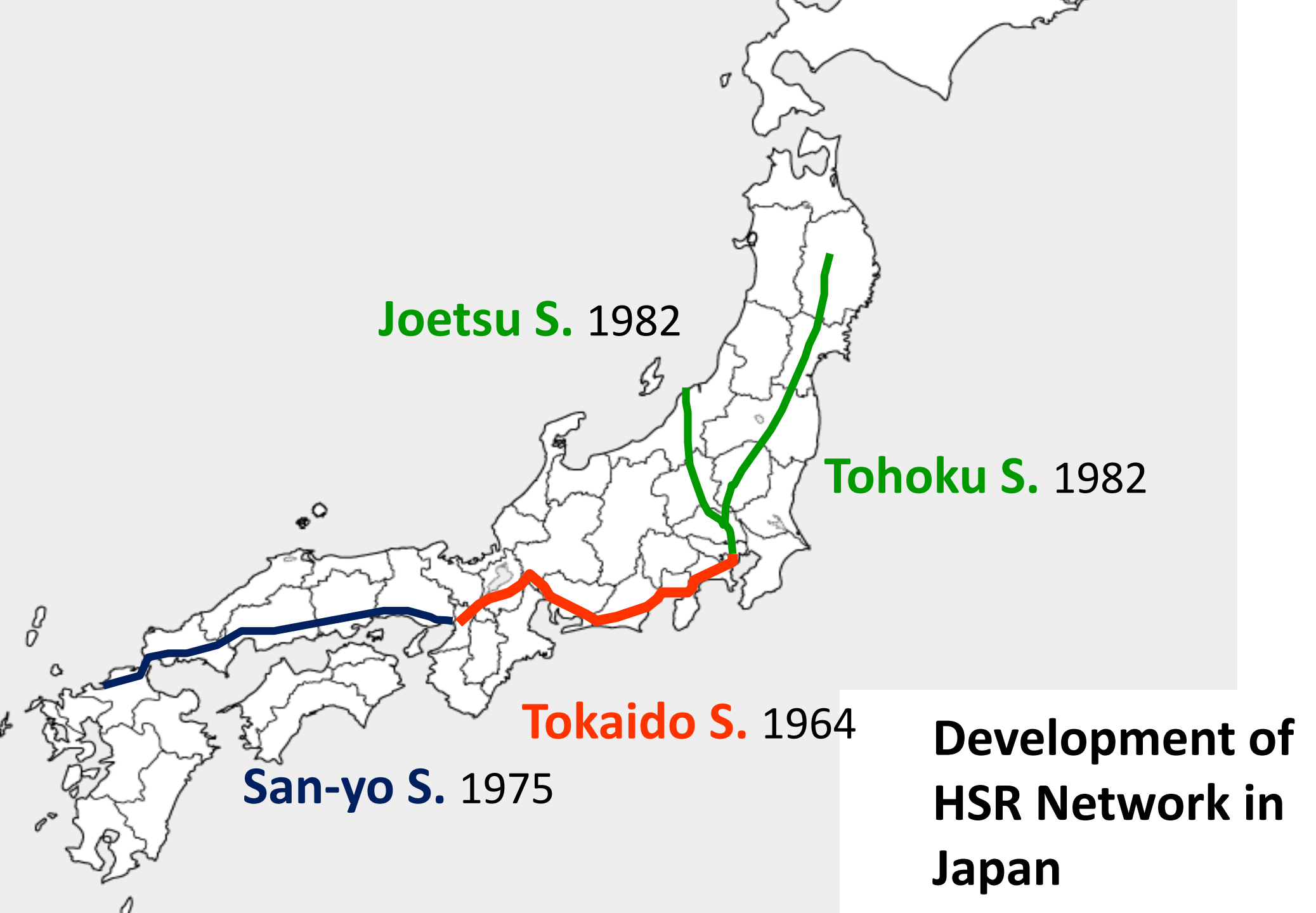
**Development of
HSR Network in
Japan**



San-yo S. 1975
(till Okayama 1972)

Tokaido S. 1964

**Development of
HSR Network in
Japan**



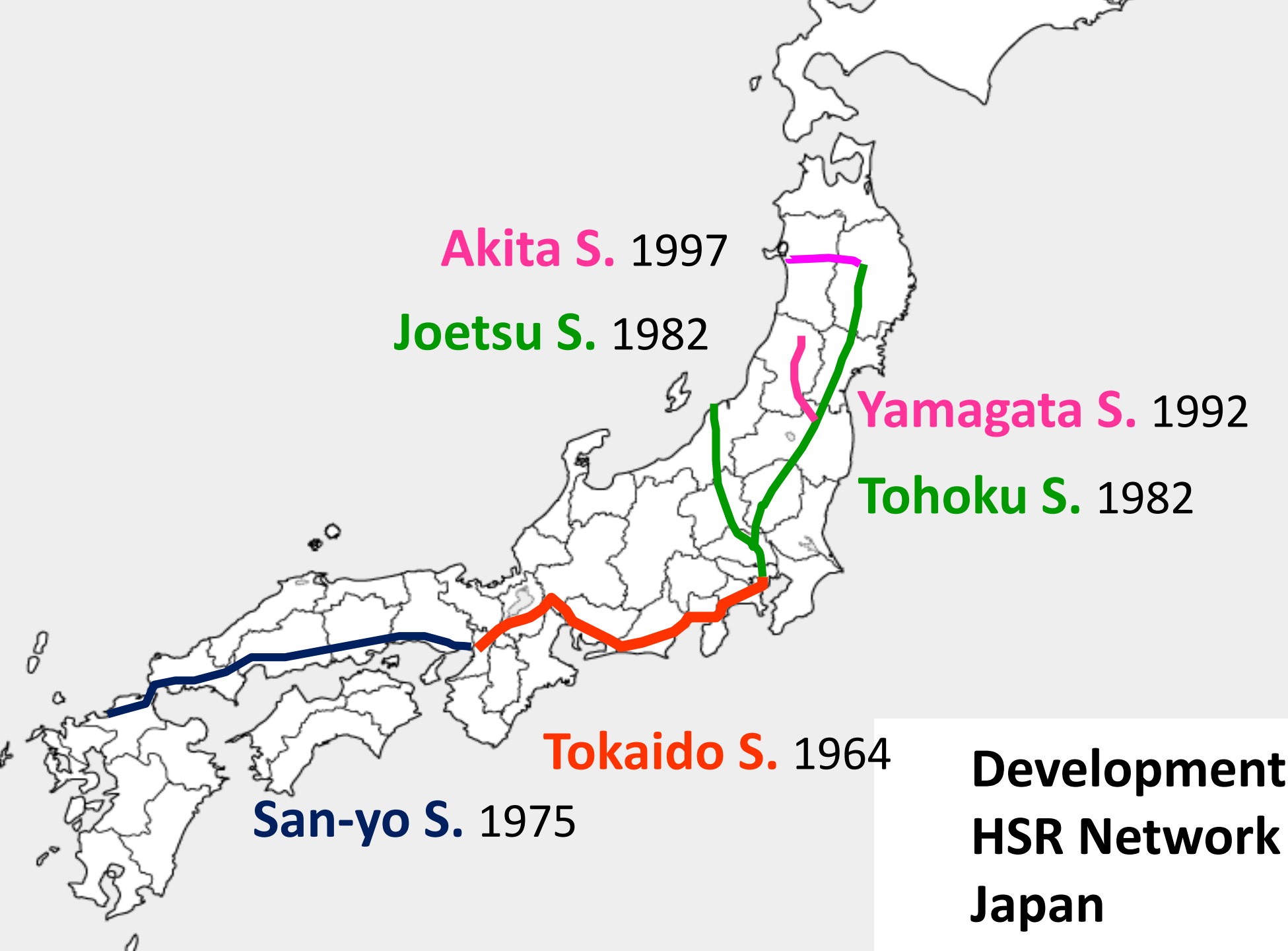
Joetsu S. 1982

Tohoku S. 1982

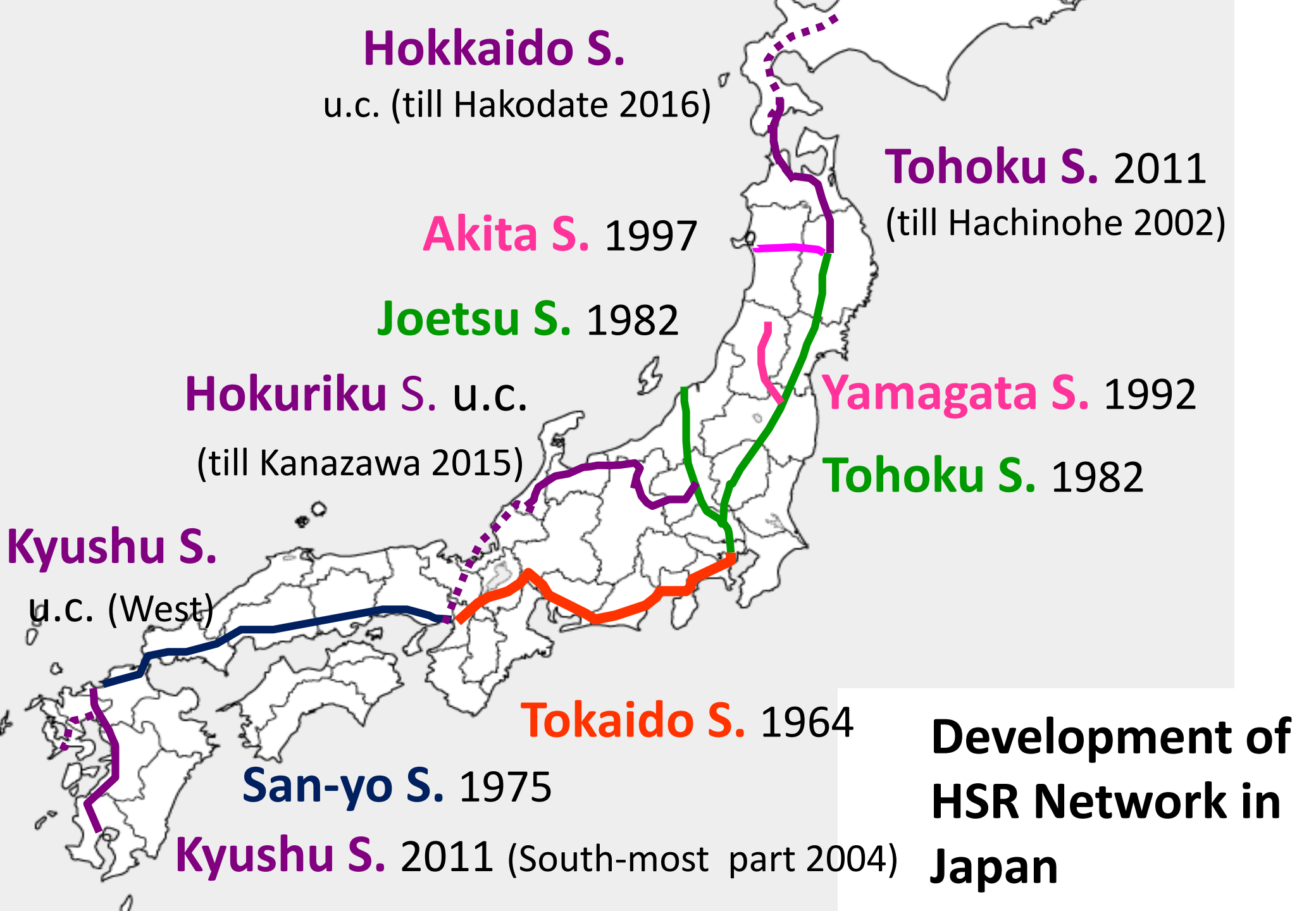
Tokaido S. 1964

San-yo S. 1975

**Development of
HSR Network in
Japan**



**Development of
HSR Network in
Japan**



Hokkaido S.

u.c. (till Hakodate 2016)

Akita S. 1997

Joetsu S. 1982

Hokuriku S. u.c.

(till Kanazawa 2015)

Tohoku S. 2011
(till Hachinohe 2002)

Yamagata S. 1992

Tohoku S. 1982

Kyushu S.

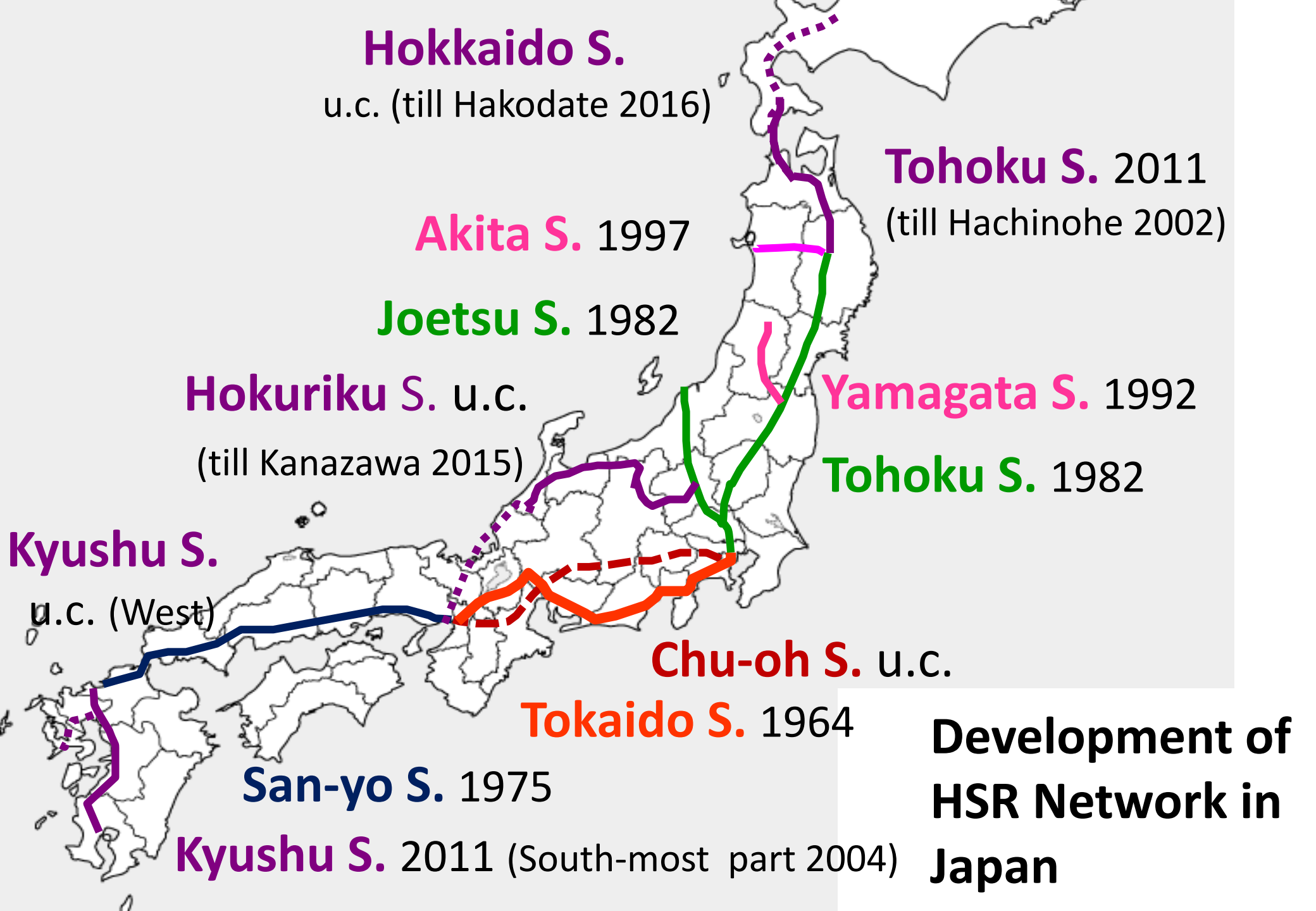
u.c. (West)

Tokaido S. 1964

San-yo S. 1975

Kyushu S. 2011 (South-most part 2004)

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Kyushu S.

u.c. (West)

Chu-oh S. u.c.

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San-yo S. 1975

Kyushu S. 2011 (South-most part 2004)

**Development of
HSR Network in
Japan**

HSR Development after Tokaido-S 高速鉄道の展開

- Transp. capacity improvement → Development of backward regions **輸送力増強 → 地域開発**
- Speed-up from 200 regime to 300 regime and other performance improvement **速度向上などの性能向上**
- New track construction → Direct Operation into (improved) existing tracks **(改軌した) 在来線への直通運転**
- Development of Non-Adhesion Train (MagLev Train) **超電導磁気浮上鉄道の開発**

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HSR Development after Tokaido-S 高速鉄道の展開 in the World 世界の動き

1960s and 1970s: Shinkansen in Japan

1980s: Japan and France...

1981 TGV Paris-South-East opened at 260km/h

1989 TGV Atlantic opened

1990s: Japan and Europe

1991 ICE (Germany) opened

1992 AVE (Spain) opened ...

1994 Eurostar across the Channel (International Operation of HSR)

1996 Thalys in between 4 countries ...

2000-: Birth in Asia

2004 KTX (Korea)

2007 HSR (Taiwan)

2008 HST (Beijin-Tienjin, China)

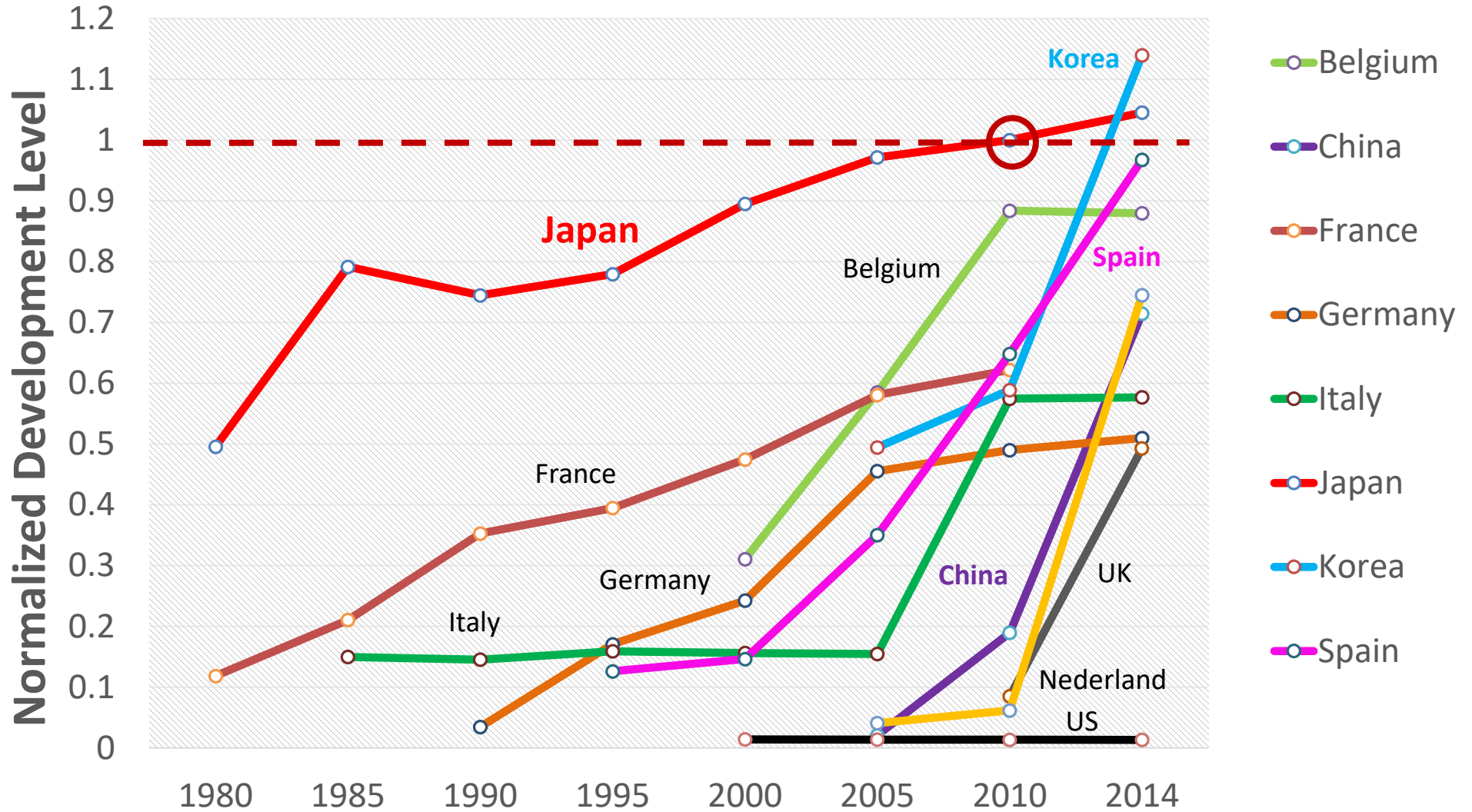
2010s: Hard Competition for New Markets of HSR

Normalized Development Level of HSR Network (1980-2014)

高速鉄道ネットワークの整備水準（延長）

(Japan in 2010 = 1)

by Ieda, Zhao Xi, et al. (2013, 2016)



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Types of HSR Development 高速鉄道整備の類型

Type 1: for **solving existing transport capability problems** in trunk lines

逼迫する輸送問題の解決を図る。

→ ex) Tokaido, Chuo-MagLev

Type 2: for **enhancing nation-wide economic growth** by improving passenger mobility along economically accumulated national land axes
国土の主軸(経済集積地)上の旅客移動速度を向上し国土全体の経済活力を増進する。

→ ex) Sanyo, Tohoku (south segment)

Type 3: for **promoting regional vitality in remote areas** by improving accessibility to/from there

僻遠地のアクセス性を向上し地方部の振興を図る。

→ ex) Joetsu, Hokuriku, Tohoku (north segment), Hokkaido, Kyushu

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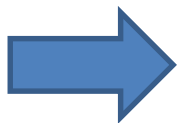
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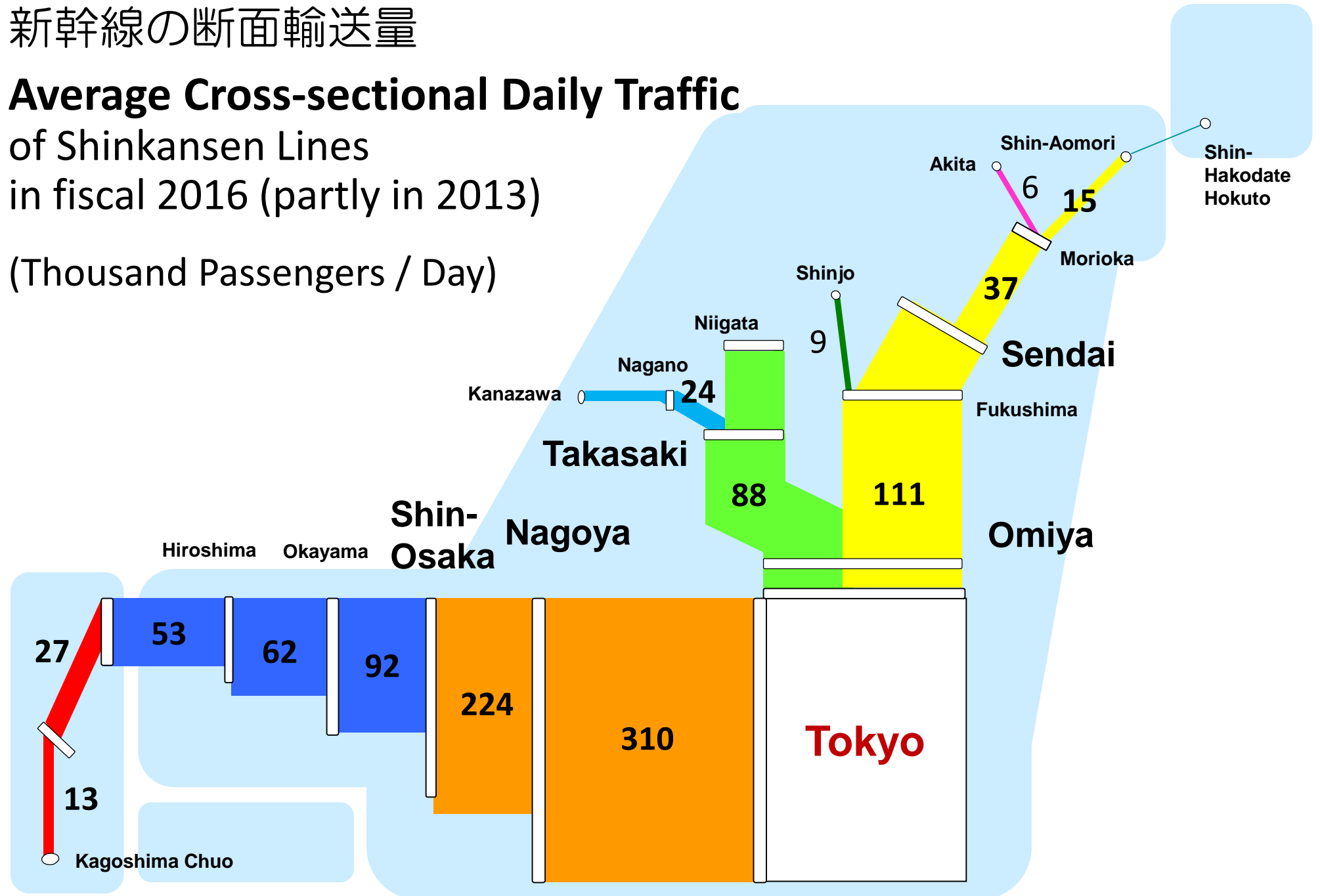


Organizational, Financial as well as Technical frameworks highly depend on these types.

新幹線の断面輸送量

Average Cross-sectional Daily Traffic of Shinkansen Lines in fiscal 2016 (partly in 2013)

(Thousand Passengers / Day)



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Diversity in Design Concept of HSR 基本コンセプトの多様性

- Separated system or Inter-operability ?
分離独立 or インターオペラビリティ
- Distributed power units or Concentrated power units ?
動力分散 or 動力集中
- Adhesion system or Non-Adhesion system ?
粘着鉄道 or 非粘着鉄道
- Regional transport or Long-distance transport ?
地域輸送重視 or 長距離輸送重視
- Structure-oriented track or Maintenance-oriented track ?
重構造軌道 or メンテナンス軌道
- Ordinary train-set or Articulated train-set ?
通常車両 or 連接車両
- Station Space: Pax. Stock-function or Pax. Flow-function ?
旅客を溜める機能重視 or 旅客を流す機能重視

..... etc.

Factors and Philosophy to Determine Design Concept

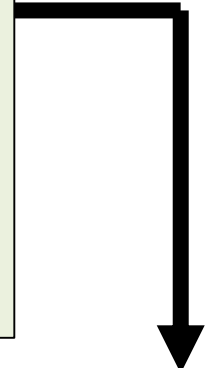
基本コンセプトを決める諸条件と計画思想

Surrounding Conditions 環境条件

- Geographic and Climatologic Factors 地形・気候条件
- **Demographic** and **Socio-Economic** Factors 人口・社会経済条件
- Technological Potential 技術的背景とポテンシャル
- Business and Industry Factors ビジネス環境
- Labor Factors 労働条件
- Factors about **Existing Railway System** 既存鉄道の状況
- **User** and **Transport Market** 利用者・交通市場の状況
- **Political** and **Financial** Factors 政治的・財政的状況

Philosophy / Value
Judgment of Planners and
the Society
理念・計画思想・価値観

Fundamentals
of HSR
高速鉄道の**基**
本コンセプト





Extraordinary Large Space in Shanghai **Hongqiao HSR Station**, China: Most space for pax. waiting

上海虹橋駅の広大な駅空間 ほとんどの空間が旅客の待合いスペースに充てられている。

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Japan National Railway
→
in 1987: Privatized and
spatially separated into 6
passenger and 1 freight
companies (JRs)

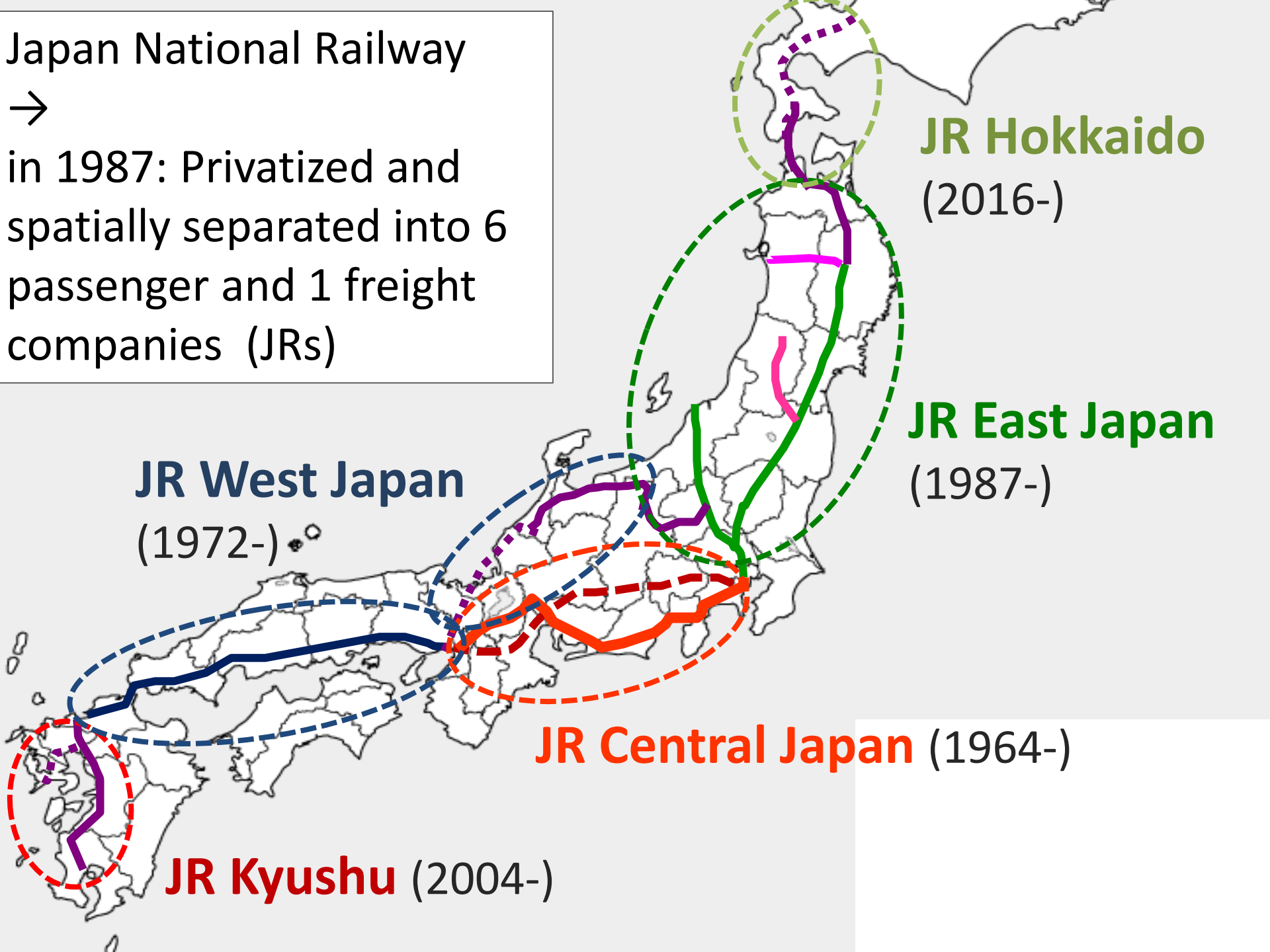
JR West Japan
(1972-)

JR Hokkaido
(2016-)

JR East Japan
(1987-)

JR Central Japan (1964-)

JR Kyushu (2004-)



Diversification in Management Policies of HST after the Regional Division / Privatization of Japan National Railways in 1987

国鉄分割民営化と新幹線のマネジメント方針の多様化

	<u>JR Kyushu</u>	<u>JR West</u>	<u>JR Central</u>	<u>JR East</u>
<i>Pax. Vol.</i>	Light	Middle	Extremely Heavy!	Heavy!
<i>Route</i>	← Simple Linear Line →		Tree-Shape Nwk	
<i>Train Sets</i>	← Several Types →		Extremely Standardized	Many Types (incl. Double Dck.)
<i>Econ. Seats</i>	← partly 4 rows →		← All 5 rows →	
<i>Aesthetic Design</i>	Extremely Good!	← not bad →		Good!
<i>Operation</i>	← simple →		very simple	varietied



Photo by Daretarō 11.05.04 大宮駅



↑ Tokaido and Sanyo Lines



↑ Tohoku and Joetsu Lines
← Hokuriku Line



Train-Set of Kyushu Shinkansen

A Swallow Icon

END

ご清聴ありがとうございました。