

International Research & Development (R&D)

PROF. DR. NORIFUMI KAWAI, MPIA (Pittsburgh)

Special Topics in Internationalization

Università degli Studi di Bergamo

Dipartimento di Scienze Aziendali

Bergamo, ITALY



■ What is 'R&D'?

- ❖ Basic research, applied research, product or process development.
- ❖ Research & Development (R&D).
- ❖ Research is often conducted in research institutes
- ❖ Development is often conducted in business divisions.

■ R&D Internationalization is slower than other activities!

- ❖ **Johanson & Vahle's (1977) Uppsala model:** Firm international expansion pattern = Exports → sales subsidiaries → production sites → R&D units.

❖ Why so late?

- Basic & applied R&D activities are **NOT** constrained by the market.
- The usual routine work is **NOT** clear.
- It is **difficult to transfer** superiority from the base in the home country.

Source: Oki (2017).



■ Activities from Development to Mass Production

Name of Activity	Contents
Basic Research	<u>Theoretical and experimental research</u> to gain new scientific knowledge that underlies products & processes.
Applied Research	<u>Research from practical use</u> rather than basic research. Of the knowledge discovered by basic research. There are many studies seeking practical application.
Product Development	Activities to <u>plan products, formulate specifications, & incorporate them into detailed design based on the results of basic and applied research.</u>
Product Prototype	Activities to <u>make products</u> according to the design created in product development & <u>check whether the products satisfy the functions.</u>
Process Development	Activities to <u>design a product line for a particular product model.</u>
Process Prototype	Activities to <u>actually create the process designed in process development</u> & <u>check whether the product can be made.</u>
Mass Production Start-Up	Activities to fine-tune the process to meet the cost & defect rate targets based on the designed process & bring it to mass production.
Mass Production	Activities to produce for customers.

Source: Oki (2017).



■ Key Functions Held by 293 Japanese Manufacturing Corporations that Mass-Produce in Southeast Asia

Activities Carried Out by Overseas Subsidiaries	Number of Overseas Subsidiaries Engaged in Activities	% of Overseas subsidiaries Engaged in Activities
Mass production start-up	265	90.40%
Process Improvement	236	80.50%
Process Development	183	62.50%
Product Improvement	145	49.50%
Product Development	55	18.80%
Basic Research	18	6.10%

❖ Mass production start-ups account for **90%** of the surveyed Japanese MNCs. However, **only 6%** of them get involved in **basic research activities**.

Source: Oki (2017).



■ Recently, the R&D Internationalization is Accelerating!

- ❖ **The period 2000-2010:** The number of overseas R&D bases of Japanese MNCs has expanded to **less than three times** (↑)
- ❖ **Toyota:** USA (1973 & 1977) → Europe (1987 & 1993),
→ Thailand, Australia, & China (2000 & later).
- ❖ **WHY do MNCs need to globalize their R&D Activities?**
 - To carry out R&D that meets local needs.
 - To obtain “knowledge & technology that can only be obtained in that country”. (**Example:** Establishment of a research institute on the west coast of the US, where IT human resources are abundant, promotion of joint research with well-known overseas universities, acquisition of overseas venture companies etc.)
 - Make up for the shortage of human resources on the home country-side.

Source: Oki (2017).



■ Overseas R&D Units: Kuemmerle's (1999) HBE vs. HBA

❖ HBE-Oriented Overseas R&D Units

- **Demand factor:** Responses to customers' interests & demands.
- Introduced superior technology from the base in the home country & utilized it in a form tailored to the local area.
- Close collaboration within local subsidiaries & MNCs is important.
- **Example:** Panasonic China Life Research Center (Mainly local staff except the director).
 - ◆ Collect information by conducting group interviews, home visit surveys, & relevant surveys.
 - ◆ Planning a “tanning drum type washing machine with a sterilization function” (Understanding that local people are sensitive to viruses).
 - ◆ **Panasonic washing machine share** = 3% (2007) → 18% (2008).

Source: Oki (2017).



■ Overseas R&D Units: Kuemmerle's (1999) HBE vs. HBA

❖ HBA-Oriented Overseas R&D Units

- **Supply factor:** Acquire knowledge & technology that are difficult to obtain in the home country in overseas markets.
- **Knowledge cluster:** Industry, universities, & governments.
- Entering the local research community by having a local R&D base → Absorption of tacit knowledge is possible.
- **Example:** TOYOTA RESEARCH INSTITUTE INC – **AI Research**
 - ◆ Toyota established in January 2016 in **Silicon Valley, USA**.
 - ◆ An urgent need to accumulate knowledge & technology related to AI for Toyota aiming to develop self-driving cars.
 - ◆ Close collaboration with **Stanford University**.
 - ◆ **Head of TRI:** Gil Bratt, a leader in robotics & AI research who directed robot projects at the Defense Advanced Research Projects Agency of the US Department of Defense.

Source: Oki (2017).



■ What Determines the Location of Foreign R&D Centers?

- ❖ Agglomeration of corporate R&D centers;
- ❖ Agglomeration of research units by local universities & governmental organizations;
- ❖ Agglomeration of suppliers of parts & materials;
- ❖ Market size & growth;
- ❖ Distance between strategic units in the MNC networks;
- ❖ Costs of factor endowments; &
- ❖ The level of intellectual property rights protection.

Source: Oki (2017).



■ Internationalization of R&D in China & India

	Myth	Reality
Learning from abroad	Advanced technology comes from the West; India and China are adopters of the Western technologies	Not always. Joint collaboration with the Western companies is rapidly increasing in quantity, both in India and in China
Low cost technology development	Technology development in India and China is very cheap	Not always. Especially in China, overcoming the difference in custom and standard is sometimes even more costly
Role of repatriates	The returnees from the West with higher education and excellent working experiences play a major role in enhancing the technological standard and entrepreneurial spirits in India and China	Not always. The role of the repatriates is quite important in both countries, but also sometimes exaggerated. In both China and India, repatriates also include second-class scientists and engineers who cannot survive in the US. In China, local managers complain that even low-quality repatriate engineers often demand high salaries

Source: Asakawa & Som (2008).



■ Internationalization of R&D in China & India

	Myth	Reality
Standardization	China is more interested in setting its own local standard rather than conforming to the international standard	Not always. China is increasingly interested in participating in setting both local original and international standard.
Only for local innovation	The purpose for conducting R&D in Asia is only for local adaptation rather than global innovation	Not always. There are quite a few examples of global innovation originated from R&D in India and China. For example, just to name a few, Adobe's PageMaker 7.0 was entirely developed in India by Indian staff and is widely used in the entire world. As for China, Nokia's N2100 and N6108 were developed locally and introduced to the global market

Source: Asakawa & Som (2008)..



■ Changes in the Balance between Autonomy & Information Connectivity in Overseas R&D Units

❖ Autonomy

- Decision-making power (Selection of research projects, budgeting plans, selection of equipment, recruitment, performance evaluation & promotion of researchers, decision to team up with counterparts etc.)

❖ Control

- Power to promote technology transfer from the home country & other countries & to decide the strategic direction of research topics.

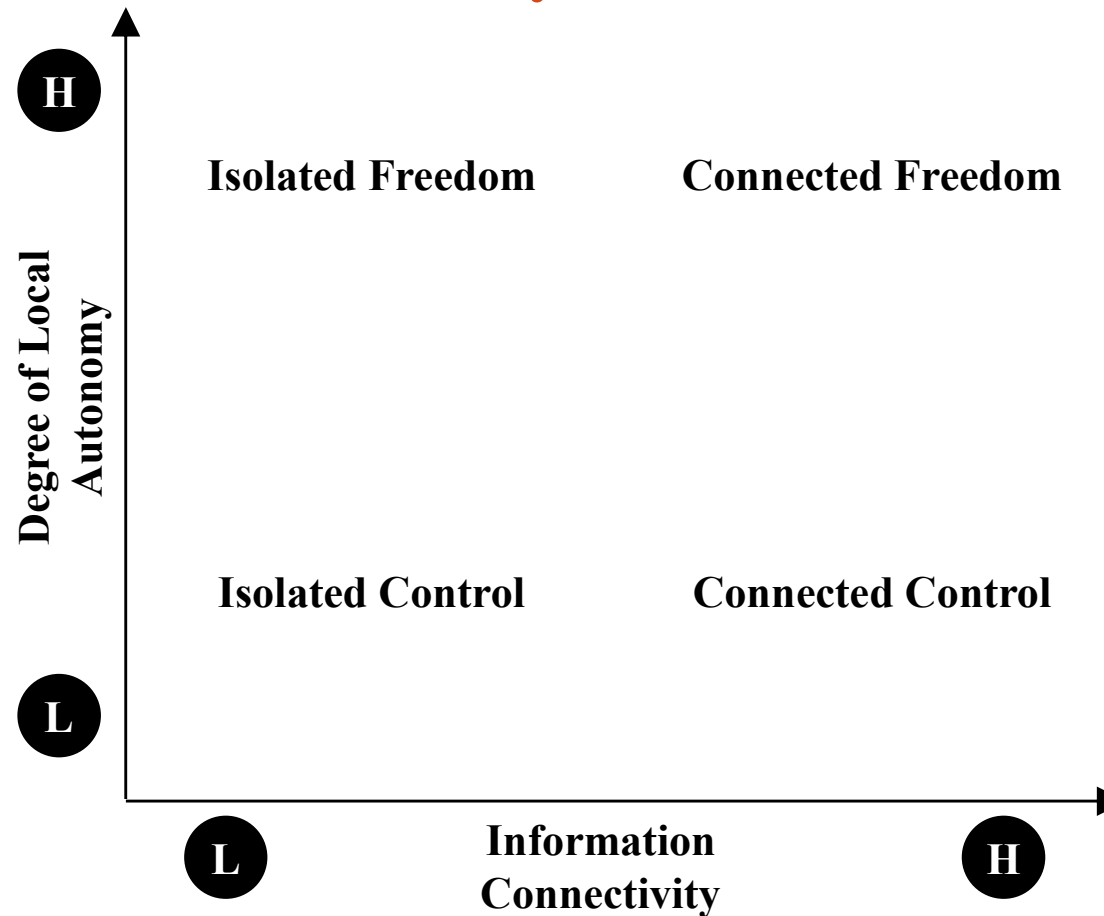
❖ KEY POINTS

- The parent company needs to keep the balance between autonomy & control. **Asakawa's (2001)** paper published in *Research Policy* discusses the dynamic change in this balance depending on the role of foreign subsidiaries → **3 possible stages.**

Source: Oki (2017).



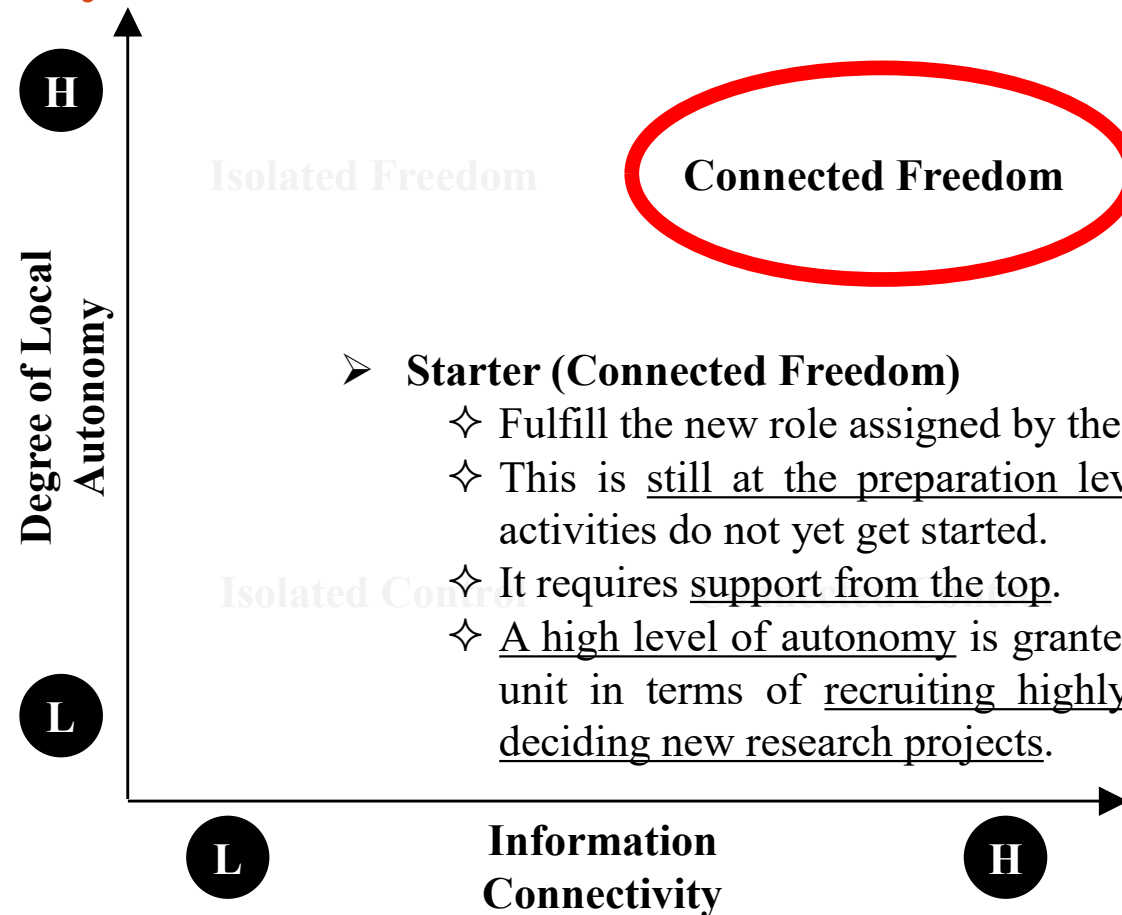
■ Typology of Overseas R&D Units from a View of the Balance between Autonomy & Information Connectivity



Source: Asakawa (2001).



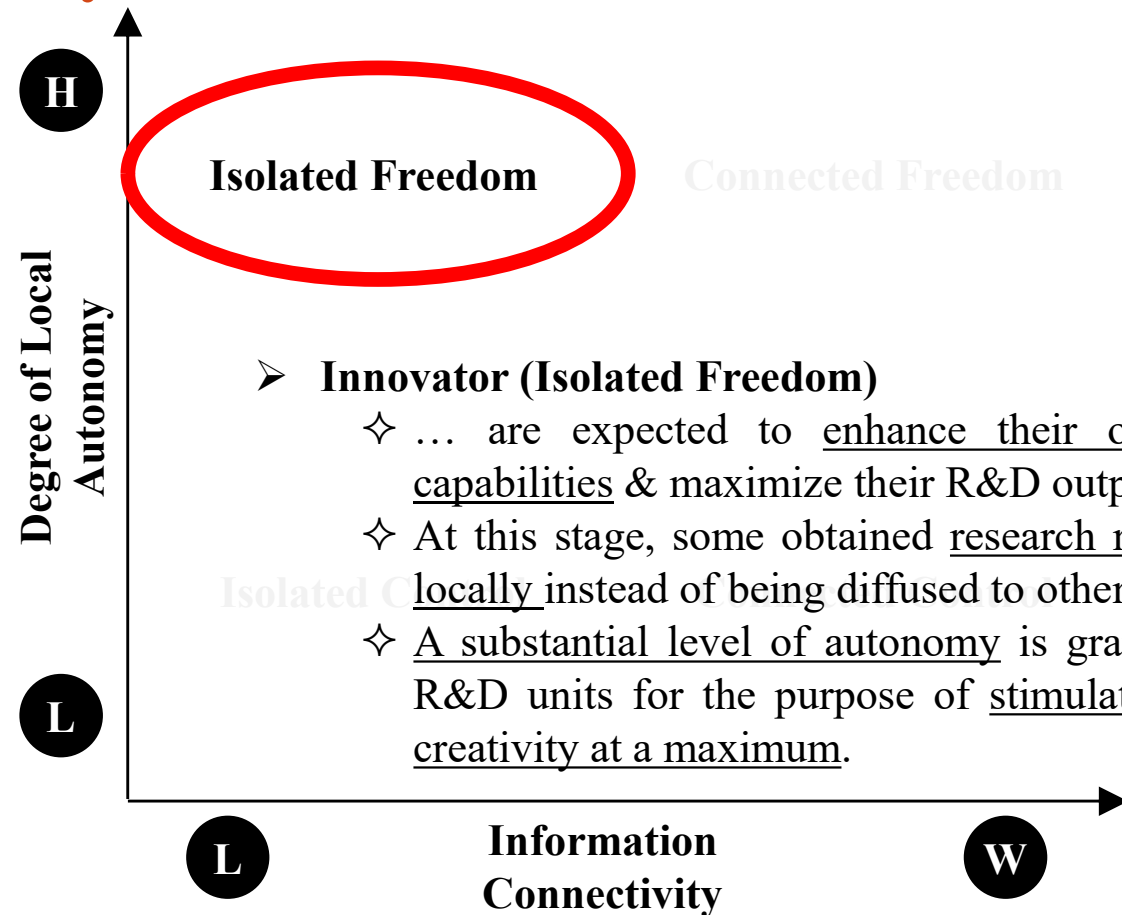
■ Changes in the Balance between Autonomy & Information Connectivity in Overseas R&D Units



Source: Asakawa (2001).



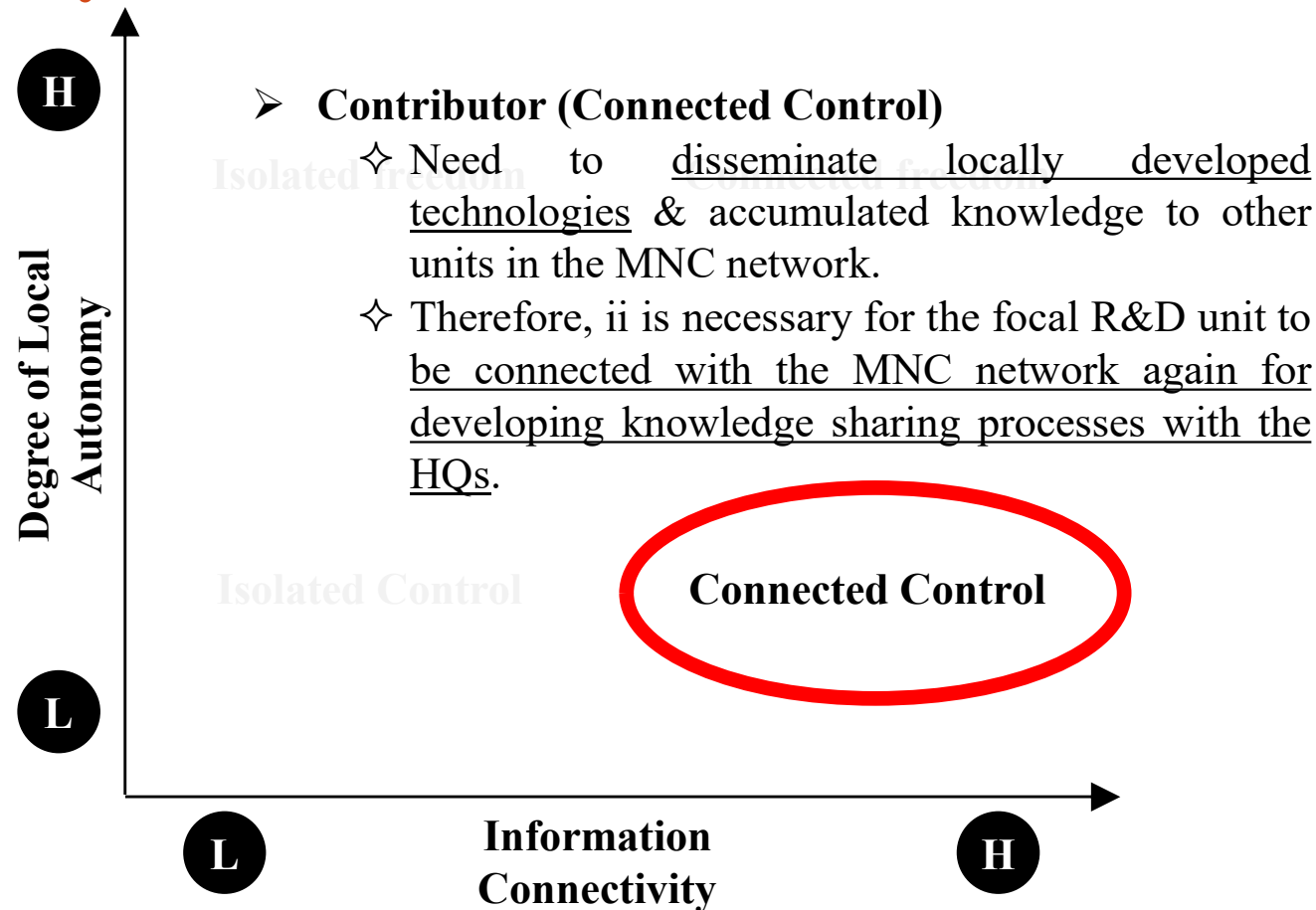
■ Changes in the Balance between Autonomy & Information Connectivity in Overseas R&D Units



Source: Asakawa (2001).



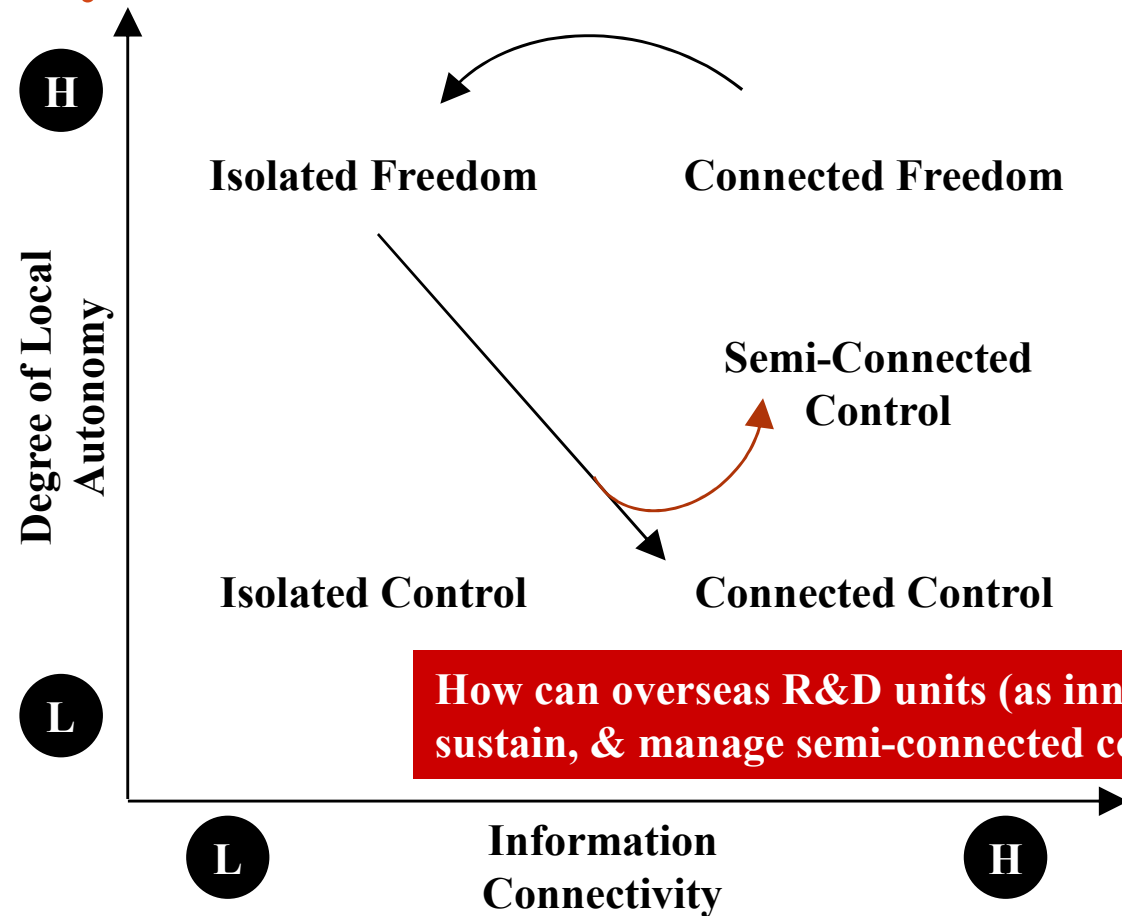
■ Changes in the Balance between Autonomy & Information Connectivity in Overseas R&D Units



Source: Asakawa (2001).



■ Changes in the Balance between Autonomy & Information Connectivity in Overseas R&D Units



How can overseas R&D units (as innovators) gain, sustain, & manage semi-connected control?

Source: Asakawa (2001).

The End of Today's Lecture



ご清聴有難う御座いました。

Thank you so much!

Merci beaucoup !

Vielen Dank für Ihre Aufmerksamkeit!

Grazie mille !

【Contact Address】

ADDRESS: 208 in Via dei Caniana 2, 24127 Bergamo, ITALY

E-mail: norifumi.kawai@unibg.it