



Enabling Multilingual Collaboration through Machine Translation

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IT@Intel

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Intel Corporation:

The World's Largest Semiconductor Manufacturer

Leading Manufacturer of Computer, Networking & Communications Products

- 166 Sites and 579 Buildings in 63 Countries
- \$54B in Annual Revenues from Customers in Over 120 Countries
- 25 Consecutive Years of Positive Net Income
- Over 100,000 Employees
- 80,000 technical roles, 10,400 Masters in Science, 5,200 PhD's, 4,000 MBA's
- One of the Top Ten Most Valuable Brands in the World for 11 Consecutive Years
- Ranked #46 on Fortune's 100 Best Companies to Work For List
- Invests \$100 Million Each Year in Education Across More than 70 Countries
- The Single-Largest Voluntary Purchaser of Green Power in the United States
- More than One Million Hours of Volunteer Service in Our Communities in 2011

Intel IT Vital Statistics



6,400 IT employees
54 global sites

91,500 Intel employees[†]
164 sites, 62 countries

69 Data Centers
~75,000 servers

> 138,000 Devices
> 109K PCs (80%+ mobile)
> 29,000 Handhelds (58% BYO)



Source: Information provided by Intel IT as of Jan 2012.

[†] does not include wholly owned subsidiaries that Intel IT does not directly support

Agenda

Objective and Business Drivers

Multilingual Chat using Machine Translation

Machine Translation in Community Forums

Conclusions

Vision, Objective and Business Drivers

- **Vision**

- Enable people who speak different languages to communicate and collaborate with each other - improving overall customer experience and support efficiency

- **Objective**

- Research quality, performance, and usability of using machine translation to deliver multilingual interaction in chat and community forums

- **Business Drivers**

- Effective contact-center and online-sales center efficiencies require tools and methods that reduce costs as well as increase customer reach, satisfaction, and loyalty
- Follow-the-Sun support model presents challenges when using chat tools to deliver seamless 24-hour, around-the-clock support and sales contact – ideally in the customer's native language
- Reduce transaction costs (email and phone more expensive)
- Dual-skilled (language and technology) support resources are more expensive, and relatively scarce

MT in Customer Support Chat



MT/Chat Proof of Concept - Overview

Objective

- Proof-of-concept using machine translated chat to enable multilingual interaction for support agents and sales subject matter experts to service customers who don't speak English

Design

- MT integrated with chat application to deliver multilingual chat
- Three prototypes using different MT systems, but the same chat application

Methodology

- Used Intel call center agents to simulate agent-to-customer chats
- English <-> Spanish (Latin America) and English <-> Simplified Chinese
- 8 different chat scenarios, 4000 chats
 - 2 agent teams per language pair
- Evaluation criteria included
 - Human evaluation of multilingual chat
 - Translation quality, usability, performance
 - Data analysis
- Regular Intel translation QA evaluation used as a baseline for comparison

Success Criteria and Challenges

Success criteria

- Be accessible – anytime, anywhere – in the customer's native language
- Improve the online experience
- Improve support team efficiency while engaging with non-English speaking customers
- Meet Intel's translation and usability standards
- Integrate into the existing online support infrastructure used by customers
- Provide a solution that could scale across the business

Challenges with MT / Chat

- Lack of multilingual chat corpora for MT training
- People use short-cuts and abbreviations (F2F = face-to-face, k = okay, etc.)
- Typos and misspellings are common
- Chat communication is fast paced
- Agents often handling multiple chats at the same time – difficult and potentially distracting environment

Multilingual Chat Prototype

Dual language display for Translation

Please wait for a site operator to respond.

Translation: [Por favor, espere un operador del sitio responder.]

(DEV Only)You are now chatting with 'ryanm'

Translation: [(Sólo DEV)Ahora que está conversando con 'ryanm']

(DEV Only)you: Ryan
Translation: [Ryan]

(DEV Only)you: Hola
Translation: [Hello]

(DEV Only)ryanm: Hello. How are you?
Translation: [Hola. ¿Cómo estás?]

(DEV Only)you: Bien. Tengo una pregunta muy fácil.
Translation: [Not bad. I have a very easy question.]

(DEV Only)ryanm: OK
Translation: [Vale]

La ventilador no gira.

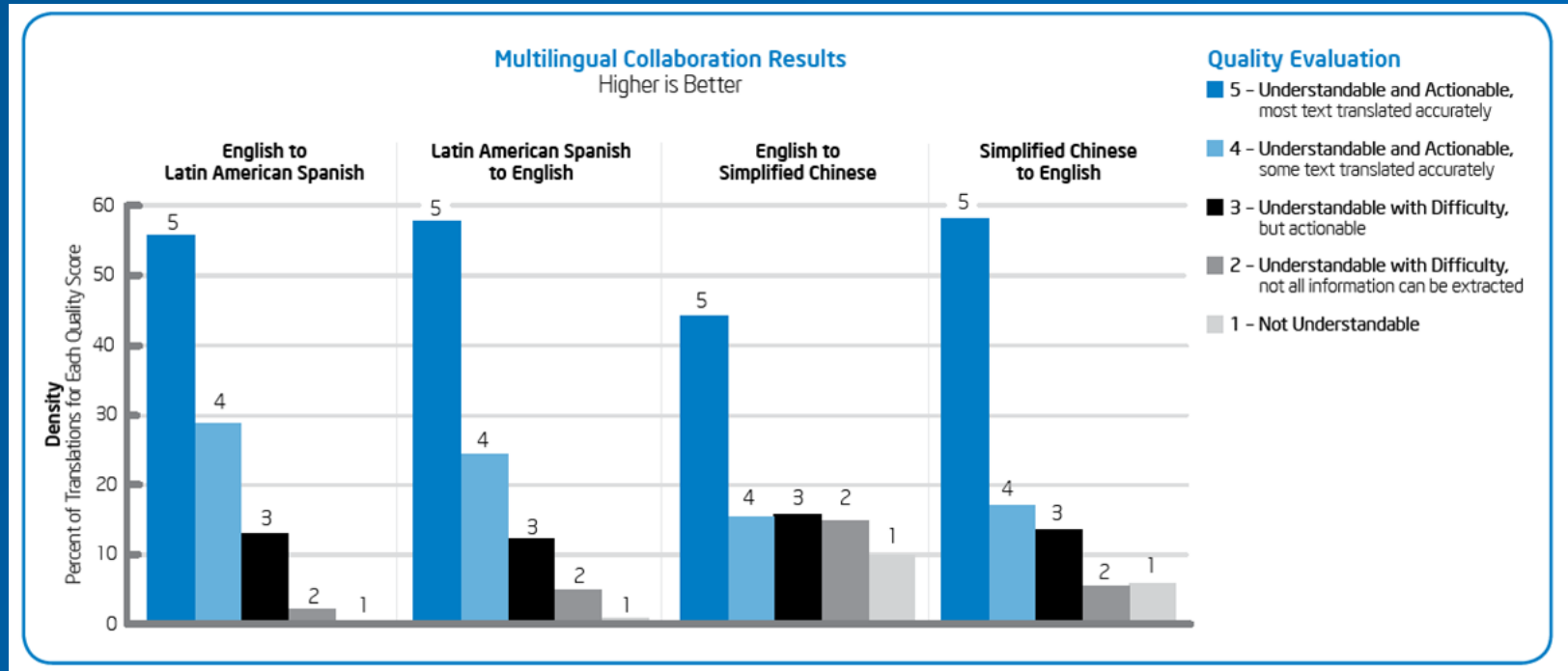
Request a different translation.

[Language](#) [Translation Preview](#) [Tools](#)

Translation: The fan does not turn.
Reverse: El ventilador no gira.

Preview/Reverse translation

MT/Chat POC Results – Quality scores



Results showed that multilingual collaboration in real-time chat provides reasonable translation quality

MT Chat Results and Conclusions

- Chats were understandable and actionable, and useful in finding answers and solutions for customers
- Users typically like seeing both source and translation in the chat window, and preferred having both preview and reverse
- Little or no observed delay to the chat flow caused by machine translation
- Quality varied by language pair, but using domain specific and translated chat data to train the MT increased chat quality
- Mistranslations were often because of shorter (idiomatic) sentences without technical context – asking for clarification or rewording increased success

Results showed that multilingual collaboration in real-time chat provides reasonable translation quality and allows customers to communicate in their own language

MT in Community Forums



Vision: Transform Intel community Forums to multilingual communities

Remove the language barrier, enable people to read all community posts, regardless of the source language, make comments in their native language, and to collaborate with community members from different parts of the world

Today	Future
Community members can interact only in one language; global customers can't participate in forum discussion using their native language	Increase interaction by enabling multilingual discussions, where anyone coming to the community can participate using their native language
Content is separated by different communities	Enable greater collaboration and sharing with all content in one community
Intel support community is available only in English and simplified Chinese	Build a single global community where more than one language can conveniently be added over time
Community support bounded and limited by time zones	Community support can be extended across time zones
Difficult to support Intel customers equally on a global scale	Increase ability to support global customers with the same standards

MT in Community Forums POC - Overview

Objective

- Research quality, performance and usability of using MT to deliver multilingual collaboration capability for both Support and other Intel communities

Design

- Integrate MT into Intel Community platform
- Seamless integration with a “Translate” button next to the “response” button
- To translate a post, the user selects “Translate” and chooses a language from the drop down list, and the MT system then translates the post

Methodology

- Test and evaluate MT solution using dialogue from a pre-selected community environment
- 10 sample interactions in English, each ranging from 5-17 individual exchanges
- Assembled bidirectional language pair evaluations using English as source, for four target languages – French, German, Latin American Spanish and simplified Chinese
- Repeated process using French, German and Brazilian Portuguese as source languages, using MT to translate back to English

MT/Forum - Success Criteria

- Integrate with the current community look and feel, which is familiar to community members, and be easy to use and intuitive
- Encourage communication between community managers and participants in their languages that represent the regions responsible for the majority of Intel's revenue
- Display the translation side-by-side with the original text to enhance usability and instil user confidence
- Demonstrate potential to improve the online customer experience
- Meet Intel's translation quality and usability standards
- Provide a solution that could scale across the business

POC met success criteria; production Beta developed

MT/Forum Beta Production System

Currently running Live beta version for a 6 month trial on the live support forum

The image displays three overlapping screenshots of the Intel Communities forum interface. The top-left screenshot shows a thread titled "Intel(R) HD Graphics (Microsoft Corporation - WDDM 1.1) con Windows 8 Release Preview, como puedo actualizar los drivers?". The thread is in Spanish and includes a question from user Alonzo, a response from Robert_U, and a translation widget. The top-right screenshot shows the same thread with a translation of the question into English. The bottom screenshot shows the thread with a translation of the answer into English. The interface includes a search bar, navigation tabs, and a footer with the Intel logo and "IT@Intel" branding.

<http://communities.intel.com/community/tech>

Conclusions

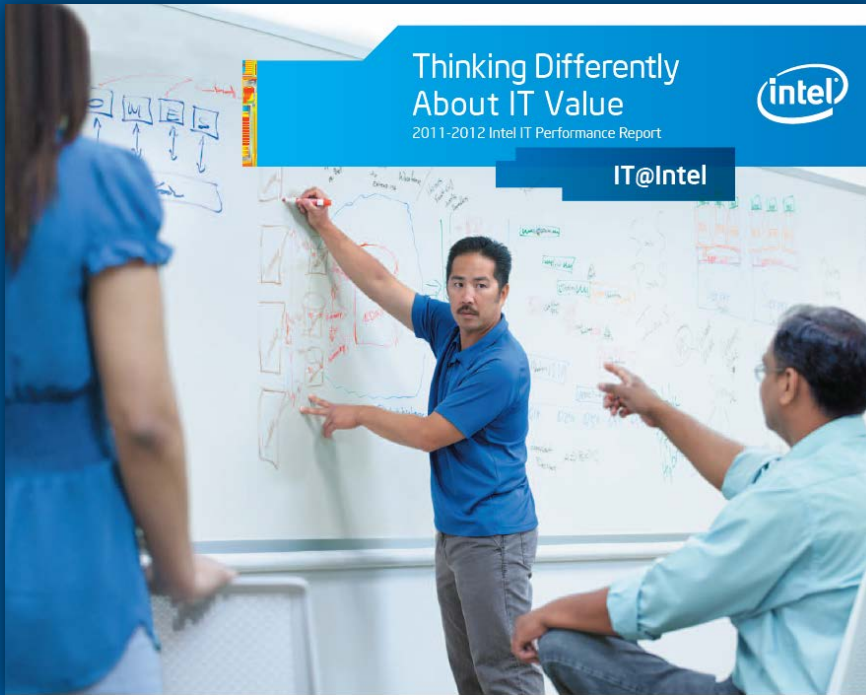
Both projects provided reasonable quality in bi-directional translations for selected languages

As a result of this research we anticipate a future MT solution will deliver the following benefits:

- Make information easier to access
- Increase our reach to existing and new customers no matter where they live by eliminating language barriers
- Improve the way we connect and empower our employees and customers online
- Make the online support environment more collaborative and easier to use
- Reduce support costs or avoid them
- Add value across our entire corporation in areas where multilingual collaboration is required to drive solution innovations, business partnerships and revenue

IT@Intel

Sharing Intel IT Best Practices with the World



Thinking Differently
About IT Value
2011-2012 Intel IT Performance Report



IT@Intel

IT@Intel White Paper
IT Best Practices: Program Productivity and IT Innovation
January 2011

Enabling Global Collaboration with Intel®-based Infrastructure

Executive Overview

With access to advanced collaboration tools deployed on Intel®-based infrastructure, Intel employees can easily and instantaneously share data, brainstorm new ideas, and work safely and collaboratively with team members and Intel's business partners around the world.

The collaboration tools we support are complex, those that assist in personal productivity, and those that assist in business operations. Personal productivity tools include email, calendar, and collaboration. Business operations tools include customer relationship management, sales and marketing, and financial. These tools are used to support Intel's global operations, including sales, marketing, and financial. Intel's global operations are supported by Intel's infrastructure.

Global Business Productivity
Global Business Productivity enables users to work more effectively and efficiently. Key elements of these strategies include:

- Accelerating time to market to take advantage of performance and power efficiency improvements.
- Consolidating and virtualizing our server resources.
- Utilizing facilities to improve facilities capacity, utilization, and energy efficiency.
- Adding capacity to existing capacity to support new data centers in aggregation sites where possible.
- Ensuring new centers enhance flexibility and financial value.

Next Section
Strategy: Financial Analysts, Intel IT
Strategy: A Global Server Data Center Analysis, Intel IT
Strategy: Virtualization
Strategy: Project Progress, Intel IT
Strategy: Project Progress, Intel IT
Strategy: Project Progress, Intel IT
Strategy: Project Progress, Intel IT
Strategy: Project Progress, Intel IT

IT@Intel White Paper
Intel Information Technology
Data Center Efficiency
September 2008

Intel IT Data Center Solutions: Strategies to Improve Efficiency

Executive Overview

Over time, Intel IT has evolved our strategies to optimize our data center infrastructure to respond faster to business needs while enhancing the services and value it brings to the business. Our new data center strategies shift the emphasis away from reducing the number of physical data center facilities to, instead, focusing on approaches that leverage the full potential of our data centers worldwide. This helps increase business value across the entire data center infrastructure. We expect our efforts to achieve a combined cost savings of about USD 1 billion by 2014.

Our approach centers on three strategies: optimization, utilization, and energy efficiency. The key elements of these strategies include:

- Optimizing IaaS configurations to substitute for localized data center capacity and to support remote data center services.
- Sustaining the server storage solution in the high-performance computing (HPC) era.

Our strategies are already yielding results. For example, from 2008 to 2009, the increased use of automation tools, such as automation and an enhanced, reduced data center facility, capital investment by 85 percent.

Our long-term planning process will help us continue to drive broader efficiencies across the data center environment as well as respond faster to business needs, which in turn enhances the services and value that IT brings to the business.

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Thank You

