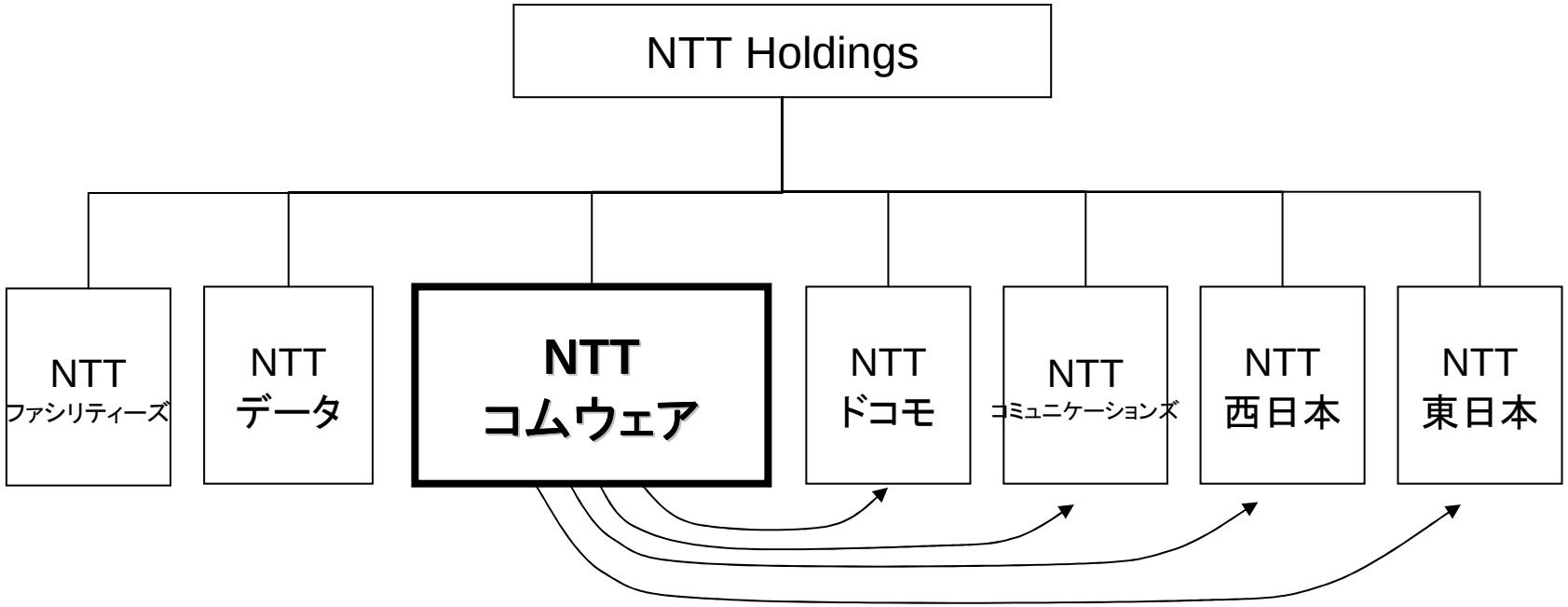
NTTコムウェア研究開発部とMIT Media Lab Tangible Media Group (TMG) との共同研究

- Tangible IP Network Designer -

2003/11/19

NTTコムウェア 研究開発部

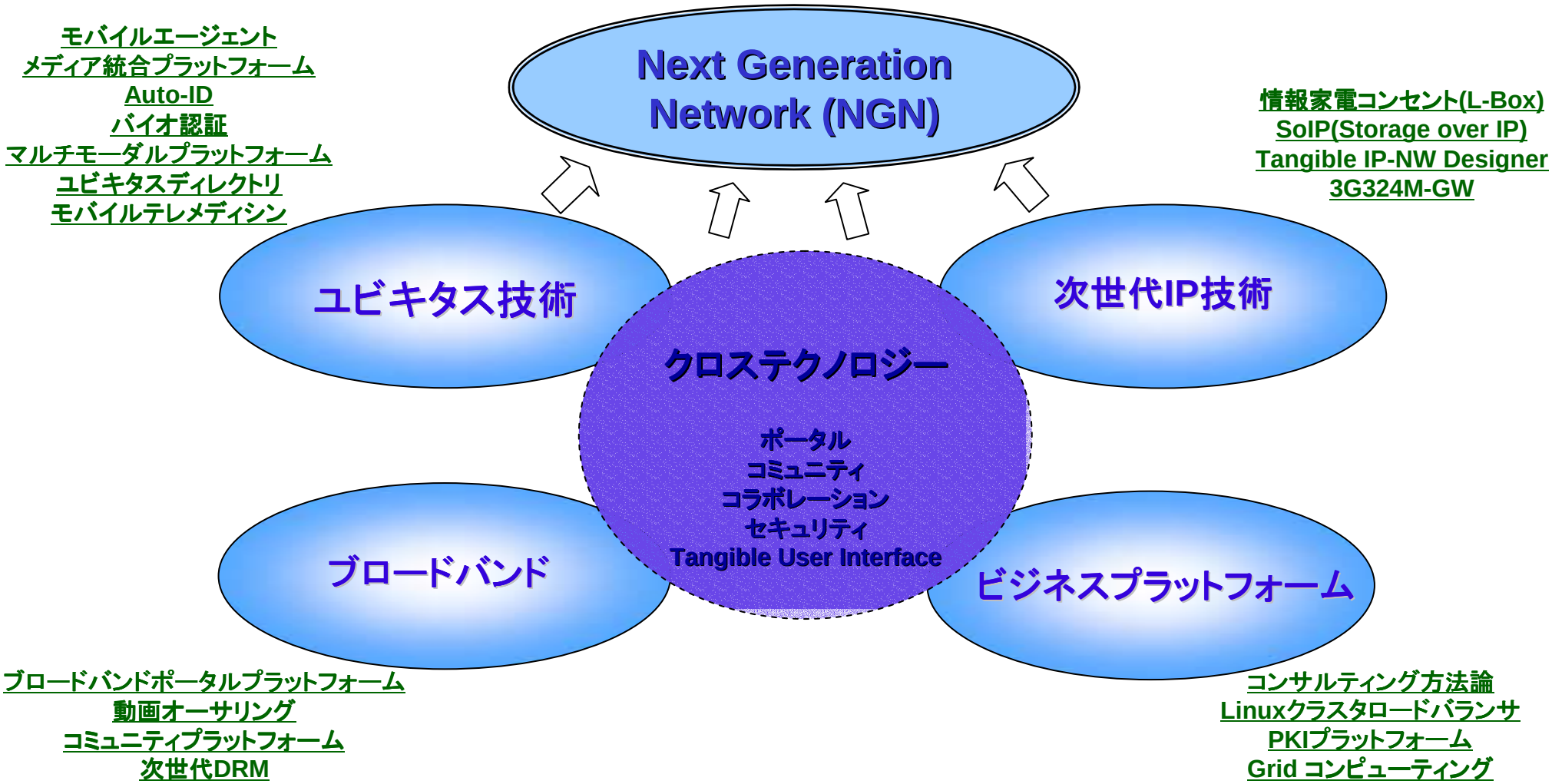
NTTグループにおけるNTTコムウェア



- NTTコムウェアはNTTのソフトウェア開発部門が分社化されて設立されました。
- NTTグループの8つの主要子会社の1つです。
- NTTコムウェアは、NTT東、NTT西、NTTコミュニケーションズ、NTTドコモのようなキャリアへネットワーク関連システムやITシステムを提供しています。

NTT Comware の研究開発ビジョン

研究開発部では、ユビキタス技術・ブロードバンド技術・次世代IP技術・ビジネスプラットフォーム技術の４つの
コアテクノロジーを中心に取り組むと共に、ビジネスオリエンテッドなクロステクノロジーにも積極的に取り組んでいます。



NGN の要素技術

- NTT コムウェア研究開発部では、以下の表にあるようなNGNに必須となる要素技術の開発を行っています。
- NGNのネットワークマネジメント技術への最も重要なアプローチがTangible IP Network Designerです。
- Tangible IP Network Designerは、IPネットワーク設計とIPネットワーク監視業務の双方をサポートします。

Area	NGN Technologies
ネットワークインフラ	EoMPLS, Mobile-IP, IPv6, IP over Optical, Mobile NW rating technology
ディレクトリサービス	ユビキタスディレクトリ, ENUM, SIP over NAT/FW
ユビキタスプラットフォーム	コミュニケーションサーバ, 情報家電コンセント, 3G324M-GW, Media Conversion, 無線LAN位置情報, セキュリティ
ネットワークマネジメント	Tangible IP Network Designer

Tangible IP-NW Designer

Tangible IP-NW Designer は、NTTコムウェアのIP-NWシミュレータとMIT Media Lab.TMGのセンステーブルとの融合によって生まれました。

Next generation UI - TUI & Integrated UI

TUI

- TUIは次世代ユーザインターフェイス（UI)のキーテクノロジー。
- UIテクノロジーは、CUIからGUIへ、さらにTUIへと進化する。

Integrated UI

- 用途に応じた様々なUIを統合するIntegrated UIの考え方、これからのビジネスアプリケーションにも効果的。
- Tangible IP-NW Designerはコンサルティングには TUIであるセンステーブルを、設計にはLCDタブレットとデジタルペンを、運用には3Dテクノロジーをと、業務に応じた最適なUIを採用。

Collaboration with MIT Media Lab TMG

- 2002.8 TMGとのコラボレーションを開始
- 現在も1名の研究員が常駐

Tangible IP Network Designer の開発経緯

第1フェーズ

イベントドリブンに基づくIPネットワークシミュレータを開発し、TMGのセンステーブルと統合。

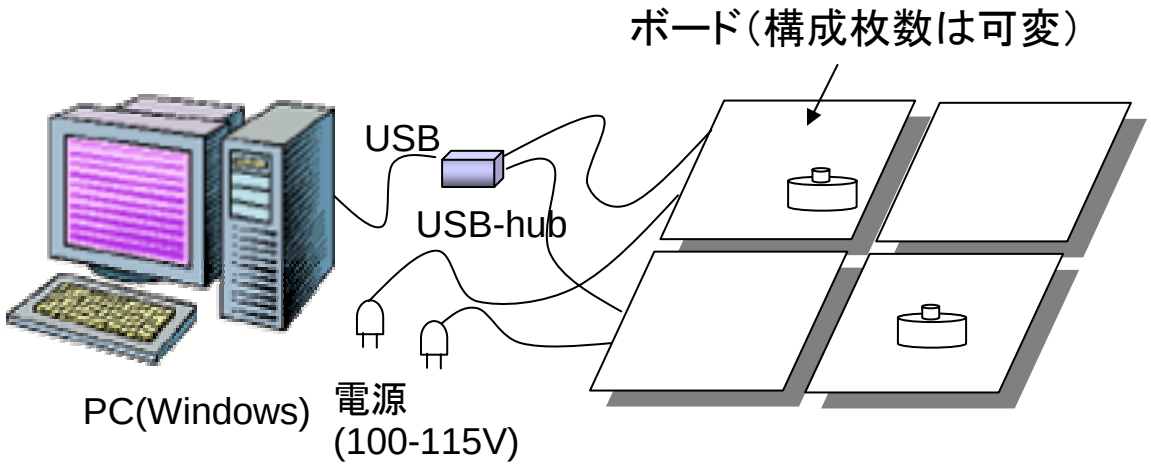
第2フェーズ

より協調的な設計作業ができるようシミュレータを改良し、また、没入感を生み出すドーム型の3Dディスプレイとの融合。

第3フェーズ

現在、石井教授とTMGスタッフの協力を得て、コムウェア版センステーブルを開発。3次元裸眼立体視ディスプレイ、3次元入力装置、LCDタブレット、デジタルペン（Anotoペン）とともに融合。

NTTコムウェア版 Sensetable



- ボード(30cmx40cm)を複数枚結合することで拡張性を実現。
- トラッキング：同時に直径40mmのパックを10個同時にトラッキング可能。

3D表示技術の評価

“3D”は次世代UIのキーテクノロジーのひとつとなりえる可能性を秘めています。
研究開発部では2種類の3Dディスプレイを評価しています。

- 没入感のあるドーム型ディスプレイ
- 立体視3Dディスプレイ（PCグリッドを使ったリアルタイムレンダリングによる）

ドーム型 3D ディスプレイ

立体視 3D ディスプレイ

IP-NW Designer on Business Week

Science & Technology Computers

It Only Looks Like Child's Play

Can MIT replace keyboards with pinwheels, globes, and what resembles a hockey game?

IT WOULD BE EASY TO MISTAKE Hiroshi Ishii's lab at Massachusetts Institute of Technology for a day-care center after all the toddlers have scampered through. Listless pinwheels hang above a cubicle. A sandbox sports a huge crater, as if Big Foot had visited. Projections dangle from the ceiling at precarious angles, and small wooden houses lie strewn across tables.

These seeming remnants of child's play are, in fact, the tools of a very adult quest to forge a new frontier in computing. For the past eight years, the 45-year-old, Japanese-born Ishii has been striving to liberate society from the tyranny of computer keyboards, monitors, and mice by creating new ways for humans to view and manipulate data. A silicon-enhanced pinwheel turning furiously, for instance, might warn a data-center manager that a network is nearing overload. Or homebuilders might mold sensor-laden sand into different shapes and patterns on a table to evaluate drainage in an area targeted for development. Microprocessors would still be running software models to crunch the data—but users would never have to touch a keyboard. "We're inventing a new medium," says Ishii. It looks nothing like the windows, icons, and pull-down menus that make up today's graphical user interface. "But in certain areas, like teaching or design," Ishii declares, "our interface is superior."

REAL-WORLD TEST

A DECADE AGO, a handful of evangelists like Ishii talked about "tangible" computer interfaces that could engage the user in a more physical way. In 1995, Ishii's Tangible Media Group was created to do just that. And while the science on display here sometimes appears fanciful, this isn't a playpen where engineers can indulge their every digital whim. The research is grounded in the real world, and it has attracted investment from companies such as Intel, furniture maker Steelcase, and Japanese telecom colossus Nippon Telegraph & Telephone. The lab brings togeth-

Data Workbench Want to upgrade your company's computer network—or redesign it from scratch? This "sensetable" has a built-in antenna that reads what's happening to objects on the table representing network routers, storage systems, mail servers, and the like. The data are transmitted to a computer that instantly remodels the network and projects the new design. Additional information about the cost and capacity of the upgraded network is displayed on screens.

er teams from industry and academia, and the ideas have plenty of support outside the Media Lab. "We ought to use the power of computing to get the technology the hell out of the way," says John Seely Brown, the former director of Palo Alto Research Center, which did similar work in the 1990s.

Ishii's journey toward tangible computing hinged on one critical encounter. As a researcher at NTT in the late 1980s and early '90s, he worked on souped-up videoconferencing systems. In 1994, he presented his work at a conference, and MIT Media Lab co-founder Nicholas Negroponte heard him speak. Right away, says Ishii, "he challenged me to stop my previous work. He doesn't like incremental things. He said 'life is short.'" It took Ishii about 10 minutes to make up his mind. Just a year later, he moved to Cambridge, Mass., and quickly started making his mark in the area of next-generation interfaces.

Now, Ishii is getting a chance to test-drive one of his most talked-about gizmos. Called IP Network Design Workbench, it aims to make it easier for engineers and nontechnical execs to collaborate in designing telecom and computer networks. It does this by letting team members sit around a "sensetable" and rejigger components of the network—routers, servers, storage systems, fiber optic pipes, and the like—and examine the results of their experiments in real time.

The project's sponsor, an NTT unit called NTT Comware, is counting on the workbench to help recruit new network customers outside NTT's family of companies. Running a data network with 60 million subscribers is a $3 billion-a-year business for Comware. But to grow, it wants to design and sell Web-based networks—from virtual private networks to entire telecom systems—to other companies and government agencies. "Within NTT, it's easy to communicate what a network is," says Kunihiko Tanaka, a Comware general manager based in Cambridge, Mass. "Outside, we have to explain."

How will the table help? The power is all in the user interface. A big-ticket purchase like a network—or even a network upgrade—often requires an O.K. from a company's chief financial officer, CIO, or both. These execs typically aren't comfortable using computer-aided design programs running on workstations to grasp the merits of what they're buying. Tanaka thinks that if the customer can sit at a table with Comware engineers and see how changing the number or location of network routers and servers will affect performance and costs, they'll be able to settle quickly on a design and close the sale.

IMMEDIATE IMPACT

RIGHT NOW, THE demo table at MIT displays a relatively simple configuration of switches and computers typical of a small office. A video projector above shines a network design onto a 2-foot-by-3-foot white table. An antenna embedded in the table can track the movement and placement of electronically charged objects, resembling small hockey pucks, that slide over the table surface. Using the pucks, Tanaka can shift icons projected onto the table to change the network configuration. He might, say, add an e-mail server or upgrade switches and routers. In a flash, the computer that drives this simulation reconfigures the network, and the picture and additional displays adjust to tell the user two things: how far the upgrade will go to meet expanded requirements and whether it can all happen within budget.

The software involved in this simulation isn't so different from the programs that run on a workstation. Based on input from the table, a program crunches the numbers and relays the new set-

Music Genie in a Bottle Receivers embedded in the necks of these bottles let them pick up programmed music from the sensetable and then play it when a stopper is pulled. Care for a carafe of Embraceable You?

Urban Design Some sensetables can work with mockups of buildings to help urban planners see how the placement of new structures will affect airflow and light over time. Other tables would let landscape architects sculpt models in clay and capture the 3D geometry through laser scanning.

Conclusion

- TUIはコラボレーションを必要とする作業を効果的に実現します。
- 今後は Integrated UI 技術がビジネスアプリケーションのユーザインタフェースのキーになる。
- TUIは、IP網設計だけでなく、その他の様々なアプリケーションに適用することができます。
- 来年発表予定のビジネスプロセス分析の新たなアプリケーションにご期待ください！

Acknowledgments

MIT Media Lab TMG

Prof. Hiroshi Ishii
James Patten
Dan Chak
Jason Alonso
Rich Fletcher

Digital Life Consortium

Andrew Lippman
Bruce Blumberg
Deborah Widener

NTT COMWARE

Ichiro Kase
Kazuhiko Tanaka
Hideki Nakanishi
Mitsunori Hirano
Atsunobu Narita
Megumi Eguchi
Yoshinori Furukawa
Yasuyuki Kajiura
Yoshiyuki Kawai
Ayano Kenmotsu
Kazue Kobayashi
Rika Morii
Makoto Nakamura
Takuya Ogawa
Mitsuhiro Tamechika
Yuji Wada

MIT Staff

Betty Lou McClanahan
Lisa Lieberson
Brian Spires
Cornelle King
Matt Tragert

Collaborators

U.S.E Co.ltd.
Johokobo. Inc.
ABEISM CORPORATION
Future Technology Laboratories

Contact Information

Tangible IP-NW Designer に関するお問い合わせは以下の連絡先までお願いします。

ipnw@rd.nttcom.co.jp

連絡窓口:

平野光徳、成田篤信

Tel: 043-211-2455