

LDT S7: IoT-led Digital Transformation

DTSL

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Session Objective

- What are SCPs/IoTs
- Value Propositions They Offer
- Strategic Decisions to be made while investing in IoTs/SCPs

Waves of IT-Driven Competition

First Wave (1960s-1970s)

- Automation of individual activities - order processing, bill paying, resource planning
- Increase in Productivity, Standardized Processes

Second Wave (1980s-1990s)

- Rise of the Internet - Coordination & Integration
- Globally integrated supply chains - Productivity gains, Transformed value chain

Third Wave

- Newer use-cases of existing technologies - Social media, Cloud etc.
- IT an integral part of product itself, IoTs/IloTs, Industry 4.0 tech
- Product-as-a service

Smart, Connected Products (SCPs)

Physical Components

- Product's mechanical & electrical parts

Smart Components

- Sensors, microprocessors, data storage, embedded OS, enhanced UI

Connectivity Components

- Ports, protocols-enabled wires or wireless connections
- One-to-one; One-to-many; many-to-many
- Allows information exchange; Enables distributive computing

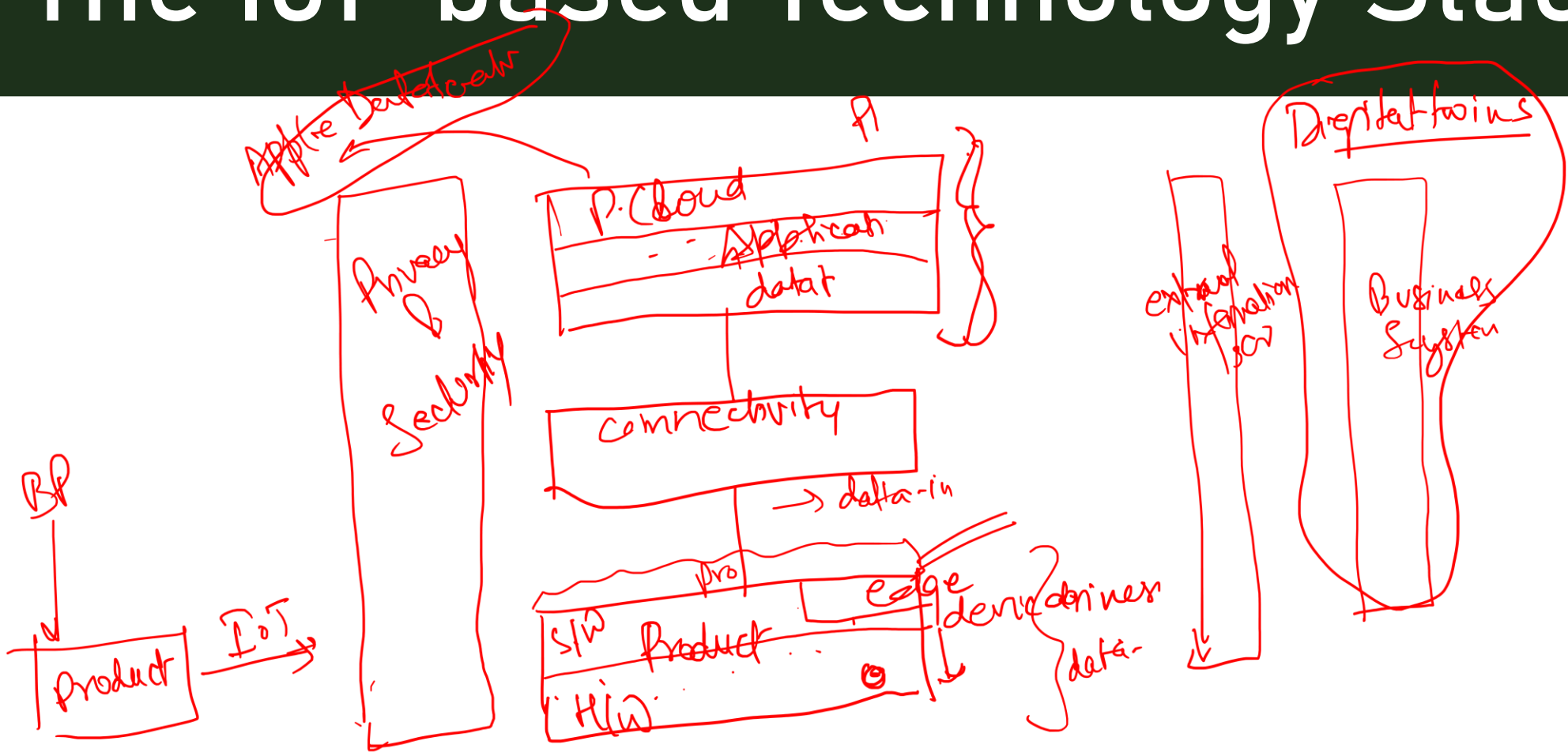
Why Now: Technically & Economically Feasible



- Breakthroughs in performance, miniaturization; Energy efficient sensors & batteries
- Compact and low-cost computer processing power & data storage
- Cheap connectivity ports; ubiquitous low-cost wireless connectivity
- Tools enabling rapid software development
- IPv6 internet registration system; protocols supporting greater security

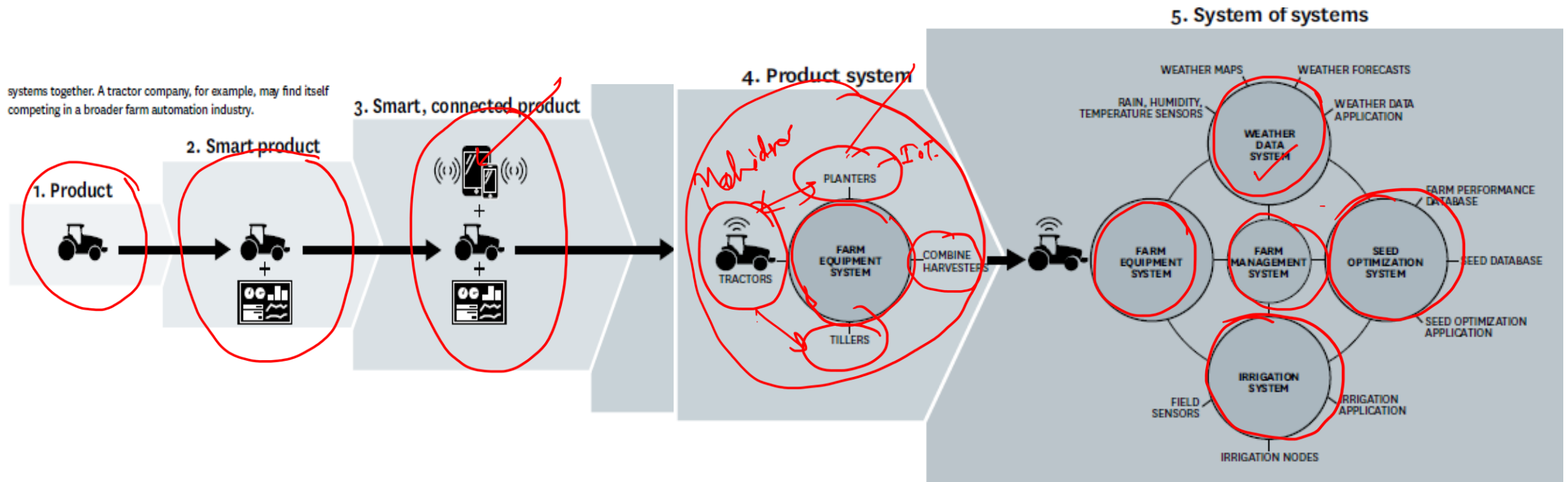
$IPv4 \rightarrow 32$
 $2^{32} = 1024 \times 1024 \rightarrow IPv6$
 2^{128}

The IoT-based Technology Stack



Industry Boundary & System of Systems: Interoperability Requirements

systems together. A tractor company, for example, may find itself competing in a broader farm automation industry.



SCPs Capability & Value Proposition

Monitoring

- Alert on change in circumstance or performance
- Track product's operating characteristics & history
 - For product design, market segmentation, after-sales service
- Warranty compliance, Benchmarking
- Can be a core element of value creation, e.g., glucose meter

Control

- Control through remote commands and algorithms (on device or cloud)
- Direct the product to respond to specified changes in its condition or environment - e.g., Farming equipment

SCPs Capability & Value Proposition

Optimization

- Exploit in-use or historical data to improve output, utilization, and efficiency e.g., Wind turbines
- Preventive maintenance & remote maintenance
 - Reduction in product down-time & repair personnel

Autonomy

- Previously unattainable level of autonomy
- Self-diagnose service needs, adapt to users' preferences
- Improves safety in dangerous environments - e.g., Joy Global's Longwall Mining System, Autonomous vehicles

What does it change for organizations?

- Product design
 - S/w-based customization, product upgrades, predictive/remote service
- Marketing & Sales
 - Better customization, market segmentation and pricing,
- After-sale service
 - Predictive maintenance and service productivity, spare-parts inventory control, warranty claims and warranty agreement violations
- Human Resources
 - Data analytics, Sales team - Product vs. service, Cloud management etc.
- Security & Privacy

Strategic Decisions on SCPs

Strategic Choices & Implications

Capabilities/ Features to pursue

- Deliver value relative to cost: Capability vs. Value e.g., A.O. Smith
- Features as per market segment; Revisit value equation
- Re-enforcement of firm's competitive position e.g., Rolex

Functionality in Product vs. Cloud

- Response time, Automation, Network reliability, and security, Location of product use e.g., Thermo Fisher's chemical analyzers
- Nature of user interface, Frequency of service/product upgrades

Open vs. Closed System

- Closed systems - comp advantage - control & optimization
- Open systems - Faster extension of utility
- Both result in de facto industry standard, benefits are different

Strategic Implications

Make-or-buy decision

- Make - significant investment in specialized skills, tech & infra
- Buy - Outsourcing costs, ability to differentiate
- Identify areas of competitive adv., product insight, commoditization

What Data to Capture/Secure

- Sufficient value relative to cost, tangible value for functionality, efficiency in value chain; How frequently, how long - e.g., Nest Rush Hour Rewards
- Product integrity, security, and privacy risks of all type of data

Data Ownership & Access Rights

- Who is the data owner? E.g., data from an aircraft engine
- Options for establishing data rights - joint ownership, NDAs, right to share, right to sell - e.g., Fitbit, Drivers' data

Biggest Strategic Risks

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- Adding functionality that customers do not want to pay for
 - Underestimating security and privacy risks
 - Failing to anticipate new competitive threats
 - Waiting too long to get started
 - Overestimating internal capabilities

References

- GE & Industrial Internet: <https://www.youtube.com/watch?v=KzXfFDJWgmQ>
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- How Smart, Connected Products Are Transforming Competition: <https://hbr.org/2014/11/how-smart-connected-products-are-transforming-competition>