



Systems Integration Case Study

David S. Watson
Lawrence Berkeley National Lab
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Overview

- ★ **Systems Integration overview**
- ★ **Case Study – Vattenfall AMI Project**
- ★ **Lessons Learned**



Case Study – Vattenfall, Sweden

Systems Integration Overview

- ★ **Known by various names:**
 - **Services,**
 - Integration
 - Global
 - Professional
 - **Solutions,**
- ★ **Systems integration costs > component costs**



Case Study – Vattenfall, Sweden



Nationwide AMI deployment late 90's

★ **System design approach used**

- ▶ Meet requirements at lowest *installed* cost

★ **High level requirements:**

- ▶ Reduce customer “churn”
- ▶ Reduce operational costs
- ▶ Increase revenue



Case Study – Vattenfall, Sweden

Features defined to meet requirements:

★ Multiple remote services:

- Automated meter reading
- **Thermostat**
- Home Security
- Eldercare

★ Access to all services via cell phone & Internet



Case Study – Vattenfall, Sweden

- ★ System designed to meet requirements
- ★ Components designed to fit into system
- ★ System integration ties it all together
 - Components
 - Networks
 - Databases & Software
 - User Interfaces
- ★ System *installed cost* was minimized

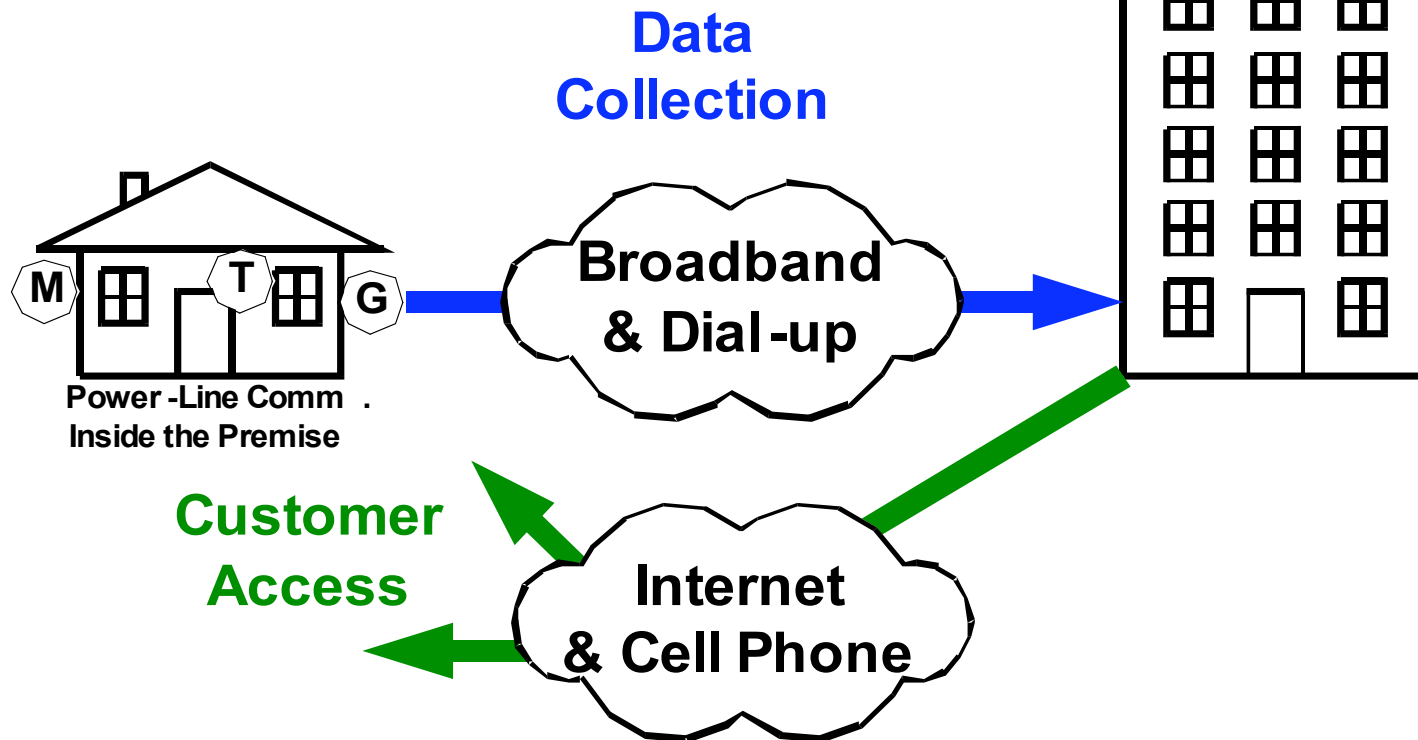


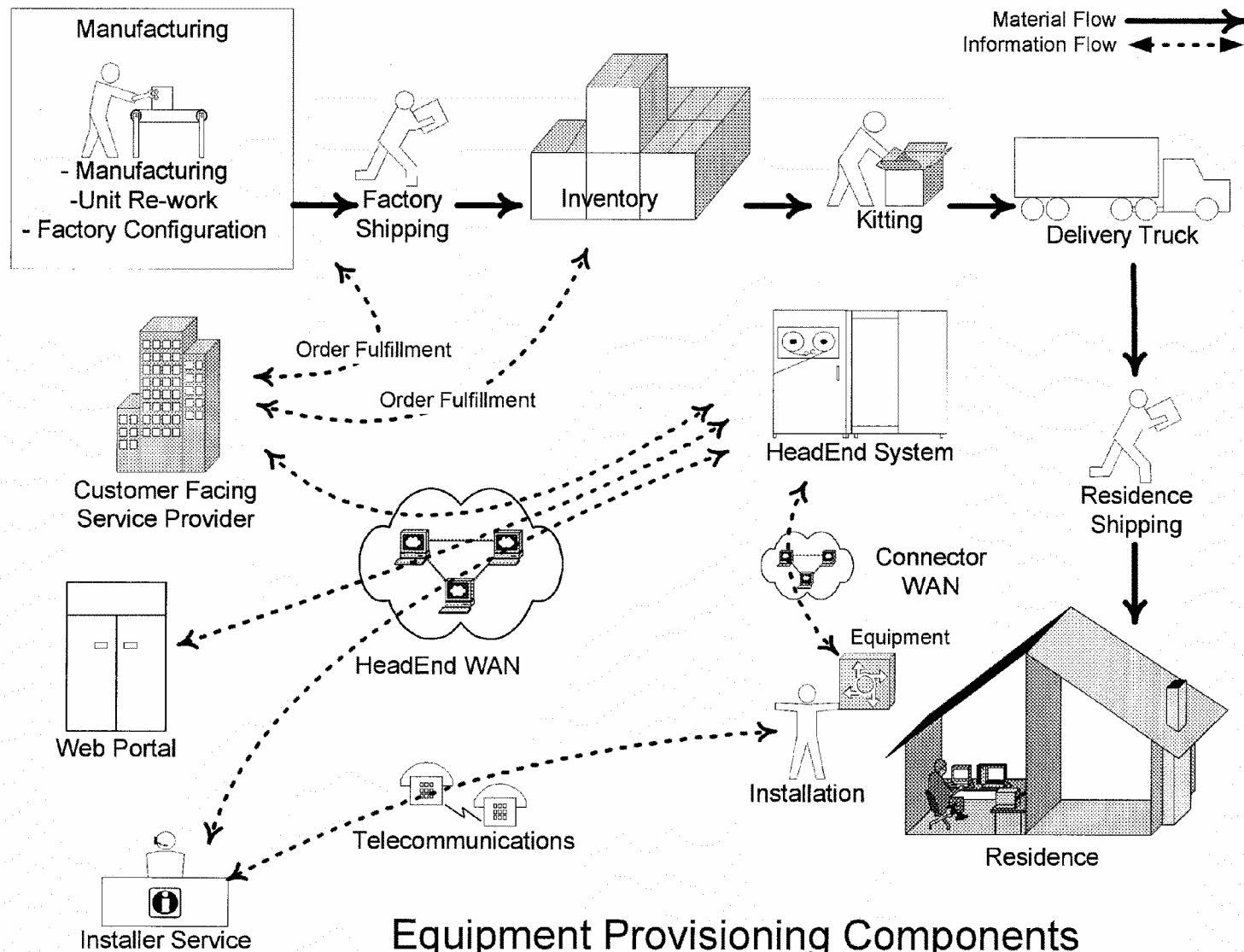
Case Study – Vattenfall, Sweden



Customer

Utility







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Lessons learned *(1 of 4)*

★ **Complete system design should be done in advance:**

- Define requirements of system
- Cost optimize the system
 - **Include systems integration & lifecycle costs**
- Minimize late design changes



Case Study – Vattenfall, Sweden

Lessons learned (2 of 4)

Lowest cost components may lead to higher installed system costs

★ Example 1: Address assignment – Linking device to an individual customer

- ▶ Lowest cost component may use dip switches (save \$2)
- ▶ Dip switches require professional installation (add \$150)



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Lessons learned *(3 of 4)*

Lowest cost components may lead to higher installed system costs

★ **Example 2:**

Privacy of customer data

- ▶ Lowest initial cost may omit encryption
- ▶ Lifecycle costs could mushroom if a security breach necessitates replacement



Case Study – Vattenfall, Sweden

Lessons learned *(4 of 4)*

Even with advanced planning, deployment issues will emerge:

- ★ Gov't phone company equipment didn't meet gov't specs.**
- ★ Power line communications interference in ~5% of homes.**
- ★ 10% of the sites accounted 90% of the tech support labor.**