Improving forecast quality in practice

Introduction
by Robert Fildes (Lancaster Centre for Forecasting)

Forecasting in Government
by Tom McBride (Audit Manager, National Audit Office)

Building a Forecasting and Planning Centre of Excellence
by Anita Tadayon (S&OP Director, Home Service & Supply, BSkyB)

How does forecasting add value to your business and what can be done to improve it?
by Steve Morlidge (Product Director, CatchBull)

Panel Discussion

Lancaster Centre for Forecasting

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the leading research centre in applied forecasting in Europe

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- Systems auditing and tuning
- MSc summer projects

Forecasting for…

- FMCG
- Electricity and Utilities
- Call-centres
- Government
- Pharmaceutical products
- Spare parts
- Promotional effects


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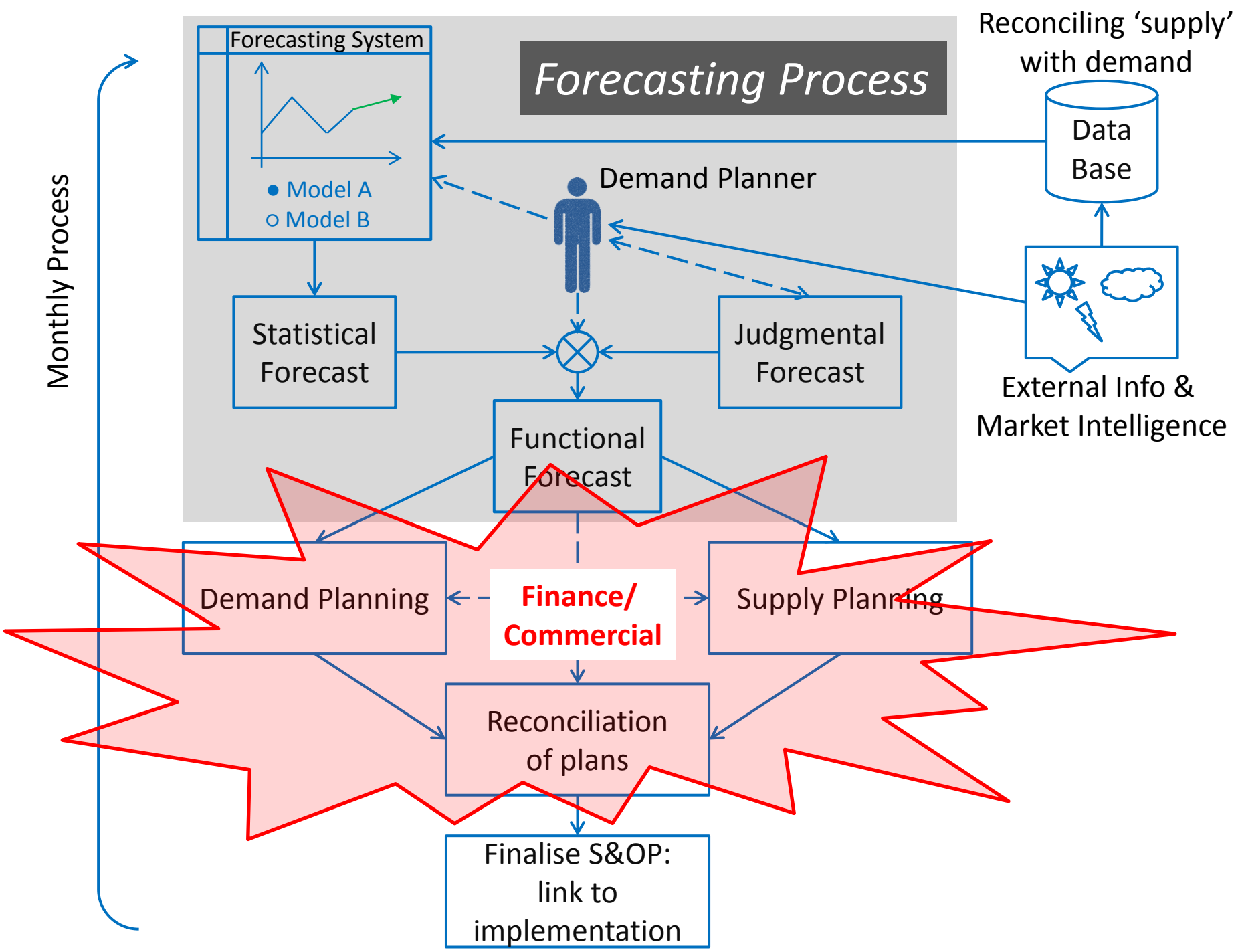
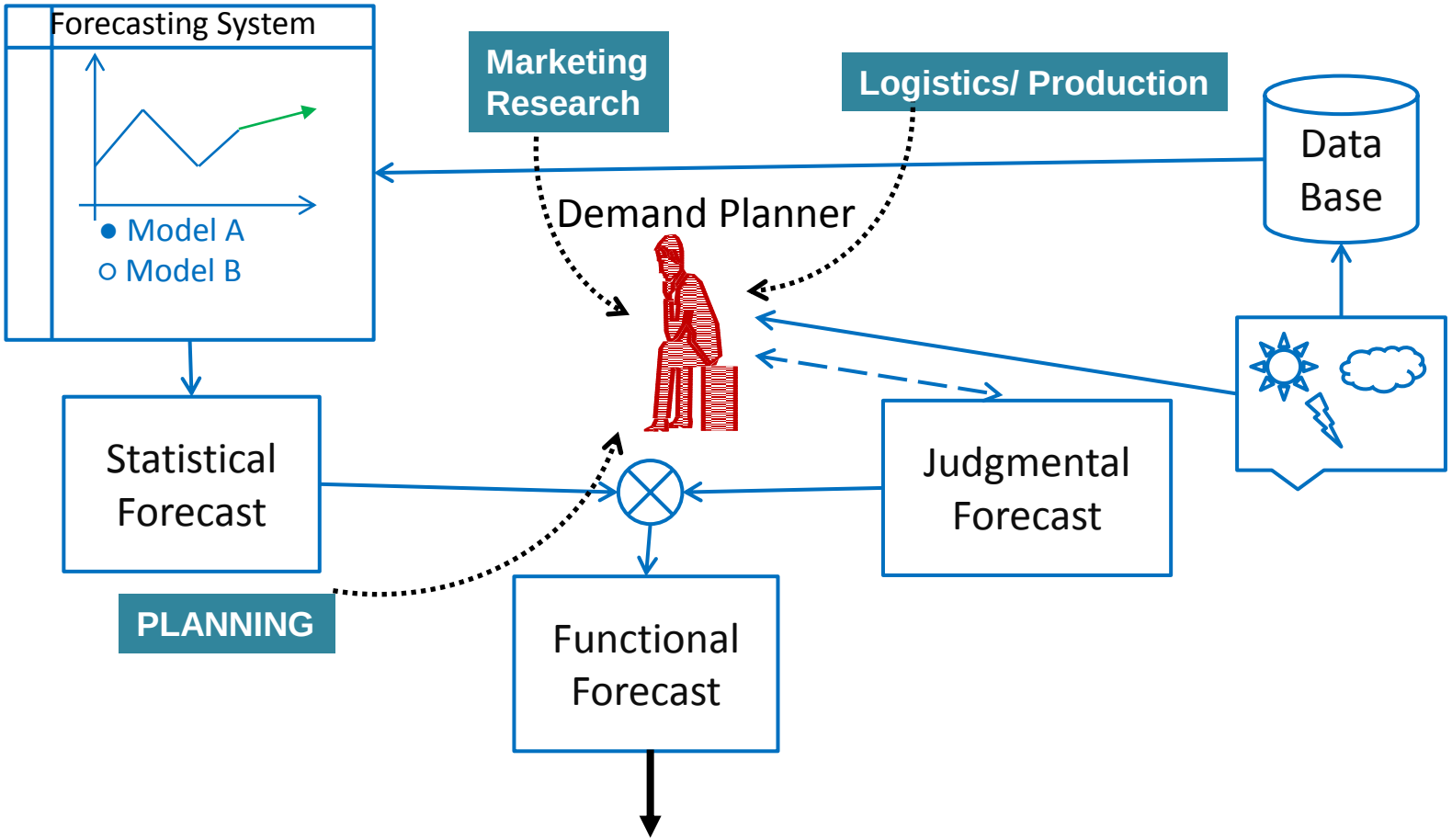
Dr. Fotios Petropoulos

Agenda

- The Forecasting Process
- Dimensions of quality
- How to go about auditing?
- Where are improvements likely to arise
  - Results of the survey
- Pointers


Forecasting Process
Monthly Process
Forecasting System
Model A
Model B
Demand Planner
Reconciling 'supply' with demand
Data Base
External Info & Market Intelligence
Statistical Forecast
Judgmental Forecast
Functional Forecast
Demand Planning
Finance/ Commercial
Supply Planning
Reconciliation of plans
Finalise S&OP: link to implementation

Forecasting Process



The process (Sales and Operations Planning)

- Statistical forecast
- Information from sales, market research, planning and logistics
- Incorporated into a final forecast from the forecasters back to interested parties
- Judgment is a key component

Usage of Forecasting Methods

Table V. Forecasting techniques ranked in order of frequency of use across forecasting horizon

Technique	Short horizon ≤3 months			Mid horizon 4 months–2 years			Long horizon >2 years		
	M&C	M&K	PS	M&C	M&K	PS	M&C	M&K	PS
Simulation	11	12	na	10	13	10	6	8	na
Life cycle analysis	12	12	6	12	10	11	5	5	na
Decomposition	9	8	na	9	7	8	10	10	na
Box–Jenkins time series	10	8	na	11	11	11	11	12	na
Expert systems	nm	12	na	nm	13	11	nm	11	6
Neural networks	nm	8	na	nm	12	11	nm	13	na

Notes: M&C, Mentzer and Cox (1984), sample size = 160; M&K, Mentzer and Kahn (1995), sample size = 186; PS, present study, sample size = 86; nm, not measured in the study; na, not applicable (no respondents indicated use of the technique for that time horizon).

Key findings:

- judgmentally based methods more used than objective methods
- complex methods used less than simple methods

How are forecasts typically produced?

	Fildes&Goodwin 2007	This survey
i) Judgment alone	25%	14%
ii) Statistical methods exclusively	25%	30%
iii) An average of a statistical forecast and management judgmental forecast(s)	17%	19%
iv) A statistical forecast judgmentally adjusted by the company forecaster(s)	34%	37%

Steps in improving forecast quality

- Auditing the current forecasting activities
  - Purpose, horizon, information, value
  - Evaluation: the accuracy record (PHIVE)
  - Benchmarks
- Establishing the current forecasting process
  - Who does what, with what resources?
  - What information is available?
  - Where do errors creep in?
    - Other people's information
  - Internal judgment calls
- Areas for improvement
  - Resources (people, software, data base)
  - Techniques
  - Information flows

Auditing performance – why?

- Need to know if current performance is good, bad or indifferent in order to decide priorities for improvement
- Measures need to be relevant to performance objectives.
  - Standard KPIs may not be relevant
  - Impact on organization
- Questions for any proposed performance measure:
  Does it help…
  - to identify why the problem occurred?
  - to correct or mitigate them (not find who to blame)?

Consultants?
Industry surveys?
Organisational Specific
Benchmarking

Applying benchmarking to Forecasting
Creating an improvement plan

- Goals, objectives
  - Horizon, level of aggregation (e.g. national, regional), updating
- Scope and responsibilities
  - Sales, finance? Or just the analysts
  - Who carries the can?
- Resources
  - Software a given? Staffing? Data systems?
- Critical success factors
  - Areas of weaknesses in current performance
- Performance measures
  - Evaluation, how measured

Industry standards in forecasting

Dimensioning the Forecasting Process & UNDERSTANDING YOUR OWN PROCESSES

Based on a work carried out by John Mentzer & colleagues on 34 US companies (Moon et al, Int. J. Forecasting, 2003)

- Functional integration in the Organisation (S&OP in supply chain)
  - collaboration and co-operation between the forecasting team and other business functions
  - link with decision making/ planning
- Systems
  - data base
  - software
  - support
  - feedback and organisational learning
- Technical approach
  - problem specification, e.g. level of disaggregation, time horizon
  - techniques
  - evaluation and KPIs (accuracy)

Problems with a Company

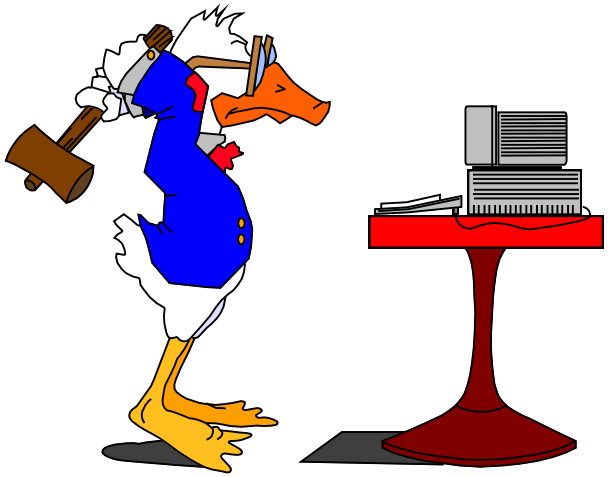
- Data
- Data-user interface
- The Forecasting Support System
- Motivation & Training of Key Personnel
- Technical support
- Information flows (and linkages) from other departments
- Lack of time (and resources)

Need for systems:
- **accurate statistical methods**
- **easy-to-use**
- **easy-to-understand**
- **incorporate judgement**
- **incorporate drivers**

Forecasts are Frequently Politically Modified
- In a US survey, 60% thought this damaged accuracy

“A good forecasting system leads to improved decisions”

What’s to be done? Improve!



- Forecasting Techniques
- Information flows and the organisation of forecasting
- Forecasting resources and the information syste

Improving forecasting

Company-wide interview-based multinational survey (1988)

Activity	Respondents Scoring Important
• Developing consistent data	83%
• Increased software support	70%
• Improved techniques	66%
• Improved data bases	61%
• Improved communication with users	35%

How have things changed?

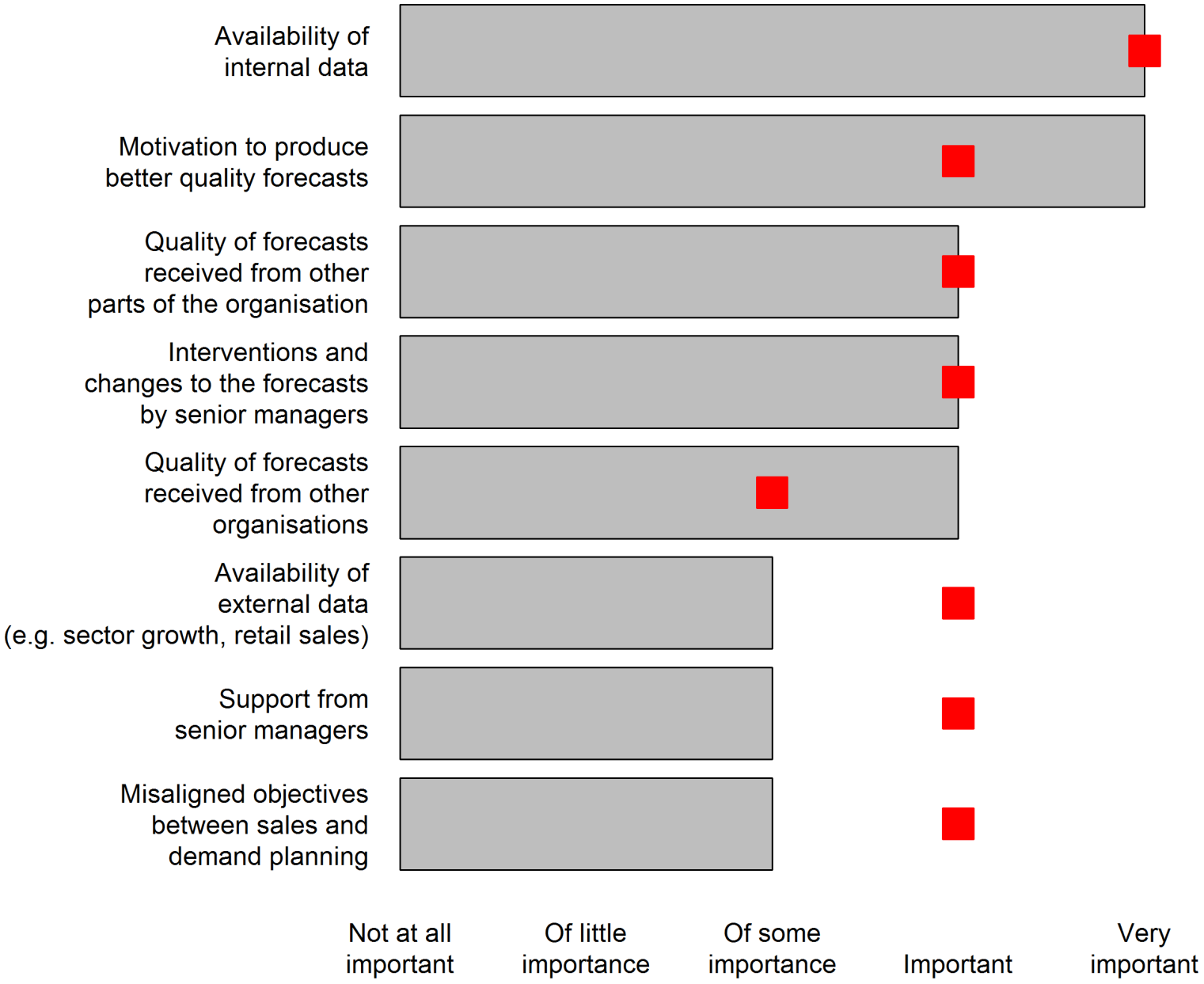
Improving forecast quality in practice: our survey

Potential problem areas that get in the way of improving the quality of business forecasting.

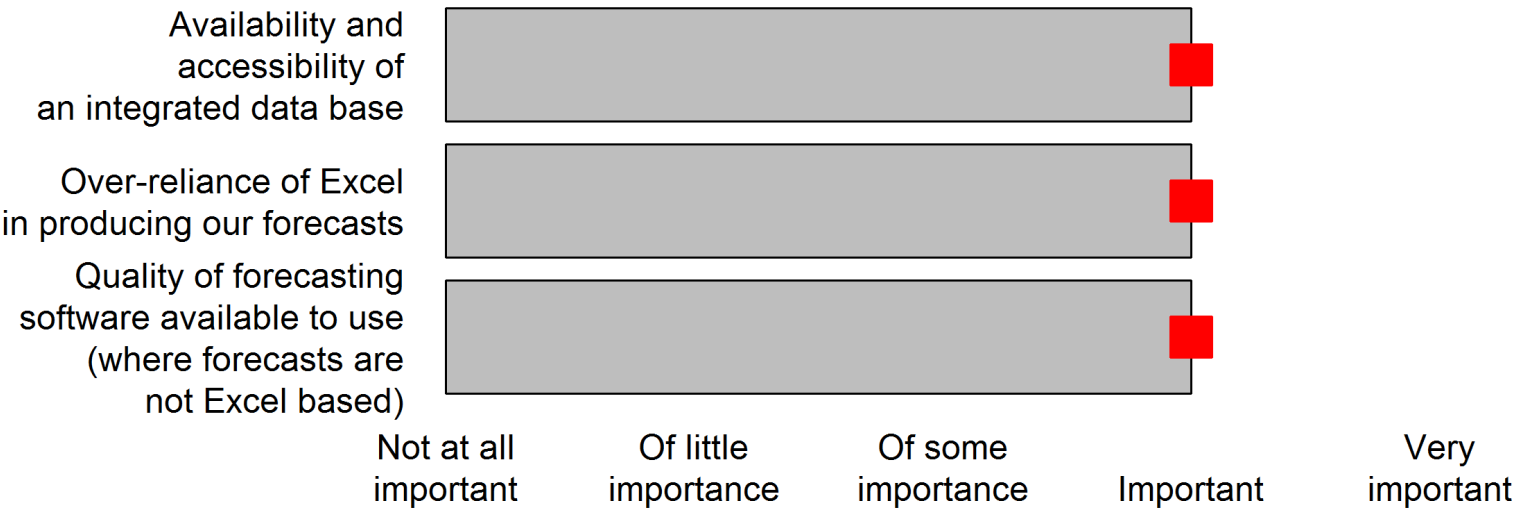
- Organization/Information
- Systems
- Resources
- Techniques
- Evaluation

Sample size: 41

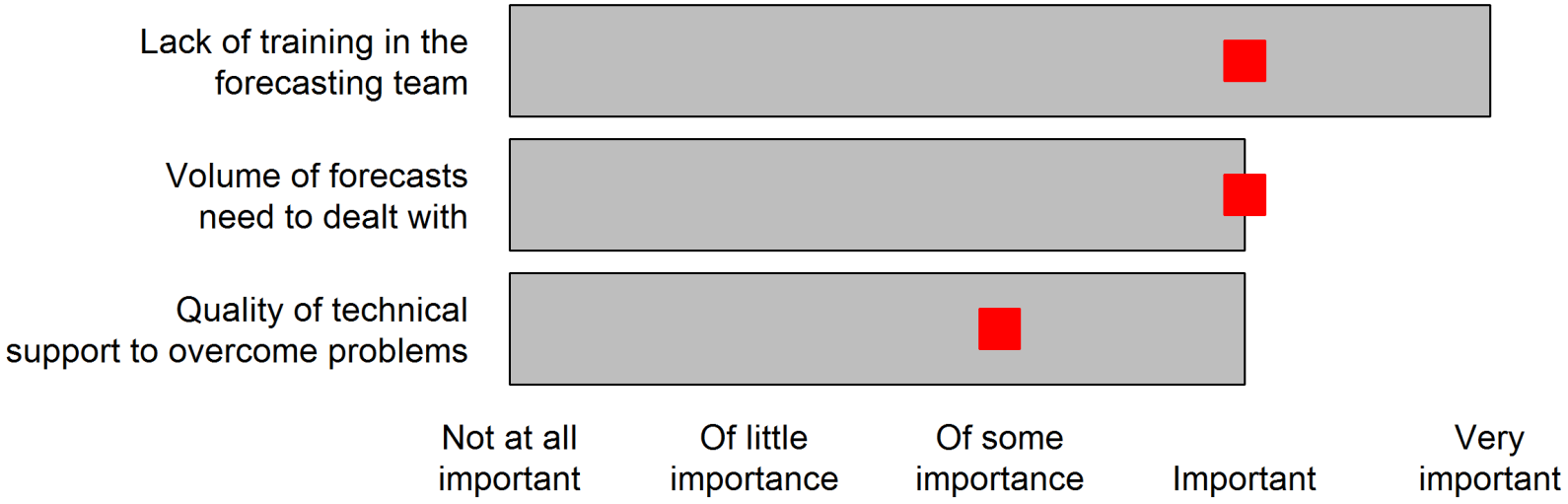
Organisation/Information



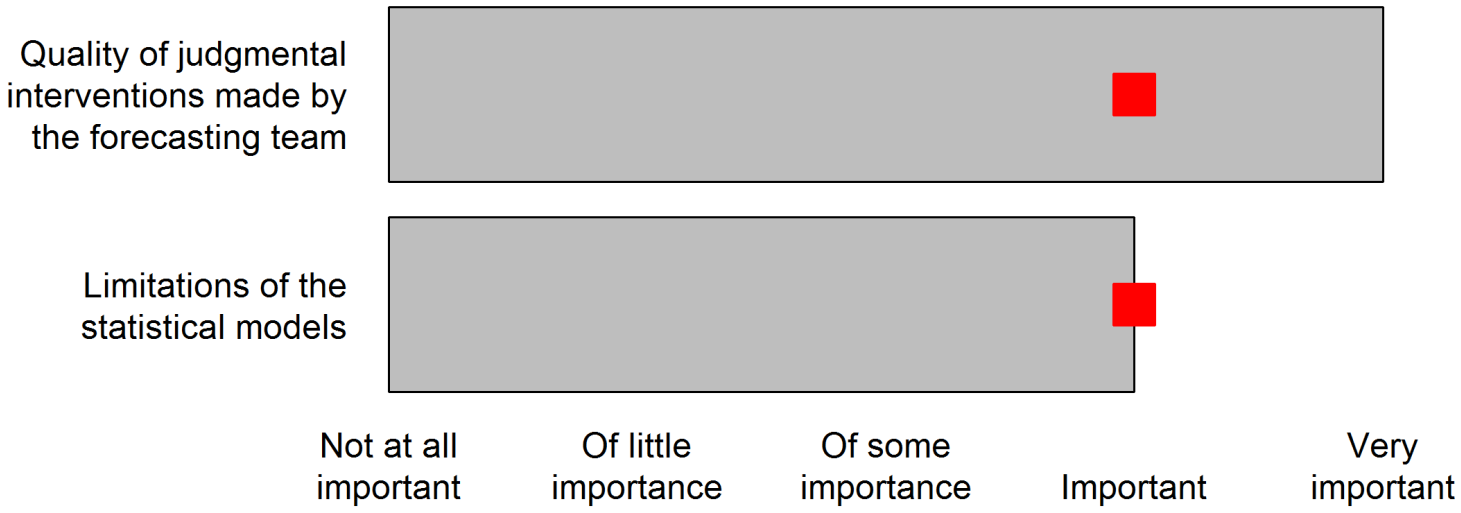
Systems



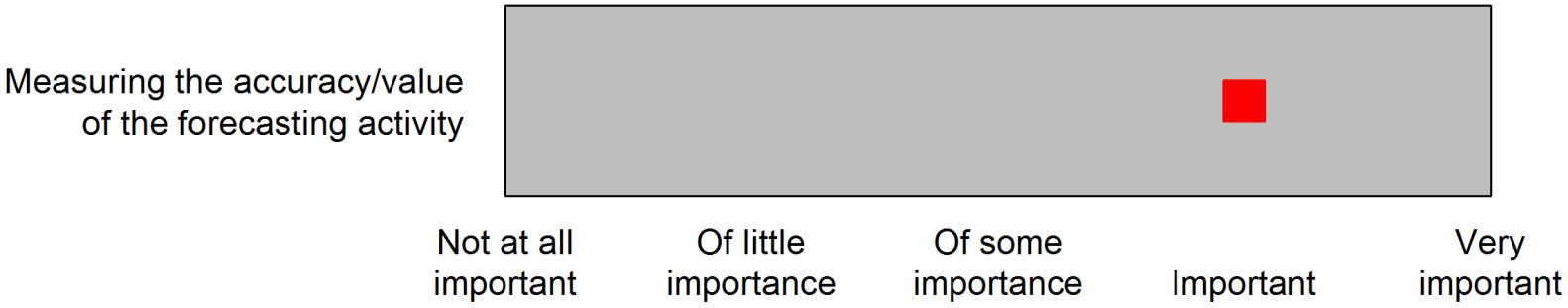
Resources



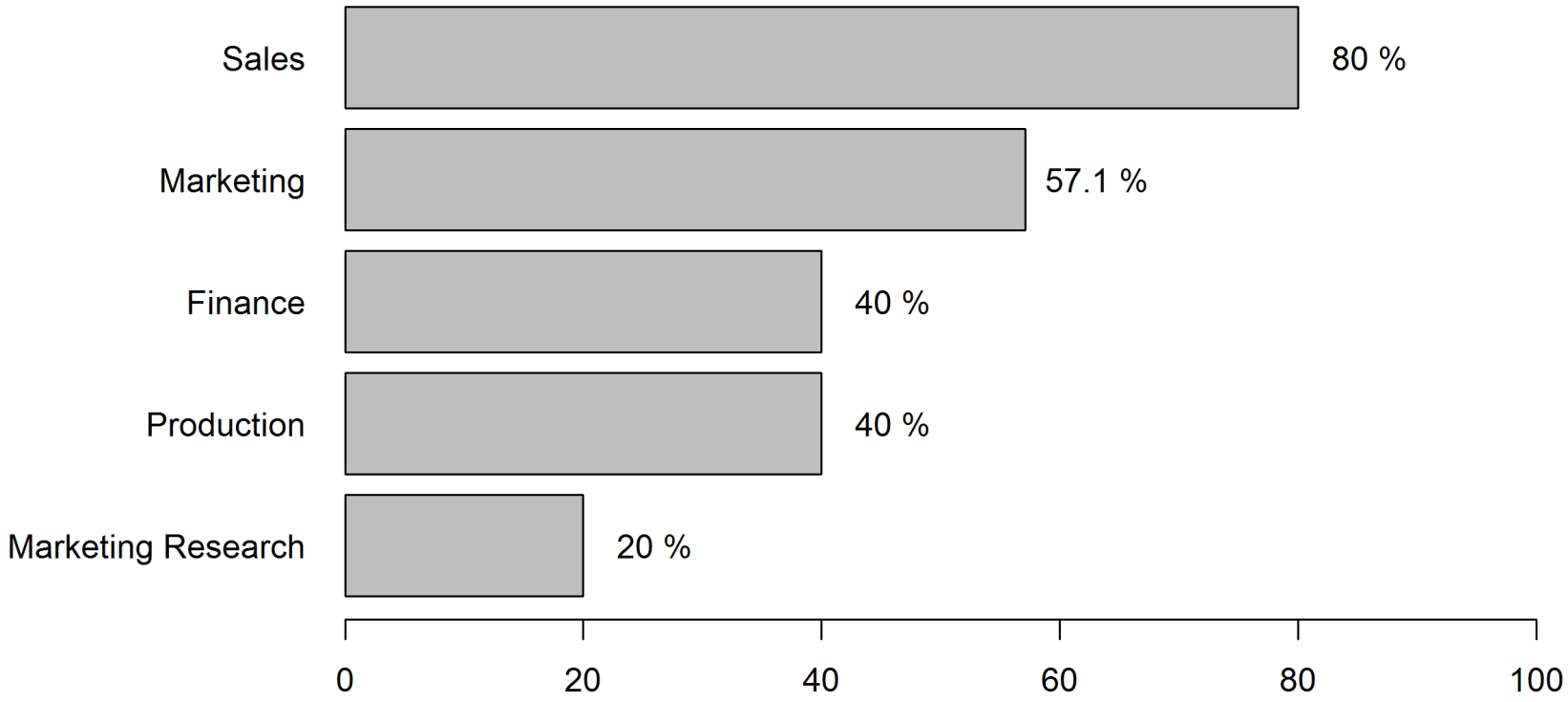
Techniques



Evaluation

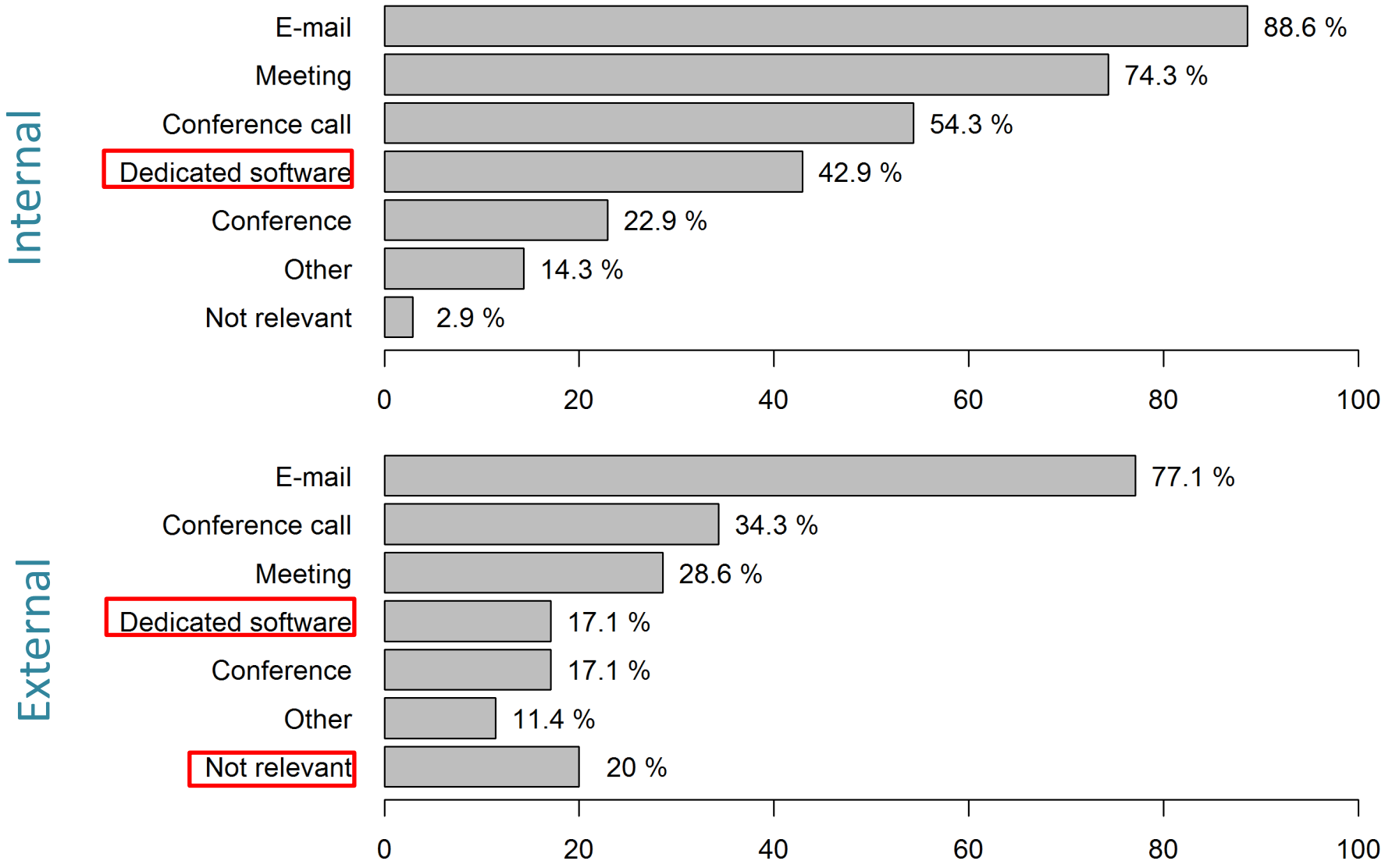


Information sharing



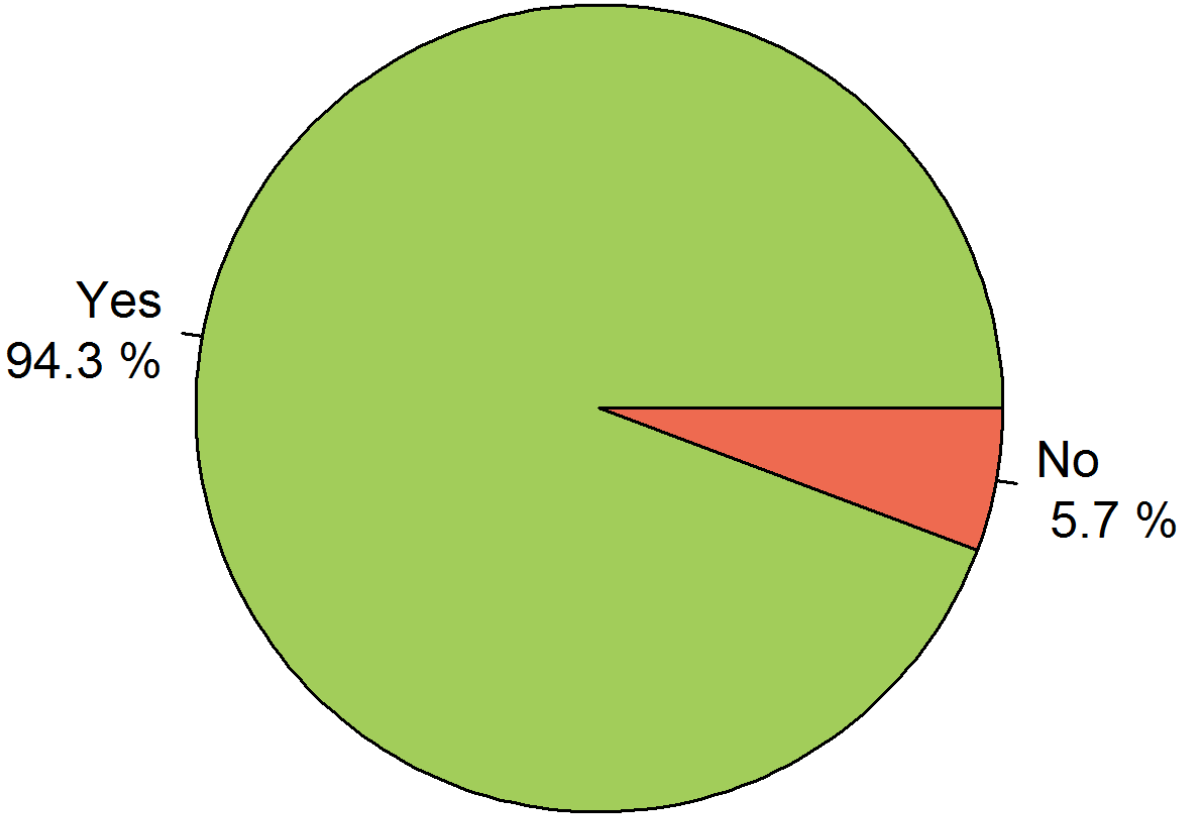
Other: Purchasing / Supply, Planning and Control (Logistics), Revenue Growth Management

Means of collaboration



Principal objective:

Production of accurate forecasts, given the available resources



Other objectives: Timeliness, Stock availability, Stability of forecasts, …

Evaluating an organisational design

- Forecaster and Decision Maker
  - responsibilities for data, forecasting & innovation
- Information Flows
  - from the environment
  - intra-organisational flows and loss of information
- Technical Characteristics of the forecast
  - accuracy and bias
  - responsiveness and speed
  - uncertainty

The forecasts aren't used

The information is not there

Poor techniques are employed

and we don't understand how bad they are

Why don’t we adopt better forecasting processes?

Barriers to adopting new procedures

- Compatibility with existing practices
- Divisibility
- Communicability and complexity
- Riskiness
- Managerial factors + *value of new procedure*
  - Top-management
  - User-designer relationship
  - Implementation strategy
  - Environmental events

How to implement proposed improvements?

Improved forecasting is achieved by:

- Improved information flows
- Using new techniques and processes
  - with the associated software
- Support systems to encourage effective inclusion of judgment
- Effective organisational links
- Trained, motivated and better resources managers
  - ✓ forecasters with too much to do produce worse forecasts!

Takeaways

- Specify forecasting problem
  - Level of aggregation & Forecast horizon
  - Available information
- Data base
  - IS and common accessible data base
- Current accuracy
  - Compared to base line method on your data
    - Exponential smoothing, Naïve
  - Appropriate measures?
  - Value-added analysis of judgment?
- Software choices
  - Benchmarked statistical methods
- Implementation and Improvement Issues

Workshop Aim: To consider paths forward for you/ your company to improve your forecasting processes

Types of auditing

- The basic idea is to determine the processes in your company that could or should be improved. This is to be achieved by:
  - finding out organizations might be doing better,
  - finding the gap between their perfor[illegible]ce and [illegible]ow they carry out the processes,
  - finally, make changes to bring y[illegible]
- **Internal:** between operatio[illegible]tal organisation
- **External:** between operations that ar[illegible]ifferent organisations
- **Non-competitive:** against operations in organisations that are not direct competitors
- **Competitive:** compare with direct competitors
- **Performance:** comparing levels of achieved performance
- **Processes**: comparing your way of doing things with the way used by others to see if can learn from their practices

Consultants?
Industry surveys?

Requires co-operation and exchange of data, directly or through third party.

Factors in forecasting auditing

- Key Variables
- Information sources
- Methods
- Accuracy
- Organisational importance, motivation and credibility of forecasting
- Environmental uncertainty
  - competitive pressures, e.g. new products & services, promotional intensity
- Forecasting process

Auditing organisational and motivational issues

	Score
• Organisational Importance given to Forecasting	5 (very important)
• Credibility Attached to Forecasts by Senior Managers	4
• Importance in Planning	4
• Priority given to Forecast Improvement by Top Management	4
• Integration across functional areas	3

Takeaways II

- Additional information valuable?
  - Market information
    - Is it collected and stored effectively?
    - Can it be analysed?
- Software choices
  - Good statistical methods
  - Benchmarking against 'best practice' alternatives
  - Easy-to-use reporting and analysis capabilities
- Implementation and Improvement Issues
  - Next steps to improve accuracy?
  - Is the forecasting process designed to lead to improved accuracy?
  - Is accuracy monitored?
  - What's the staff's motivation to improve accuracy?
  - What extra resources/skills do you need?

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