ICAR AND SENSOR DEVICES – A PROGRESS REPORT ON THE DEVELOPMENT OF ICAR GUIDELINES FOR CERTIFICATION, ROUTINE MAINTENANCE/CALIBRATION AND DATA USABILITY STANDARDS FOR SENSOR DEVICES FOR LIVESTOCK

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Chair, ICAR Subcommittee for Recording and Sampling Devices

Chair, ICAR Sensor Devices Task Force

Challenges in Modern Herd Recording

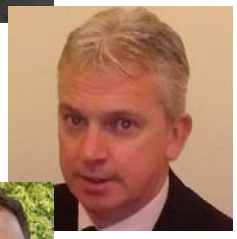
Livestock are ideal candidates for repeated measures – **What can I tell you?**

Producers are saying I made the investment - **How are you going to use my farm/herd data?**

Recording organizations are looking for guidance – **What do we do?**

Sensor Devices Task Force

Steven Sievert, Chair, US



Martin Burke, ICAR

Kees de Koning, Netherlands

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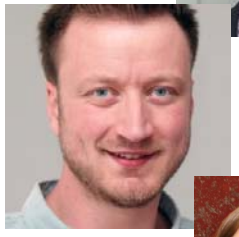
Franz Josef Auer, Austria

Harrie van den Bijgaart, Netherlands

Reinhard Reents, Germany

Clement Allain, France

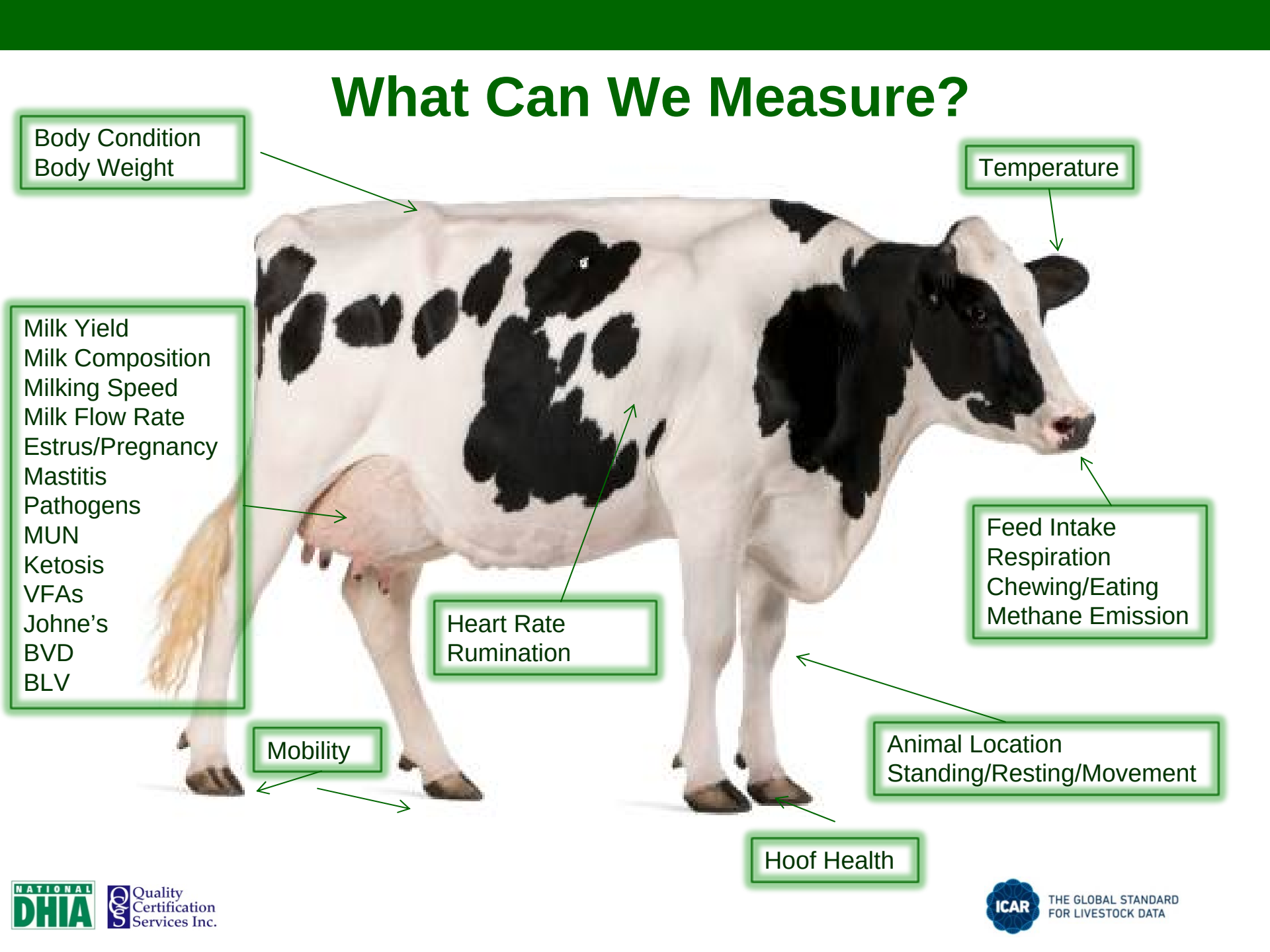
Brian Wickham, Ireland/NZ



Jeroen van den Ban, Lely

Cecilia Bågenvik, DeLaval

What Can We Measure?

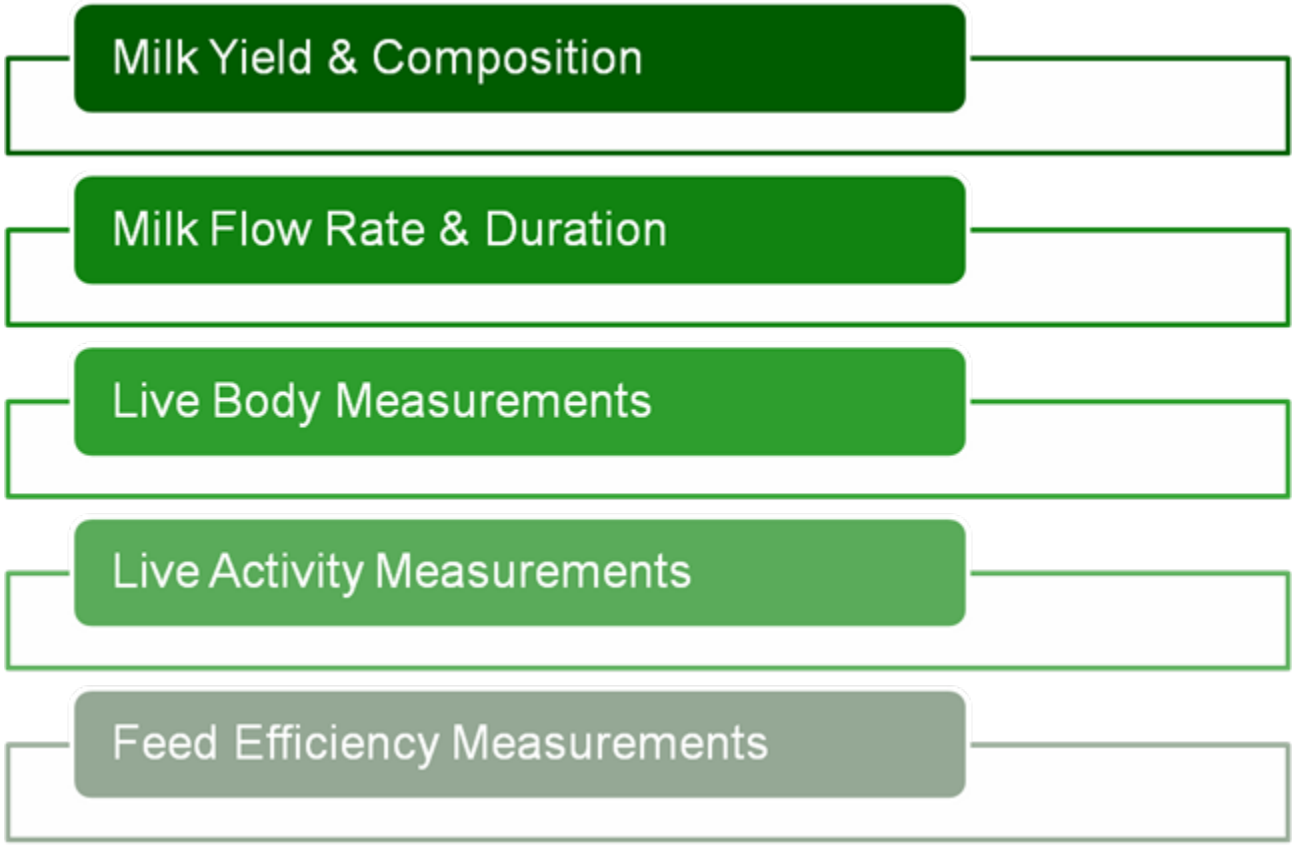


Survey Says…

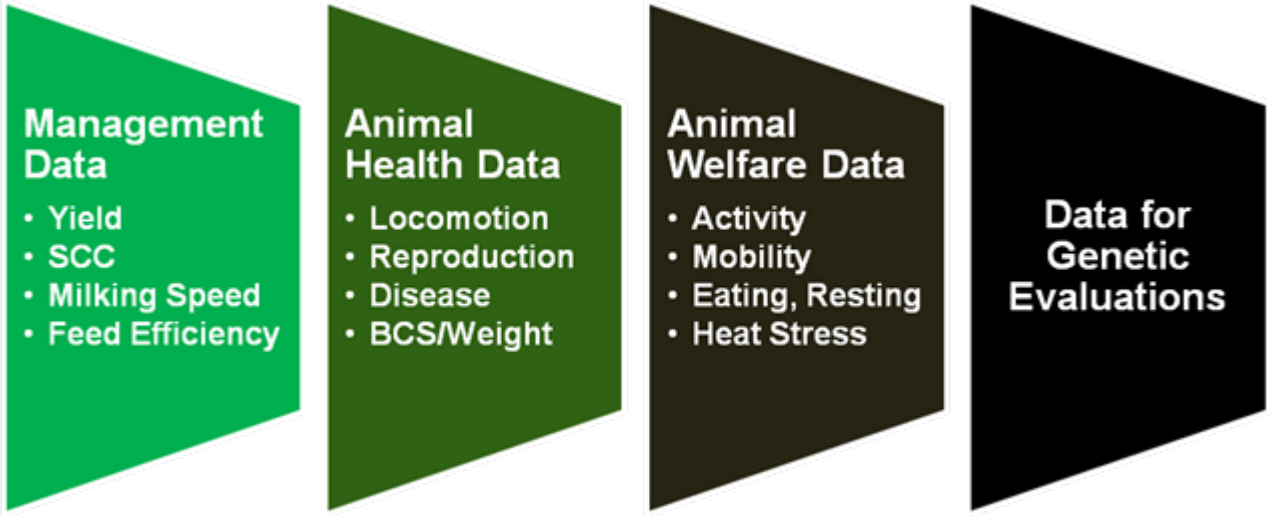
Priorities for ICAR SD-TF

Survey of ICAR Members & Experts

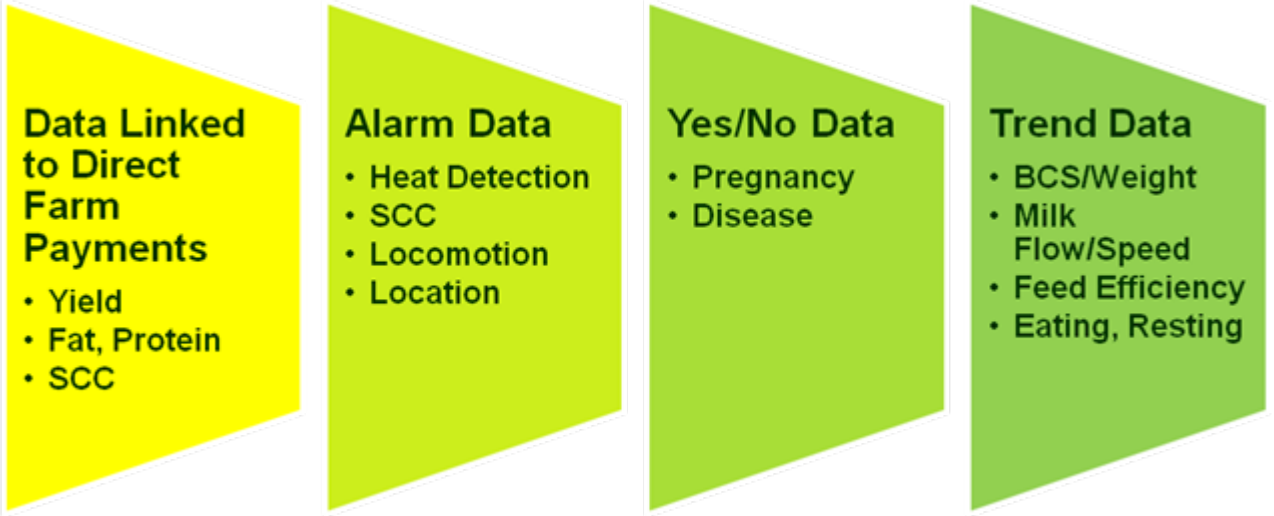
- Survey summary & results to posted on ICAR website
- Strong support of ICAR guidelines for many meaures
- SD-TF grouped into five main categories



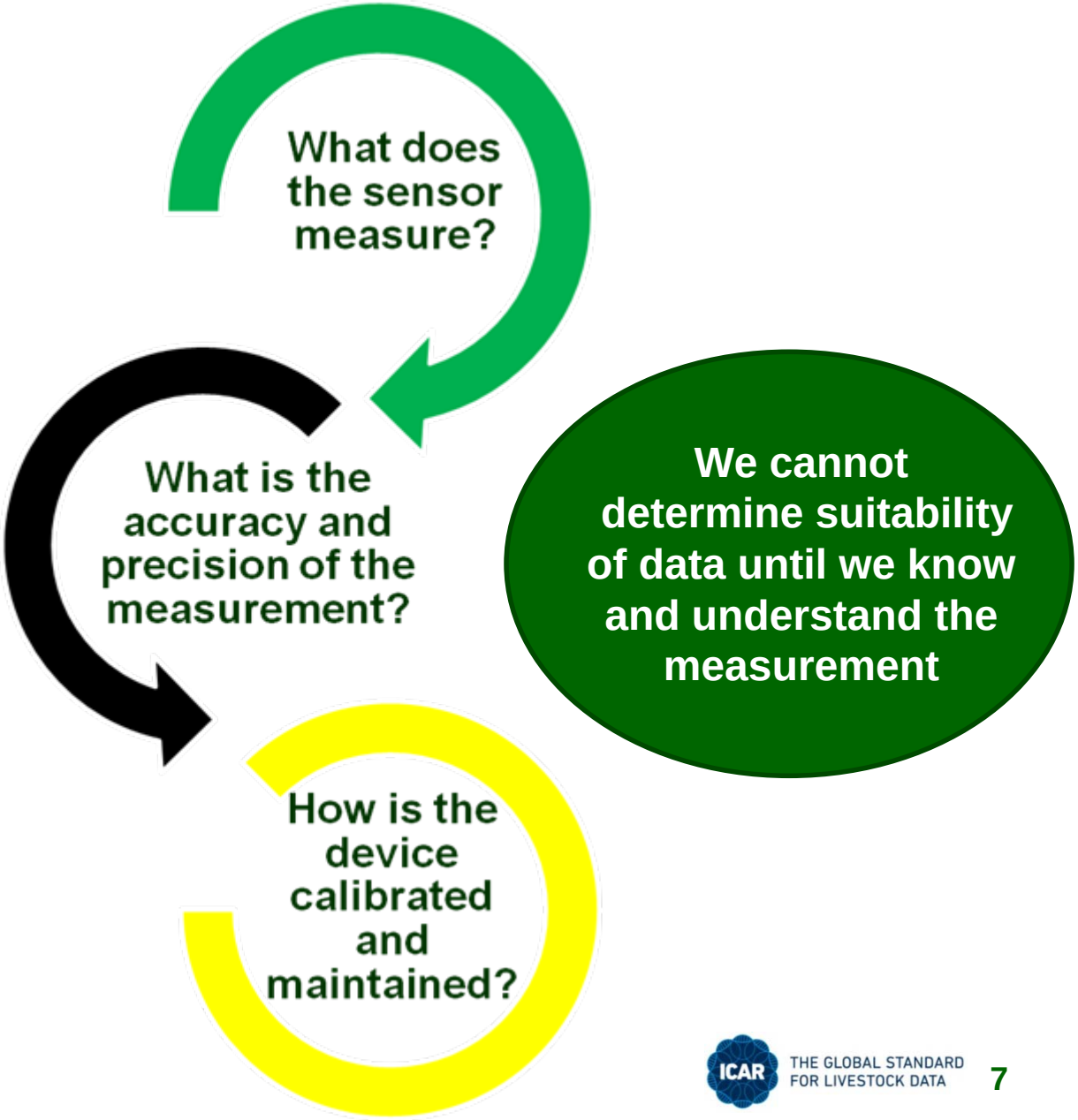
Multiple Ways to Classify Sensor Data



Different Needs for Accuracy & Precision



Reviewing Sensor Devices



What are We Measuring?

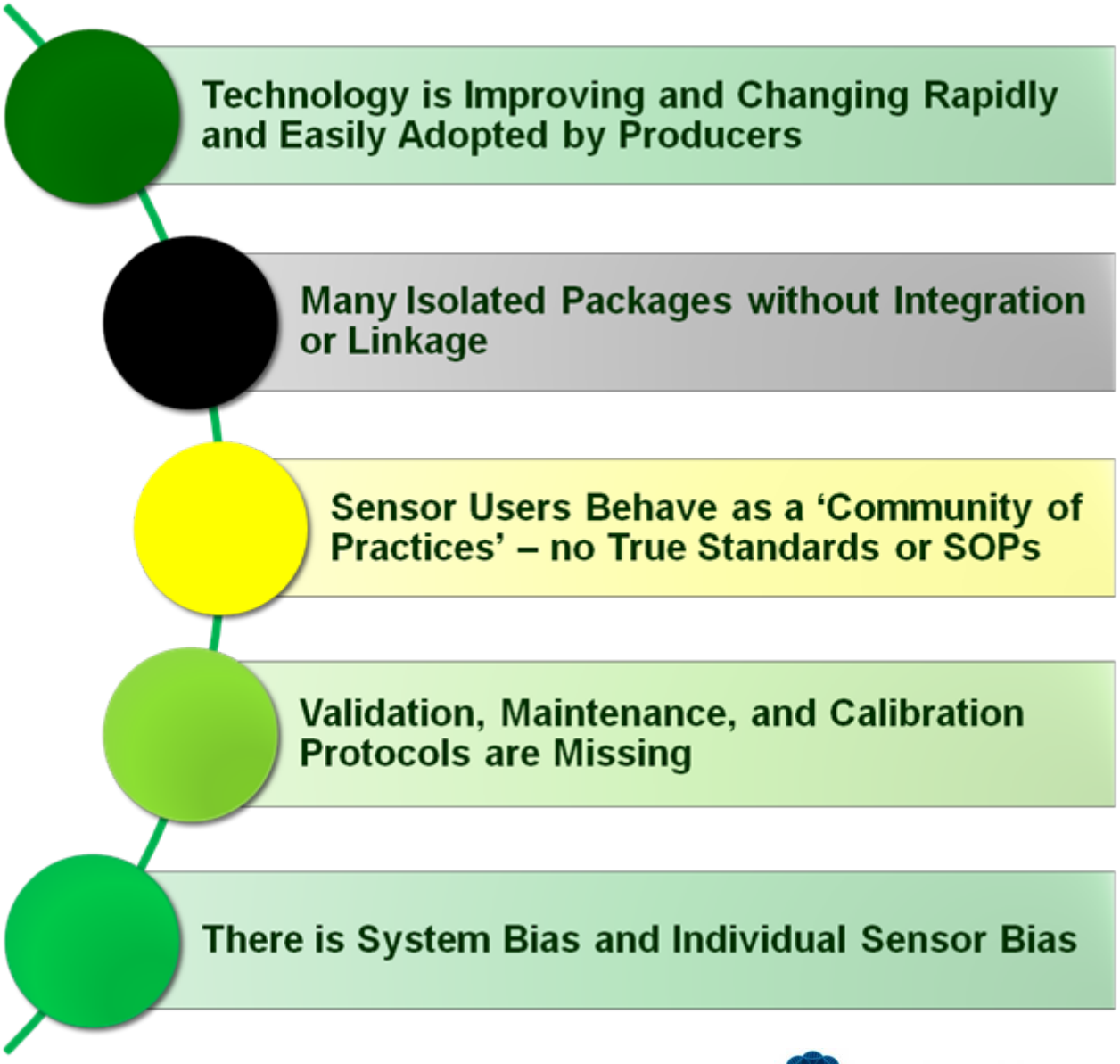
Mastitis
or
Milk Quality
or
Something Else?

Summary of Validation Criteria or Reference Measurements

- Review of milk quality measures by SD-TF
- Will be expanded to include measures from other categories
- Serve as validation for sensor devices
- Limited to device bias only, not system bias
- Will be published on ICAR website

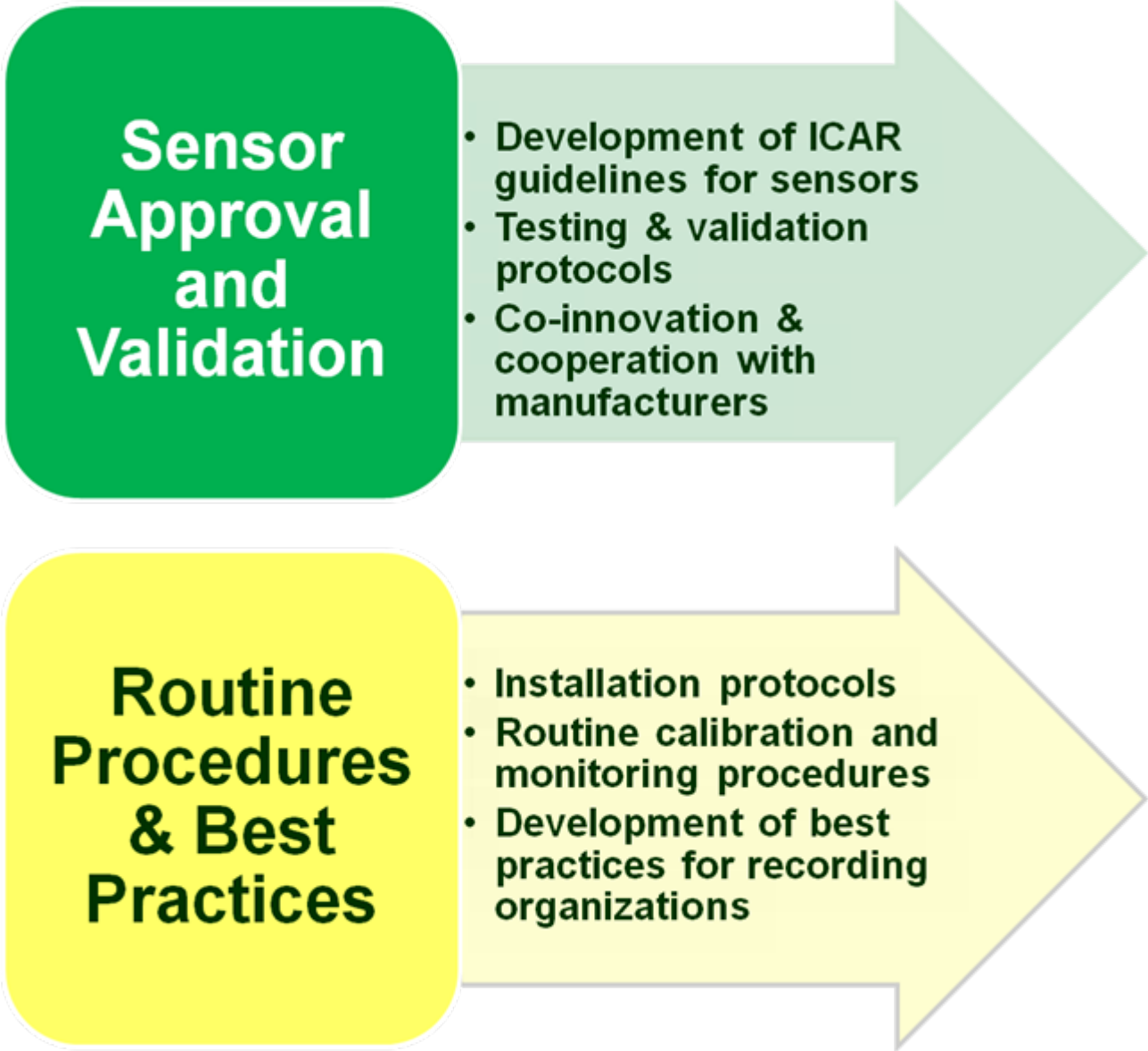
- Paper to be presented in session on sensor devices on Sunday morning

Current State of Sensor Technology



Needs of the Industry & Producer

Approval, Calibration & Best Use Protocols



Data Considerations for SD-TF

Precision of Recording

4.2% vs. 4.22% vs. 4.222% (Milkfat)

181,000 vs 180,862 (SCC)

Values provided are the result of algorithm

Adjusting vs. Calibrating

Adjusting to known value (i.e. BT SCC) is not the same as calibrating the device(s)

Adjustments make the data look better but don't increase accuracy – the individual device biases still exist in the system

Challenges Exist with Sensor Systems

Devices that Measure Multiple Parameters

How do we handle data where certification for one parameter exists but not for all parameters measured?

All data flows through interface and once data is in the system, it flows

Device Certification

Marketing vs. Testing & Certification

Working with ICAR is not the same as ICAR-Certified

Benefits of ICAR testing & certification

Measures or Parameters Need to be Defined

Define the parameter and recording period – for example…

- 7 consecutive days - BCS
- 30 consecutive milkings - SCC
- a fraction (240 seconds) of the milking session - MS

Other data to be captured

- animal ID
- date/time stamp
- parlour/stall location where applicable
- sensor device name/type
- define other linked data or traits

Is the Data Real?

Handling of missing data points

- How are missing points estimated?
- Mean of actual data only?

Outlier handling and exclusion

Data smoothing

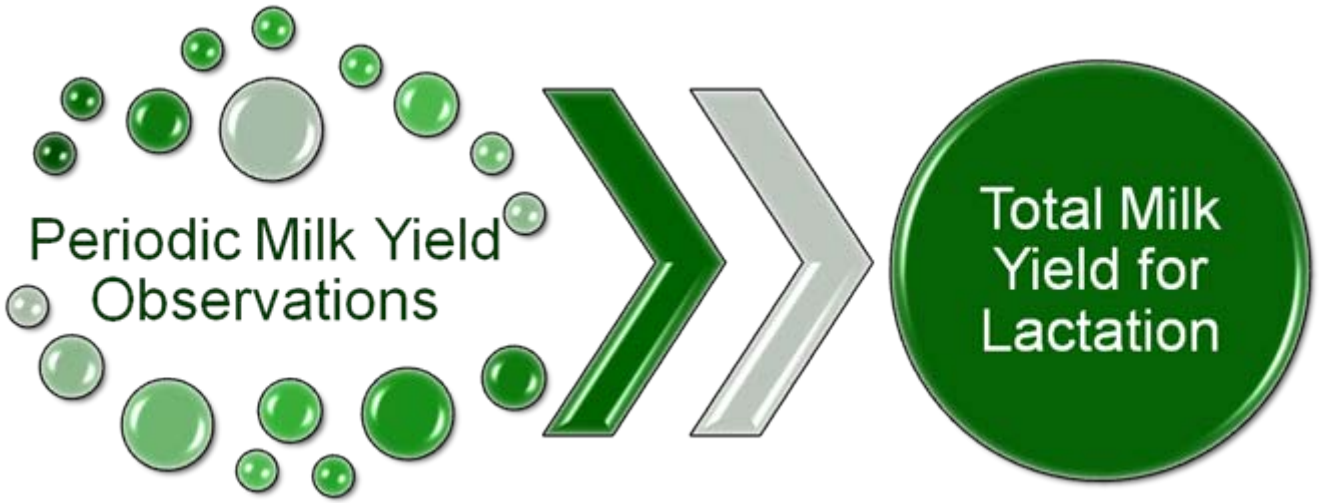
System Bias or System Adjustment?

Range of accurate measurement

Evaluation of algorithm

- Test data set to send through system algorithm to validate output?
- Protecting IP must be a consideration

Merging Multiple Streams of the Same Data



- **Producer may contribute information for the same parameter from different measuring devices**
- **Need to capture not only data point(s) but also source of the data**

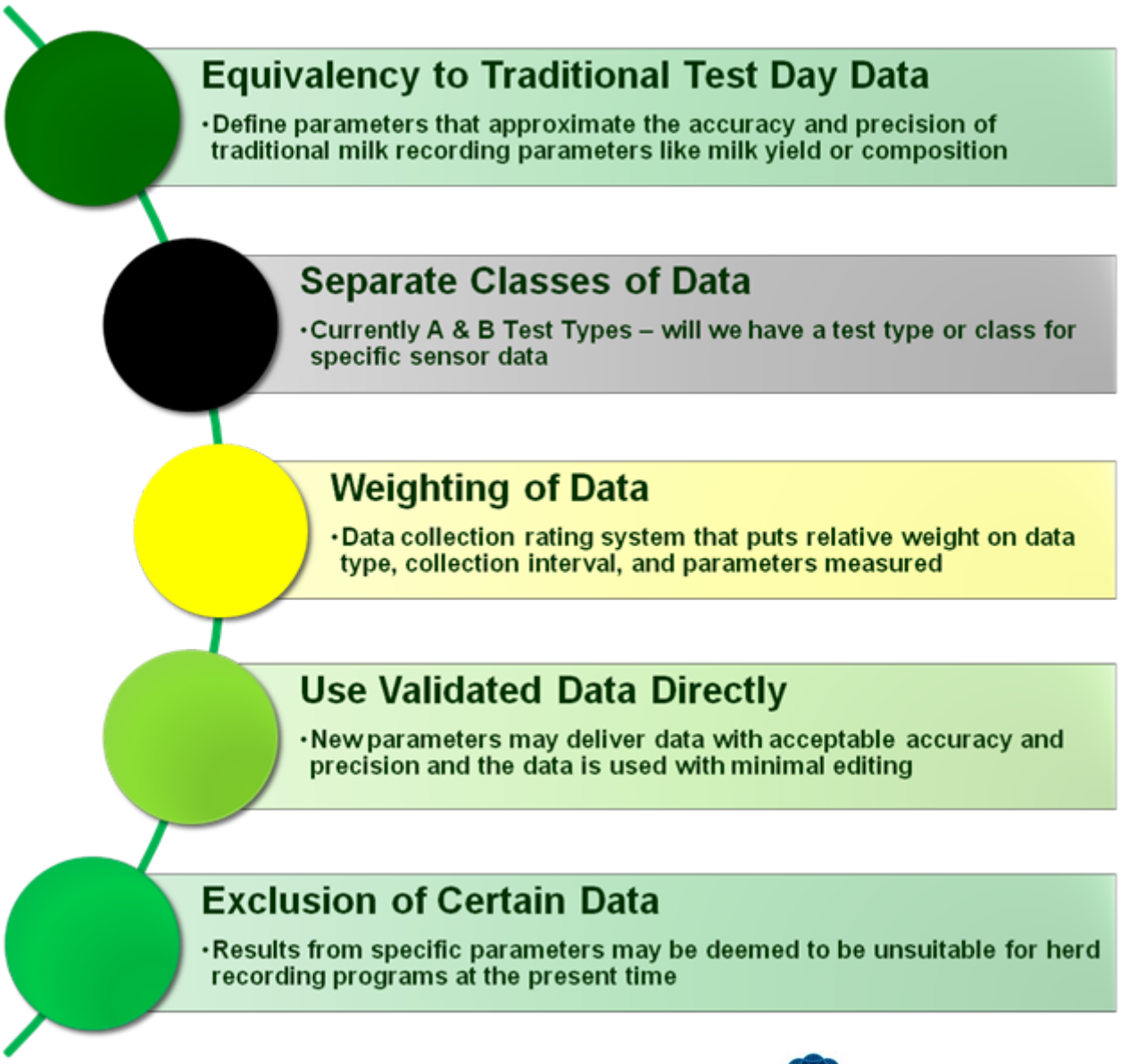
How will we value each data point?

How will we value the whole record?

What information will we deliver?

How Will We Value Sensor Data?

The Same Parameter May Be Estimated by Different Methods with Different Data Values Assigned for Each Method



Reference Materials on the ICAR Website

Creation of ‘Landing Page’ for Sensors

- Sensor survey results
- Internal work of SD-TF
- External research
- Proposed guidelines
- Proposed best practices
- Proposed testing and certification requirements

Link to other ICAR SC/WG/TF

Goal is Summer 2018 for Launch

Goals of the ICAR Sensor Devices Task Force

Producers, breeding companies, herd books, recording organizations, and manufacturers are looking to ICAR to establish research-based standards and guidelines for the usability of sensor device data in their programs.

Timeline & Delivery

Sensor Devices Task Force

May 2016
- ICAR Board approved creation of Sensor Devices Task Force (SD-TF)

2016-2017
- Conference calls/web-based meetings
- Identification of additional expertise
- Development of initial guidelines/standards

June 2017
- Presentation – ICAR 2017 in Edinburgh
- Initial concepts on best practices for review

2018
- Collaboration with manufacturers and database administrators
- Launch of sensor resource page(s) on ICAR website
- Dissemination of proposed guidelines to members and manufacturers

Summer 2019
- Proposed revisions to guidelines presented to the General Assembly at ICAR 2019 in Prague for approval

June 2019
- Sensor Device Task Force transfers work to Recording and Sampling Devices Subcommittee