1. Defined Benefit Scheme (DBS)

1.1 What Is It?

The DBS is a retirement plan where the benefits are predetermined based on the member's salary and years of service. It guarantees a stable income post-retirement, calculated using a specific formula.

1.2 Key Features

- **Retirement Pension**: Members receive 2% of their revalued earnings per year of pensionable service, capped at 70% of their final salary.
- **Normal Retirement Age (NRA)**: Set at 65 years.
- **Early Retirement**: Allowed from age 55, but benefits are reduced based on actuarial factors (e.g., 42.5% reduction at age 55 for staff joining after 1 June 2009).
- **Late Retirement**: Permitted up to age 70, potentially increasing the pension amount.

1.3 Death Benefits

- **Spouse's Pension**: Provides 60% of the member's retirement pension to the surviving spouse.
- **Children's Pension**: Equal to 40% of the spouse's pension for each child; doubled if no spouse's pension is payable.
- **Former Spouse's Pension**: Calculated based on the duration of the marriage during employment.

1.4 Transfers

- **Transfers-In**: Members can transfer pension rights from other schemes into the DBS, with the transferred amount converted to pensionable service.
- **Transfers-Out**: Allows the actuarial value of accrued benefits to be transferred to another pension scheme upon leaving ECB employment.

1.5 Adjustments

- **Pension Increases**: Annual adjustments based on inflation (Harmonized Index of Consumer Prices) or general salary increases.
- **Actuarial Reductions**: Applied for early retirement or significant age differences between the member and spouse.

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2. Voluntary Contribution Scheme (VCS)

2.1 What Is It?

The VCS is an optional savings plan where members can contribute a portion of their salary to build additional retirement savings. Contributions are invested and grow over time.

2.2 Key Features

- **Contributions**: Members can contribute up to 12% of their monthly basic salary.
- **Account Balance**: Contributions, along with investment returns, are credited to an individual account.

2.3 Benefits

- **Supplementary Retirement Pension**: The account balance is converted into a supplementary pension at retirement using actuarial factors.
- **Lump-Sum Withdrawals**: Members can opt to withdraw part or all of the balance as a lump sum upon leaving service.
- **Death Benefits**:
    - Spouses can receive the account balance as a lump sum or a supplementary pension.
    - If no spouse exists, the balance is paid to legal heirs.

2.4 Flexibility

The VCS offers flexibility in choosing how benefits are received, catering to individual financial needs and goals.

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3. Retirement Options

3.1 Early Retirement

- Available from age 55.
- Actuarial reductions apply (e.g., 42.5% reduction at age 55 for post-2009 staff).

3.2 Normal Retirement

- The default retirement age is 65.
- Full benefits are provided based on the member's years of service and revalued earnings.

3.3 Late Retirement

- Members may work and contribute until age 70, potentially increasing their pension benefits.

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4. Dependents and Death Benefits

4.1 Spouse's Pension

- 60% of the member's pension is payable to the surviving spouse for life.
- Adjustments apply for significant age differences between the member and spouse.

4.2 Children's Pension

- 40% of the spouse's pension per child, doubled if no spouse's pension is payable.

4.3 Former Spouse's Pension

- Calculated based on the length of the marriage during the member's ECB employment.

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5. Transfers and Mobility

5.1 Transfers-In

- Facilitates the integration of pension rights from previous employers, enhancing pensionable service.

5.2 Transfers-Out

- Enables the transfer of accrued benefits to another pension scheme upon leaving the ECB.
- Full transfer requires cashing out all benefits under both DBS and VCS.

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6. Actuarial Valuations and Adjustments

- **Periodic Valuations**: Conducted every three years to ensure the financial health of the DBS.
- **Actuarial Adjustments**: Reductions for early retirement and age differences between spouses; conversion factors for VCS benefits.

Detailed Explanation of Benefit Calculations and Methodology

1. Defined Benefit Scheme (DBS) Benefit Calculations

1.1 Retirement Pension

The DBS retirement pension is calculated using the following formula:

$$\text{Pension} = 2\% \times \text{Revalued Earnings} \times \text{Years of Pensionable Service}$$

- **Revalued Earnings**: The average of the member's highest basic salaries over a maximum of 30 years of pensionable service, adjusted for inflation or salary changes.
- **Years of Pensionable Service**: Total years of service for which contributions were made to the scheme, including any transferred or bought-back periods.
- **Maximum Pension**: Capped at 70% of the member's final salary.

Example Calculation:

- Revalued earnings: €100,000
- Years of pensionable service: 25

$$\text{Pension} = 2\% \times 100{,}000 \times 25 = €50{,}000 \text{ annually}$$

1.2 Early Retirement Adjustments

For members retiring before the **Normal Retirement Age (NRA)** of 65, reductions are applied based on age:

The following table shows the early retirement factors:

Age		Scheme_Prior_2009	Scheme_Post_2009
55		0.3200	0.4250
56		0.2800	0.3950
57		0.2400	0.3630
58		0.2000	0.3290
59		0.1600	0.2920
60		0.1200	0.1875
61		0.0900	0.1500
62		0.0600	0.1125
63		0.0300	0.0750
64		0.0150	0.0375
65		0.0000	0.0000

Adjustment Formula:

$$\text{Reduced Pension} = \text{Calculated Pension} \times (1 - \text{Reduction Factor})$$

Example:

- Calculated pension: €50,000

- Retirement age: 60
- Reduction Factor (Scheme_Post_2009): 18.75%

$$\text{Reduced Pension} = 50{,}000 \times (1 - 0.1875) = €40{,}625 \text{ annually}$$

1.3 Late Retirement Enhancements

For retirement after age 65 but before age 70, the pension may increase based on actuarial factors. The precise enhancement depends on the actuarial advice at the time.

1.4 Spouse's Pension

- **Calculation**: 60% of the member's retirement pension.
- **Age Adjustment**: If the spouse is more than 10 years younger than the member, reductions apply if they have been married less than xxx years:
  - 1% for each year beyond 10 up to 20 years.
  - 2% for each year beyond 20 up to 25 years.

Example:

- Member's pension: €50,000
- Spouse's age difference: 15 years
- Reduction: 5% (1% × 5 years)

$$\text{Spouse's Pension} = 60\% \times 50{,}000 \times (1 - 0.05) = €28{,}500 \text{ annually}$$

1.5 Children's Pension

- 40% of the spouse's pension per child.
- If no spouse's pension is payable, this amount is doubled.

Example:

- Spouse's pension: €28,500
- Children: 2

$$\text{Child's Pension per Child} = 40\% \times 28{,}500 = €11{,}400 \text{ annually}$$

1.6 Projection of Revalued Earnings

To project revalued earnings, age-based salary increment rates are applied. The table below shows the increase percentages based on the member's age:

From_Age	Increase_Percentage
20	0.01
25	0.016
30	0.018
35	0.017

From_Age	Increase_Percentage
40	0.016
45	0.015
50	0.014
55	0.0

These percentages are applied annually to forecast future salary levels, which are then used to compute revalued earnings.

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2. Voluntary Contribution Scheme (VCS) Benefit Calculations

2.1 Supplementary Retirement Pension

The VCS benefit depends on the account balance and actuarial conversion factors:

$$\text{Supplementary Pension} = \frac{\text{Account Balance}}{\text{Conversion Factor}}$$

- **Account Balance**: Total contributions plus investment returns.
- **Conversion Factor**: Actuarial factor based on the member's and spouse's ages at retirement.

Example:

- Account balance: €200,000
- Conversion factor: 20

$$\text{Supplementary Pension} = \frac{200{,}000}{20} = €10{,}000 \text{ annually}$$

2.2 Lump-Sum Withdrawals

Members may withdraw part or all of their account balance as a lump sum instead of converting it to a pension.

2.3 Spouse's Supplementary Pension

If a spouse's supplementary pension is elected, an additional conversion factor is applied, reducing the member's supplementary pension proportionately.

Example:

- Account balance: €200,000
- Member-only conversion factor: 20
- Member-and-spouse conversion factor: 15

$$\text{Member's Pension} = \frac{200{,}000}{15} = €13{,}333 \text{ annually}$$

2.4 Death Benefits

- Spouse can opt for a lump sum or convert the account balance into a supplementary pension using the applicable conversion factor.
- If no spouse exists, the account balance is distributed to the legal heirs.

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3. Actuarial Assumptions and Adjustments

3.1 Pension Conversion Factors

- Net present value of an actuarial annuity
- Periodically reviewed to account for life expectancy and economic conditions.
- Higher conversion factors reduce the annual pension.

3.2 Pension Adjustments

Pensions under both schemes are adjusted annually

3.3 Sensitivity Analysis

Actuarial valuations include sensitivity analyses to ensure the sustainability of the pension schemes under various economic scenarios.

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4. Summary of Key Calculation Formulas

1. **DBS Retirement Pension**:

$$2\% \times \text{Revalued Earnings} \times \text{Years of Pensionable Service}$$

2. **Early Retirement Adjustment**:

$$\text{Reduced Pension} = \text{Calculated Pension} \times (1 - \text{Reduction Factor})$$

3. **Spouse's Pension**:

$$60\% \times \text{Member's Pension} \times (1 - \text{Age Adjustment Factor})$$

4. **VCS Supplementary Pension**:

$$\text{Supplementary Pension} = \frac{\text{Account Balance}}{\text{P.Conversion Factor}}$$

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Implementation of DBS Calculations: High-Level Explanation

Objective of the Framework

The primary goal is to ensure accurate and transparent calculation of pension benefits under the DBS. The framework:

- Accounts for both historical and projected earnings.
- Applies revaluation and inflation adjustments as per scheme rules.
- Computes benefits for retirement scenarios, including early and standard retirement.
- Incorporates the impact of leave periods and partial work years.

Key Components of the DBS Calculations

1. Historical and Projected Salaries

- **Historical Salaries**: Collected from the member's salary history, adjusted for periods of service.
- **Projected Salaries**: Future earnings are estimated based on inflation rates, salary increments, and the assumption of full-time work up to retirement.

2. Revaluation Factors

- **Purpose**: Adjust historical salaries to current value by accounting for inflation and revaluation factors.
- **Compounded Matrix**: A dynamic table of factors is created to ensure consistent adjustments for both past and future years.

3. Pensionable service

- Salaries are adjusted for years where members worked part-time or took leave.
- Ensures that only the actual time worked/transferred in contributes to the pension calculation, as per scheme rules.

Processes in the DBS Calculation Framework

Step 1: Data Collection and Preparation

- Load personal data (date of birth, joining date, salary history).
- Identify key milestones like the year the member turns 65 (normal retirement age).

Step 2: Historical and Future Salary Consolidation

- Combine past salaries with projected earnings to create a complete salary table from the start of service to retirement.

Step 3: Application of Revaluation Factors

- Use the compounded revaluation matrix to adjust historical salaries to current value.
- Apply inflation rates to project future salaries.

Step 4: Retirement Scenarios

- Calculate pension benefits for retirement ages 55 to 65.
- For early retirement, apply reduction factors based on the member's age and scheme rules.

Step 5: Final Adjustments

- Incorporate adjustments for leave periods, worked percentages, and any applicable salary caps.
- Calculate the revalued and adjusted pensionable earnings for each retirement scenario.

Outputs of the Framework

5. **Revalued Salary Tables**:
    - Show yearly earnings, adjusted for inflation and revaluation.
    - Separate tables for each potential retirement age.
6. **Retirement Benefit Calculations**:
    - Pension amounts for each retirement age.
    - Transparent breakdown of calculations, including reductions for early retirement.
7. **Comprehensive Reports**:
    - Summary of total pensionable earnings.
    - Clear documentation of factors, adjustments, and rules applied.

Alignment with DBS Rules

The framework adheres to key provisions of the DBS, including:

- **Revaluation of Earnings**: Ensures salaries are adjusted to reflect current value.
- **Early Retirement Reductions**: Applies scheme-specific reduction factors for members retiring before 65.
- **Service Periods**: Considers only actual service years, with adjustments for part-time work or leave periods.
- **Maximum Pension Cap**: Enforces the rule that pensions cannot exceed 70% of final salary.

Conclusion

This framework operationalizes the DBS rules systematically, ensuring accurate and fair pension calculations. It provides members with a transparent view of how their pensions are computed and facilitates informed decision-making regarding retirement options