# EDISON Data Science Framework (EDSF):

## Facilitating Data Science Curricula Development and organisational capacity building

# Introduction and Agenda

**EDISON**
building the data
science profession

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University of Amsterdam

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EDISON – **E**ducation for **D**ata **I**ntensive **S**cience to **O**pen **N**ew science frontiers

# Workshop Agenda

**Part 1 10:00 – 13:00**

1. Introduction and bootstrapping (30 min)
   - EDISON Data Science Framework and EDISON project legacy.
   - Workshop goals and attendees interests
2. Background information and how the EDSF has been done (60 min)
   - EU and International studies on data related competences and skills
   - EU standards, projects, initiatives, associations
3. EDISON Data Science Framework (EDSF) in details and walk through customised curriculum design (90 min)
   - EDSF components: Competence Framework (CF-DS), Body of Knowledge (DS-BoK), Model Curriculum (MC-DS), Data Science Professional Profiles (DSPP)
   - Walk through customised curriculum design: from target professional groups or competences to curriculum suggestions

**Part 2 14:00-16:00+**

1. Curriculum analysis and design – Interactive session and practice (in groups)
   - Analysis of Data Science and Data Management curricula by champion universities adopting EDSF
   - Continue with the curriculum design for target professional groups or study programmes
   - Assessment and discussion on Data Science soft skills: workplace and 21st Century
2. Critical issues in implementing research and enterprise Data Science capacity building and Data Management practices: skills management, team building, infrastructure issues.
   - Interactive session and open discussion
3. Closing: comments, future steps, community building
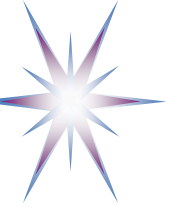
# INFRASUPP04 CSA Project EDISON

- University of Amsterdam (UvA) - NL
- University of Stavanger (UiS) - NO
- University of Southampton (Southampton) - UK
- European Grid Initiative (EGI) - EU
- Engineering (ENG) - IT
- Forschunginstitut for Telekommunikation und Kooperation (FTK) – DE
- InMark - ES

- September 2015 – August 2017

- EDISON Data Science Framework (EDSF)
  - **Release 2 components CF-DS, DS-BoK, MC-DS, DSPP**
  - Compliant with EU standards on competences and professional occupations e-CFv3.0, ESCO
- Skills development and career management for Core Data Experts and related data handling professions
- Academic programmes and professional training courses (self) assessment and design
- Individual competences benchmarking and Data Science team design
- Cooperation with International professional organisations IEEE, ACM, BHEF, APEC (AP Economic Cooperation )
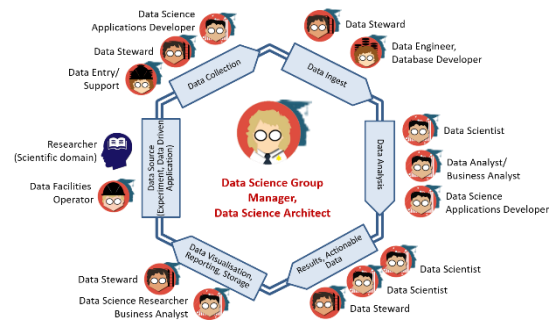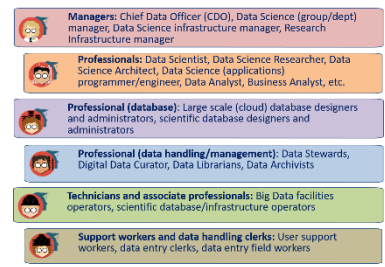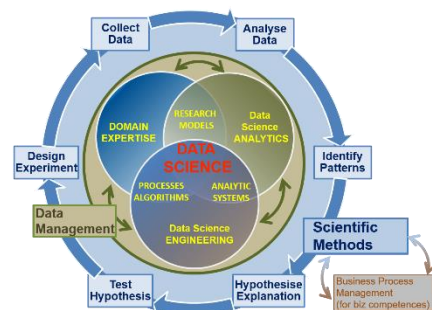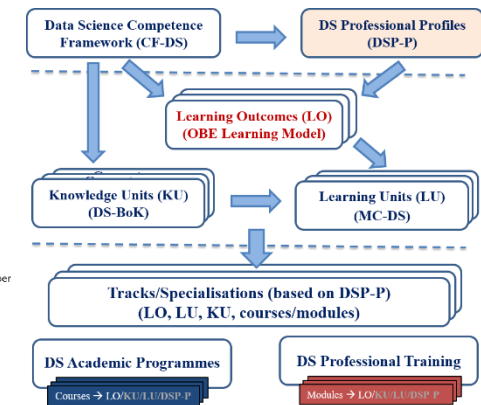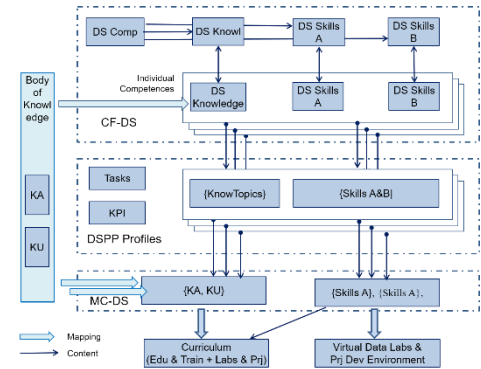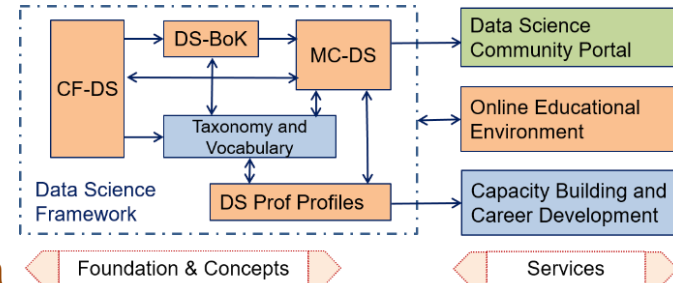
# EDISON Data Science Framework (EDSF)
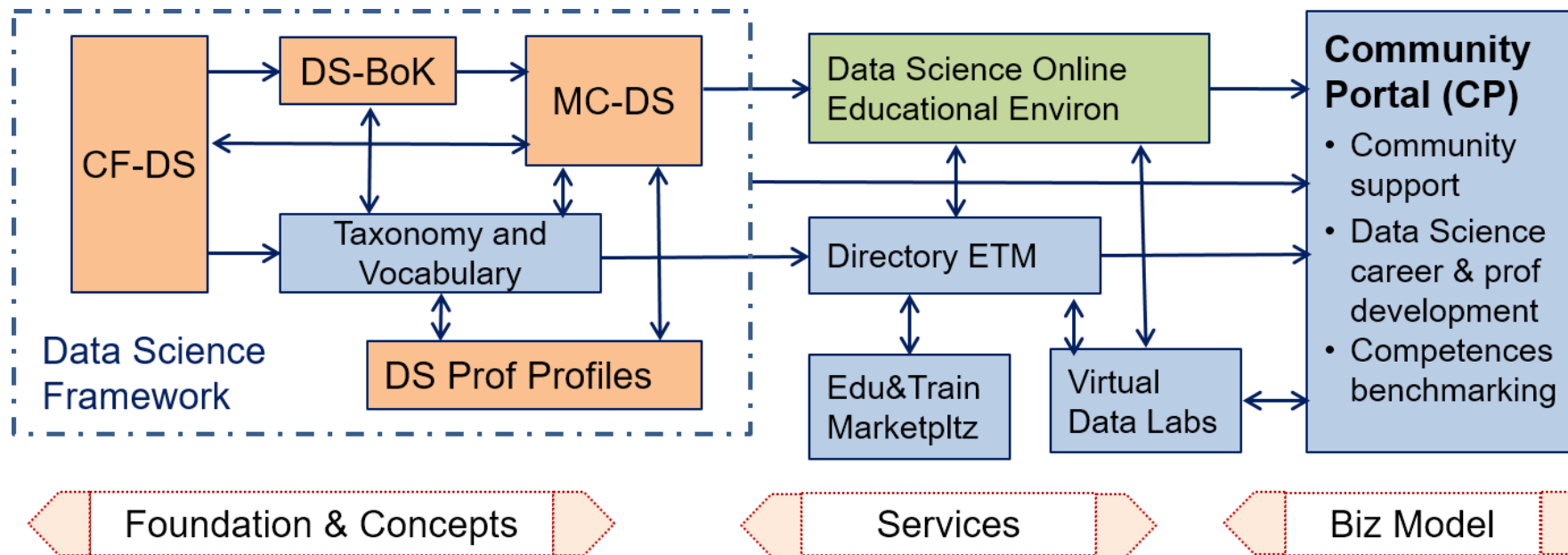


**EDISON Framework components**
– CF-DS – Data Science Competence Framework
– DS-BoK – Data Science Body of Knowledge
– MC-DS – Data Science Model Curriculum
– DSP – Data Science Professional profiles
– Data Science Taxonomies and Scientific Disciplines Classification
– EOEE - EDISON Online Education Environment

**Methodology**

• ESDF development based on job market study, existing practices in academic, research and industry.

• Review and feedback from the ELG, expert community, domain experts.

• Input from the champion universities and community of practice.

# Roadmap recommendations: Data Science Education and Training for Europe (2017)

A. Policy recommendations for the EC and Member States
- R1. Critical skills management and training
- R2. Gender balance and multi-cultural environment
- R3. Common data literacy
- R4. Data driven technology and education divide.
- R5. European studies on demand and role of Data Science and Analytics skills
- R6. Include the above actions in the European Digital Single Market Scoreboard

B. Recommendations to universities and professional training organisations
- R7. EDSF adoption by universities
- R8. Addressing Data Science professional and workplace skills in university curricula
- R9. Multiple delivery form
- R10. Sharing experience, courses and instructors
- R11. Supporting technical infrastructure for Data Science and data related education and professional training

C. Recommendations for Research (e) Infrastructures
- R12. Critical skills management in Research (e) Infrastructures

D. Required support and contribution to the standardisation bodies
- R13. The following are essential measures to achieve EDSF support existing and new standards.
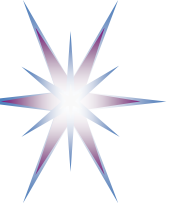
# EDSF Recognition, Endorsement and Implementation

- **DARE (Data Analytics Rising Employment)** project by APEC (Asia Pacific Economic Cooperation)
  - DARE project Advisory Council meeting 4-5 May 2017, Singapore

- **PcW and BHEF Report "Investing in America's data science and analytics talent"** April 2017
  - Quotes EDSF and Amsterdam School of Data Science

- **Dutch Ministry of Education recommended EDSF** as a basis for university curricula on Data Science
  - Workshop "Be Prepared for Big Data in the Cloud: Dutch Initiatives for personalized medicine and health research & toward a national action programme for data science training", Amsterdam 28 June 2016
  - Dutch Gov Program on re-skilling IT/data workers for DSA competences

- **European Champion Universities network**
  - 1st Conference (13-14 July, UK)
  - 2nd Conference (14-15 March, Madrid, Spain)
  - 3rd Conference 19-20 June 2017, Warsaw
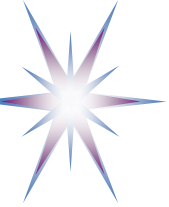
# Ongoing activities and developments
https://github.com/EDISONcommunity/EDSF

- **EDISON Community Initiative and Call for contribution EDSF Release 3**
  - Call for comments and contribution - Deadline 30 June 2018
  - Editorial team work June – July 2018
  - Target publication EDSF Release 3 – end July 2018
  - Call for sponsorship

- **Industry digitalisation projects and data literacy skills training**
  - **MATES project funded by EU ERASMUS Programme -** EU Maritime industry digital transformation, data skills development and Data + Ocean literacy
  - Port Rotterdam Data Management training for data driven digital transformation
  - Skills for SME: Data Science, IoT, Cybersecurity: Prepare to Data Economy and Industry 4.0

- **DARE project by APEC** (Asia Pacific Economic Cooperation)
  - Continuing cooperation for Asia Pacific region
  - Recommended Data Science and Analytics Competences published August 2017 - https://www.apec.org/Press/Features/2017/0620_DSA

# Further development and exploitation

- Development of EDSF based tools
    - Competences benchmarking and Job market monitoring

- Inter-universities initiative "Data Science for UN's Sustainable Development Goals" to focus in-curricula research (projects) on UN priority goals

- Toward EDSF and Data Science profession standardisation
    - ESCO (European Skills, Competences and Occupations) taxonomy
    - CEN TC428 (European std body) – Extending current eCFv3.0 and ICT profiles towards e-CF4 with Data Science related competences
    - Work with the IEEE and ACM curriculum workshop to define Data Science Curriculum and extend current CCS2012 (Classification Computer Science 2012)

- Data Science Manifesto – Primarily focused on professional and ethical issues in Data Science, new type of professional
    - Professional and ethical issues as a primary focus

# EDISON Initiative Online Presence

- EDSF github project - https://github.com/EDISONcommunity/EDSF
  - Component documents CF-DS, DS-BoK, MC-DS, DSPP

- EDISON Community work area and discussions - https://github.com/EDISONcommunity/EDSF/wiki/EDSFhome
- Mailing list - edison-net@list.uva.nl

- EDISON project website (still active) http://edison-project.eu/
  - EDISON Data Science Framework Release 2 (EDSF), 3 July 2017 http://edison-project.eu/edison-data-science-framework-edsf

- Data Science Community Portal (http://datasciencepro.eu)
  - To host future EDISON Community initiatives

# Links to Workshop Resources

- EDISON Workshop home
  https://github.com/EDISONcommunity/EDSF/tree/master/EDSFcurriculaDesign

- EDISON Data Science Framework Release 2 (EDSF)
  https://github.com/EDISONcommunity/EDSF

- (old http://edison-project.eu/edison-data-science-framework-edsf)

Component documents

CF-DS – Data Science Competence Framework
https://github.com/EDISONcommunity/EDSF/blob/master/EDISON_CF-DS-release2-v08.pdf

DS-BoK – Data Science Body of Knowledge
https://github.com/EDISONcommunity/EDSF/blob/master/EDISON_DS-BoK-release2-v04.pdf

MC-DS – Data Science Model Curriculum
https://github.com/EDISONcommunity/EDSF/blob/master/EDISON_MC-DS-release2-v03.pdf

DSPP – Data Science Professional profiles
https://github.com/EDISONcommunity/EDSF/blob/master/EDISON_DSPP-release2-v05.pdf

# Other related links

- Amsterdam School of Data Science
  - https://www.schoolofdatascience.amsterdam/
  - https://www.schoolofdatascience.amsterdam/education/

- Research Data Alliance interest Group on Education and Training on Handling of Research Data (IG-ETHRD)
  - https://www.rd-alliance.org/groups/education-and-training-handling-research-data.html