FET Flagships:
Recommendations for Implementation

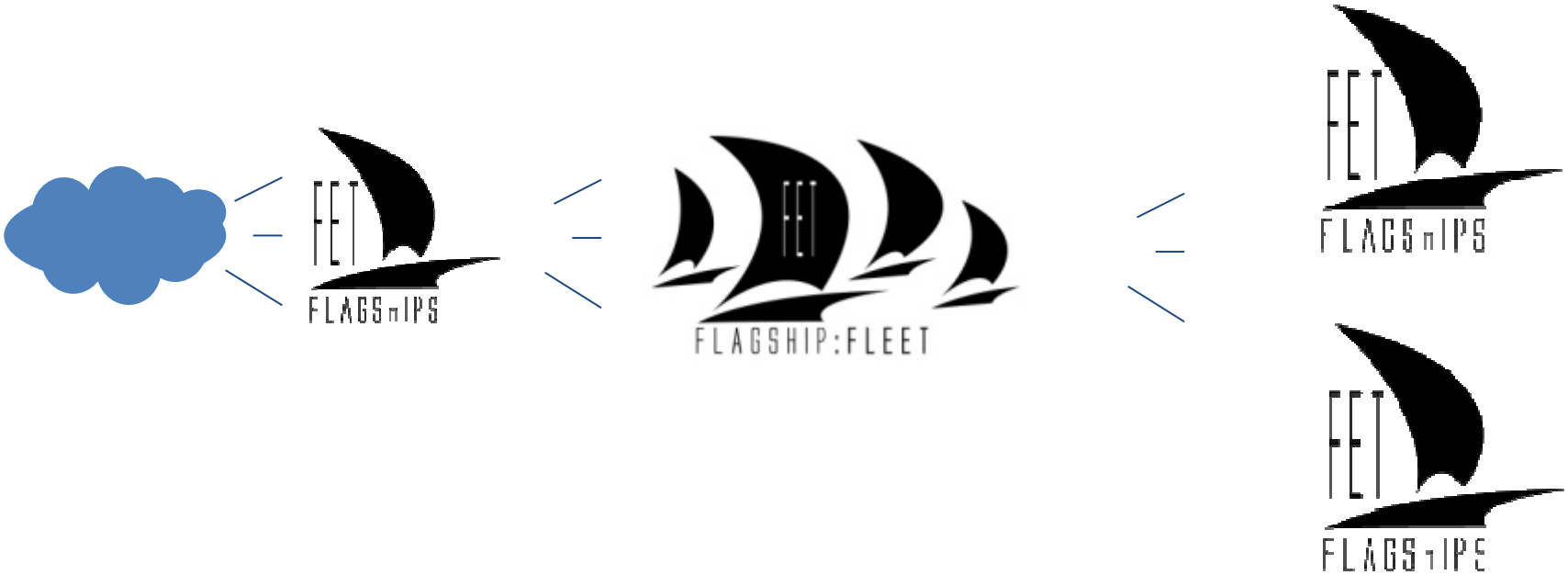
Ergebnisse der Studie

28 April, 2011

Stefan Lasser, FFG

Big Picture

FET Flagship Study	Pilots	Launch

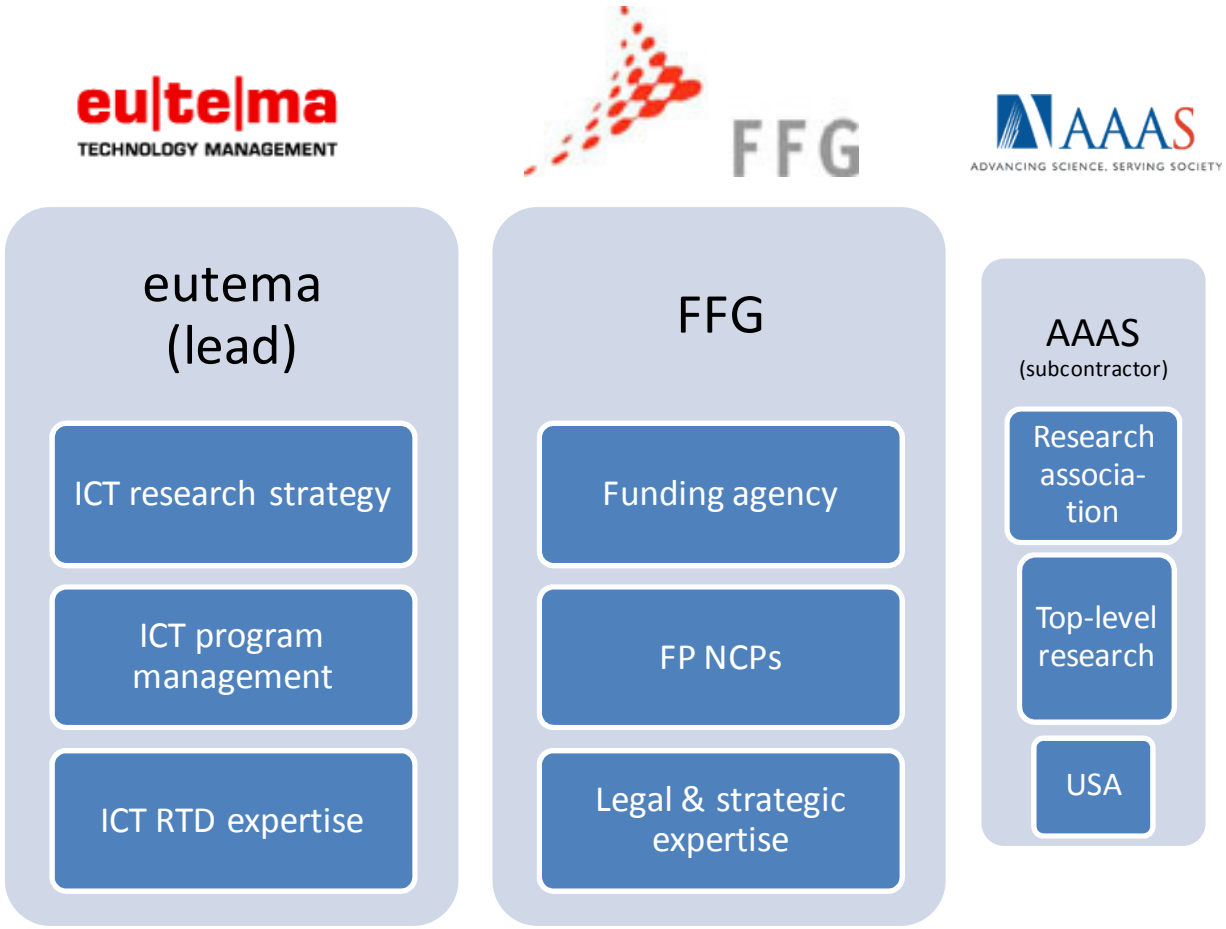


2010	2011	2013

FET Flagships Study

- Call for Tender FET FLAGSHIPS (SMART 2009/0051) of the European Commision
- Future and Emerging Technology Flagships (FET-F‘s)
- 10 months (starting 2009-12-22)

Partners



+ independent experts

Fokus der Beispiele für Ergebnisse

- **Lessons learned aus vergangenen Initiativen**
- Unterschiede von Forschungsfeldern
- Eignung bestehender Fördermechanismen

Identification of previous flagships

- Criteria
  - Focus on “Grand Challenge”
  - With ICT innovation a key component
  - Multi- or interdisciplinary research activities
  - Duration of 10 years
  - Budget of €100 m per year
- Information on:
  - Goals
  - Funding level
  - Funding source
  - Partners involved
  - Planning horizon
  - Result
  - Impact

- 66, initiatives 23 in detail
- Different approaches
  - big budget vs. small budget
  - infrastructure vs. project based
  - narrow vs. broad focus
- Different scientific areas
  - Genomics, Cancer Biology, Ecology, Information Technology, Astronomy, Computer Science and Engineering, Autonomous Vehicles, Particle Physics, etc.

Previous Flagship-like initiatives: AAAS Collaboration

Previous flagship-like examples
DARPA Challenge
Human Genome Project
Large Hadron Collider
Long-term Ecological Network
Strategic Computing Initiative
Assembling the Tree of Life

- Ambition
- Plausibility
- Structure
- Integration
- Impact
- Lessons learned

→ Success Factors

DARPA Grand Challenge

- **Goal: prize competition for autonomous ground vehicles**
- Announced 2002 (04/05: desert, 06: urban environment)
- **Ambition**: up to US$ 10 m prize money for a well-known challenge
- **Plausibility**: no roadmap, but ambitious goals and milestones; no successful track completion in first competition
- **Structure**: extensive rules and logistics (information, qualifying …)
- **Integration**: competition between teams, but focusing effect
- **Impact**: huge leap in technology sophistication, estimated of the amount of money spent much greater than prize money; very strong effect on the coherence of the field

Lessons learned (DARPA)

- **Success:** huge technological leap, strong impulse for the field
- Challenge: competition is also a deterrent (but participation from more established industry and hungry companies keen to demonstrate abilities); academic interest often student-driven
- Vision: design of the competition was a challenge
- Flexibility: was necessary, e.g. due to failure of first competition
- Criticism that competition had the drawback of being forced to find a winning team at the cost of scaling back ambitious goals.

Analysing the Tree of Life

- **Goal: evolutionary history for a major lineages of life**
- Established 2002, duration 10-15 years
- **Ambition**: huge challenge as there is a plethora of taxa
- **Plausibility**: long planning, but lack of roadmap and milestones
- **Structure**: NSF grant mechanism, NSF PO, US$112m grants, only few mechanisms for formal or informal interaction between projects
- **Integration**: based on experience, changes in 2010 call with more emphasis on the integration
- **Impact**: large impact for individual aspects (e.g. beetle, flowering plants, fungal families); but integration of different lineages a huge challenge.

Lessons learned (Tree of Life)

- **Success:** Identification of an important conceptual initiative by a community of scientists
- Not yet a success: “Tree of Life” as such
- Vision: roadmap or vision necessary for a clear understanding of the whole initiative
- Oversight: periodic internal or external evaluation lacked until 2008
- More emphasis on coordination needed: the sum should have been larger than its parts
- Balance between investigator needs and program requirements. In case of NSF this happened through changes in call – with appropriate response

Lessons learned (others)

- **Human Genome**
  - Ambitious goals that many did not quite believe to be realistic
  - 5-year strategic plans with continuous updates and reviews
  - Many formal meetings & information sharing
  - Capabilities check of the community

- **Large Hadron Collider**
  - Strong sense of community and strong peer pressure
  - CERN as a key enabler helped by international collaboration

- **Long-Term Ecological Research Network**
  - Put information management in place prior to data collection
  - Provide incentives for collaboration
  - Regularly evaluate progress
  - Clarity in research questions to unite the community

- **Strategic Computing Initiative**
  - Lack of common goals might lead to disintegrated efforts

Success factors (all examples)

Results: Cross-cutting principles

- Involve the research community in shaping the program
- Balance individual researcher goals with those of the initiative
- Clearly define and evaluate goals of initiative
- Leadership
- Develop an appropriate structure
- Create an environment conducive to integration
- Implement data management plan prior to data acquisition

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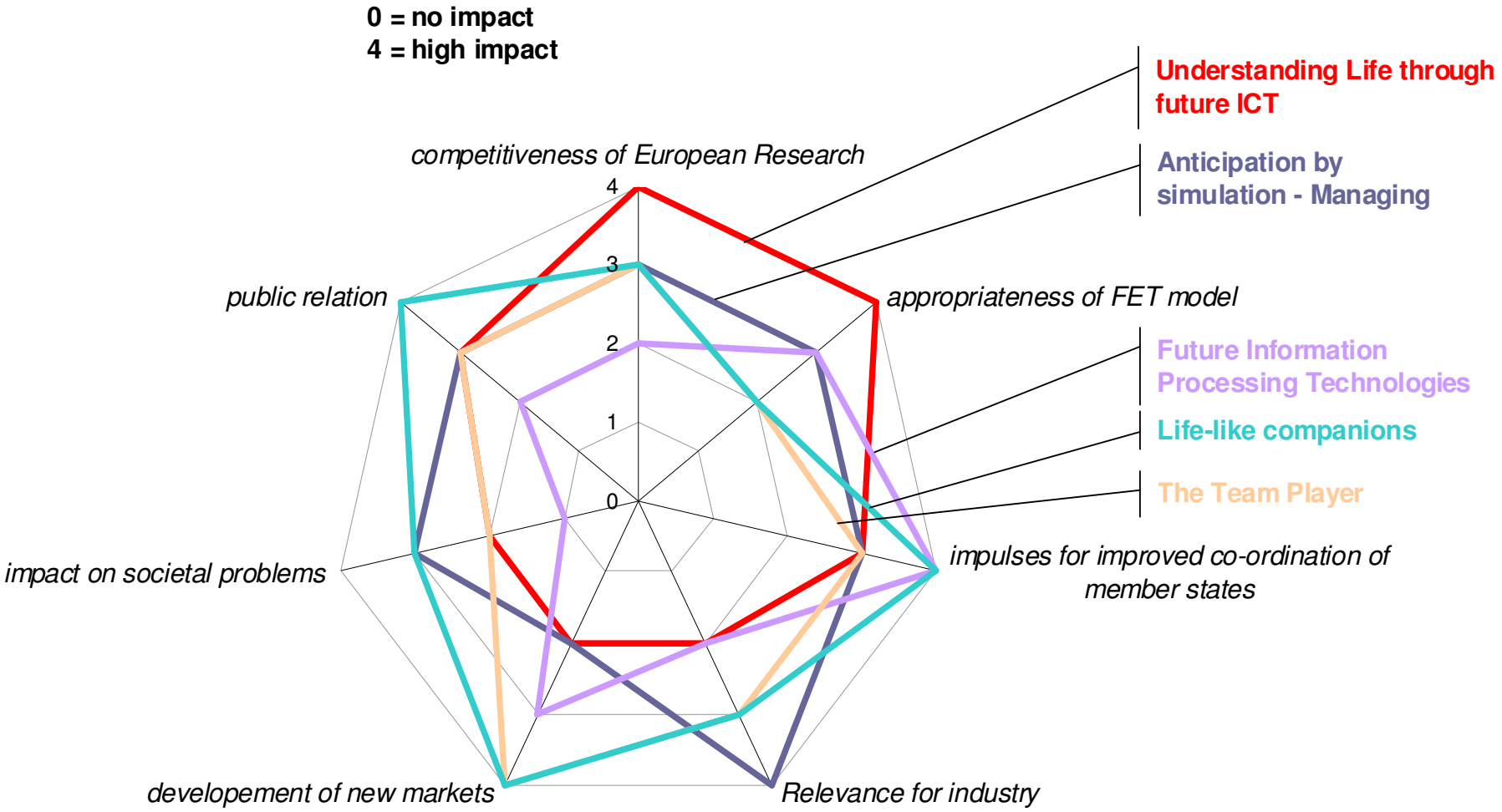
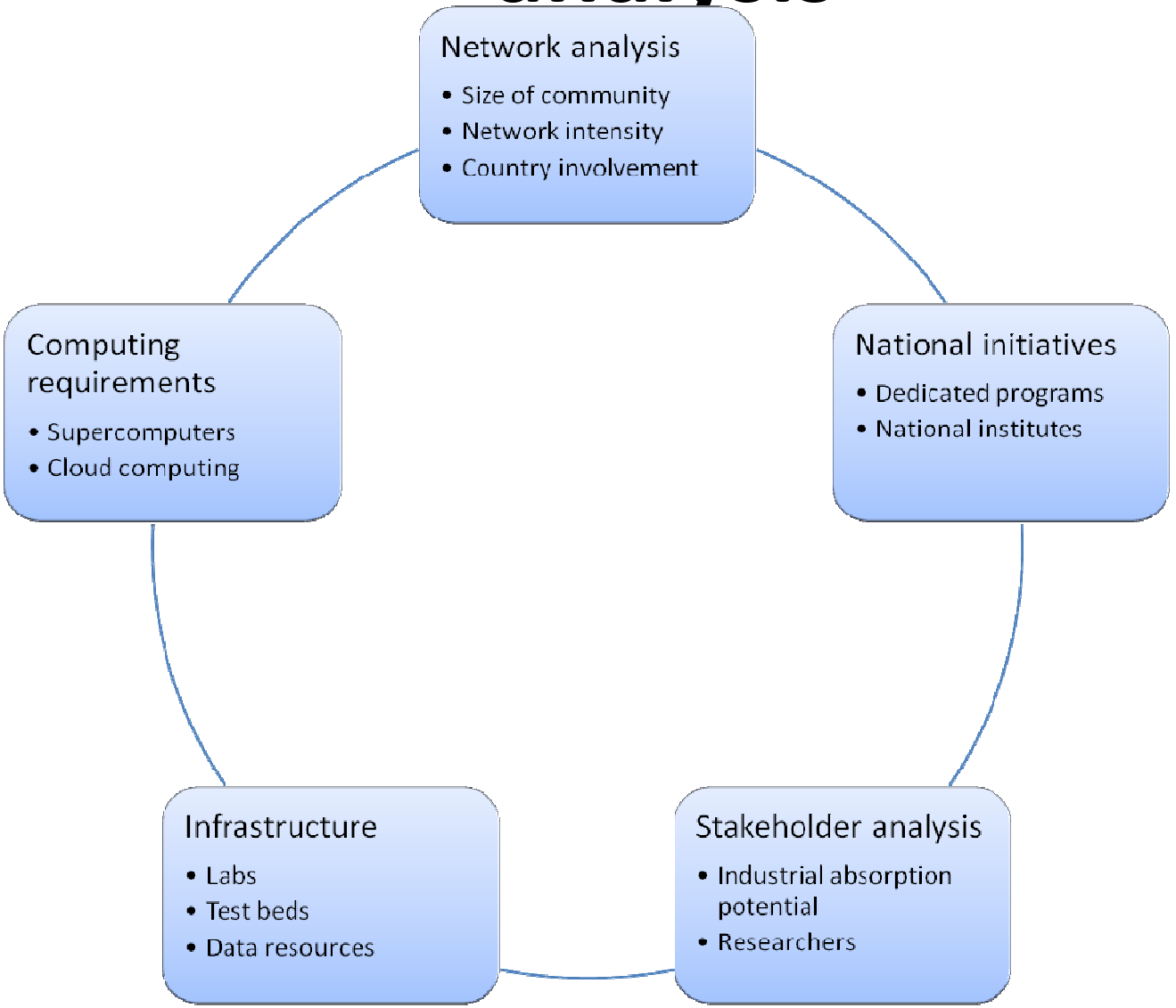
ex ante impact assessment summary



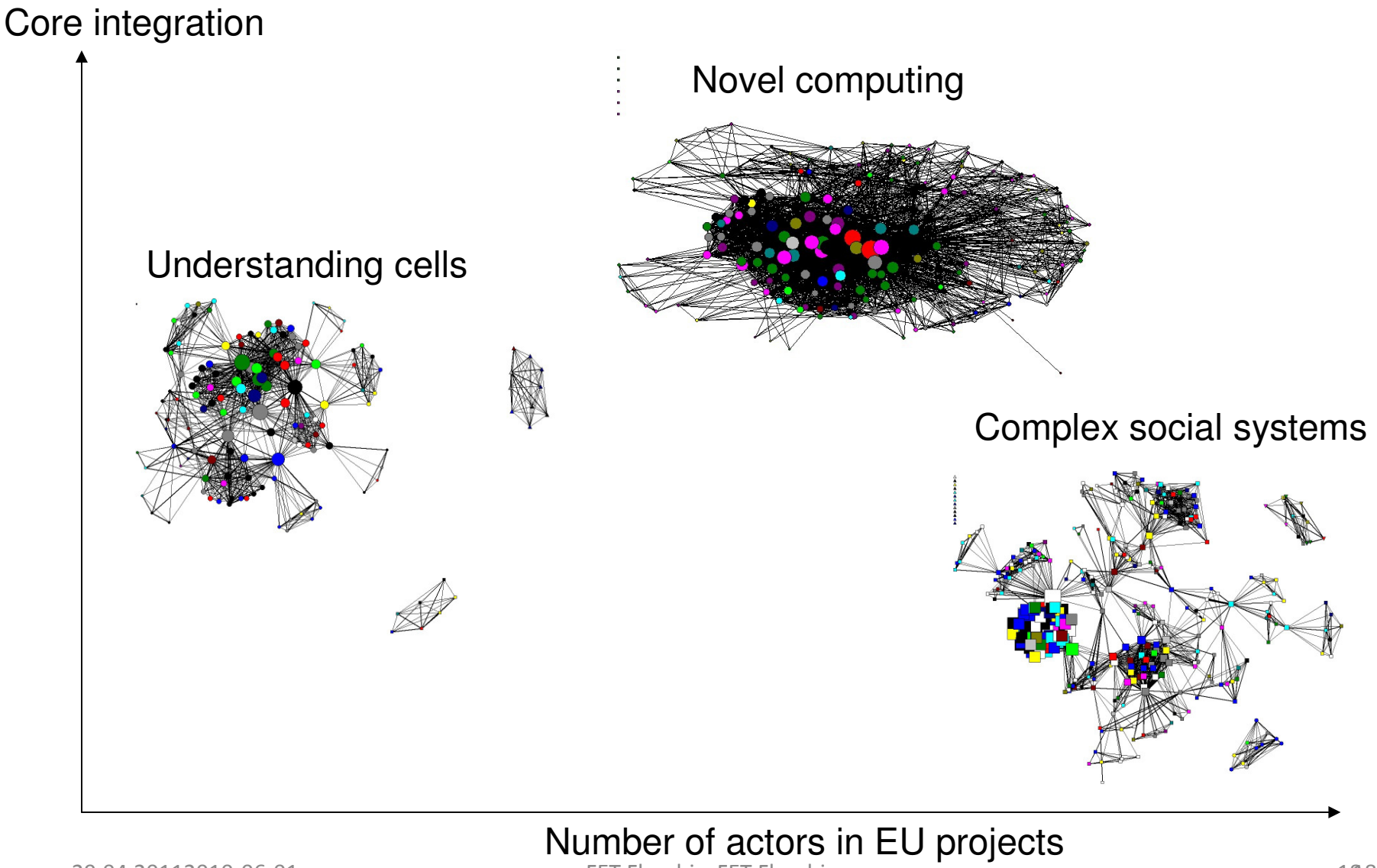
Resource and key player analysis



Resources and key players

	Understanding Cells	Complex Social Systems	Novel (Quantum) Computing
Characteristics			
main EU instrument used	collaborative projects	collaborative projects	single institute grants
actors in EU projects	145	378	209
nr. projects	23	56	102
average part./project	6	7	2
int. cooperation in EU projects	low	high	medium
structure of community	tight integration	broad, fragmented	highly integrated
clusters	4	3	1
overlap with other topics	low	low	high
Key player nations	CH, DE, FR, NL, SE	DE, ES, FR, NL, GB	AT, DE, DK, FR, IT, GB
National activities			
programmes	few, specific	few, specific	many general
other		EU infrastructure JRC	
centres, groups	generally in line with funding programmes		
	CH, DE, ES, IT, NL,S,	*CH, ES, NL, SI*	*AT, CH, DE, ES, FR, GB, IT, NL, PL, SE, SK*
ERA-NET		Complexity Net	Upcoming ERA+

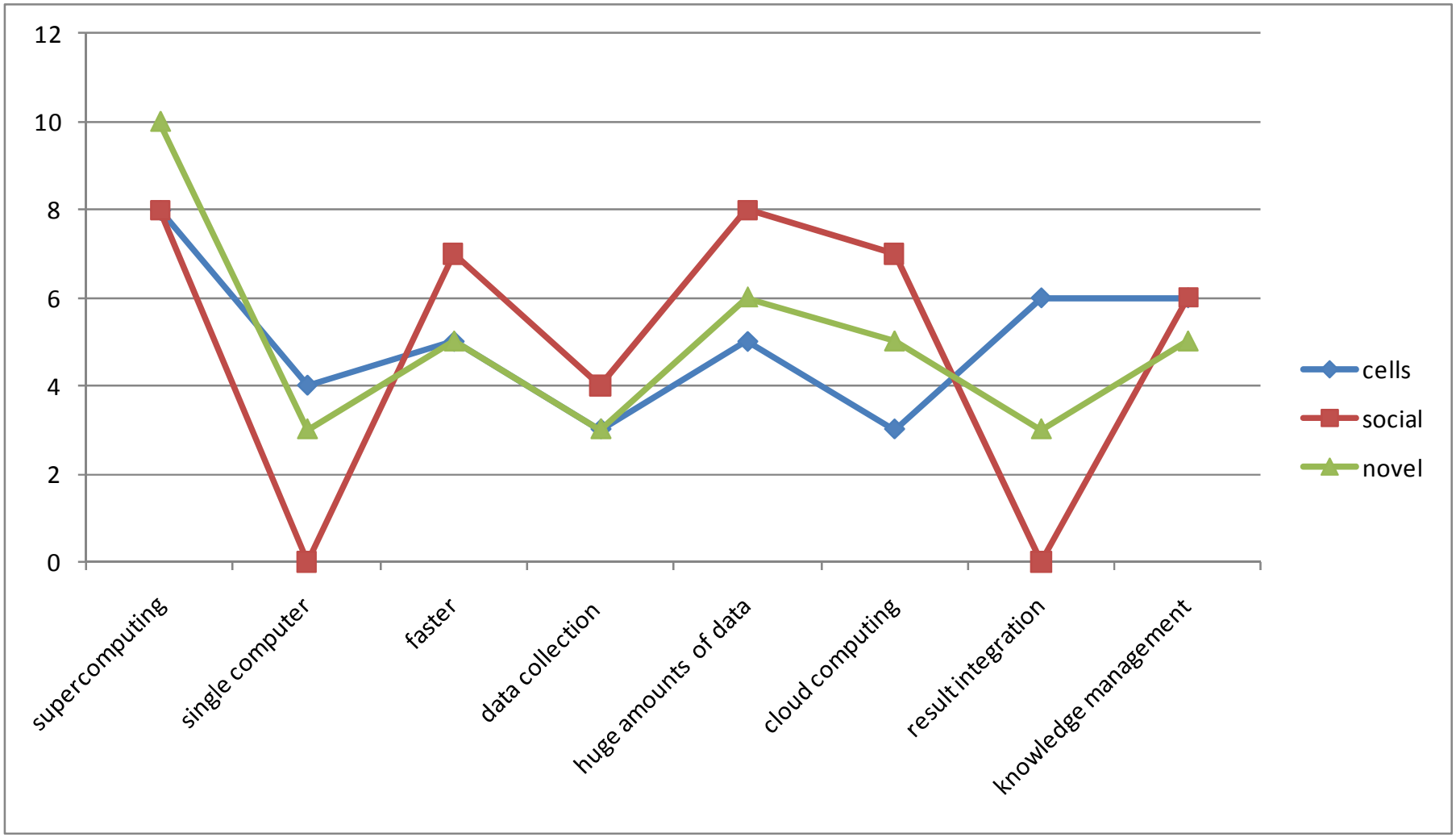
Resources and key players



Infrastructure

	How important is… *(weight 1..10)*	Understanding Cells	Complex Social Systems	Novel Computing	Total
4.1	the use of supercomputing for this flagship topic in general	**8**	**8**	**10**	**26**
4.2	a single joint supercomputing facility (rather than possibly smaller scale computers for each group)	**4**	**0**	**3**	**7**
4.3	much faster processing power than available today	**5**	**7**	**5**	**17**
4.4	a joint infrastructure for data collection and data management	**3**	**4**	**3**	**10**
4.5	facilities for storing very large amounts of data (e.g. Petabytes)	**5**	**8**	**6**	**19**
4.6	the use of cloud computing (1) for this flagship topic in general	**3**	**7**	**5**	**15**
4.7	data bases to integrate mostly results from the projects	**6**	**0**	**3**	**9**
4.8	knowledge management infrastructure (e.g. for papers, reports, lab books, etc.)	**6**	**6**	**5**	**17**
Total		**40**	**40**	**40**	

Infrastructure



Fokus der Beispiele für Ergebnisse

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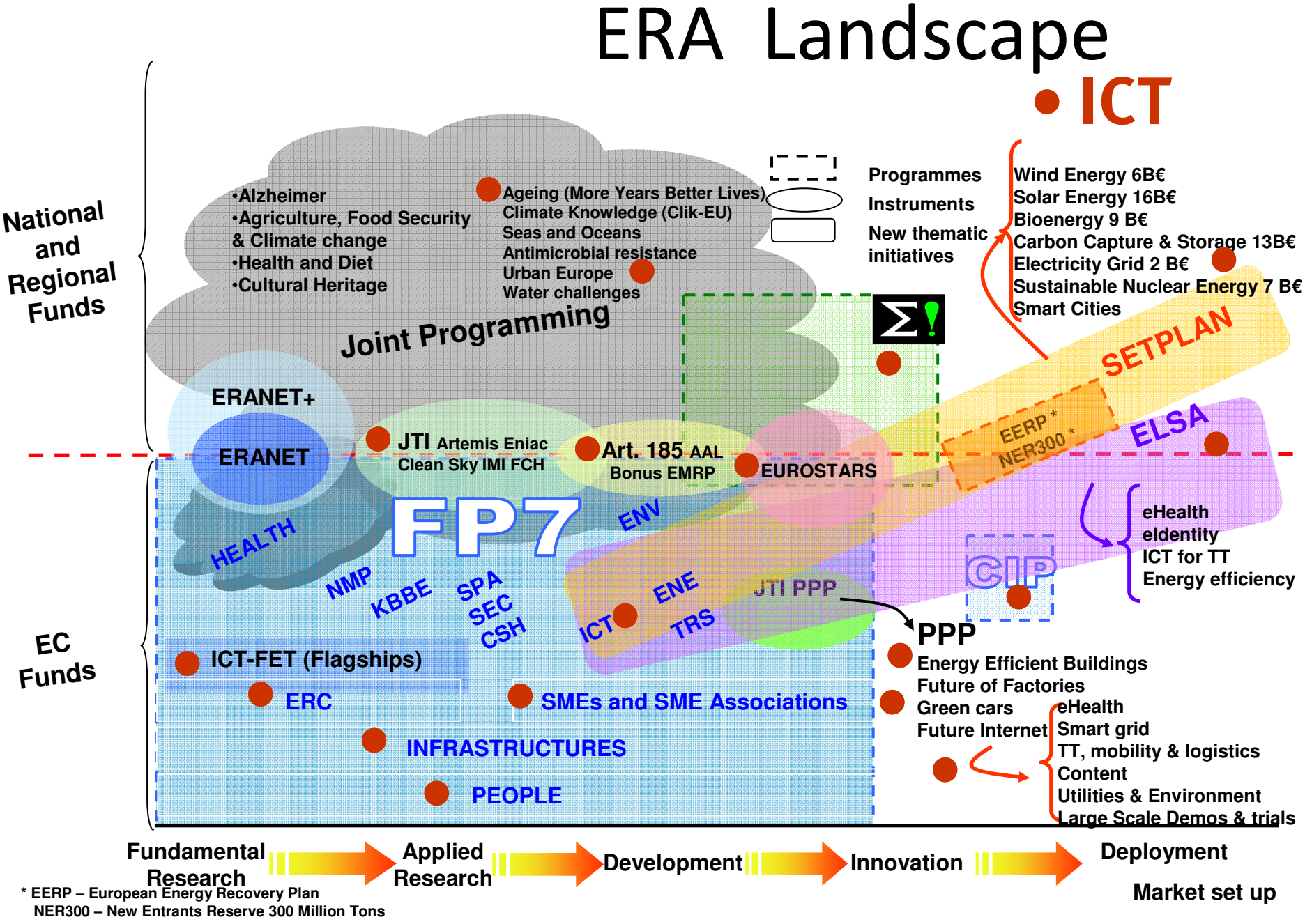
ERA Landscape

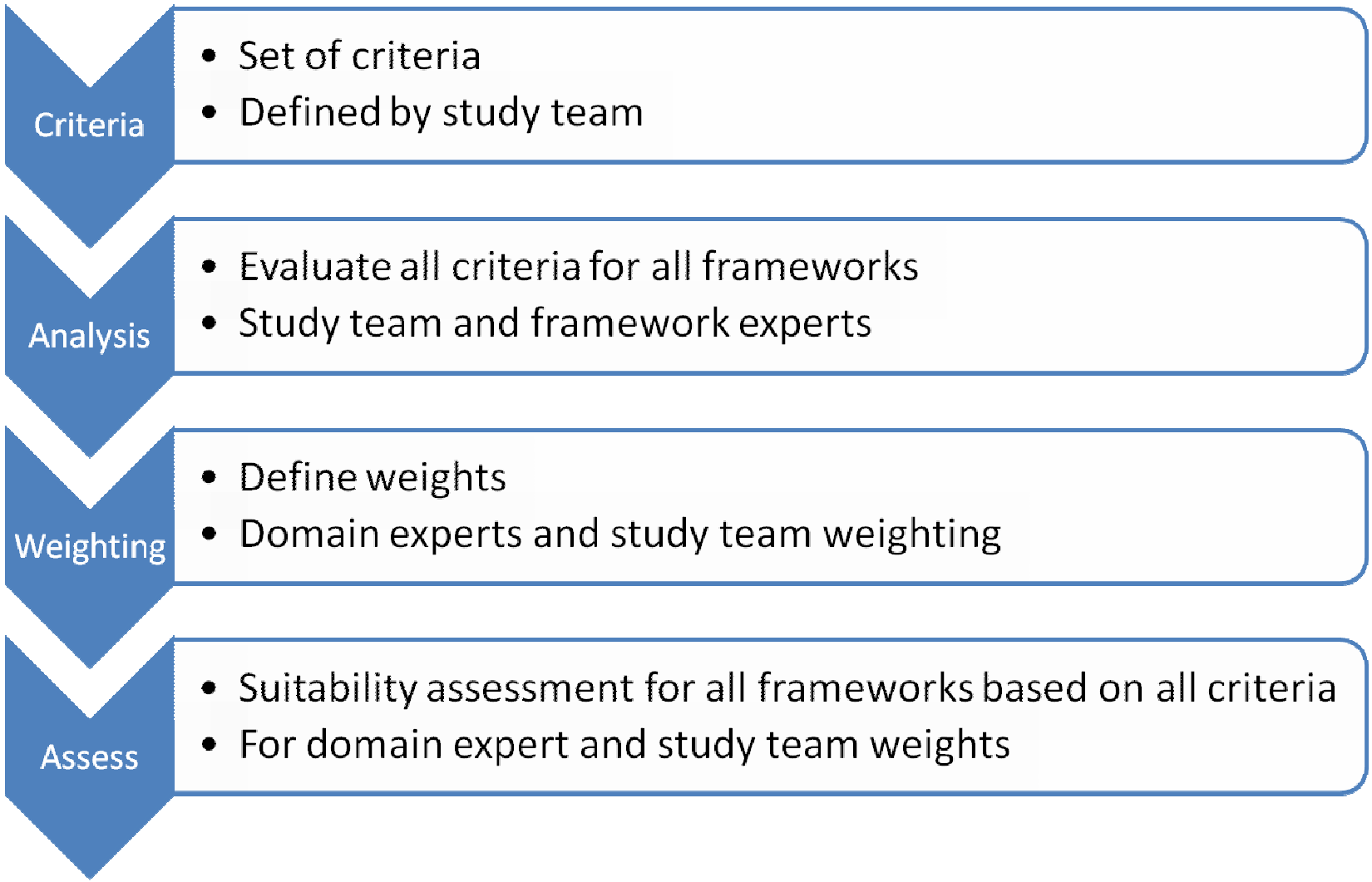


* EERP – European Energy Recovery Plan
NER300 – New Entrants Reserve 300 Million Tons

Frameworks collected, described, and analysed

a) AAL (Ambient Assisted Living Joint Programme, Art. 185)
b) ARTEMIS (Joint Undertaking, Article 187)
c) CERN (Nuclear research centre)
d) EIT KIC (European Institute of Technology / Knowledge and Innovation Communities)
e) ESA (European Space Agency)
f) ETP (European Technology Platforms)
g) EUREKA
h) EUREKA Cluster CATRENE
i) EUREKA-Eurostars
j) FoF (Factories of the Future, PPP (Public-Private Partnership) in FP7)
k) FP7 Cooperation
l) IMI (Innovative Medicine Initiative Joint Undertaking, Article 185)
m) ERA-NETs (using as a particular example the MNT ERA-NET)

Suitability assessment: Criteria set



Suitability assessment: Criteria set 1

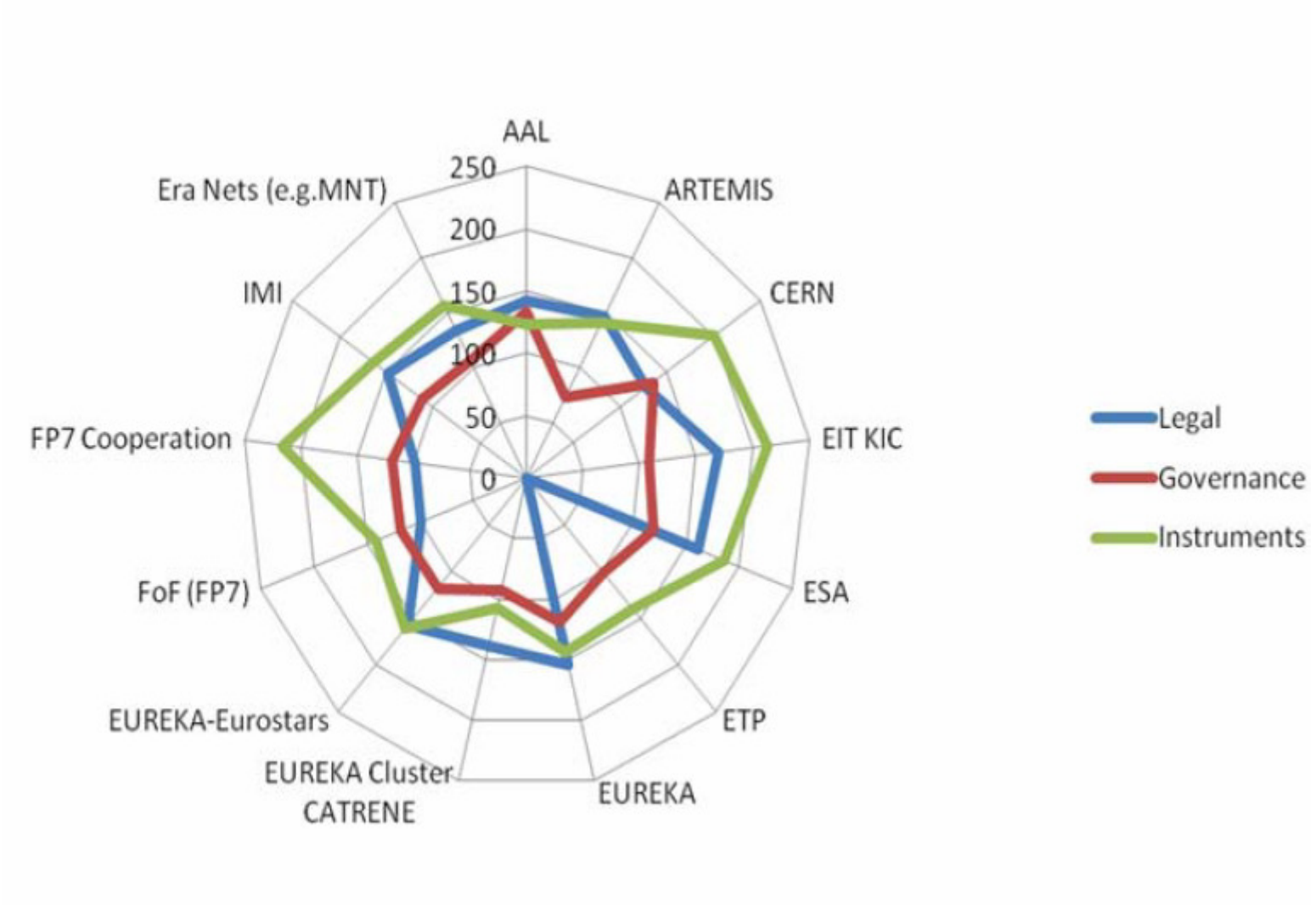
Crit. 1	Legal Framework *Does the legal framework facilitate:*
1.1	EU-wide cooperation
1.2	participation of international partners in projects
1.3	funding for international partners
1.4	usage of different funding sources (e.g. EU-FP, national, regional etc.)
1.5	flexibility of funding mechanisms ; e.g. (annual) basic funding, project-/program funding, open competitive bidding
1.6	multiannual commitment (e.g. concerning budgets)
1.7	longterm cooperation
1.8	research in teams in single member states
1.9	single researchers
1.10	competitions (awards/prizes)
1.11	competition between ideas or teams, i.e. competitive calls (with/without deadline)
1.12	flexibility in the structures (i.e. decision bodies, governance models etc.)
1.13	autonomy (i.e. making its own funding decisions)
1.14	rules of cooperation between partners and IPR Regulations (e.g. consortium agreement)

Suitability assessment: Criteria set 2-3

Crit. 2	Governance *Does the governance structure support:*
2.1	efficient management of different funding sources
2.2	interplay of public decision making bodies
2.3	simple, direct hierarchical structures with clear competences
2.4	responsibility of scientific leaders in the management
2.5	different channels to reach a broad acceptance by the public
2.6	quality control and continuous improvement
2.7	strategic development
2.8	long-term commitment of all partners including the funding providers (EU, member states)
2.9	transparency in the evaluation and selection process
2.10	an environment favourable to integration

Crit. 3	Types of RTD activities/ Instruments *Are there activities available or implementable that support:*
3.1	fundamental/basic research
3.2	industrial and experimental research
3.3	technology development/application-oriented research
3.4	studies and roadmapping activities
3.5	public relation actions
3.6	information exchange and cooperation between projects
3.7	involvement of all actors along the value chain (universities, research institutions, industry, users)
3.8	networking
3.9	co-operative RTD projects
3.10	international collaboration
3.11	exchange of researchers
3.12	conferences and workshops
3.13	PhD scholarships
3.14	research grants (single researchers)
3.15	(co)funding of joint infrastructure
3.16	centres in several EU locations
3.17	flexibility of consortia (e.g. mechanisms for changes in the structure of partners and involvement of third parties (associated partners) during the project

Results (all)


AAL
ARTEMIS
CERN
EIT KIC
ESA
ETP
EUREKA
EUREKA Cluster
CATRENE
EUREKA-Eurostars
FoF (FP7)
FP7 Cooperation
IMI
Era Nets (e.g.MNT)
250
200
150
100
50
0
Legal
Governance
Instruments

Results (winner's board)

Ranking based on expert weights

Top ranked initiatives	Total over all flagship topics	Crit. 1 Legal	Crit. 2 Governance	Crit. 3 Instruments
1. EIT- KIC	**492***	**170***	109	213*
2. ESA	466*	161*	119	186
3. CERN	464*	128	**135***	201*
4. EUREKA-Eurostars	437	158	118	161
5. FP 7 Cooperation	435	99	119	**217***

Framework conclusions

Strengths of top ranking instruments

- Legal framework
  - Long-term cooperation
  - Multi-annual budget commitment
  - EU-wide cooperation
  - Usage of different funding sources
- Governance
  - Transparency in evaluation, selection
  - Long-term commitment of all partners
  - Strategic development
  - Simple hierarchical structures, clear competences
  - Different channels to reach a broad public
- Instruments
  - Support co-operative RTD
  - Flexibility of consortia (less important for Cells)
  - Studies and roadmapping activities
  - Involvement of all actors along the value chain
  - International cooperation
  - Co-funding of joint infrastructure

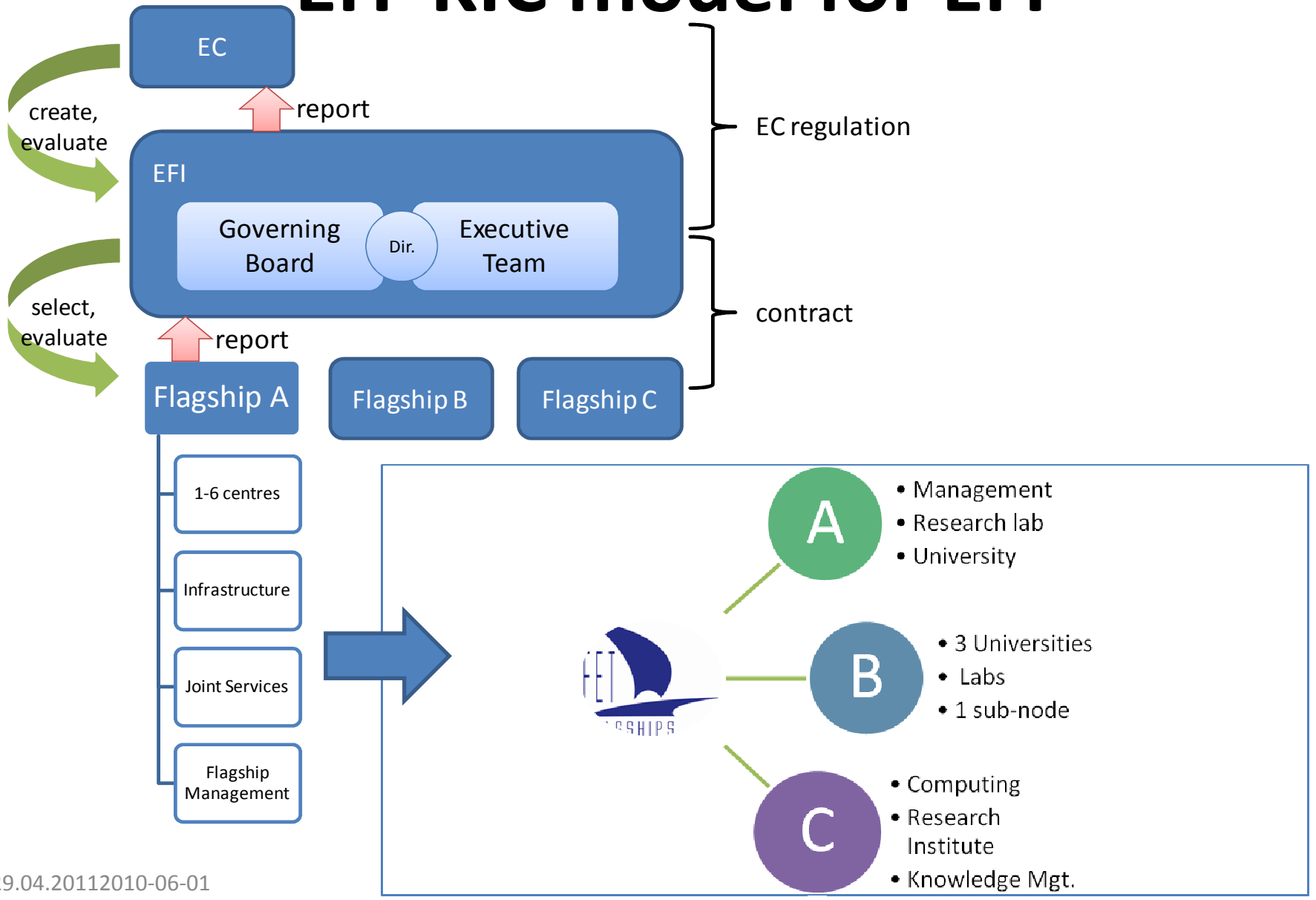
Cross-checked with Sherpa report results.

Specific points for EIT-KIC

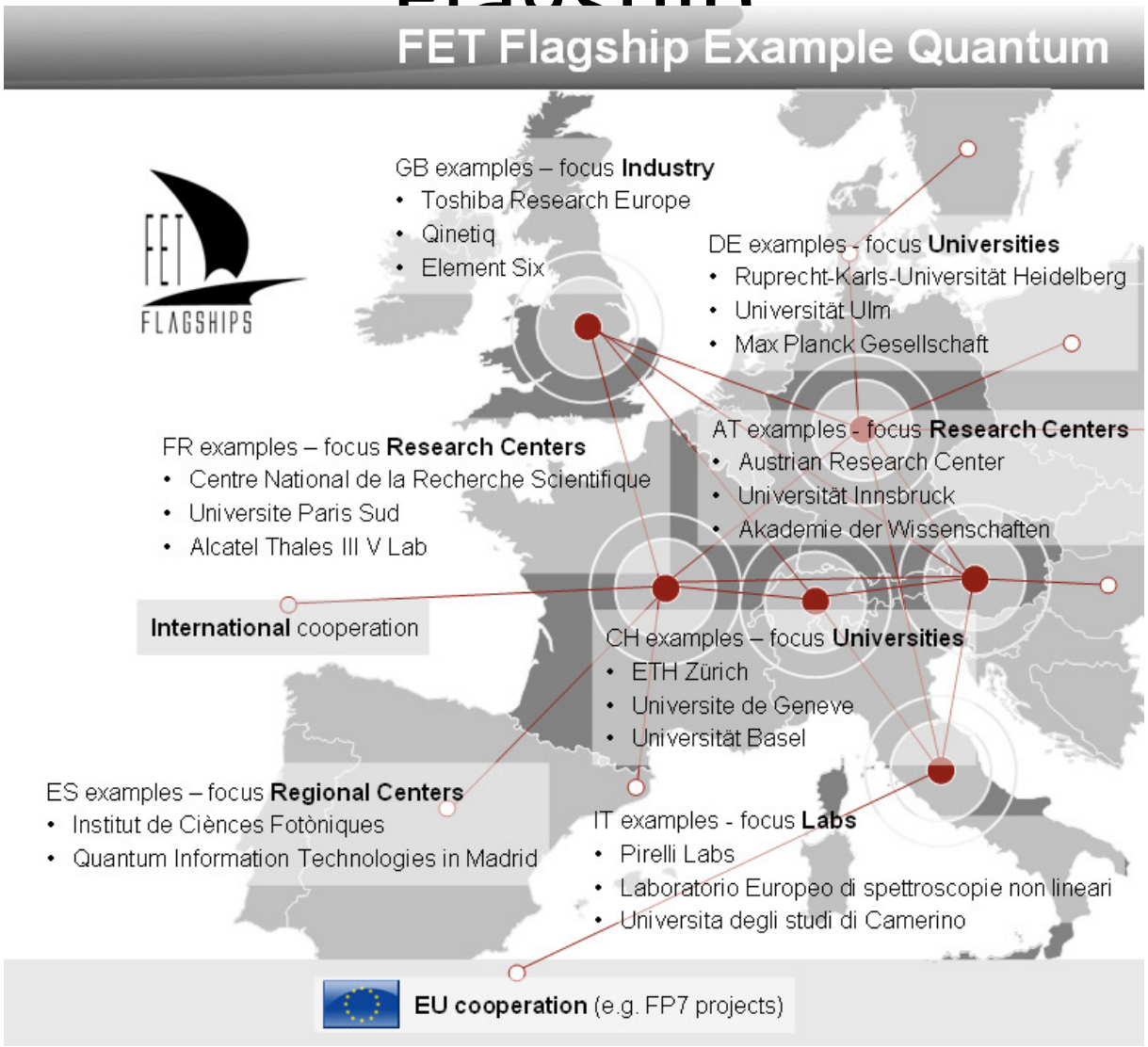
- Legal framework
  - An environment favourable to integration
  - *KIC does not support single researchers*
  - *Transparency*
- Governance
  - Strong competition between ideas
  - Multi-annual commitment
- Instruments
  - Strong networking effects through the co-location centres / nodes

- **Improvements:**
  - Scientific leaders as managers
  - Avoid conflict of interest of board
  - Stronger basic research component
  - Adapt the co-location centre concept
  - Selection not to be based on funding alone
  - Seek synergies with structural funds
  - Intermediate steps and goals
  - Strong political drivers and leaders
  - Monitor development of KICs

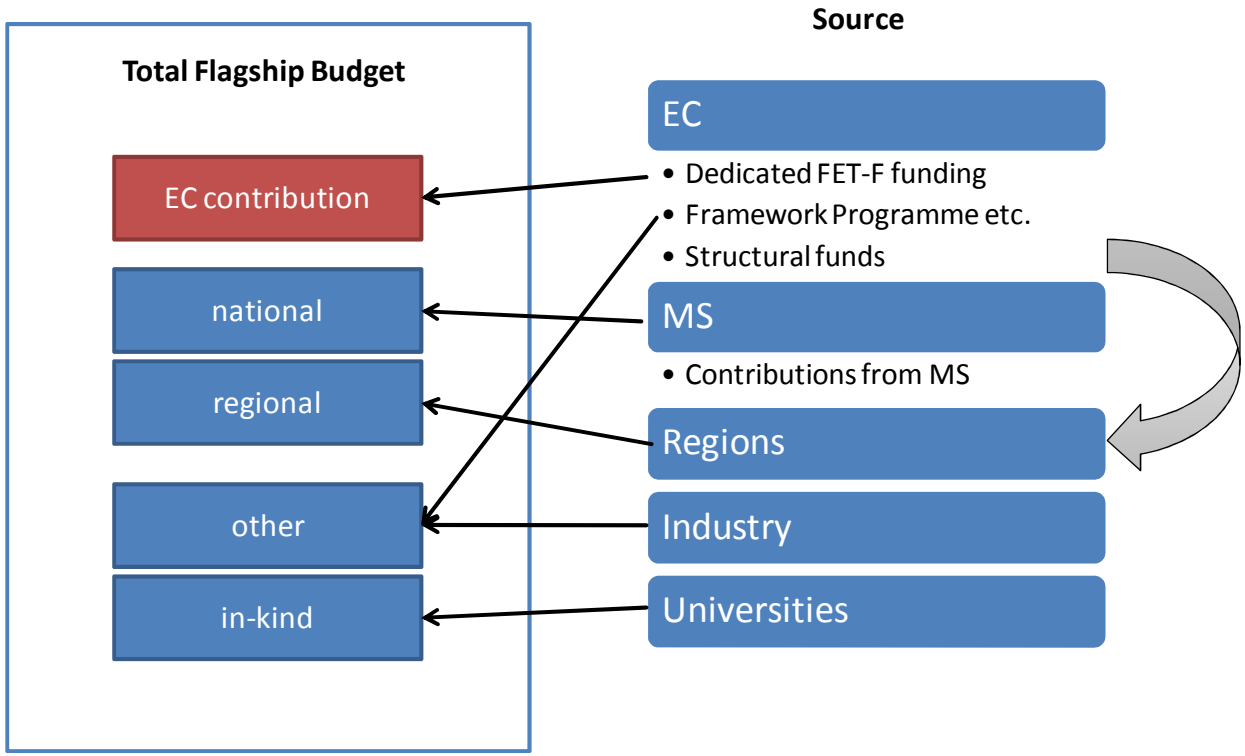
Implementierungsvorschlag: EIT-KIC model for EFI



Beispiel für ein konkretes FET Flagship



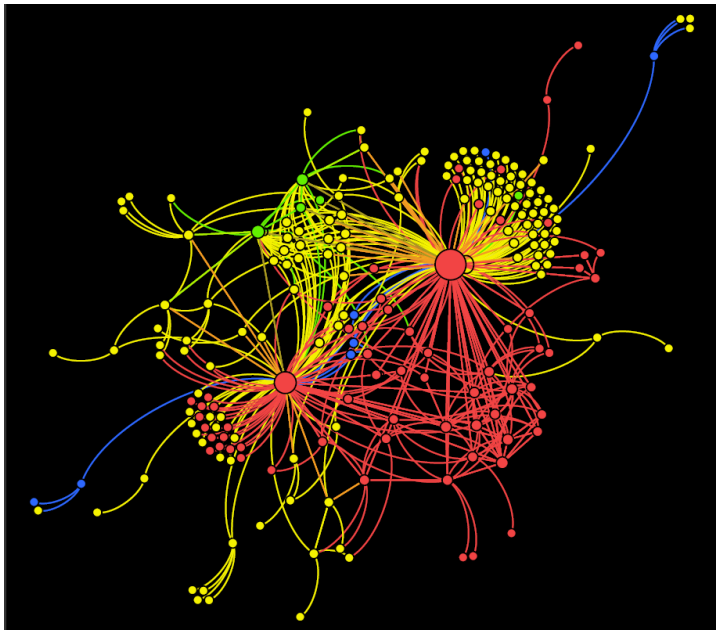
EFI Budget and Commitments



EC: regulation, EFI budget, monitoring and control
MS: regulation, flaghip budget, national infrastructure, resources
Regions: funding + structural funds
Researchers, universities: set-up, MS motivation, in-kind contribution, management

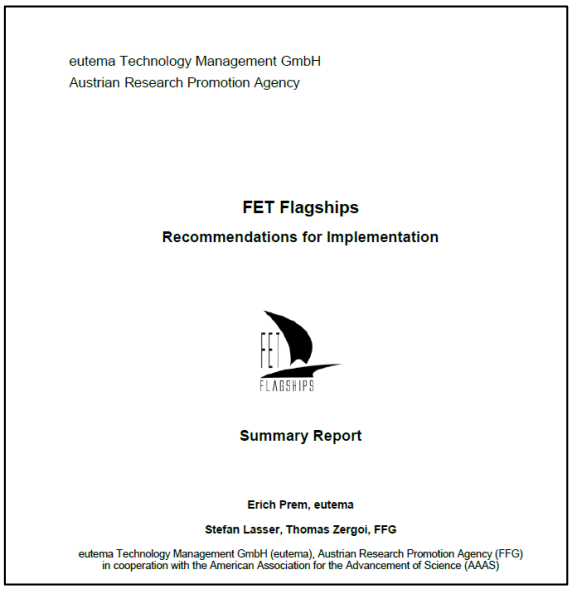
Kontext erfordert Grenzüberschreitungen!

FFG
Experten
Konsortium
EC



FET Flagships auf CORDIS

http://cordis.europa.eu/fp7/ict/programme/fet/flagship/



FET Flagships going public


Updated daily at www.ResearchResearch.com

13 May 2010

Research Europe

1bn-euro 'social science Cern' to predict behaviour – p5

Iter Bill for fusion project soars – p4

Election What the UK's political crisis means for research – p7

Researchers want email, web and mobile data to help policymakers manage future crises

by Laura Hood lhnews@ResearchResearch.com

A group of social scientists, mostly from Europe, is proposing a 1-billion-euro project that would use data on human behaviour to help policymakers predict and react to social and economic emergencies such as acts of terrorism or financial crises.

The FUTURICT Knowledge Accelerator project is being coordinated by the Swiss Federal Institute of Technology (ETH) in Zurich. The project's ambition is to encourage a style of policymaking in which decisions are based on more [illegible] the proposal will be submitted to the European [illegible] for innovative pan-European ICT-based research.

A one-year pilot phase will determine whether the knowledge accelerator secures longer-term funding from the Commission of 20 million euros a year for 10 years. The ETH-led group will also need to attract funding of around 80m euros per year from other sources including individual governments and the private sector.

Steven Bishop, a mathematician at University College London, told *Research Europe* that discussions are ongoing particularly with telecoms companies. The attraction for these companies would be the ability to use the data for commercial purposes, he says.

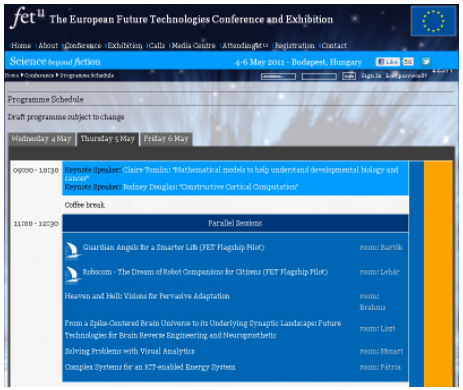
"An improved ability to model and simulate social dynamics is going to accelerate our knowledge hugely because we really do not fully understand how we interact with technology, or indeed with each other," says Bishop. "It's bizarre that we can put men on the moon and know infinite amount of detail about microscopic elements of the bodies in our universe but we still cannot predict an election."

Bishop says he would like to establish what he calls a more [illegible] ical place for [illegible] cts of different [illegible] may not [illegible] going on so [illegible] what's happening [illegible] scientific and philanthropist George Soros has expressed an interest in involving his New-York-based Institute of New Economic Thinking and also the Central European University in Budapest.

The proposal will be submitted to the European Commission's Flagship Programme, a funding mechanism for innovative pan-European ICT-based research.

Helbing acknowledges that there will be concerns about the security of the data, and that obtaining consent from large numbers of people will not be easy, though he says these could have technical fixes. "The issue seems to be to develop better technologies to allow one to do business without violating privacy," he says.

"We will have an ethics committee to deal with issues like the storing, anonymising and processing of sensitive data," he adds. "We will also develop technologies for decentralised storage and evaluation, so I do not think all data will be stored in one place. Furthermore, we are developing experimental techniques that allow one to do reliable behavioural measurements without knowing who the participants are."



Possible Early Warning Sign for Market Crashes

By Brandon Keim | March 18, 2011 | 1:11 pm | Categories: Physics

Complexity researchers who study the behavior of stock markets may have identified a signal that precedes crashes.

They say the telltale sign is a measure of co-movement, or the likelihood of stocks to move in the same direction. When a market is healthy, co-movement is low. But in the months and years before a crash, co-movement seems to grow.

Regardless of whether stock prices go up or down or stay the same, they do so in tandem. People are copying each other, and a small nudge can send everyone in the same direction. The system appears primed for collapse.

"One of the most important things happening now is that economists are trying to understand, what is systemic risk? When is the entire system vulnerable to disaster? Our results show that we have a direct, unambiguous measure of that vulnerability," said Yaneer Bar-Yam, president of the New England Complex Systems Institute.

Seen through an econophysicist's eyes, a stock market panic is an avalanche.

Bar-Yam's findings, released Feb. 13 on arXiv, are part of an emerging research field known as econophysics. It applies to economics insights from the physical world, especially from systems in which networks of interacting units produce radical collective behaviors.

Heated water turning to gas is one such behavior, known technically as a phase transition. Another is snow gathering into an avalanche. Seen through an econophysicist's eyes, a stock market panic is an avalanche, too.

Kontakt

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