Hints on the process

Build consortium gradually. Hard-core group (3 or so) first; prepare 2-3 page summary; then identify gaps and invite others; physical meeting is good; then identify further gaps and finalise beneficiaries. Invite more partners than you think you will need. Some may not provide letter of commitment in time.

Think twice before agreeing to coordinate. The commitment lasts at least 5 years in practice and you will end up doing 5x the work of any other partner.

Assign a **totally reliable person** to be responsible for each key section (Excellence, Impact, Implementation)

Work in **two phases**:

1. Achieve a scientifically-compelling case

2. Remove weaknesses (even minor ones) **<—- critical stage**

Allow time for **independent scientific review** (say 2 weeks)

Hints on the content

Identify **the REA research agenda** in your domain; check non-responsive mode projects (eg STREPS) for ideas

Use **positive language** (starting with the acronym)

Aim to **create an impression of excellence** and fundability in the first page (or paragraph)

Consider everything in advance e.g. identify risks and mitigations

Avoid duplication of expertise. Identify USPs for each member. Show previous links and expected collaborations.

Be ambitious. e.g. Public dissemination; in a bar ('Pint of Science') versus major institution (Royal Society or equivalent); e.g. make promotional video

Introduce **innovative training elements** (not just study schools)

Identify **networking tools** (e.g. Slack)

Phase 2: remove weaknesses

Be concrete; remove vagueness e.g. You're holding a workshop. Title? When? Host? Responsible partner? Outside invitees? Same for program of meetings and (to a lesser extent) secondments.

Avoid being too conditional or tentative e.g. instead of "We hope this training programme will contribute towards the next generation of researchers in X", say "This programme will train the next generation …"

Identify roles. Name beneficiaries or, better, individuals that will take each important role e.g. training coordinator, deputy coordinator, ethics, web, …

Avoid artificiality. e.g. equal distribution of resources amongst beneficiaries; try to represent the complex reality

Continuity. Make sure the ordering of training (esp. complementary training) makes logical sense e.g. Ethics, Scientific Conduct precedes How to Write a Paper

Is it sufficiently clear how the **network provides added value**?

All-important first impressions

1 Summary

Speech is a hugely efficient means of communication: a reduced capacity in listening or speaking creates a significant barrier to social inclusion at all points through the lifespan, in education, work and at home. Hearing aids and speech synthesis can help address this reduced capacity but their use imposes greater listener effort. The fundamental objective of the ETN "Enriched communication across the lifespan" (ENRICH) is to modify or augment speech with additional information to make it easier to process. Enrichment aims to reduce the listening burden by minimising cognitive load, while maintaining or improving intelligibility. ENRICH will investigate the relationship between cognitive effort and different forms of natural and synthetic speech. Non-intrusive metrics for listening effort will be developed and used to design modification techniques which result in low-burden speech. The value of various enrichment approaches will be evaluated with individuals and cohorts with typically sub-optimal communication ability, e.g., children, hearing-impaired adults, non-native listeners and individuals engaged in simultaneous tasks. The ENRICH consortium consists of 8 beneficiaries and 6 partners from academia, industry and clinical practice in 8 countries, who collectively provide diverse infrastructure for investigating spoken communication and for applying innovations to end-user populations. ENRICH will address the unmet need for multi-skilled practitioners and engineers in this rapidly growing sector currently facing a serious workforce shortage. Through a comprehensive training programme driven by the needs of industry and clinical practice, it will equip fellows with not just the necessary cross-disciplinary knowledge and research techniques, but also with experience of entrepreneurship and technology transfer so they can translate research findings into meaningful products and services that will facilitate spoken language communication in the coming decades.

What is the problem?

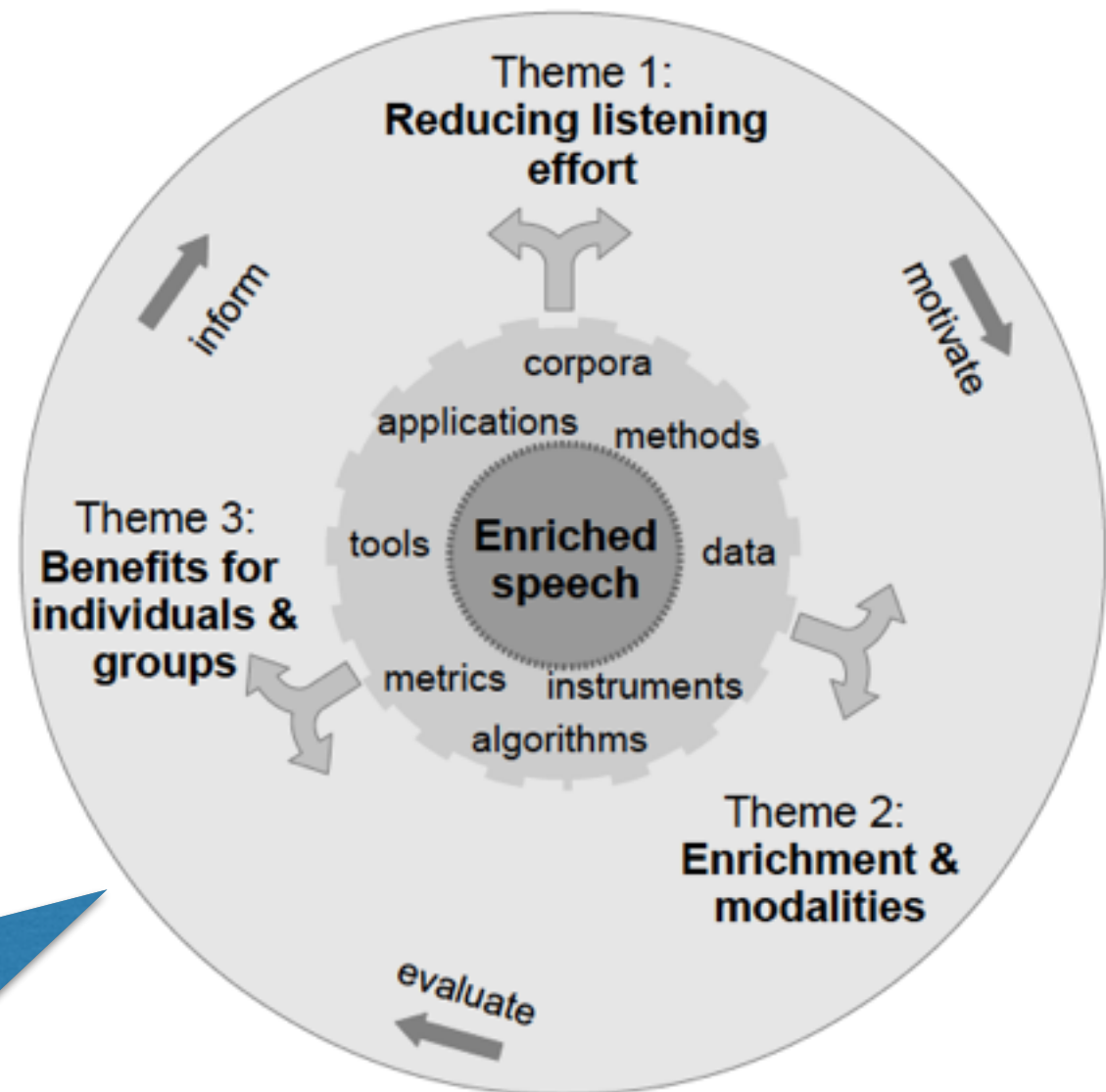Main objective of the network

the 'science'

Who are we?

IMPACT!

Needs to captivate (or at least not bore)

Themes

Easier to understand (and construct) a complex proposal

Useful throughout as a structuring mechanism (objectives, work packages, ESR projects)

But links between themes must be clear and not arbitrary

Clear timetable of events

Table 2.2b: Main Network-Wide Training Events, Conferences and Contribution of Beneficiaries.

	Main Training Events & Conferences	ECTS (if any)	Lead beneficiary	Project month	Creativity	Entrepreneurship	Innovation
E1	Recruitment event	no	UCL	3	✔		
E2	Intensive starter workshop (residential)	no	UEDIN	6	✔	✔	
E3	Peer-to-peer 'upskilling'	no	UEDIN	6+	✔		✔
E4	3-week Summer School	yes	UoC	12	✔		✔
E5	Intensive entrepreneurship course	no	UoC	12	✔	✔	✔
E6	Workshop on cognitive effort & speech styles	yes	RUN	16	✔		✔
E7	Workshop on speech modifications	yes	UPV/EHU	22	✔		
E8	Workshop on hearing impairment	yes	HöRZ	30	✔		
E9	Winter School on applications of enriched speech	yes	IDMT	36	✔	✔	✔

How addressing H2020 goals

- UCL, RUN, UEDIN, Sonova and UPV/EHU are participants in the FP7 Marie Curie ITN *Investigating Speech Processing in Realistic Environments* (INSPIRE; 2011-2015).
- RUN and UPV/EHU collaborate on understanding of conversational speech by non-native listeners.
- RUN and UMCG collaborate on the perception of accented and conversational speech in hearing-impaired individuals/cochlear implant users.
- Stylianou (UoC) recently spent a one year sabbatical at UPV/EHU working with Hernaez and Erro on the intelligibility of synthetic speech.

Specific examples of anticipated synergies in ENRICH include:

- using the dialogue elicitation methods developed at UCL in multiple studies of group and individual differences in the cost of speaking clearly, particularly with RUN.
- UCL, HöRZ & UMCG will bring together their expertise on audiovisual speech and language processing, hearing impairment, and hearing aids to co-develop visual materials that can be embedded in their ESR projects.
- UoC will collaborate with UCL, RUN, Hacettepe and Chania General Hospital to evaluate clear speech modifications.

Unique selling points

Expertise

Resources

Exposure of recruited researchers to different (research) environments and complementarity thereof

Here we pick out some of the key specialisms, resources and research environments that each beneficiary will bring to the research and training programme.

UPV/EHU: (i) extensive experience in computational modelling of human speech perception in noise, including state-of-the-art metrics for intelligibility prediction; (ii) access to a very large multilingual population; (iii) access to specialist listeners via a simultaneous translation and interpreting programme; (iv) existing strong links to local trilingual schools; (v) experience in organising Summer/Winter Schools.

UEDIN: (i) large interdisciplinary group of researchers from engineering, computer science and linguistics; (ii) world-class specialism in speech synthesis; (iii) experience in large-scale international evaluations of metrics other than intelligibility via the Blizzard Challenges; (iv) specialist course material on speech and language technology; (v) strong backing from the University Institute for Academic Development.

UCL: (i) internationally-renowned Deafness, Cognition and Language Research Centre, bringing together leading deaf and hearing researchers in sign linguistics, psychology, neuroscience; (ii) specialist teams working on cochlear implants and visual cues to speech communication within Ear Institute and Psychology & Language Sciences; (iii) extensive lab facilities for behavioural and neuroimaging studies in speech and hearing, (iv) strong links with Institute of Cognitive Neuroscience; (v) links with renowned hospitals such as Great Ormond Street Hospital.

Facilities

Links e.g. clinics, industry

Individual ESR projects
NB: in Implementation

measurable objectives

Links to work packages

and deliverables

ESR1   A computational metric for listening effort (WP2, WP3, WP5)   UPV/EHU   D1, D2, D4, D5, D6

Objectives: While psychological models of listening effort exist, none operate at the level of the speech signal itself and are thus unable to provide a computable index to estimate the ease or difficulty of understanding specific exemplars of speech. The availability of such a metric would enable the use of a closed-loop optimisation framework for reducing the effort involved in processing speech. The key objectives of this project are (i) to develop and validate metrics for effort, and (ii) to apply them in the generation of speech enriched to lower its cognitive processing burden. Amongst others, ideas from statistical machine learning, speech quality and psycholinguistic models of word recognition will motivate effort to quantify the effect of speech styles and modifications on listening effort.

Expected results: (i) A range of computational metrics for prediction of effort from the speech signal; (ii) Scientific insights into the principal conveyors of effort in the speech signal.

Planned secondments: (i) RUN: to learn about instruments and paradigms for the measurement of listening effort, as well as speech reductions; (ii) Sonova: to obtain developer and end-user perspective of listening effort in hearing impairment; (iii) IDMT: to discuss modelling/prediction in auditory perception; (iv) Toshiba: to consult on metrics with Prof. Moore.

Concrete details of secondments and purpose

Clear statement of expectations

Should be more than a collection
of independent PhD projects

Table 3.1e. How projects tackle ENRICH objectives

Objective	ESR1	ESR2	ESR3	ESR4	ESR5	ESR6	ESR7	ESR8	ESR9	ESR10	ESR11	ESR12	ESR13	ESR14
Theme 1: Reducing listening effort														
1 Design/evaluate enrichments influenced by cognitive effort metrics	*		*	*		*	*	*			*	*		*
2 Identify effects of enrichment on cognitive efforts for individuals/groups	*	*	*	*			*	*			*	*	*	*
3 Simulations representative of real life applications & environments		*			*		*	*	*			*		
4 Application in school/clinical settings		*								*		*	*	
Theme 2: Enriched information and modalities														
5 Develop technological interventions to improve speech communication						*				*	*		*	*
6 Improve computer-generated speech for users of AAC devices		*				*								
7 Design enrichments that provide 'cognitive headroom' for other tasks	*					*							*	
8 Develop enrichments for NH adults in noise, L2 listeners, children						*			*		*	*		*
9 For hearing device users, embed machine readable information						*								
10 Address near-field, synthetic and remote human-human speech						*								*
Theme 3: Individual and group benefits of enrichment														
11 Test impact of enrichment on ease of processing for groups/individuals	*	*	*			*	*	*			*		*	*
12 Measure group/individual differences in speakers' speech enrichment							*	*		*		*		*
13 Investigate relation between listener abilities and enrichment benefits		*	*	*			*	*						
14 Investigate links between speaker abilities and clear speech modifications							*	*		*				

Impact should be multi-layered: industry, fellow scientists, Europe, Fellows' careers,…

One approach is to tabulate career destinations and required technical AND complementary skills

Career	Skills	
	Core set	Complementary set
Clinical practice	hearing sciences + impairment; hearing devices; speech and language processing; communication skills; experience of clinical challenges facing practitioners and patients	basic programming; basic signal processing in hearing devices; basic knowledge of speech technology
Engineer in the specialist communication aid industry	strong programming; human-computer interaction; interpersonal skills; experience of clinical challenges facing practitioners and patients	general knowledge of speech synthesis; some knowledge of signal processing
Academic/clinical research (hearing science)	hearing sciences; speech perception; speaking effort and styles; communication skills; research methods; statistics; some experience of clinical challenges facing practitioners and patients	moderate programming; general knowledge of signal processing techniques; basic knowledge of speech technology
Engineer in the specialist hearing aid industry	signal processing; embedded systems; experience of clinical challenges facing practitioners and patients; fundamentals of hearing-device provision and hearing science	communication skills; good programming; basic knowledge of medical product regulations (CE marking); basic knowledge of speech synthesis
Spoken language technology engineer	exceptional programming; signal processing; machine learning; speech synthesis	communication skills; general knowledge of hearing science; awareness of clinical challenges facing practitioners and patients
Academic research (engineering)	strong programming; signal processing and/or machine learning; communication skills	general knowledge of hearing science; awareness of clinical challenges facing practitioners and patients

Figure 2.1a: The initial career profile templates. The core set covers essential skills that are needed to gain employment in that sector, whereas the complementary set describes additional skills that will set ENRICH ESRs above graduates from other PhD training programmes. All ESRs will also develop their creativity and innovation skills.

Partners (ie unfunded)

Must have a clear role in the network

Letters of commitment should mention specific contributions and expected benefits

TOSHIBA
Leading Innovation ⟫⟩

TOSHIBA RESEARCH EUROPE LIMITED

CAMBRIDGE RESEARCH LABORATORY

208 CAMBRIDGE SCIENCE PARK, MILTON ROAD, CAMBRIDGE, CB4 0GZ, UK
TELEPHONE: 01223 436900   FAX: 01223 436909
INTERNATIONAL +44 1223-436900   INTERNATIONAL +44 1223-436909

To whom it may concern

The Speech Technology Group (STG) at the Cambridge Research Laboratory (CRL) of Toshiba Research Europe Limited is at the forefront of research in the field of speech communication. Four key topics are primarily investigated: automatic speech recognition (ASR), speech synthesis (TTS), dialogue management (DM) and speech intelligibility in adverse environments. With respect to intelligibility, the focus is on developing methods for speech modification that facilitate communication in noisy and reverberant environments. Three researchers (one senior) work on this topic on-site and in close collaboration with representatives from academia.

CRL supports the objectives of ENRICH and is committed to participating as an associate partner organization. More specifically, CRL will contribute by:

- Hosting of early stage researchers (ESR) recruited by the members of the ENRICH network according to the plan presented in the project proposal to evaluate in real conditions work suggested by ESRs.
- Co-supervision of ESR according to the plan presented in the project proposal providing feedback of industry needs.
- Contributing towards the real innovation competitions at the end of the programme by suggesting challenges
- Participating at the industry evaluation committees in various training events of the network

Yours sincerely,