

The Bologna Declaration: Its Consequences in the Educational and Professional Fields in Spain

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Key words:

SUMMARY

The application of the Bologna Agreement in the European countries implies modifications in the educational field and, as consequence, in the professional one as well.

The author tries to give an overview and analyze the followed process in the Spanish Universities, how all of them have worked all together and which has been the final results at the Graduate and Master levels.

This new educational situation will bring new challenges for the profession, opening new fields of activity and broadening the scope of our profession. As the Spanish Association has been involved, since the first moment, in the hole process, these changes and challenges are being studied and analyzed and will help our profession to give a step forward in the next future.

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1. THE BOLOGNA DECLARATION

As most of lecturers know the Bologna Declaration is the result of several previous meetings of the responsible politicians of education in Europe.

The main items of this declaration are:

- To increase the international competitiveness of the European system of higher education.
- To ensure that the European higher education system acquires a world-wide degree of attraction equal to our extraordinary cultural and scientific traditions.
- To reach in the short term, and in any case within the first decade of the third millennium, the following objectives:
 - Adoption of a system of easily readable and comparable degrees (implementation of the Diploma Supplement).
 - Adoption of a system essentially based on two main cycles graduate and postgraduate.
 - Establishment of a system of credits - such as in the ECTS system.
 - Promotion of mobility for students, teachers and administrative staff.
- Promotion of European co-operation in quality assurance.
- Promotion of the necessary European dimensions in higher education.

Regarding the two different cycles it is established:

- Access to the second cycle shall require successful completion of first cycle studies, lasting a minimum of three years.
This cycle should consist of three or four years (180 or 240 ECTS)
- The degree awarded after the first cycle *shall also be relevant to the European labour market as an appropriate level of qualification.*
- The second cycle should lead to the master and/or doctorate degree as in many European countries. (*Nothing is said about professional qualifications given by this cycle; in fact, in many countries, full professional qualifications are awarded in the first cycle and the second one is devoted only to widen knowledge and access to doctorate.*)
This cycle should consist of one or two years (60 or 120 ECTS).

2. APPLICATION IN SPAIN

The final legislation concerning the Bologna Declaration has been published in Spain by 25 January 2005 (Royal Decrees 55/2005 and 56/2005 for the Graduate and Postgraduate cycles, respectively).

According to this legislation the **Graduate** cycle will consist of **180 or 240 ECTS** (60 ECTS/year) and the **Postgraduate** will consist of **60 or 120 ECTS** (60 ECTS/year as well).

Professional qualifications will be fully awarded after the first cycle; but, exceptionally, according to the Article 8.3 of the RD 56/2005, “ the Government will be able to establish general own rules and special requirements to access to studies of Master when this level entitles to **professional regulated activities**”.

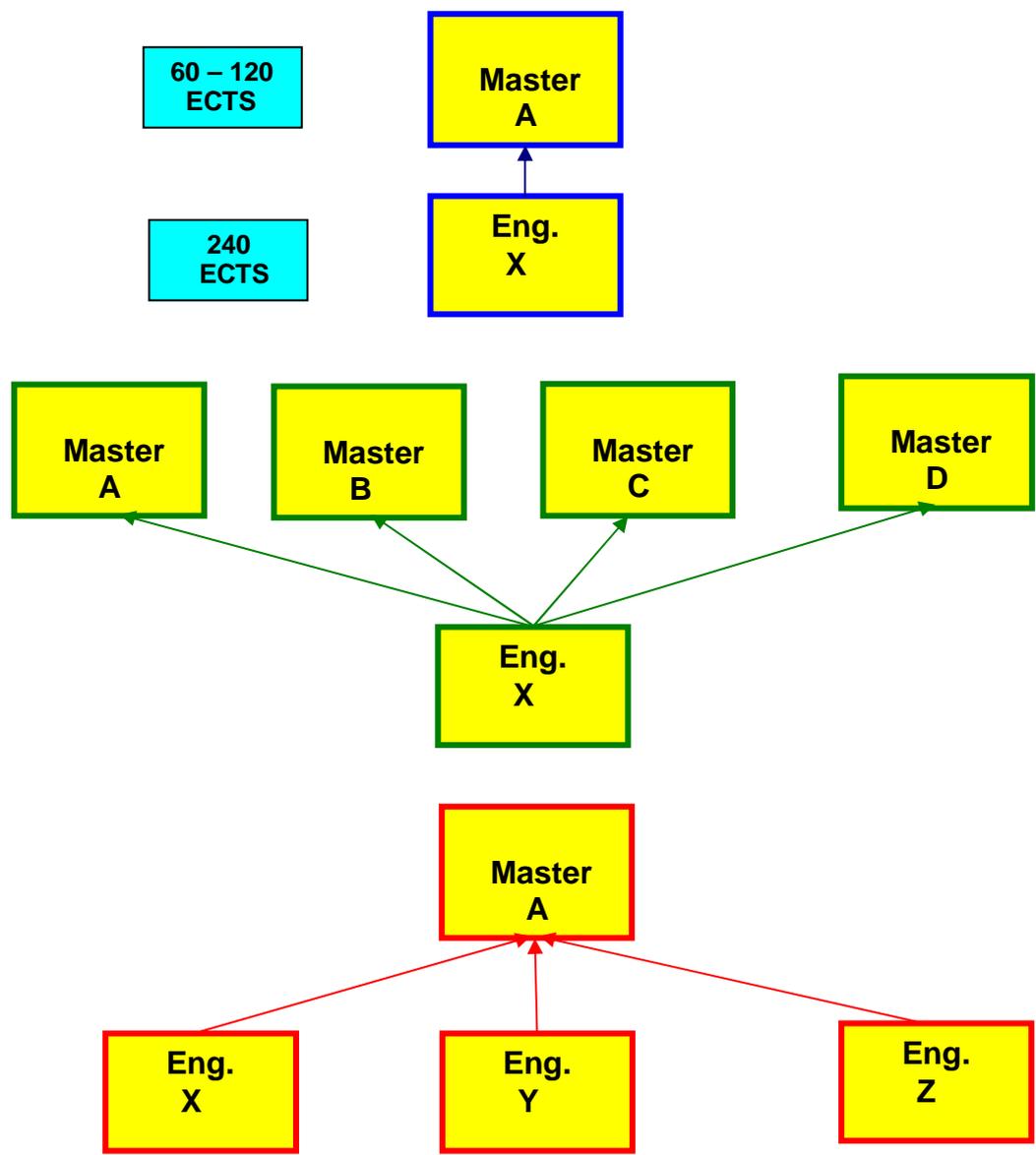
And which are such activities?; in principle all Engineering Professions and some others as Medicine, Law, etc. Could this Article be the way to give professional qualifications to some new Master degrees?; although the Government maintains that this regulation is thought only for Medicine, Law and Secondary Education Teachers, most of us think that this is the way to introduce professional qualifications in some Master degrees, mainly related to Civil and Industrial Engineering.

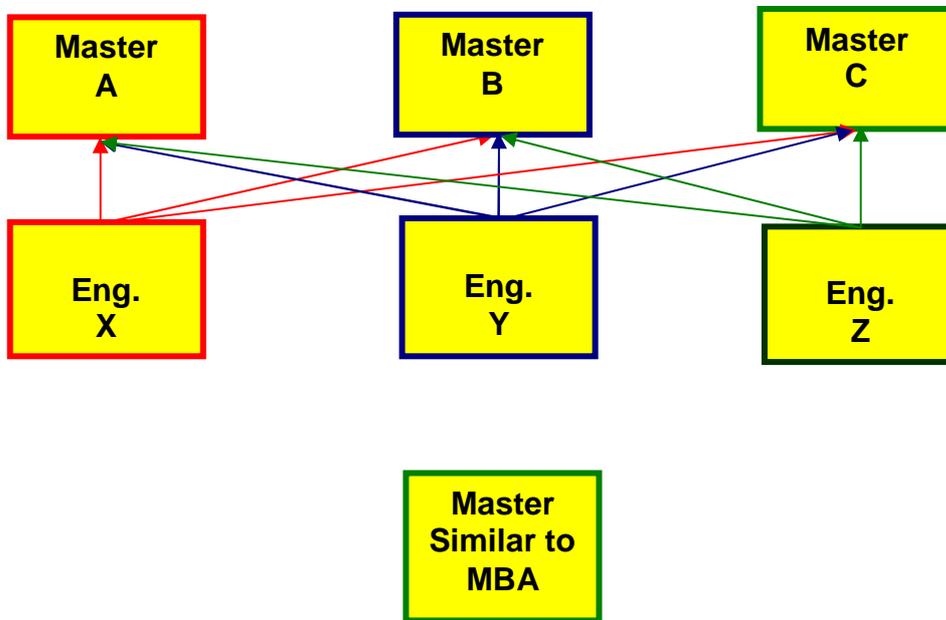
By the time of writing this paper most of the “old” degrees and professions are involved, in different stages, in adapting to the new system. By 7 April it will be given the “**New Catalogue of Graduate University Degrees**”; in such a document will appear the name, duration and professional qualifications of every new Degree; to prepare this catalogue all Universities and the Professional Associations are working, in separated Working Groups according to their professional field, together with the Government and supporting this work in the respective “White Books” of every new Degree and, consequently, Profession.

Which have been the main considerations to work in the Graduate cycle? :

- Only one name for degree.
- 240 ECTS + Final Thesis + Professional Practice + Languages
- With several orientations and profiles to fulfil the different needs

Which have been the proposed models? ; in principle they were:





Horizontal Master common to many Engineering Degrees

3. THE NEW DEGREE IN SURVEYING

Since the middle of 2003, invited by a governmental agency (ANECA), all Universities with a degree in Surveying, plus the Professional Associations, started working in what, finally, would be the “White Book” of the new degree.

We were divided into three different commissions:

- Academic Commission
- Professional Commission
- Quality Assurance Commission

with different and complementary fields to work.

The first to finish should be the Professional in order to establish Professional Fields for the new degree, in such a way that over them the academic curriculum could be built, although

only in a 70%, what establish the common core of the degree, mandatory for all Universities, leaving the other 30% to be fulfilled by every University.

The main used information came from the FIG, CLGE (Comite de Liaison des Géomètres Europeens), EEGECS (European Education in Geodetic Engineering, Cartography and Surveying, to which belong about 150 European Universities), research work of Associations and from employers.

Ten different professional fields of activity (Profiles) were establish after studying and considering all available information; these profiles, the basement of the academic curriculum were:

- Project, development and management of Measurement Processes; modelling, representation and visualization of the physic characteristics on, under and over the terrestrial surface.
- Project, development and management of Information Systems.
- Project, development and management of processes of images use.
- Project, development and management of Navigation and Positioning Systems.
- Project, development and management of processes and products for Civil Engineering and Architecture.
- Project, development and management of processes and products for Environmental, Agronomic, Forestry and Mining Engineering.
- Project, development and management of processes and products for the Information Society: Telecommunications and Informatics.
- Project, development and management of processes and products for Cadastre and registry.
- Project, development and management of processes and products for Land Management.
- Project, development and management of processes and products for Valuation.

All these fields of activity led us to a clear conclusion:

*To appropriately develop and acquire the needed knowledge we should go to a **four years, at least, degree**, making possible to leave the final thesis for another semester, in such a way that we would have **four and a half** years to fulfil the academic curriculum, bearing in mind the chance of getting one or several Master degrees where suitable specialization could be reached.*

With all this information, Academic Commission developed a Common Core Curriculum, whose application in every University is compulsory, in such a way that all ones have a common structure in a 70% of the curriculum and leaving 30% for free disposal.

The subjects established by this Commission will be, later on, split in modules or courses.

Four big groups of subjects were considered:

- Basic subjects
- Common Subjects to Engineering
- Specific subjects to this Engineering
- Complementary subjects

In the following diagrams can be seen subjects and number of ECTS and student's work hours.

| <u>GROUP I: BASIC SUBJECTS (34 ECTS)</u> | | | |
|---|---------------------|---------------------------|----------------------|
| SPECIFIC SUBJECTS | CREDITS ECTS | Student Work Hours | |
| | | Minimum Hours | Maximum Hours |
| MATHEMATICS | 17 | 425 | 510 |
| PHYSICS | 8.5 | 212.5 | 255 |
| COMPUTER SCIENCE | 8.5 | 212.5 | 255 |
| Total | 34 | 850 | 1020 |

| <u>GROUP II: COMMON SUBJECTS TO ENGINEERING (27 ECTS)</u> | | | |
|--|---------------------|---------------------------|----------------------|
| SPECIFIC SUBJECTS | CREDITS ECTS | Student Work Hours | |
| | | Minimum Hours | Maximum Hours |
| CIVIL ENGINEERING | 12.5 | 312.5 | 375 |
| GRAPHIC ENGINEERING | 3.5 | 87.5 | 105 |

| | | | |
|----------------------------------|-----------|------------|------------|
| ENVIRONMENTAL ENGINEERING | 3.5 | 87.5 | 105 |
| GEOMORPHOLOGY | 3.5 | 87.5 | 105 |
| ENGINEERING PROJECTS | 4 | 100 | 120 |
| Total | 27 | 675 | 810 |

| GROUP III: SPECIFIC SUBJECTS TO THIS ENGINEERING (100 ECTS) | | | |
|--|---------------------|---------------------------|----------------------|
| Specific subjects | CREDITS ECTS | Student Work Hours | |
| | | Minimum Hours | Maximum Hours |
| SURVEYING | 18 | 450 | 540 |
| ADJUSTMENT | 5 | 125 | 150 |
| PHOTOGRAMMETRY AND RMOTE SENSING | 18 | 450 | 540 |
| CARTOGRAPHY | 18 | 450 | 540 |
| GIS | 7 | 175 | 210 |
| GEODESY AND ASTRONOMY | 12 | 300 | 360 |
| GEOPHYSICS | 5 | 125 | 150 |
| GNNS | 7 | 175 | 210 |
| CADASTRE AND LAND MANAGEMENT | 10 | 250 | 300 |
| Total | 100 | 2500 | 3000 |

| GROPU IV: COMPLEMENTARY SUBJECTS (7 ECTS) | | | |
|--|---------------------|---------------------------|----------------------|
| SPECIFIC SUBJECTS | CREDITS ECTS | Student Work Hours | |
| | | Minimum Hours | Maximum Hours |
| LAW | 3 | 75 | 90 |
| ECONOMY | 4 | 100 | 120 |
| Total | 7 | 175 | 210 |

If, finally, the **Final Thesis** is not included in these four years, there will be a semester (30 ECTS) to develop it.

According to the new legislation we hope to have one or several Master degrees, with or without competencies, and a PhD one.

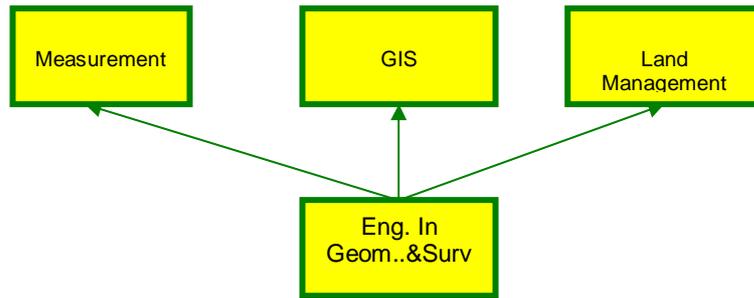
The name, after many discussions, for this new engineer is: “**Engineer in Geomatics and Surveying**”; its main value consists in not satisfying anybody.

To this new engineer have been proposed new professional competencies which should be approved by the Government. Three have been the key stones to define such a competencies:

- The competencies of the Engineers who will be replaced by the new one.
- The Professional Profiles established in the “White Book”
- The competencies that have our colleagues around Europe (CLGE) and the world (FIG definition).

What about the present Engineers in Surveying?; the Government will establish the steps to come from the old to the new situation; it is probably that most of them could get the new degree without any complementary step; law foresees the possibility of coexisting both degrees, but Universities will only teach the new one.

Consequently, the structure of the new degree will be as appears in the following diagram, where three different Master degrees have been considered although this will be decided in the future.



4. THE NEW PROFESSIONAL SITUATION

This new degree, the professional basement about which it has been built and the need of converging on our European colleagues, make us focus our profession in fields that are now very far from our activities.

Some short diagrams about our today professional fields could clarify our status:

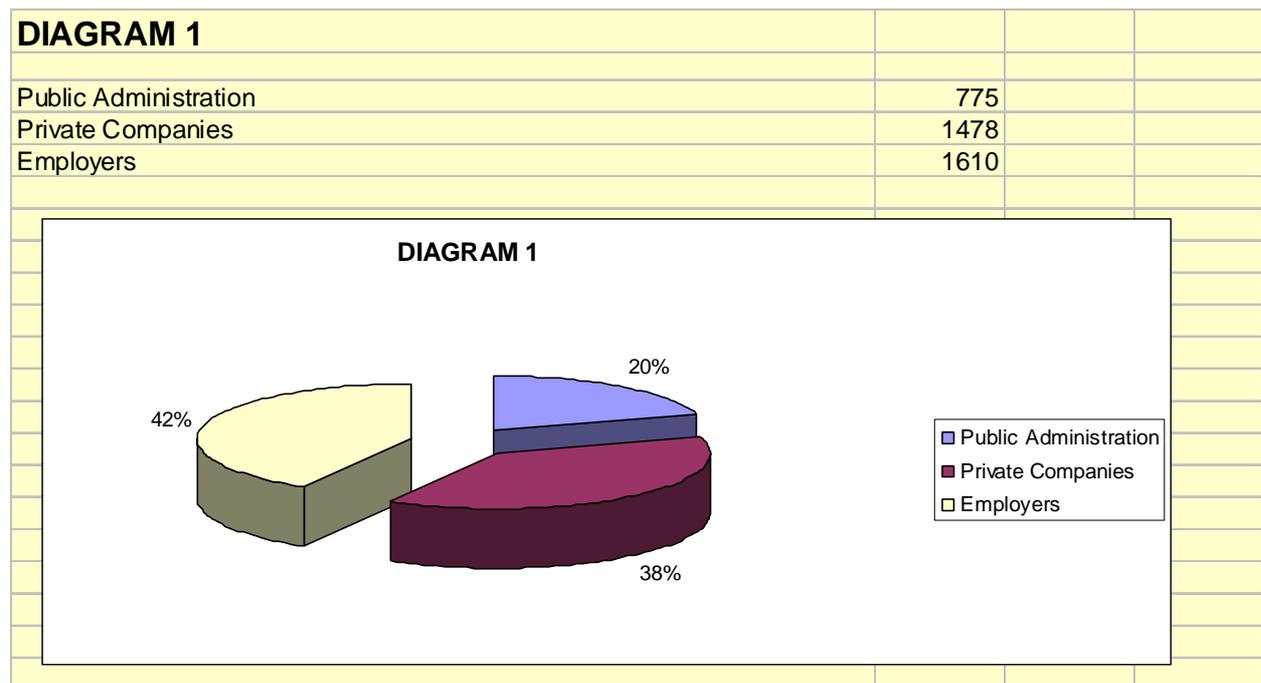
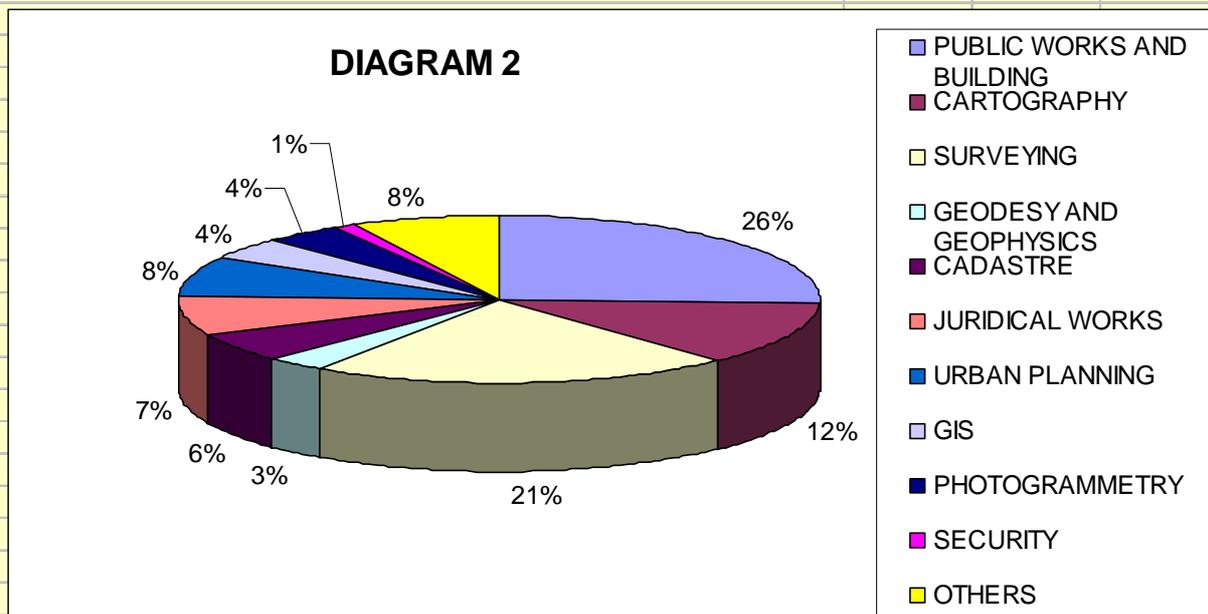


DIAGRAM 2.- PROFESSIONAL FIELDS IN SPAIN

| | |
|---------------------------|-----|
| PUBLIC WORKS AND BUILDING | 992 |
| CARTOGRAPHY | 473 |
| SURVEYING | 828 |
| GEODESY AND GEOPHYSICS | 122 |
| CADASTRE | 217 |
| JURIDICAL WORKS | 282 |
| URBAN PLANNING | 300 |
| GIS | 161 |
| PHOTOGRAMMETRY | 158 |
| SECURITY | 37 |
| OTHERS | 293 |



The idea managed by the Professional Association (Colegio de Ingenieros) is to, maintaining the present fields of activity, widen and emphasizing some of them.

So, **Property**, in its widest sense, should be the most important incoming activity of our professionals.

Cadastre was, during many years, the most important professional field; because of political decisions our role nearly disappeared in the past; it is our idea to come back and strength our presence in this so important field; for that we are now talking to politicians and the future seems to be very promising.

Urban and Rural Planning is a new field we want to incorporate to our profession, sharing, of course, with other professionals, but in the deep conviction of our need and our relevant role.

Something similar could be said about **Valuation**, where many different professionals develop their work and where we can, as well, have our own area.

Land Administration and Land Management are so deeply linked to the Surveying profession that it is very difficult to explain why, in Spain, traditionally, Surveyors have been so far of them.

The new degrees, Engineer in Geomatics and Surveying and the correspondent Masters, will give enough knowledge and capacities to our incoming professionals to occupy, with the highest success, new posts of work in these fields.

In Bratislava, past September 2004, we did a small survey among the represented countries about their most relevant fields of activity; the following diagram makes clear the situation and the enormous differences with Spain in the Property field.

| Country | | AL | | AUS | | DK | | FR | | HOL | | POL | | SWE | | SUI | | | | | | | | | | | | | | | |
|------------------------------------|------------------------------|--------------------|--|-----|--|----|--|----|--|-----|--|-----|--|-----|--|-----|--|----|--|---|--|----|--|----|--|----|--|---|--|----|--|
| | | Professional Field | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Geodesy | | 17 | | 5 | | 5 | | 5 | | 15 | | 10 | | 5 | | 10 | | | | | | | | | | | | | | | |
| Surveying | | 12 | | 5 | | 40 | | 15 | | 20 | | 20 | | 10 | | 10 | | | | | | | | | | | | | | | |
| Cartography and GIS | | 14 | | 30 | | 10 | | 12 | | 5 | | 12 | | 10 | | 5 | | | | | | | | | | | | | | | |
| Property | Cadastre | 25 | | 20 | | 25 | | 25 | | 10 | | 20 | | 20 | | 25 | | | | | | | | | | | | | | | |
| | Valuation | 11 | | 49 | | 45 | | 5 | | 45 | | 10 | | 59 | | 3 | | 50 | | 3 | | 33 | | 15 | | 55 | | 5 | | 60 | |
| | Planning and Land Management | 13 | | 25 | | 15 | | 24 | | 37 | | 10 | | 20 | | 30 | | | | | | | | | | | | | | | |
| Engineering Surveying and Building | | 8 | | 15 | | | | 9 | | 10 | | 25 | | 20 | | 15 | | | | | | | | | | | | | | | |

We know about the difficulties that will arise in our way, but we are confident in our forces and your help, when it is needed.

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